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A LOGGING ROAD IN ONTARIO

Frontispiece.

Canadian Forestry Journal.

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THE CANADIAN FORESTRY ASSOCIATION.

By the Editor.

The Canadian Forestry Association presents to its members and the public the first number of the Canadian Forestry Journal, which will be devoted to the interests of the Association and the advancement of the forestry movement generally. It has been felt for some time that a distinctive medium representing the Association was imperatively required if it was to bring its objects and work to the attention of the public in an adequate manner, and enlist popular sympathy and support. In pursuance of this object a decision was reached at the annual meeting that such a publication should be undertaken, and in fulfilment of that resolution the publishing committee now submit the first number.

As this marks an important step in the history of the Association, it may be well to take the opportunity of presenting a brief sketch of its development and the purposes of its organization. The project for the formation of the Canadian Forestry Association was initiated by Mr. E. Stewart, Dominion Superintendent of Forestry, who called a meeting of a number of persons interested in the subject at his office, on the 15th February, 1900. At that meeting it was decided to form such an Association, and on the 8th March following, the first annual meeting was held in the City of Ottawa, at which the Canadian Forestry Association was duly organized, with the following staff of officers:—Honorary President, His Excellency the Governor-General; President, Hon. Sir Henri Joly de Lotbiniere; Vice-President, Wm. Little; Secretary, E. Stewart; Assistant Secretary and Treasurer, R. H. Campbell; Board of Directors: Hiram Robinson, Thos. Southworth, Professor John Macoun, Dr. Wm. Saunders, Hon. G. W. Allan, E. W. Rathbun.

The considerations that determined the promoters of the movement to take such a step deserve recapitulation.

Canada has from the beginning of her history been noted for the extent and riches of her forests, and the lumber industry has been one of the leading branches of her manifold activities, and has developed with her growth, forming a principal contributor to the domestic and export trade of the country, giving employment to a large section of the population, developing a healthy and sturdy class of men, and adding to the wealth and prosperity of the Dominion. At the same time the revenue received by some of the provincial governments directly from the forest has been one of the largest sources of income, and has rendered a resort to direct taxation in any other form almost altogether unnecessary. The export of domestic forest products for the last fiscal year was $36,724,445. In Ontario and Quebec the usual revenue from woods and forests is from a million and a quarter to a million and a half dollars each year, and in the other provinces which control their own timber lands the revenue is steadily on the increase. In New Brunswick, during 1903, it was $196,500. In British Columbia the revenue for the present year was estimated at $250,000, and it will probably be much larger. The total value of forest products, as stated by the Census of 1901, is for the census year, $51,000,000.

European students of forestry, who have been forced by the condition of affairs on that continent to give the wood supply careful thought, have sounded a note of alarm as to the future. We quote from M. Mélard, one of the leading foresters of France:

"At the present moment the forestry situation in the world can be summed up in these words:

"*The consumption of wood is greater than the normal production of the accessible forests; there is in this production a deficit which is for the moment supplied by the destruction of the forests.*

"This situation is very grave. It merits the attention not only of foresters by profession, but of economists and statesmen. Forestry questions which to-day encounter so much indifference, are destined to take, before many years, a capital importance in the consideration of civilized people. May it not then be too late!"

"It is profoundly disquieting to ascertain that 215 million inhabitants of Europe, constituting the nations where commerce and industry have attained the greatest power, do not find enough of wood in the forests of the territories which they occupy.

"If Sweden, Finland, and Canada should supply alone the importations of all the countries requiring manufacturing wood, their normal production would not suffice, and their forest capital would be promptly dissipated."

Dr. Schlich, a leading English authority, discussing the same question, and reaching a somewhat similar result, concludes with the following statement:

"The great standby for coniferous timber will be Canada, if the Government does not lose time in introducing a rational management of her forests."

What is the actual forest situation in Canada to-day? Originally covered by an immense forest, stretching from the Atlantic to the Pacific, unbroken save where the prairie fire and the buffalo had won for themselves a place on the plains of the West, the axe and fire and the advance of settlement have so changed the face of nature that the hardwood forests have practically disappeared, and with the exception of birch and, to a less extent, maple, Canada is dependent almost wholly on outside sources for her hardwood supply. Those who have had opportunity of observation state that not more than one-third of her coniferous forests are mature timber, the remainder being brulé or small trees. In many districts fire has done its work by itself or as an accessory to the axe, with such destructive effect that large tracts, once forest-clad, are now bared to the rock or sand foundation upon which so much of the coniferous forest stands, and left useless and unproductive, efforts to convert them to agricultural purposes having proved utterly futile.

Flowing from the great forest-clad hills and mountains of the Dominion are numerous perennial streams which in their descent form water-powers of immense possibilities and value, and furnish supplies of moisture to the plains beneath, plains which, in some cases, in order to their successful cultivation, require a substantial addition to the scanty rainfall which they receive. The possibilities of electrical development and other uses of the energy furnished by these streams open immeasureable limits to Canada's industrial future. And the even flow, and in some situations, the very existence of such watercourses depends on the preservation of the forests at their sources. In Southern France, at the beginning of the last century, the slopes of the Pyrenees, the Cevennes, the Alps, were deforested and left bare to the action of the elements. The results were the transformation of even-flowing streams into rushing torrents, the erosion of the slopes into gullies and ridges, destructive land-slides, and the deposit of silt on the plains beneath to such an extent that some 8,000,000 acres of once fertile soil in twenty departments were involved in the disastrous consequences of forest destruction on 1,000,000 acres of mountain slopes. France has already spent $20,000,000 to help repair this condition and replace the forests, and it is estimated that more than $30,000,000 will have to be expended before the area which the State possesses, only some 800,000 acres, will be restored. Canada has no special dispensation from Providence, and a similar transgression of the laws of nature will inevitably bring the same results. Is there not, therefore, reason that this question should

be given the most careful consideration by all seriously interested in the future of the country?

In the older districts too severe denudation has already resulted in dangerous freshets in the spring time, and the failure of springs and streams in the summer, when their need is most felt, losses from violent windstorms have increased, and the supply of wood for fuel and domestic purposes is diminishing so rapidly that it will soon become altogether inadequate, if some measures are not taken to ensure renewal. The condition that is thus being brought about by artificial means exists naturally in the prairie districts. Here the need of wood for fuel and shelter is felt from the beginning. The direct bearing which the shelter afforded by a strip of timber has on agricultural production is clearly shown by the comparative results on sheltered and unsheltered plots recorded in 1900 at the Indian Head Experimental Farm, where the shelter meant a doubling or trebling of the yield, while on some exposed places the crops were a complete failure.

The esthetic value of trees has influence on one side of life which it is well that Canadians should not neglect. The beautifying of the home, the embellishment of the city street, the ornamentation of the park and roadside, with the graceful forms, the beautiful foliage and the grateful shade of forest trees, brings to each of these a charm and attractiveness which cannot but have an elevating effect on the national life by awakening the sense of beauty and attaching the affections of the people more strongly to the homes and haunts of their native land.

In laying down the programme of its principles, the Canadian Forestry Association kept all these questions in view. In brief, the statement of its objects is: To advocate and encourage judicious methods in dealing with our forests and woodlands; to awaken public interest to the deteriorating effects of wholesale destruction of forests; to consider and recommend the exploration, as far as practicable, of the public domain, and its division into agricultural, timber and mineral lands, with a view to devoting the public lands to the purposes for which they are best fitted; to encourage reforestation and the planting of trees on the prairies, in cities, towns and villages, and throughout the country; to collect and disseminate for the benefit of the public, reports and information bearing on the forestry problem in general.

The Forestry Association, although it is consolidating the influence of those favoring better forest management, is not the pioneer in this movement. Such a movement has been supported and advocated for many years by earnest and far-seeing citizens of the Dominion, most of whom have now identified themselves with the Association. By writings, by ad-

dresses, by petitions to the Government, they sought to bring the matter to the attention of the public, but the time was not ripe, and the public indifference did not readily yield. "The forests of Canada are inexhaustible" was the stock argument. "Forestry is a fad" was the general opinion. And if any interest was aroused, it was quickly lulled again by the absence of that pressure of necessity which is the greatest incentive to action. "The future may be allowed to look after itself."

Progress was, however, being made. A great forestry convention was held in Montreal in 1882, at which the American Forest Congress was organized. This conference was attended by large numbers from Canada and the United States, and the papers and discussions aroused much attention at the time, and while the effects were to a large extent ephemeral, still from that time may be dated the first effective efforts to deal with forest fires, and to make permanent reservations of timber lands, and these are the two special directions in which Canadian forest policy has made the greatest development.

Fire is the most serious menace to the forest, and protection from it must be at the basis of any system established. At first consideration it might seem preposterous that the vast extent of the Canadian forest could be effectively protected from fire, but when it is reflected that the fires that result from natural causes are comparatively few in number compared with those that originate through the action of man, the matter does not seem to be an utter impossibility. And that it is not so experience has already shown. The Dominion and Provincial Governments, with the exception of British Columbia and Prince Edward Island, have established special fire-ranging services, commencing with that of Ontario in 1885, and these have been effective in proportion to the thoroughness with which they have been worked out. The more that has been spent on the service the greater has been its effectiveness, and the results have been the saving of much valuable timber. The smoke from forest fires which was at one time the usual accompaniment of every summer in the cities of Eastern Canada has given place to almost complete immunity from such an unpleasant state of the atmosphere. A great deal still remains to be done in extending the system and perfecting its operations, but the principle of a fire ranging staff is justified beyond the possibility of hostile criticism. The fire-ranging system is an established and unassailable feature of Canadian forest policy. It is a form of fire insurance for the forest which is both cheap and effective. In the Province of Ontario, which spends the largest amount upon this service, the expenditure was $31,237 in 1903, and the revenue received from woods and forests was $2,307,356. Although this revenue was swollen beyond the usual proportions by bonuses

for timber limits, it may be pointed out that the large bonuses tendered were justified on the part of the purchasers largely by the immunity from fire ensured by the fire preventive service.

Timber reserves have also been established in different parts of the Dominion, partly with the object of protecting the game animals and the watersheds, but also with the purpose of providing a permanent supply of timber. These reserves, so far as they extend, and they now comprise an area of over eighteen million acres, are a concrete exemplification of the principle that lands which are unfitted for other purposes should be devoted to the growth of timber. This is a principle of first importance, for, as the forests require but little from the soil, they already exist, and can be produced on lands so rocky or sandy that nothing else of value can grow upon them. In every part of Canada, and particularly along the great Laurentian ridge, and in the mountainous districts, there are large areas bearing magnificent forests, which, bared of such covering, have no other productivity to take its place. The extent of such areas in Canada constitutes an imperative demand that the forest should be continued and reproduced.

The necessity for tree growth on the western plains was early recognized, and an effort to stimulate action in this direction was made by the adoption of the Tree Culture Claim Act, under which the holder of entry for a quarter section of land might earn title thereto by planting forty acres of forest trees. Lack of knowledge of the requisites of success resulted in almost total failure of this plan of reforesting the plains. When the Experimental Farms were established in the West in 1889, experiments in tree growing were immediately begun, and have resulted in a clearer understanding of the conditions of success and of the species which give the most satisfactory results. With the inauguration of the Dominion Forestry Branch in 1899, a still further impetus was given. A scheme for supplying the settlers with trees, to be planted and cared for under expert advice, has been worked out successfully, and gives promise of great future development.

This was the course of development the forestry policy of Canada had followed when the Canadian Forestry Association came into existence. Since that time the fire protective force has been increased, and the methods of management improved throughout the Dominion, and such a force has been established in some places where previously no effort of the kind had been made. The Forest Reserves have been enlarged and the number increased. In Ontario a plan for assisting the farming population to set out wood lots has been arranged through the medium of the Agricultural College. While the Forestry Association cannot assume all the credit for these advances, it can at least claim

that all efforts in that direction have had its support, and that it has had sufficient effect on public opinion to assist materially in making the way for such development easier. Annual meetings of the Association have been held each year, and reports of the proceedings have been published and widely distributed. The Association has, by resolution, made representations on forestry questions to different governments and other public bodies, all of which have received respectful consideration, and have had an influence on the course of forest legislation. By the editing of a forestry department in *Rod and Gun in Canada*, by public meetings and through the press, the purposes of the Association have been kept before its members and the public, and it is hoped to do this more completely through the columns of the present journal.

The Canadian Forestry Association, at the end of the fourth year of its existence, has a membership numbering nearly six hundred, including legislators, foresters, lumbermen, farmers, scientific men, and others. Its financial position is good, and in addition to the publication of the Forestry Journal, several advance steps are now under contemplation, with the object of reaching and arousing public interest more fully.

What are the possibilities of the future? In regard to this we may learn much from others.

Germany has for centuries been working out a forest administration, which from crude beginnings has developed into a highly specialized system, in which the annual returns from the forest have steadily increased both in quantity and value, although for the most part such forests are situated on poor, sandy soil, or in rough, hilly or mountainous districts. With a population of 240 persons to the square mile, Germany considers it profitable to not only keep her poor lands, at present forested, in that condition, but to increase the area of such forest lands, even by purchase. The net annual income from her 35,000,000 acres of forest land is $63,000,000.

In France a similar policy has been followed, and although the recklessness of the Revolution period interfered with its steady advancement, since 1870 no forest lands belonging to the State have been alienated, but instead the area has been increased from year to year, and improved methods of management are being developed.

Canada's system of forest administration cannot, however, be wholly the same as that of any other country, and must start on a simple basis.

Its foundation has been laid in the policy, almost universal in Canada, of keeping the forest lands under Government control, in the fire-ranging system, and in the setting apart of forest

reserves. The reserves give an opportunity for a more careful and minute study of forest conditions than is possible in the great area of the general forest, and are the first steps toward the final conquering of much that has become a wilderness, but which may yet blossom, if not as a rose, at least with a beauty and verdure and value of its own. The aim of the management must be to produce a forest of well-formed trunks, clear and clean, and the evolution of the forest by which this is reached is a question requiring careful study. Various influences affect the results beneficially or otherwise. Different species of trees have varying effects on one another. Some will grow in dense shade; some require light. For some a great deal of moisture is necessary; others prefer dry locations. Insects do their destructive work, as for instance the larch sawfly, which killed the tamarac throughout the northern forests; rot and fungi and storms all have their effect.

The problems of economy, of engineering, of transportation, of management, of scientific investigation, that a study of forest administration opens up will give scope for the best intellect that Canada can produce, and display a field for investigation, fascinating in itself and in its possibilities of practical application for the good of the country.

The educational institutions have recognized the meaning this movement has for them, and have been turning their attention to the possibility of providing the scientific training that may be necessary. Sackville University has had a course of lectures on Forestry. Queen's University, during the term of 1900, also held a similar series, and both she and the University of Toronto have been looking towards the establishment of a School of Forestry. The Ontario Agricultural College is taking active steps in its special sphere.

The forestry movement should appeal to all Canadians. Canada has been blessed by Providence with a wealth of forest. It has inwoven itself in her poetry and her history. It clothes with beauty her sterile lands, making them productive and giving healthy occupation to a happy people. In the advance of the civilization of the nineteenth century two-thirds of this forest has been swept away by fire, uselessly and needlessly. Rocky and sandy wastes have been bared and left desolate. Is this all that the intelligence of man can do? Has the twentieth century no other purpose to accomplish? Will the close of another cycle find the destruction much more surely and completely established? Or will the expiration of another hundred years find the forests clothing the rocky hills and valleys with their beautiful verdure, well-ordered, productive, abounding in wealth for the state, furnishing the needs of Canada and the regions beyond, supporting a hardy and intelligent populace, form-

ing a shelter for the wild animals and a place of pleasant resort for the people ? The accomplishment of such a purpose is well worthy the support of all patriotic citizens, of all who love their native land, and have an interest in its future. Such is the purpose which the Canadian Forestry Association has set before it as the ideal for Canada, to which it proposes to work, and for which it appeals for support.

A request was made recently to the Bureau of Forestry for the Province of Ontario for a forester to assist in the management of timber limits in Algoma, to which the only reply that could be sent was, that there was no supply to meet the demand. Such a request, however, emphasizes the fact that the need of trained foresters is beginning to be felt.

At a recent meeting of the Board of Directors of the Canadian Forestry Association, a resolution was passed expressing the opinion of the Board that in view of the annual destruction of timber in British Columbia, and the difficulty of guarding the forests from fire, it is desirable that the Bush Fires Act of that province should be amended so as to prohibit the starting of fires for the clearing of land between the first day of May and the first day of November in each year, unless a special permit for that purpose be granted by the Forest Ranger, or other officer appointed for the district in which such permission is asked.

A great deal of interest has been excited in the County of Renfrew, in Ontario, by the preparations being made for the erection of what is popularly known as a "stump factory." The object of the establishment is to utilize the red pine stumps in that district by reducing them by the action of heat in a retort, and it is expected that the chemical products and charcoal will return a good profit. Similar establishments have been in operation in Michigan for some time with satisfactory results. The farmers in the vicinity of the proposed location have great expectations of having lands cleared at a profit, thus accomplishing two purposes, as the result will be a considerable increase in the agricultural value of the lands.

CANADA AS A FIELD FOR INTELLIGENT FORESTRY.

E. Stewart, Dominion Superintendent of Forestry.

The production and proper utilization of the unoccupied forests of Canada is a matter that demands the serious consideration of theCanadian people. Very few countries possess so large an area of forest lands as Canada, and while a part of this is fit for and will be brought under cultivation for the growth of agricultural products in the future, a large proportion is unfit for this purpose, and can be more profitably left for the production of timber and to protect the game, which is also an important product of our northern regions.

Before, however, dealing with these unoccupied forests of the north, let us consider for a moment the uncleared lands of the older provinces granted by the Crown for agricultural purposes, and also those under license as timber limits.

According to the census of 1901, 34% of the total area of the farms of the five eastern provinces is still in forest. If this quantity of woodland were uniformly distributed throughout all parts of these provinces, the most exacting economic forestal demands would be met, but this is very far from being the case. In the older settlements in most cases very little woodland is left, the high average percentage being made up by the newer districts, but here too the axe and the forest fires are busy in bringing about similar conditions to those now prevailing in the old frontier countries, in some of which the country is almost denuded, and resembles in bleakness our western plains. It is a well understood fact that a certain proportion of the area of any district should be left in forest. This may vary from, say, 10% to 30%. There are some districts in the older provinces where there is not 5% left, and the result is to be seen in the disastrous spring floods followed later on in the season by droughts, where in former years, before the country was cleared up, neither the one nor the other was ever experienced. This state of affairs is becoming so common in many parts that it is high time that the municipalities should take action to encourage the farmers to leave a portion of their farms in forest by reducing or freeing such wooded areas from taxation or by other means to this end. But the farmer himself will not only be doing good to the community at large, but also best serving his own interests by allowing a certain portion of his farm to remain in forest as a wood-lot. Space will not permit me to deal with the farmer's wood-lot further than to say that there are very few farms which have not a certain percentage of land that is better adapted, and can be more

profitably used, for that purpose than for the growth of agricultural products.

Our people too frequently fail to realize the elements of reproduction and growth that are constantly going on in the forest; that though they do not require to sow, yet there is a proper time to harvest a wood crop, and that a little care in the protection of the young trees from destruction by stock or otherwise will be amply rewarded by the young trees which should take the place of those that have reached maturity, and which the owner has removed. There is another fact regarding trees very different from agricultural products, and it is this: no rotation of the forest crop is necessary. The same varieties can be grown on the same soil for an indefinite period.

A considerable percentage of our forest land lying immediately north of the present settled districts in Ontario and Quebec, but not extending beyond the northern watershed of the St. Lawrence is held under license by lumbermen and capitalists. These licensees have only the right to cut the timber of certain varieties on their limits. In former years the bush operations of the lumbermen were invariably followed a year or two after by a forest fire, that not only burnt up the dry brush that he had left on the ground, but also destroyed all the remaining standing timber, and not only that, but more frequently than otherwise the fire did not confine itself to the area cut over, but spread to other parts and often destroyed large adjoining areas of good timber. It is gratifying to know that great improvement in this respect has taken place within the past few years, and that the destruction in those districts by forest fires has greatly decreased, owing to the greater care exercised in the use of fire, and by a patrol system which cannot be too highly commended.

Another step in advance, however, is necessary, and that is with reference to the proper harvesting of the timber crop so that the same limit may continue through the increment of growth to furnish a timber crop in perpetuity. Here is a great field for intelligent work. The time has now arrived when the timber on those limits has reached such a value that no holder can afford to disregard the extensive young growth of pine not yet large enough for saw logs with which every limit abounds, and which if protected will more than repay a good rate of interest on any care that may be necessary to protect it. There is a great opportunity here for the intelligent forester. Not only is it necessary to protect the limit from fire; to cut only trees that have arrived at a state of maturity, but also to remove the useless or inferior varieties in order that the more valuable may have room to grow and that the area may be utilized to the best possible advantage.

Let us now consider the conditions of that vast stretch of unoccupied forest country lying north of what has been referred

to. It extends in an east and west direction, from ocean to ocean, a distance of about three thousand miles in length, with an average breadth of probably about five hundred miles, between the arable land on the south and the barren lands of the far north. Is there anything in connection with this great region demanding our attention? To this or almost any question regarding it an answer is difficult to give, for the reason that we know so little about it, but this very ignorance suggests one thing that should be undertaken, and that is exploration and examination in order to ascertain the value of what we there possess. Very little information of a definite character can be obtained at present even concerning its geography, no matter how diligent the enquiry, and much less concerning its resources and capabilities, while to the great majority of our people this region is a veritable "terra incognita" of which no more, perhaps less, is known than of the steppes of Asia, or the deserts of Africa, and yet it is, so to speak, Canada's wood-lot. It occupies the same relation to the arable land to the south that the rough and uncleared portions of the individual farm do to the cultivated parts of it.

I have said elsewhere that we as a people occupy the position of a farmer who has settled, cleared up and erected buildings on the front of his farm, but who has never even visited the portion outside his enclosures. What would be the course of any intelligent farmer on starting to make a home on one of our bush lots? Certainly the very first act would be to explore and thoroughly examine every part of his homestead. He would then clear up those parts best adapted for the growth of crops, and leave the less productive portions for pasture, and the roughest of all to serve his purpose as a wood-lot; and this is precisely what the nation should do with reference to its unoccupied lands. The first thing is to learn what we really possess and its character; second, to invite settlers to locate only on land which will reward them for their labour; and, third, to retain in the hands of the Government such forested land as is unfit for agriculture but is better adapted for the growth of timber than for any other purpose. The policy should be to afford the settler the means by which he may earn his living by granting him good land on which he can grow his crops, whereas to make him a gift of the natural timber outside his own homestead would be virtually giving him possession of a crop which he had no part in producing, but which was the natural product of the soil, and which it had taken a century to produce. This should be regarded as an asset of the whole country. There can be no valid reason whatever adduced to support the theory that the timber on non-agricultural lands should be given away to the individual. In the case of agricultural lands the farmer's intelligent labour is the chief factor in producing his reward, but in the case of the virgin forest he does

not produce it, but simply appropriates what nature unaided has taken perhaps a century or more to produce.

Forestry for several reasons is a subject that belongs peculiarly to the State. One reason why this is the case is the far-reaching effects which the forests have on the character of the country in modifying its climate, and in regulating its water supply, both of which affect the community at large. Another reason is owing to the length of time required for trees to attain maturity. A long period of from fifty to one hundred years or more is required for our forests to attain their greatest commercial value, so there is no inducement to the individual looking to his own immediate interest to engage in the raising of a timber crop when he knows that his earthly career will have closed long before the return for his labour can be realized; whereas the life of a nation is not measured by years only but by centuries.

We have in that great region, which is well described as our subarctic forest belt, as I have stated, a vast tract largely unfit for agriculture. Within it are many great lakes and rivers which owing to the cool temperature of the water contain fish of the best quality. The land is covered with timber, a large part of which it must be admitted, is of less commercial value than that growing farther to the south, but which is already attracting attention for the manufacture of pulp. The most widely distributed tree of that region is the spruce, white and black, which is *par excellence* the tree for that purpose. This region too is the home of a great variety of the most valuable fur-bearing animals, and it is scarcely necessary to say that their existence depends very largely on the preservation of the forest which is their home. We have also in these wilds, owing to the numerous rivers and streams with which the region abounds, and the rough and broken state of the country, rapids and waterfalls innumerable which will furnish sufficient power for all purposes and at little expense. Of its mineral wealth it is too early to speak yet, but there is little doubt that the explorer will find rich rewards for his enterprise in this virgin field. The larger lakes and rivers afford means of communication throughout almost every part of this great dstrict.

When all these conditions are duly considered, surely we have a region of country worthy of careful investigation. A moment's reflection will reveal what an important part the forest exerts over its welfare. Permit the destruction of this forest covering by fire or otherwise, and what will be the result? To say nothing of the evil effects on the climate of the fertile lands farther south that would result from the destruction of this barrier against the northern air currents, the severe winter of those high northern latitudes will be made almost intolerable by the winds that will

then blow uninterruptedly over the denuded land; the streams bereft of the present natural reservoirs which the forest covering at their sources affords, will then be torrents in the spring time, and dry during the summer and winter months, causing destruction to the fish and to navigation; the fur-bearing animals and other game will practically disappear, and instead of having a land with many possibilities, we will have an arctic desert.

Fortunately the land in this great region is practically all in the possession of the Crown, so that little difficulty stands in the way of conservative forestry there. From what has been said it is evident that there is a great field for intelligent forestry in Canada, which it should be the aim of the people and of the Governments, both Federal and Provincial, to have put in practice with as little delay as possible.

Dr. A. Harold Unwin, formerly of the Dominion Forestry Branch, but now of the Imperial Forest Service, writes from West Africa that he has started work in the Western Division by inspecting concessions, i.e., timber limits that are being worked, and also rubber tree plantations that are already set out. This year two hundred new plantations are being worked, scattered over a tract of country about one hundred miles square, and as the inspection has to be made on foot, it takes some time to see the district.

The concessions cause a great deal of supervision, as no concessionaire may cut any tree under twelve feet in girth at ten feet from the ground, and must plant twenty mahogany seedlings for every large tree he cuts, and must also preserve any young mahogany growth he may find. The latter operations are directed by the forest service. There are twenty-eight foresters, all natives, for the work in the Western Division. In the Central Division there are six foresters. The latter division includes mainly rubber plantations, though there is splendid timber at some distance from the railroad.

The appropriation for the service is $50,000, and gives ample for everything except the extension of the plantations. The revenue of the colony is good, and increasing, so that it is expected there will be a larger appropriation in the near future.

The foresters also have charge of the game in the districts, which consists of several herds of wild elephants, quite a responsibility to undertake.

There is no pine in the country, but the question of introducing Long Leaf Pine is being considered. It will grow well, and the imported timber stands the climates, ants, &c., splendidly.

FOREST INFLUENCES.

Professor J. B. Reynolds, Ontario Agricultural College.

At the present time much is being said and written concerning the forest. Forestry problems include a consideration of forest management, of the forest as a resource, and of the forest as a condition. The last question, the forest as a condition, comprises the subject of this paper, and upon this subject I shall try to present the best information available.

Dr. Fernow states this question topically, as follows:

The forest exerts an influence

I. Upon the climatic condition within its own limits and beyond.

II. Upon the distribution and character of the waterflow.

III. Upon the mechanical condition and erosion of the soil under its cover.

I. The climatic influence of the forest is, conjecturally, fourfold: (1) Upon the temperature of the air and of the soil; (2) upon winds and storms; (3) upon evaporation and the humidity of the air; (4) upon the precipitation—rain and snow. I say conjecturally, for the influence of the forest upon precipitation is by no means established, or generally admitted.

Control of Temperature by the Forest.

The forest exerts its influence upon temperature by reason, principally, of the tree-crowns. These shade the ground and prevent the heat of the mid-day sun from having its full effect; conversely, the same crowns check the radiation of heat from the forest soil and air at night and in winter. Thus, the maximum temperatures within the forest are lower than those in the open, while the minimum temperatures are somewhat higher. In summer, the lowering of the maximum is much greater than the raising of the minimum. In winter the extremes are about equally reduced. Hence, the net effect of the forest in summer is, to lower the mean temperature of the forest air; and in winter, this cooling effect almost or entirely disappears. The net annual result is to cool the air—the mean annual temperature within the forest being lower than that in the open; and to moderate it, the extremes of high and low, both daily and annual, being reduced. The moderating effect of the forest is much greater than its cool-

ing effect. The amount of influence thus exerted depends, of course, upon the character and the closeness of the tree-crowns, —a thick stand of forest having a greater quantitative effect, in the direction indicated, than a thin stand; while an evergreen forest has less effect in summer, and greater effect in winter, than a deciduous forest.

Control of Winds and Storms by the Forest.

One of the most important influences of the forest is due to its action as a wind-break. On its windward side, the effect of the forest is slight. But on the leeward side, the checking of the velocity of winds results in partial or complete stagnation of the air, with the phenomena attendant upon stagnation, namely, increased humidity of the air, decreased evaporation from the ground and from plants, higher temperature during the day, and lower temperature at night. Hence the effect of the windbreak is occasionally injurious, in favoring night frosts. But this is only occasional. The ratio between the *width of the area protected* and the height of the windbreak, has been variously stated by different observers, but a moderate estimate is, that for every foot of height of the windbreak, an area of ten feet in width is protected. Thus a belt of trees 30 feet high will protect from cold, drying winds, objects on its leeward side at a distance of 300 feet back from the belt.

Protection from lightning is, in all probability, afforded to buildings by single trees, to a greater extent by clumps and belts of trees, and it is equally probable that extensive forests, while they may increase the frequency, reduce the intensity and destructiveness of thunderstorms over their own areas and beyond.

Influence of the Forest on Evaporation and Humidity.

In the forest, evaporation from three sources is to be considered: (1) Evaporation from the soil; (2) transpiration from the leaves: (3) evaporation from rainfall intercepted by the leaves, branches and trunks of trees. German experimenters have established for these quantities the following values: As compared with the amount evaporated from a free water surface in the open (1) the evaporation from soil under forest litter and within the forest, is 13 per cent; (2) transpiration from the leaves, 77 per cent; (3) evaporation of intercepted rainfall, 61 per cent; total, 151 per cent. On the same basis of comparison, the amount of moisture added to the air over cereals on the average is 173 per cent; over sod, 192 per cent; over bare soil, 60 per cent.

The forest, therefore, is more conservative of moisture than sod or cereal crops, but returns to the air 2½ times as much moisture as does the bare soil.

TREES AND SHRUBS AT EXPERIMENTAL FARMS.
Brandon and Indian Head.

EXPERIMENTAL FARM AT INDIAN HEAD.

(1) Row of Poplars. (2) Balm of Gilead. (3) Manitoba Maple (4) American Elm

The absolute amount of water-vapor in forest air is very slightly greater than that in the open, and on account of the lower temperature of forest air, its relative humidity is generally higher than that of air in the open.

The Influence of Forests upon Precipitation.

It has been generally stated by those anxious to emphasize the deleterious effects of deforestation, that the wholesale destruction of the forests has resulted in decreased rainfall over the deforested areas. This may be the case, but positive proof is lacking. It seems probable that the rainfall over certain parts of Ontario has decreased within the last 25 years. But whether this is a consequence of the clearing of the land, or merely a result of those changes of climate that occur over large cycles of time, who can say? There is no component of the climate that is more variable and uncertain than the rainfall. An experimental inquiry into the relation between the forest and rainfall is, from the very nature of the problem, exceedingly difficult. To conduct such an inquiry, all factors, other than the forest, that can cause a difference in the observed rainfall, must be eliminated, and the experiment must cover a long series of years. Many such attempts have been made, with conflicting results. Experimentally the question is still undecided, but the concensus of opinion is that the forest has little or no influence on the amount of rainfall.

The question may be examined theoretically with some interest. Rainfall is the consequence of evaporation of moisture from the earth's surface, with subsequent condensation of vapor caused by cooling of the air containing it. Where there is no evaporation there can be no rainfall, unless vapor is carried over from some other area. Deserts are rainless because there is no evaporation there, and because the air above desert regions is too hot and dry to allow of cooling and condensation of vapor that may be carried over them; also these areas are usually so situated that vapor-bearing winds do not reach them.

Rainfall over any locality may be increased either by an increase of evaporation from the area in question, and a subsequent condensation and fall over this area, or by an attraction exercised upon large air movements whereby clouds and vapor-laden winds are diverted to the locality and precipitate rain there upon.

Of the various causes of rainfall, the principal is the upward movement of moisture-laden air and the cooling by expansion as the ascending air reaches levels of less and still less pressure. This upward movement may be part of a great cyclonic movement, covering hundreds of miles in horizontal extent, such as

one of our winter storms; or it may be part of a merely local air-movement, such as our summer showers usually are; or it may consist of a forced movement up the slope of a mountain-side. The question is, to what extent may the forest modify any or all of these movements, so as to affect rainfall?

First, as to the cyclonic movement, even if evaporation is increased over a forested area, the vapor is carried possibly hundreds of miles by the great horizontal movements of air in this class of storms; hence, increased evaporation over a forest does not increase the rainfall. Next, can the forest induce atmospheric conditions that will divert the storm-path? Theoretically, this seems impossible for great cyclonic areas, and doubtful even for local storms.

Secondly, as to storms of local origin, such as the thunderstorms, vapor formed from any region may be deposited again over that region. Hence, if evaporation is increased by the forest, it seems likely that rainfall also in the summer time, when local storms abound, may be increased. Referring now to the table of evaporation given above, we may see that evaporation from a forested region is less than that from sod or cereals, but more than that from bare soil. The substitution by the farmer of grass, root, and cereal crops for the forest in Ontario, would, therefore, tend to increase evaporation from the cultivated areas, and thus whatever effect the forest may have upon local rainfalls would be intensified by deforestation and cultivation.

As it does not appear probable that the forest on a mountain side can intensify the effect of the mountain in causing rainfall, we are forced to the theoretical conclusion that the effect of the forest in increasing rainfall can be but slight, and is probably in most regions nil. This theoretical conclusion is, on the whole, supported by such experimental data as have been obtained by the various investigators.

II. We come now to the consideration of the influence of the forest upon the distribution of the water-flow.

The forest controls the distribution of the water (precipitation) that reaches it, in the following ways:

(1) By intercepting part of the rainfall.

(2) By diminishing evaporation, within its own borders and beyond.

(3) By transpiring large quantities of water, and thus diminishing the water-content of the soil.

(4) By the influence of the forest-litter, (*a*) absorbing part of the precipitation, (*b*) offering a mechanical obstruction to surface flow and thus preventing run-off, (*c*) protecting the surface

soil from the beating of heavy rains; and thus keeping it in a more loose and receptive condition.

(5) By the shade and by its control of the winds it holds the snow cover until late in the spring, thus giving opportunity for the water to penetrate the ground slowly instead of running off in floods.

Of these factors 1, 3 and 4 (*a*) tend to diminish the amount of water in the soil, and thus to lower the water-table. The other factors tend to increase the water supply relatively, and to raise the water-table.

(1) The amount of rainfall intercepted has been variously stated by different experimenters. Of course, a light shower is almost entirely intercepted by the tree-crowns of a dense forest, and given back to the air immediately as vapor; while the greater part of a heavy or long continued rain must reach the ground. On the average from 10 to 20 per cent of the total rainfall is intercepted. This amount is, of course, a direct loss to the forest soil.

(2) As has been already stated, the wind-breaking power of the forest is one of its most important influences. The cold, dry winds of winter, sweeping unchecked over the vast treeless plains of the North-West make it exceedingly difficult to rear fruit trees. Still more destructive to tree life is the warm, dry wind known as the Chinook. The Chinook, in Northern America, has been known to consume entirely in twelve hours a snow cover of 2½ feet deep, and to raise the temperature 57 degrees in 24 hours, while the humidity fell in the same time from 100 to 21 per cent. It is probable that the treeless state of the North-West is the result of these sudden and extreme changes of temperature and humidity. If a forest could be interposed in the path of the Chinook, its well-known action in checking the velocity of the wind, and in preventing extremes of temperature and humidity, would result in self-preservation. At any rate, the beneficial effects of shelter belts, clumps of trees, or wooded areas, upon orchards and crops that lie to the leeward is unquestioned. The high winds are checked, and the fruit trees are not subjected to winter drought. The snow is allowed to lie evenly, and to remain longer. The general effect, summer and winter, of the forest in reducing evaporation is most beneficial. An Illinois farmer sums up his observation upon this matter thus: "My experience is that now, in cold and stormy winters, wheat protected by timber belts yields full crops, while fields not protected yield only one-third of a crop. Twenty-five or thirty years ago we never had any wheat killed by winter frosts, and every year a full crop of peaches, which is now rare. At that time we had plenty of timber around our fields and orchards, now cleared away."

To mention the influence of the forest-litter (4), and the holding of the snow cover (5), suggests the third topic of my article.

III. *The influence of the forest upon the mechanical condition and the erosion of the soil under its cover*, is due simply to the impedance offered to the fall of water by the forest litter. A heavy rain falling unimpeded upon bare clay soil, almost invariably packs it, puddles it, and injures its texture, its capacity to convey water. Upon lighter soil the effect of the rainfall is less injurious, but is always in the direction of compacting. The forest litter, by breaking the force of the rain-drops, allows the soil to remain open and friable. The tree roots also, penetrating the soil, form channels for the entrance of water. Then, on sloping ground and on hillsides, the loose litter retards the run-off, and allows the water more time to percolate the soil. Thus, the rainfall is encouraged to become ground water, which, from the resistance offered by the compact subsoil, flows slowly down to lower levels, and supplies springs and streams perennially. In the forest, with its litter removed, the rainfall and the melted snow, instead of becoming seepage water, largely run off the surface, denuding the hillsides of serviceable soil, and stripping them to the bare rock; while the rapid rush of surface water occasions destructive freshets. Later in the season springs and streams dry up.

Mr. J. W. Toumey, of the Washington Bureau of Forestry, writes in the Year-book for 1903 on "The Relation of Forests to Stream Flow." The following is a quotation from that article: "In a careful study of the behavior of the stream flow on several catchment areas in the San Bernardino Mountains, it has been found that the effect of the forest in decreasing surface flow on small catchment basins is enormous, as shown in the following tables, where three well-timbered areas are compared with a non-timbered one:—

PRECIPITATION AND RUN-OFF DURING DECEMBER, 1903.

Area of Catchment basin.	Condition as to Cover.	Precipitation.	Run-off per square mile.	Run-off percentage of precipitation.
Sq. miles.		Inches.	Acre-ft.*	Per cent.
0.70	Forested....	19	36	3
1.05	do	19	73	6
1.47	do	19	70	6
0.53	Non-forested	13	312	40

At the beginning of the rainy season, in early December, the soil on all four of these basins was very dry as a result of the long dry season. The accumulation of litter, duff, humus, and soil

*640 acre-feet equal 12 inches of precipitation over a square mile.

on the forest-covered catchment areas absorbed 95 per cent of the unusually large precipitation. On the non-forested area only 60 per cent of the precipitation was absorbed, although the rainfall was much less.

RAIN-FALL AND RUN-OFF DURING JANUARY, FEBRUARY AND MARCH, 1900.

Area of Catchment basin.	Condition as to Cover.	Precipitation.	Run-off per square mile.	Run-off percentage of precipitation.
Sq. miles.		Inches.	Acre-ft.*	Per cent.
0.70	Forested....	24	452	35
1.05	do	24	428	33
1.47	do	24	557	43
0.53	Non-forested	16	828	95

The most striking feature of this table as compared with the previous one is uniformly the large run-off as compared with the rainfall. This clearly shows the enormous amount of water taken up by a dry soil, either forested or non-forested, as compared with one already filled to saturation. During the three months here noted, on the forested basins about *three-eighths* of the rain-fall appeared in the run-off, while on the non-forested areas *nineteen-twentieths* appeared in the run-off.

RAPIDITY OF DECREASE IN RUN-OFF AFTER THE CLOSE OF THE RAINY SEASON.

Area of Catchment basin.	Condition as to Cover.	Precipitation.	April run-off per sq. mile.	May run-off per sq. mile.	June run-off per sq. mile.
Sq. miles.		Inches.	Acre-ft.	Acre-ft.	Acre-ft.
0.70	Forested....	1.6	153—	66—	25—
1.05	do .. .	1.6	146—	70—	30—
1.47	do ...	1.6	166	74	30
.53	Non-forested	1.	56	2—	0

The above table clearly shows the importance of forests in sustaining the flow of mountain streams. The three forested catchment areas, which, during December, experienced a run-off of but 5 per cent of the heavy precipitation for that month, and which during January, February and March of the following year had a run-off of approximately 37 per cent of the total precipitation, experienced a well-sustained stream flow three months after the close of the rainy season. The non-forested catchment area, which, during December, experienced a run-off of 40 per cent of the rainfall, and which during the three following months

*640 acre-feet equal 12 inches of precipitation over a square mile.

had a run-off of 95 per cent of the precipitation, experienced a run-off in April (per square mile) of less than one-third of that from the forested catchment areas, and in June the flow from the non-forested area had ceased altogether."

This has been the universal accompaniment of deforestation in Ontario and elsewhere. For the Ontario farmer this last consideration is of great practical importance. The question of preserving or renewing forests on a large scale is not for him. That is a State affair. But the denuding of local hillsides and watersheds can yet, in many sections, be stayed, or, if denuded, they may, without excessive labor and expense, be replanted, and the evils of wholesale removal of the forest, to some extent, mitigated.

The Secretary has received several requests for copies of the First Annual Report of the Canadian Forestry Association, which it has been impossible to comply with, as the supply has been exhausted. If any members of the Association or others have spare copies the Secretary will be glad to be informed. No charge has been made for any of the reports of the Association when issued, but no doubt those who are anxious to obtain copies of the first issue would be prepared to do so even if it should be necessary to make some return to the present holders.

There has been considerable excitement in Toronto recently in regard to the removal of shade trees from the streets. Whether the agitation is well directed or not may be a question, for sometimes the removal or replacing of trees is a necessity, considering it only from the point of view of the trees themselves. The form of butchery which passes for improvement in some civic administrations, and which is perpetrated by persons without even a rudimentary idea of proper cutting or pruning of trees, cannot, however, be too severely condemned, and there is great room for improvement in this respect in Canadian cities and towns.

A GLANCE AT FOREST CONDITIONS IN NEW BRUNSWICK.

G. U. Hay, D.Sc., St. John, N.B.

Two years ago, while camping out near Kedron Lake, in the south-west part of New Brunswick, I came upon the remains of a magnificent white pine, lying prostrate in the woods. From this a section had been cut off close to the butt, the diameter of which was nearly three and a half feet. The length of the piece cut off and carried away, perhaps for exhibition purposes, was a little less than five feet. The remainder of the tree, a fine bole, straight as an arrow, and nearly one hundred feet in length, was left to rot in the woods. It had evidently been felled not many years before, since the cut end was not greatly weathered, and there were traces of still unhealed wounds left on the smaller trees that had been caught in the death of this monarch of the forest as it crashed to earth.

The commercial value of this huge trunk, had it been manufactured into lumber while it was sound, could not, at the lowest estimate, be less than one hundred dollars, even though there were great difficulties in transporting it from the forest where it lay.

I recall the sight of another huge pine trunk in a secluded part of the forest in Northern New Brunswick. A single log had been taken from the fallen tree, which, covered with moss, had sunk half its thickness into the loose forest mould. It had lain there probably fifty or more years.

One is loath to believe that a lapse of fifty years has brought about no better sentiment in regard to forest preservation or the repression of individual acts of waste and vandalism.

If in the first instance quoted above the section of pine was used to exhibit the size of our trees and demonstrate our forest wealth, would not companion pictures of a huge moss-covered pine trunk rotting in the forest, or a picture of what may be seen everywhere in New Brunswick, decaying pine stumps of large size, about the only evidence now of its former existence as a timber tree, be just as appropriate to our needs—and far more useful—showing the wasteful lumbering that has been done in the past, and the necessity of an education of a practical and helpful character to teach people to respect trees and appreciate their value.

There is another picture, so common that it may be only briefly alluded to here, and that is of the destruction caused by

forest fires. There is scarcely a mountain or hill in New Brunswick from whose top one may not look down upon some scene of desolation where the ravages of fire are only too evident. And what is true of New Brunswick is true of the other provinces of Canada. Fortunately a bountiful Nature soon clothes these blackened wastes with fresh foliage. But the best parts of the forest are gone; and with them often the accumulation of leaf mould, the product of successive centuries of growth and decay.

The white pine as a timber tree has almost totally disappeared from our forests. The only large grove of red pine that I know of is the one found on a ridge or moraine extending into the great Nepisiguit Lake. The butternut or white walnut is becoming so scarce that it is now almost impossible to be obtained at any price. The same is true of the basswood. Thousands of noble hemlocks have been sacrificed for their bark. Large timber trees of the black spruce, which has been New Brunswick's greatest source of forest wealth, are becoming scarce, and the lumber operators of the present day are clearing out large portions of what remains, and pulp-mills may soon make havoc of the young growth.

Of the species of forest trees in New Brunswick, upwards of forty in number, the above include, with a few others, such as white spruce, cedar, hacmatack, the chief commercial products used for manufactures and export. The scarcity, with the consequent higher price of these staples, has brought into use others of less value, such as the hemlock, hitherto regarded only for its bark; even the "almost useless" poplar is found to be serviceable. Many of our hardwood trees, so called, of which New Brunswick has many fine forests, have yet been untouched with the exception of birches, and are destined as their uses become better known, to constitute a great source of wealth to the province. Furniture made from yellow birch is little inferior to walnut. Rock maple, beech, elm and other hardwoods are also greatly prized for furnishings and other purposes.

A few days since I passed along a road that I had not seen since a child. Then there were some trees of generous size mingled with smaller growth that gave a pleasant shade. Now the whole character of the road seemed changed. There were a few hollow, fire-eaten trunks where once stood noble trees. Blackened stumps lined the road-sides, hidden at intervals by a struggling tangled growth of poplar, birch and spruce. And yet there are fine farms here and there, with well cultivated meadows and a few houses—very few—with shade trees around them. But continued "choppings" and fires had made bare the uplands and bereft them of all semblance to beauty or utility. Tree weeds and blackened stumps are poor substitutes for fine trees along a roadside.

The above are a few of the many instances which might be adduced to show that man has exhibited a woeful lack of intelligence and judgment in destroying the woods which were so abundant when the country was discovered. In a comparatively few years he has wasted with a lavish prodigality Nature's slow production of hundreds of years. If great forests of useful and beautiful trees had been rare in this country they would have been husbanded with a care and forethought commensurate with their value; but because they have been so abundant and easy to convert into money, they have been destroyed with such an ignorance of Nature's processes, and with such a disregard of the rights of future generations, that the results are lamentable. and little short of calamitous. Forests that should have been kept intact by a wise system of cutting out the larger growths and allowing the smaller ones to mature, have been depleted of everything that would do for timber, while the refuse, strewn everywhere, has fed the fires and doomed many a fine forest region to destruction.

There are a few forests left intact in the depths of the New Brunswick wilderness where lumbermen have not yet penetrated and which are yet unmarked by the dismal tokens of the fire scourge. A few of these it has been my good fortune to visit—near the headwaters of the numerous branches of the Tobique. What a delight it was to wander through these great natural parks, chiefly of hard or mixed woods, through which one might drive a team, and to look upon the perfectly rounded boles of birches, spruces, elms, beeches, and occasional pines, their tops reaching to the height of from seventy to one hundred feet.

Mingled with my feeling of admiration was one of regret that in this beautiful province of New Brunswick, once so nobly endowed in its luxuriance of forest wealth, which might have increased under wise management with successive generations, trees had been destroyed where they should have been cultivated. Our forefathers in the settlement of the country did much for which it is presumed we are sufficiently grateful; but would that they had left undone some things which were done! Forest destruction, however, was a part of the first settlers' work, and a necessary beginning to civilization.

But among the early settlers there were many who spared some of the forest trees and found comfort in their beauty and shade. They did not begrudge a few feet of soil to the rightful owners, nor treat the trees as enemies or encumbrances, to be rooted out and destroyed. Many of the noble elms that adorn the broad intervals of the St. John, Kennebecasis, and other rivers, show the wisdom and sense of beauty that distinguished the early settlers of these regions. The magnificent grove of red and white pines, on the grounds of Judge Wilkinson, on the south

side of the Miramichi, between Chatham and Newcastle, the only easily accessible place, perhaps, in New Brunswick where a large grove of these fine trees may be seen, is a good evidence—and many others might be shown—that the old settlers loved trees, and spared them for adornment and shade near their dwellings.

Though we may regret the wastefulness and improvidence of former generations, the present duty is to preserve the remnants of our woodlands, to create a sentiment in favor of trees, and to protect and cultivate them in large forest areas, not only for purposes of lumber, but to husband the water supply of the country, maintain and increase its area of fertile soil, and reclaim by reforesting, wherever practicable, the fire-swept wastes. Nature cannot be looked to to restore our forests as they were. Man must give his intelligent assistance; and it would seem to be wisdom to begin now, when the demand for wood products is greater than it has ever been in the history of the world, and when the market value of these products is constantly on the increase.

The first step naturally is to exercise a close supervision on our forests as they are, to restrain the output of lumber by judicious cutting, to leave standing all trees not up to a standard size, to get rid of undesirable trees, and the undergrowth that interferes with the admission of light, and to protect the forest from the danger of fire by removing all brush and refuse. The latter is obviously so important a preventive measure that some lumbermen—not by any means all—attend to this as a matter of wise economy, and their care is rewarded by greater exemption from fires, although, as in the case of a farmer freeing his fields from weeds, he is not safe unless his neighbors follow his example. The forest region on the Little Tobique River, New Brunswick, lumbered by Mr. G. F. Hale, is one that is kept in good condition, and there may be others which have not come under the writer's observation.

The regeneration of our forests cannot of course be expected from lumbermen, whose object it is to cull out the marketable trees without regard to the improvement or protection of the young growth. In individual cases such as that cited above, a lumber operator, after years of cutting, may leave his forest depleted of all the largest trees, but in such a condition under his intelligent management that it will prove a valuable asset to the country. How desirable a condition of things! But such ideal conditions may be realized if the forester is called in to the aid of the lumberman, if a rigid system of supervision is instituted by Government, and if education in forestry becomes a part of our general system of instruction. Plants, trees and other outdoor things interest all healthy children; and in our Nature-Study course, if the study of trees could be made prominent, and em-

brace a more intimate and intelligent knowledge of their habits and uses, and how to take care of them, it would lay a good foundation for future study. Such instruction can only be effective by a close acquaintance with the trees themselves, and by making the groves temples of instruction as they once were.

It is generally conceded that the study of forestry as a science belongs to the university or college, and not to the secondary schools. In the University of New Brunswick which is supported by the Government, there is a fine opportunity to establish a department of forestry, of which advantage might be taken by students from the other eastern provinces of Canada. The situation of the University at Fredericton, not far from the extensive forests, and near some of the greatest lumber industries of the province, is an ideal situation for a school of forestry. The improvement of practical courses in science, kindred to forestry, which has recently taken place in the University, renders it comparatively easy to establish a course in that subject, and thus materially advance the greatest industrial interest of the province. Clearly it is the duty of the Government to take this step.

It is now four years since Professor W. F. Ganong proposed a plan of reserving a section of forest about the Nictor and Nepisiguit Lakes for a provincial park, which incidentally should serve as a resort for the people, but where the best methods of lumbering might be tested and a practical study of forestry problems be made. Although the Government signified its approval of the scheme, no practical steps have since been taken to carry it into effect. The establishment of a department of forestry at the University would open a new avenue to activity for the young men of the province; the setting apart of a reserve forest which could easily be reached from Fredericton by the extension of the Tobique Valley Railway, would serve as a practical school for students, and open a new era in our lumber industry.

THE FOREST RESOURCES OF THE LABRADOR PENINSULA.

A. H. D. Ross, M.A., Yale Forest School.

The Labrador Peninsula has an approximate area of 560,000 square miles—two and a third times that of the Province of Ontario, or 65% of that part of the United States lying east of the Mississippi River. The interior of this vast territory has always been beyond the line of accurate knowledge, and previous to the explorations of Mr. A. P. Low, B.Ap.Sc., of the Geological Survey of Canada, not one-tenth of it had ever been properly mapped.

In 1892 it was my good fortune to accompany Mr. Low, as botanist and assistant surveyor, in his exploration of the East Main River, which rises near the centre of the peninsula and flows west into James Bay. In four months we journeyed more than thirteen hundred miles in canoes, and did 368 miles of geological and micrometer survey work.

The peninsula is roughly pentagonal in form, being bounded on the south by the Saguenay, Chamouchuan, Waswanipi and Nottoway Rivers; on the west by James Bay and Hudson Bay; on the north by Hudson Strait; on the north-east by the Atlantic Ocean; and on the south-east by the St. Lawrence. The size of this immense peninsula may be judged from the fact that the air line distance between Cape Wolstenholme at the extreme mouth of the Saguenay River is 1,040 miles, whilst Belle Isle is a trifle over a thousand miles from the mouth of the Nottoway River. From the mouth of the Nottoway to Ungava Bay is as far as from Ottawa to Port Arthur; and from Ungava Bay to the nearest point on the St. Lawrence is as far as from Ottawa to Halifax.

In 1893 Mr. Low and his assistants explored the Kaniapiskau and Koksoak Rivers flowing north into Ungava Bay; in 1894, the Hamilton River, flowing east into Hamilton Inlet; in 1895, the Manikuegan River, from Summit Lake southward to the St. Lawrence; and in 1896, the line was carried across from Richmond Gulf to Ungava Bay by way of the Clearwater, Stillwater, Larch and Koksoak Rivers. Mr. Low's reports upon the geology, climate, fauna and flora of the regions traversed show that the peninsula is not by any means the barren, worthless country it was once supposed to be. Its resources in the way of minerals, timber and fish are simply enormous, and if properly protected from exploitation will be a source of great wealth to the nation. This explains why the Province of Quebec lost no time in having its

northern boundary extended to the East Main and Hamilton Rivers, thereby acquiring an additional strip of territory 250 miles in width at its western extremity, and including the whole of Lake Mistassini, the Rupert River, the Nottoway River and surrounding country. The province now has an area of 351,873 square miles, and ranks next to British Columbia with 372,630 square miles. The name Labrador is now restricted to a twenty-mile strip along the north-east coast, and all the rest (ahout 350,-000 square miles) of this immense territory is known as the District of Ungava.

The whole peninsula may be described as a high rolling plateau, underlain by glaciated Archæan rocks, and dotted with myriads of lakes and rivers, occupying nearly a quarter of the total area, and forming such a perfect network that with a knowledge of the country, it is possible to travel with canoes in almost any direction, The striæ and other glacial phenomena show that during the ice age the peninsula was completely covered with an immense sheet of ice, whose greatest thickness was midway between the headwaters of the East Main and Hamilton Rivers. From this central gathering ground the ice moved outward in all directions, gouging out rocky basins, and ploughing long shallow grooves between the low rocky ridges. Most of the smaller lakes have been formed by the deposition of glacial till in these grooves, and from the top of a ridge I once counted forty-six lakes lying all around me. The only portion of the peninsula not thickly dotted with lakes is the low country covered with marine sands and clays along the east coast of James Bay. Fully nine-tenths of the peninsula is underlain by medium to coarse-textured hornblende-granite-gneiss of different ages, and varying in color from red to light grey, a pinkish variety being very abundant. The average level of the interior is less than 2,500 feet, and over an area of 200,000 square miles does not vary more than three or four hundred feet. Towards James Bay there is a gentle slope, but along the Atlantic slope the level rises abruptly inland, and the coast is deeply cut by many narrow bays or fiords. Throughout the interior the ridges of low rounded hills seldom rise more than 500 feet above the general level of the surrounding country. Most of the large rivers have cut deep into the general level of the plateau, and their channels must be of very ancient origin. The rivers of the southern watershed seldom exceed 300 miles in length, and flow into the St. Lawrence. Several large rivers carry the waters of the western drainage area down to James Bay and Hudson Bay. The Koksoak and its tributaries carry the waters of the northern drainage area (nearly 60,000 square miles) down to Ungava Bay. On the eastern watershed, three large rivers flow into Lake Melville, at the head of Hamilton Inlet. The lakes and rivers interlock so closely that the longest

portages never exceed two or three miles. The lakes vary in size from small ponds to great sheets of water hundreds of square miles in extent, the twelve largest being Mistassinni, Michikamau, Kaniapiskau, Minto, Clearwater, Attikonak, Apiskigamish, Ashuanipi, Mistassinis, Nichikun, Manuan and Pletipe.

The large lakes and most of the rivers of the interior contain an almost inexhaustible supply of food fishes of large size and superior quality. White fish averaging four pounds and running as high as fourteen pounds, are abundant; lake trout averaging eight pounds and up to forty pounds are plentiful; brook trout from one to seven pounds occur in many of the rivers; pike from two to fifteen pounds abound in the quiet flowing streams of the southern, eastern and western watersheds; pickerel and chub occur in many of the smaller streams; ling from two to fourteen pounds are common in all the deep lakes of the interior, and are an important source of food for the Indians; suckers are the principal food of the Indians of many parts of the interior; a species of sturgeon is taken in great quantities half way down the Rupert River; and Atlantic salmon ascend many of the rivers in great numbers. When access is had to them by rail, these fisheries will become immensely valuable.

Most of the soil being derived from the underlying Archæan rocks is a mixture of sand, clay and boulders of various sizes. Along the river valleys it has been greatly improved by the rearrangement of the till and an admixture of sediments. In the vicinity of Cambrian limestones and shales, it is of a heavier nature and better suited for the growth of timber. With the exception of the higher hills and ridges, the forest is continuous over the southern part of the peninsula, as far north as the fifty-fourth parallel. About latitude fifty-five only half the country is timbered. As we go north the trees become smaller, and about latitude fifty-eight they disappear altogether.

The forest is almost entirely coniferous, and is of the regular northern type, consisting principally of spruce, larch, balsam fir, scrub pine, poplar, and birch. The latitude, height above sea-level, distance from sea-coast, topography of the district and character of the soil, all play an important part in the distribution of each species.

The black spruce, (*Picea nigra*, Link) forms about ninety per cent of the forest, and grows freely, either in cold sphagum swamps or on high hills covered with sand or heavy glacial drift. As a rule it occurs in dense thickets, with long naked stems, and on the southern watershed these thickets are so dense that the trees seldom reach a large size. Northward the stands are not so dense, and the stout trunks are often clothed to the ground with branches. In all cases the branches have a characteristic droop which enables one to recognize the tree almost as far as he

can see it. In dense stands the lower branches are generally festooned with "bearded moss" (*Usnea barbata*) which gives the forest a most weird appearance. The wood is light and soft but not strong. It is fairly stiff, however, and is used for masts, spars and various small articles where a stiff wood is required. In color it is a pale yellow-white, with thin sapwood, and in cross-section shows thin resinous bands of small summer cells and narrow conspicuous medullary rays. This explains why it is so apt to split when nailed. The prevalence of knots also detracts from its value as a saw-timber, but its long fibre makes it an excellent timber for the manufacture of wood-pulp. Its fuel value is 45%, which shows it as good a fuel as chestnut, and better than Box Elder (*Acer negundo*, L.)

"Essence of spruce" is prepared by boiling the young branches and evaporating the extract to the thickness of molasses. It has a bitter astringent acid flavor, and is said to be a useful preventive of scurvy. "Spruce beer" is made either from the "essence," or by adding molasses or sugar to a decoction of the young branches and allowing the whole to stand till it ferments. The gum is often collected and used for the preparation of chewing gum, whilst the pollen is frequently sold as Lycopodium powder.

The white spruce (*Picea alba*, Link) or cat spruce, occurs throughout the wooded area of the peninsula, and prefers a well drained soil; being confined mostly to the areas of a re-arranged drift of the river valleys and marine deposits along the coast, or to the heavier drift of the Cambrian area of the interior. South of the St. Lawrence watershed it is more widely distributed, and is found on rocky hills at an elevation of 2,000 feet. It is a rapid grower, and because of its long fibre is in great demand as a pulp wood. It has a fairly coarse texture, and is tougher, stronger and more elastic than pine. As our supplies of pine become exhausted, white spruce will largely take its place. Thus, whether we regard it as the pulp-wood or the saw-timber of the future, it is evident that it is one of the coming woods, and that it should be carefully protected from fire and wasteful methods of lumbering. At present it is used for railway ties, fence posts, telegraph and telephone poles, piles and pulping purposes. It has a fuel value of 40%, and when absolutely dry, weighs 25¼ pounds per cubic foot. The Indians macerate the fine roots in water, and use them to sew birch bark canoes, the seams being made water-tight with resin. As lumber the black and white spruces are not separated, and the red spruce (*Picea rubens*, Sargent) is often included. It is closely related to the black spruce, but is not as suitable for spars and masts. As pulp-woods the black and white spruce have been found to increase in value the farther north they grow. The value of the growing spruce for the whole Dominion is probably as great as that of all other trees combined, as it

extends from James Bay north-westward to the Yukon. In 1897 Mr. Henry O'Sullivan, D.L.S., C.E., explored the country between Lake St. John and the mouth of the Nottaway River. In his report he says: "Pulp is the industry of the coming age, spruce is the king of woods for pulp-making, and this country is the home of the spruce." He might have added that the immense waterfalls in every part of the country furnish unlimited power for saw, pulp and paper mills.

The black larch (*Larix americana*, Michaux), or tamarack, grows everywhere throughout the peninsula, and probably stands next to the black spruce in abundance. It is the hardiest tree of the sub-arctic forest belt, and continues as a tree to the very edge of the northern margin, where the black spruce is dwarfed to a mere shrub. In the interior it grows in all the cold swamps and is always the largest tree in the vicinity. Of late years, however, the European larch saw-fly has destroyed most of the larch between Lake St. John and Lake Mistassini, and the pest is spreading northward. The wood is rather coarse-grained, hard, heavy and very strong. In color it is a light brown, with thin, nearly white, sapwood, and contains broad, very resinous dark-colored bands of summer cells, a few obscure resin ducts, and numerous, hardly distinguishable medullary rays. This explains why it is such a stiff wood, and is so durable in contact with the soil. It is well adapted for use as scaffold poles, joists, rafters, railway ties, fence posts, telegraph and telephone poles, and for ship-building purposes. When thoroughly dry it weighs 39 pounds per cubic foot, and its fuel value of 62% seems to indicate that it is a trifle better than red maple (*Acer rubrum*) as a heat producer.

The balsam fir (*Abies balsamea*, Miller) prefers a wet alluvial soil, and occurs more or less plentifully about the margins of the large streams and lakes almost to the edge of the treeless area. From latitude fifty-six in the interior it ranges south-eastward to Cape Harrison, and south-westward to the mouth of the Great Whale River. In the Mistassini region and along the lower Rupert, it grows in abundance with white spruce, aspen and canoe birch.

The wood is very light, soft, coarse-grained and perishable. The heartwood is of a pale-brown color, often streaked with yellow. The sapwood is lighter in color, is quite thick, and contains conspicuous narrow vessels of smaller summer cells and numerous obscure medullary rays. Fuel value, 38%; specific gravity, 24 pounds per cubic foot; makes a good pulp, and is sometimes sawn into boards for the manufacture of packing boxes, or even laths and shingles, if nothing better can be obtained.

Beneath the smooth bark of the tree a transparent straw-colored resin, faintly tinged with green, collects in "blisters" or

BURNT WHITE PINE FOREST.
Nipissing Co., Ontario.

A LUMBERMAN'S DAM, CHERRY RIVER, UPPER OTTAWA DISTRICT

"knobs." This resin is the "Canada Balsam" of commerce, so much used in the arts and for mounting objects to be examined under the microscope. It is of the consistency of honey, and has a pleasant aromatic odor and slightly bitter taste. It is usually collected in small iron cans fastened to a pole, and furnished at the top with iron tubes sharpened at the end. The tube is pressed against the resin blister to puncture it, and the gum flows down the tube into the can. An average tree yields about half a pound of balsam.

The Banksian pine (*Pinus banksiana*, Lambert), gray pine, scrub pine, jack pine, Labrador pine, or "Cypress," grows freely on the dry, sandy drift ridges and rocky hills of the burned-over areas of the western half of the peninsula between the St. Lawrence and Whale Rivers, but does not thrive on the low swampy land along the eastern coast of James Bay. The wood is close-grained, soft, fairly strong, and weighs about 30 pounds per cubic foot. In color it is pale brown or rarely orange, and the nearly white sapwood is quite thick. Its suitability for mine props and general construction work has not yet been appreciated. When large enough it is suitable for railway ties, and occasionally is sawn up for lumber. Recent experiments show that good pulp can be made from it. It has a fuel value of 48%, and a dry weight of 30 pounds per cubic foot.

The aspen (*Populus tremuloides*, Michaux) does not seem to grow north of latitude fifty-four, and is somewhat fastidious as to soil. It prefers gravelly hillsides or moist sandy spots in the river valleys and along the lake shores. In the western part of the peninsula it grows abundantly on the unmodified glacial till of the drift ridges, but about the headwaters of the East Main and Hamilton Rivers (where the ice sheet was thickest) it is rather scarce. Its tiny seeds are provided with long silky hairs, which scatter them far and near with every wind that blows, and the seedlings grow rapidly in exposed situations. This explains why the aspen is the most widely distributed tree in North America, and also why it is generally the first tree to take possession of the soil on burned-over areas. Its roots prevent the washing away of the soil from steep slopes, and its leaves and branches afford shelter to the seedlings of longer-lived trees. It acts as a nurse tree towards most conifers, and plays a most important part in the re-stocking of our northern forests. With its pale bark, slender pendulous branches and shimmering leaves, it is a most graceful tree, and enlivens the sombre landscape with broad bands of color, light green in summer, but in autumn glowing like gold against the dark cliffs and gloomy conifers.

The wood is close-grained, has a cottony fibre, and is quite light and soft; but is neither strong or durable. The heartwood is of a light-brown color, and the thick sapwood is nearly white.

Its chief value is for the manufacture of pulp for paper, but it may also be used for fence rails, fuel, tannery or boxes. Dry weight, 25 pounds per cubic foot; fuel value, 40.

The balsam poplar (*Populus balsamifera*, Linnaeus), or rough-barked poplar, occurs farther north than the aspen, but is confined mostly to the heavy clay soil of the river valleys, or to the modified drift of the Cambrian areas. In the western interior it does not appear to grow north of Lake Mistassini. At Cambrian Lake (latitude 56°) on the Kaniapiskau River, it grows on low terraces to ten inches in diameter, but on higher ground is small and straggling. Along the lower Hamilton River it is quite common, but above the Grand Falls, which, it may be mentioned, have 302 feet of a sheer drop and a volume of about 50,000 cubic feet of water per second, is not seen again till the Cambrian area is reached at Birch Lake. The wood of balsam poplar is light, soft and fine-grained, and is well-suited for the manufacture of paper pulp, pails, tobacco boxes and small packing cases. The tree received its name because of the balsamic sticky exudation of the leaf-buds. In full foliage it is a splendid object as the wind blows through its branches, displaying the brilliant colors of its leaves, which are dark green above and rusty-looking below. The pollen of the poplars and spruces often blows across a lake in such large quantities as to form quite a thick film on its surface.

The white or canoe birch (*Betula papyrifera*, Marshall) grows everywhere in the southern part of the peninsula, and often forms dense thickets on hillsides which have been traversed by fire. With its gleaming white trunk, luxuriant dark foliage, and open, airy, graceful head, it is always a picturesque feature of the forest landscape. About Hamilton Inlet it grows to ten inches in diameter, but towards the upper waters of the Hamilton River seldom exceeds eight inches. Northward the trees are smaller, and the Indians have to import their bark for canoe-building. As the semi-barren lands are approached, the mixture of dwarf birches and willows growing on the hillsides forms almost impenetrable thickets.

The wood of canoe birch is light, strong, hard, tough, and very close-grained. The Indians use it for axe handles, sleds, paddles, snowshoe frames, and many other articles requiring a light, strong, tough wood. There is no American species to excel it as a spool wood. It is also used for the manufacture of bobbins, turned boxes, bowls, shoe lasts, shoe pegs, for interior finishing, and for the manufacture of furniture. In the settled portions of Canada most of the white birch has disappeared, but in the Labrador Peninsula vast areas yet remain to be exploited.

The heartwood is light-brown, tinged with red, but the sapwood is nearly white and quite thick. It has a fuel value of 59, and weighs 37 pounds per cubic foot when perfectly dry. The

bark is tough, resinous, very durable and impervious to water. For the construction of canoes, baskets, drinking cups, and a covering for his wigwam, the Indian finds it simply indispensable.

The arbor vitae (*Thuya occidentalis*, Linnaeus), or white cedar, occurs in only a few places between the Rupert and Nottoway Rivers, and south-eastward to the St. Lawrence. It prefers swampy places in which it generally occurs in dense stands. The wood is light, soft, brittle, and rather coarse-grained. The thin sapwood is nearly white, but the heartwood is yellow-brown and quite fragrant. The wood is very durable in contact with the soil, and is much used for posts, poles, ties, rails, shingles, etc. It weighs almost 20 pounds per cubic foot, and has a fuel value of 23. The thich layers of sapwood are easily separated, and are often used to strengthen birch bark canoes or to weave baskets. In the southern region the undergrowth consists mostly of Labrador tea (*Ledum latifolium*), pale laurel (*Kalmia glauca*) and blueberries. In damp places there is a considerable depth of sphagnum mosses, but as we go northward it is gradually replaced by white lichens or reindeer mosses which grow everywhere throughout the semi-barren and barren regions. Willows and alders fringe the shores of all the lakes and rivers of the forested area. In the semi-barren areas willows and birches creep up the sides of the hills to above the tree line. On the elevated lands beyond the semi-barrens they are only a few inches high.

The forest areas of commercial importance are chiefly confined to the southern part of the peninsula, and mostly to the lower courses of the streams flowing into James Bay and the Atlantic Ocean. So long as our supplies of pine hold out, spruce cannot compete with it, as pine is *the* lumber *par excellence*. The supply of pine is limited, however, and in a very few years spruce will largely take its place for many kinds of work. Besides this, spruce is an excellent pulpwood, and is accompanied by considerable aspen, balsam poplar and balsam fir, all of which make excellent pulp. The Crown Lands Department of the Province of Quebec estimates that in the Lake St. John district alone (3100 square miles) there are a *hundred million cords* of pulpwood. This figure is based on the extremely low estimate of five cords per acre. If the true average per acre were used, and a calculation made for the total forested area of the peninsula, the result would be beyond all belief. The available raw material is sufficient to provide for an annual output of millions of tons of pulp for an indefinite period.

Most unfortunately, however, this immense forest has suffered dreadfully from fire, and in many places the vegetable part of the soil has been so completely burned out that a couple of centuries must elapse before it is fully restocked. Mr. Low states that the fires are of annual occurrence, and occasionally burn throughout

the entire summer, destroying thousands of square miles of valuable timber to the south of the central watershed. In 1894, he wrote: "These fires are due to various causes, but the majority of them can be traced to the Indians, who start them either through carelessness or intentionally;" also: "At least one-half the forest area of the interior has been totally destroyed by fire within the past twenty-five or thirty years." This is a most alarming state of affairs, and causes the Bureau of Forestry a great deal of anxiety, as the general public seems perfectly apathetic about the matter. When Canadians begin to look upon the forest as belonging to the nation—as an extremely valuable national asset—they will insist upon having it better protected from fire. Meantime the Bureau has done some very effective work in diminishing the number of fires in the forests of the far north and north-west. At every portage along the principal canoe routes, notices, printed in English, French and Indian dialects, have been posted, warning travellers of the danger to the forest from fires which have not been completely extinguished, and there is plenty of evidence to show that these warnings are heeded. The greatest danger seems to be from settlers, hunters and tourists, very few of whom seem to understand the extremely inflammable nature of these northern forests. In hot weather the moisture is thoroughly dried out of the gummy leaves and branches, and the mossy ground is as dry as tinder, A tiny spark at such a time as this may give rise to one of the wildest scenes of destruction of which the world is capable. The resin and turpentine in the leaves burn with great rapidity, and the trees stand so close together that an irresistible front of flame is soon developed and sweeps forward, devouring the forest before it like dry grass in a running prairie fire. The pitchy trees burn almost explosively, great sheets of flame extending to a height of two hundred feet from the ground, and darting forward to bridge over open spaces, such as lakes and rivers, and start afresh in advance of the main colunm. The speed of such forest fires is almost incredible, one of them being known to travel 130 miles in 12 hours, or nearly eleven miles an hour. In a few hours millions of dollars worth of timber may be swept out of existence, and the soil impoverished for centuries. Most of the provinces have excellent laws regulating the cutting of timber on crown lands, but in all cases the protection from fire is entirely inadequate. In 1903 the Province of Quebec spent $9,694 ($17,000 less a fire tax of $7,306) to protect a revenue of over a million dollars, but where will the revenue for the next fifty years come from if fire gets into the timbered areas? In the Gatineau district each fire ranger is held responsible for 360 square miles, on the lower Ottawa for 585 square miles, and in the St. Maurice district, for 1,316 square miles! This is certainly better than no rangers at all, but which of my readers would like to be held responsible for so great a

stretch of forest in a dry season? As a purely business proposition it seems to me that the Province of Quebec can well afford to spend $50,000 per year in keeping fire out of its magnificent coniferous forests. Such an investment would prove to be the very best kind of insurance on a timber revenue, which is certain to increase tenfold in the next fifty years—provided the province has the goods to deliver.

As a result of the visit of the representatives of the Canadian Forestry Association to Sackville University, in the Province of New Brunswick, in the early part of last year, a meeting of owners of timber lands and others was held at Sackville, at which steps were taken to request the Legislature of that province for special legislation to protect the forests of the County of Westmoreland from fire. As a consequence a special Act relating to that county was passed at the last session of the Legislature. This Act provides that the Municipal Council may, on the request of the holders of a majority of acres of forest lands, appoint a Chief Forest Ranger for the county, whose duties shall be to enforce the Fire Act, investigate fires, institute prosecutions, post fire notices, and authority is given him to call out such assistance as may be necessary to fight fires that occur. Deputy Rangers may also be appointed. The fund for payment of the service, called the "Forest Protection Fund," is to be provided for by the fines collected for offenses under the Act, and by a special assessment on forest lands to cover such additional amount as may be required.

In addition to the restrictions of the general Fire Act of the province, it is specially provided that fires near forest lands, except for cooking or warmth, shall not be allowed from the 15th April to the 15th June, and from the 1st September to the 15th October, and from the 15th June to the 1st September only after permission has been received from the Ranger. No portable or other steam engine may be operated within twenty rods of any forest from the 15th April to the 15th October without leave from the Ranger, which may be granted with or without conditions. Other special provisions are that every male inhabitant must notify the Ranger of any fire he notices; that there shall be a presumption of negligence if railway companies cannot prove their locomotives to be properly guarded; that the fact of a person trespassing or loitering or camping on land where fire starts shall, in the absence of proof to the contrary, be evidence of guilt; that any person owing land on which brush, &c., is burned between the 15th April and the 15th October is to be considered responsible unless the contrary is proved.

THE LATE JOHN BERTRAM.

It is with profound regret that we have to chronicle the death of Mr. John Bertram, of Toronto, which took place on the 28th November, 1904. It is only necessary to read the last Annual Report of the Canadian Forestry Association to understand the loss which the Association has suffered in his removal. The paper read by him on "Forest Management in Ontario," the interested and strong way in which he took part in the discussions, and the kindly manner in which, at the close of proceedings, he referred to the pleasure which he had felt at being present, and to his hopes of attending the next meeting at the City of Quebec, all show how much and how deeply the Association has been indebted to him. From the beginning of its career he gave it hearty support, and had previously, in the year 1901, contributed a paper on "The Economic Management of Pine Forests," which attracted a great deal of attention, and first gave to many people the idea that an improvement in forest exploitation was possible. At the time of his death he was a member of the Board of Directors of the Association.

This explains why the Forestry Association should mourn Mr. Bertram's death. But his activities were far more widespread than the forestry movement. A successful business man, he had large interests on his hands in the Bertram Engine Works Company, and in the Collins' Inlet Lumber Company, and although he did not enter active politics, except for the short time from 1872 to 1878, when he sat as a member of the House of Commons , he always took a live interest in public questions, and their discussion, and gave large public service. As a member of the Ontario Forestry Commission appointed in 1897, he did valuable service to the province, and helped to shape the policy of steady progress in forest administration which that province has shown. And in his private business he carried out the forestry principles which he advocated in public, for the limits of the Collins' Inlet Lumber Company were being cut under his direction, with the aim of having a sustained yield, of cutting the forest interest only and not the capital. In 1903, the Dominion Transportation Commission was organized with Mr. Bertram as Chairman. The instructions to this Commission were to make a full enquiry into the transportation question as affecting Canada. This work had not been completed at the time of his death. Thus, he was con-

nected in a public way with what he considered the most important public questions for the Dominion. In his own words, "There are two great questions in Canada: transportation and forestry."

A man of strong intellectual power, a clear and able thinker, an honest and fearless exponent of his views, yet not seeking the public eye, his influence on public affairs has been greater than many have known or thought. Canada needs such men, and their places are not easily filled.

The heartfelt sympathy of the members of the Canadian Forestry Association will go out to the friends of our deceased fellow member.

NOTES.

We have secured as contributors to the Canadian Forestry Journal members of the staffs of the Forestry Bureaus of the Dominion and of Ontario, of the Geological Survey of Canada, of the University of Toronto, of Queen's University, and of the Ontario Agricultural College. In addition, we have promises of papers from others who have made special study of subjects related to Forestry. Our object will be to be of practical assistance to our readers, as well as furnishing general and scientific information in regard to forestry in a popular way.

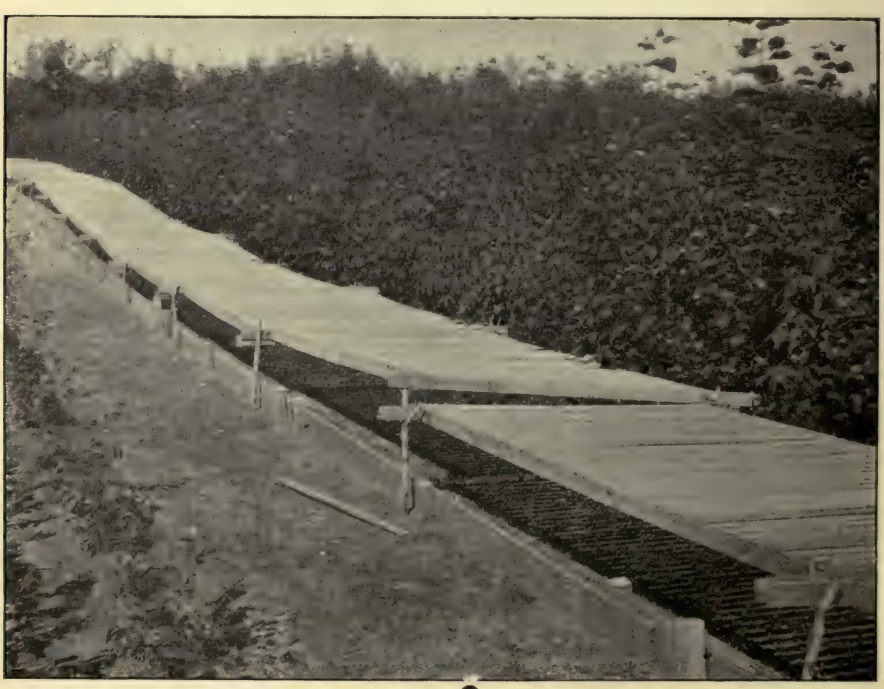
The Sixth Annual Meeting of the Canadian Forestry Association will be held at Quebec, on the 9th and 10th March, 1905. A good programme is being prepared, which will be thoroughly representative of forest interests throughout Canada. It is expected that the railway companies will give the same privileges in regard to rates as was kindly granted for previous meetings. Full announcement by circular will be made to the members of the Association at a later date. We trust the members will bear this meeting in mind, and make their arrangements so that the attendance shall be large and representative.

Attention is called to two errors in the published report of the Canadian Forestry Association for 1904. A slight change in one of the words in the thirteenth line from the bottom of page 82, which was noted on the final proof of the report, resulted, owing to the necessity with the linotype machine for the withdrawal of the whole line in such a case, in the substitution of a line from the second paragraph above. The proper reading of the line is: "In Snow Lake we have the large trout (Touladi) (*Salmo namayrush*), and possibly." In the second line of page 86, "thirty-five" should be "five."

At the annual meeting of the Ontario Experimental Union, which was held at Guelph, on December 5th and 6th, the subject of forestry received considerable attention. Since 1901 there has been a forestry section in the Experimental Union, the object of which is to gather information about and to suggest means of

JACK PINE (*Pinus Murryana*)
In Natural Forest in Western Alberta.

Nursery Rows of Green Ash Seedlings, 1 year old (Indian Head.)



Method of shading Conifer seed beds—Screens made of common lath nailed on pieces 2x2 in

improving forestry conditions in Ontario. Since it is an agricultural institution, the attention of the committee in charge has been confined almost entirely to farm wood-lots. From the first the Committee has urged that in order to increase the productiveness and efficiency of this much neglected and abused part of the Ontario farm, the Government should co-operate with the farmers of the province by giving instruction through bulletins and lectures on the subject of farm forestry, and by assisting those who require to plant by furnishing seeds or seedlings free, or at cost price. The efforts of the Union have been successful in so far that a nursery has been established in connection with the Agricultural College, from which 100,000 seedlings will be distributed next spring. It is the intention before supplying plant material to applicants that a forestry expert shall inspect the proposed planting site, and advise the planter as to the preparation of the soil, species to plant, method of planting, etc., and only those applicants who agree to carry out the directions of the expert will receive trees.

Before a large meeting, on December 6th, Dr. Clark, Forester for the Crown Lands Department, Toronto, gave a most practical address, "Farm Forestry for Ontario." He first pointed out briefly that it is worth while to develop the wood-lot, for besides its local value as a shelter for the home and crops, the increased use of wood, diminished supply and advanced price make it a most valuable asset, especially in older Ontario.

He then took up more fully a discussion of some of the most common defects of farm wood-lots under the following heads:—

I. Affecting the character of the stand:
   1. Farmers' selective cuttings.
   2. Overcutting.
   3. Grazing.

II. Affecting vigor of growth:
   1. Lack of good soil cover.
   2. Access of wind to soil.

By "farmers' selective cutting," Dr Clark meant the practice followed by so many of cutting out all the good trees and leaving only the cripples and weeds. Over-cutting is still more injurious than the farmers' selective cutting in that it causes the deterioration of the soil condition, and the trees do not develop desirable forms. Grazing, he said, is probably the most injurious agency in the wood-lot, making reproduction almost impossible, and injuring standing trees. Of the various domestic animals goats are the most injurious, sheep next, cattle next, and horses least injurious.

Lack of soil cover causes the drying out of the soil, and allows it to become hard, thereby preventing the percolation of

water into the soil and making it very difficult for reproduction to take place. Wind when admitted to the forest dries the soil, removes the soil cover, and produces an unhealthy condition of the stand.

As a remedy for these defects, Dr. Clark advised:

1. Shutting out of all stock.
2. Planting wind-breaks, especially on south and west.
3. Planting up failed places.

An interesting discussion followed Dr. Clark's address, which was taken part in by Mr. Nelson Monteith, M.P.P., Mr. Southworth, Mr. R. D. Craig, and others.

Dr. Clark gave also a short course of lectures, with practical demonstration in the Ontario Agricultural College, on wood-lots, to the Farmers' Institute speakers, so that they would be able to discuss the question more intelligently at their meetings during the winter.

British Columbia has, in company with some of the western states, been a great sufferer from forest fires during the past season, the drought which made them a possibility lasting on through the summer. The air was filled with smoke throughout a great part of the summer in many districts. Survey work was seriously interfered with, and some parties could accomplish absolutely nothing in consequence of the smoke interfering with the view of the country. A member of one of such parties states that in the district in which he was working, or rather attempting to work, in southern British Columbia, fires were occurring on every hand, and nobody seemed to consider it his business to interfere. There were no railways in that vicinity, so that the blame for starting the fires could not be placed on them. In one case a prospector's stakes were found which were six days old, and a fire which cleared the claim and a tract around was evidently about the same age. One fire was approaching a small town day by day, and the only action taken by the inhabitants was to sit down and watch it from afar and speculate as to whether or not and how soon it would reach the town. Beautiful hillsides clothed with timber of the finest quality, green and flourishing when first visited, were found in a week or two after a mass of smoking ruins, their beauty and wealth reduced to smoke and ashes. The Bush Fires Act of British Columbia provides that all officials of the Government are required to enforce the provisions of the Act, but no special staff is charged with that duty, and as a consequence no vigorous action is taken. It is a remarkable fact that British Columbia is the only province of the Dominion having control of its own forests, with the exception of Prince Edward Island, which has very little forest, which has not made

some special provision for a protective staff. The forests of that province are of immense and increasing value. Nowhere else in Canada are as large areas of noble virgin forest found. The revenue received from them by the province is steadily increasing. The market for their product is extending. In Western Ontario red cedar shingles from British Columbia rule the market, and are found in every lumber yard. The demand from the western districts is becoming larger with the advance of settlement. A province so rich in forest wealth might surely be expected to see that some special officer is charged with the duty of protecting the forests from fire, and that he receives the necessary assistance at such times as required, even if it should result in a small increase in expenditure. In the railway belt in British Columbia, which is under the jurisdiction of the Dominion Government, such a service is in successful operation, and testimonies to its good work, even during the past trying season, have been numerous and favorable.

The Province of British Columbia should place itself in line with the rest of the Dominion in this respect.

On an official call, issued by the American Forestry Association, a Forest Congress met in Washington, D.C., January 2nd to 6th, 1905. The purpose of this Congress was to establish a broader understanding of the forest in its relation to the great industries depending upon it; to advance the conservative use of forest resources for both the present and the future need of these industries; to stimulate and unite all efforts to perpetuate the forest as a permanent resource of the nation.

The Congress included Ambassadors, Ministers, and other representatives of foreign nations, members of the Federal House, Governors of States and Territories, representatives of Forest Services, Forestry Associations, Lumbermen's Associations, Irrigation Associations, Stockmen's Associations, Railroad Companies, Boards of Trade. Among the accredited delegates provision was made for ten from the Canadian Forestry Association, and the Association was well represented.

The subjects dealt with at the different sessions are as follows: (1) Relation of the Public Forest Lands to Irrigation; (2) Relation of the Public Forest Lands to Grazing; (3) The Lumber Industry and the Forest; (4) Importance of the Forest Public Lands to Mining; (5) Forestry in Relation to Railroad Supplies; (6) National Forest Policy; (7) State Forest Policy.

On the afternoon of January 5th, a special meeting was held in the National Theatre, which was addressed by the President of the United States, and other men prominent in industrial and national life.

Some of the imports of lumber and timber into Canada from the United States during the past fiscal year are as follows, and are significant of the extent to which the Dominion is becoming dependent on outside sources, at least for hardwood supplies, the most of the woods mentioned being such species as are native to Canada, and of which there was at one time what was considered an abundant and inexhaustible supply. Cherry, chestnut, gumwood, hickory and whitewood are classed together with an import of 10,828,637 ft.; of mahogany, the quantity was 1,039,052 ft.; oak, 45,922,940 ft.; pitch pine, 15,055,596 ft.; walnut, 1,210,322 ft.; white ash, 2,416,063 ft.

The value of the export of forest products was $33,091,032, logs being $450,000, lumber $27,000,000, almost equally divided between Great Britain and the United States, and square timber $2,400,000 going to Great Britain mainly. Pulpwood to the value of $1,788,049 was exported to the United States. Of manufactures of wood the value was $3,699,354, the principal item being wood pulp, $2,409,074, of which $548,720 went to Great Britain and $1,807,442 to the United States.

The *American Lumberman*, referring to an estimate made in 1897, that not over 20,000,000,000 feet of white pine would be cut in Michigan, Wisconsin and Minnesota, calls attention to the actual cut since that date, which, at a production of 6,233,454,000 feet in 1897, has by steady reduction from year to year reached a figure of 4,791,852,000 feet, but makes a total of 39,353,218,000 feet. The *Lumberman* makes an estimate of the production for the next four years, as follows:—1904, 4,400,000,000; 1905, 4,000,000,000; 1906, 3,600,000,000; 1907, 3,300,000,000; and goes on to say that it is, perhaps, safe to estimate that there is still standing in the principal white pine states of the north stumpage in excess of 20,000,000,000 feet. Some of the mills in the north now have timber to last them ten or fifteen years, and it is doubtful if ten years from now there will be less than 1,000,000,000 to 1,500,000,000 feet of white pine cut and marketed, and in such event the statement that there yet remains only about 20,000,000,000 feet of white pine would have to be amended.

In 1892 the production of white pine in these states last reached a figure of eight billion feet, and its diminution to half that quantity means that the supply is nearing an end. In face of such a diminution in ten years, the ten billion feet of pine which are in sight in Ontario do not look at all like an unlimited supply.

REVIEWS.

Trees and Shrubs Tested in Manitoba and the North-West Territories: Wm. Saunders, LL.D., Director Dominion Experimental Farms.

In this bulletin are given the results of sixteen years of experience in the testing of trees and shrubs at the Experimental Farms at Brandon, Man., and at Indian Head, in the North-west Territories. The love of treees and shrubs is almost universal, and nowhere is it more strongly felt than on the North-west plains where these are scarce. Until within the past few years, large sums of money have been spent annually by settlers in the purchase of trees and shrubs from the east, many of which, being too tender to endure the climate, have perished the first winter. The tests carried out by the Experimental Farms have made such useless expenditure unnecessary. The results are also of use to Eastern Canada, as trees and shrubs which have been found hardy at Brandon and Indian Head may be safely planted in almost all other parts of the Dominion.

Of the maples, the sugar, red and Norway maples have been unsuccessful. The silver maple will grow in Manitoba, but the maple *par excellence* for the west is the Box Elder or Manitoba Maple (*Acer Negundo*). It grows readily and quickly from seed, and has been planted extensively. The European White Birch is hardy, but the cut-leaved variety less so. The Sweet and Yellow Birches give fairly satisfactory results, and the Paper Birch is native and hardy. The hickory, chestnut, catalpa, hackberry, beech, butternut, black walnut, and locust have been failures.

The Green Ash is the only one of that genus which is perfectly hardy. Among the hardy poplars are the native species and the Russian poplar. The Mossy-Cup Oak and the American Elm are native and grow without difficulty. Most of the coniferous trees tested have proved satisfactory. Notable exceptions are Bull Pine, White Pine, Hemlock and Douglas Fir.

Of the shrubs and climbing vines successful species are Viburnum, Lilac, Snowberry, Spirea, Elder, Buckthorn, Matrimony Vine, Honeysuckle, Hawthorn, Clematis, Bittersweet and others. Nothing will add more to the beauty of the surroundings of a home than a few such flowering shrubs.

The Experimental Farms have done a very useful work in this line of experiment, and the results have been brought together in a convenient form for reference.

Tree Planting on the Prairies of Manitoba and the North-West Territories of Canada: Norman M. Ross, B.S.A., Asst. Supt. of Forestry.

This is the first bulletin of a general nature issued by the Dominion Forestry Branch. It was written with the idea of affording practical information to the settler on the western prairies, as to the best methods of propagating, planting and managing hardy trees for shelter belts, windbreaks and plantations. The information given is from the results of planting and general nursery work, which has been found successful, and only such trees are recommended for planting as have been proved absolutely hardy under western conditions.

The advantages of plantations of trees are mentioned as the protection of crops and buildings, the holding of the snow, the preservation of moisture, the supplying of fuel, fencing and material for repairs, the beauty and comfort added to the home, and as a general result, the increased value of the property. The three main points to be observed in setting out a plantation are (1) that the soil must be thoroughly prepared before planting, (2) that only such varieties of trees should be used as are known to be hardy in the district, and suited to grow in the particular kind of soil, and in the situation where it is wished to plant them, and (3) that a certain amount of cultivation of the soil after planting is absolutely necessary,

Detailed instructions are given under each of these heads, followed by information as to the setting out of plantations, and descriptions of different species of trees, with suggestions as to their management. The bulletin is profusely illustrated, and is a creditable beginning for the Dominion Forestry Branch in its efforts to supply information to the public on forestry work.

Cross-tie Forms and Rail Fastenings, with Special Reference to Treated Timbers: Herman Von Schrenk, U. S. Bureau of Forestry.

The supply of railway ties is becoming a matter of absorbing interest to the railway companies, and investigations of methods for prolonging the life of such ties are, therefore, of practical moment for, while substitutes for the wooden sleeper have been and are being tried, the latter is still the main dependence of the railways. The object of this bulletin is not, however, to consider methods of preservative treatment of the wood, but forms and fastenings, and it starts with a warning that chemical treatment is not the only point to be considered in the life of a tie. Such treatment, though it may be done so as to prevent decay will not ensure woods of poor texture against physical deteriora-

tion through wear and tear. Recent tests have shown that large ties make the most stable roadbed, and the tendency of late years has been to increase their size, as it is feared that the enormously increased weight of engines and cars now requires a stronger piece of timber under the rails than the lighter equipment of the past. The idea that economy should be practised by using fewer ties to the rail length in view of the increased rigidity of the larger rails is decidedly negatived. This would mean a decrease of the bearing surface on the ballast, which would have the very opposite effect to what is desired, as it would mean a loss of stability. The effort to manufacture more ties by cutting them of a triangular shape, is unsatisfactory for the same reason. With the larger and stiffer rail a decrease in surface, if any is made, may well be on the upper side of the tie. A form of half-round tie is, therefore, suggested, with an upper surface of eight to twelve inches. It is probable that the increased stiffness of the rail will permit of a spacing, with a tie of the form proposed, very much greater than is possible with the form usually employed.

Ties are now being cut from trees of all diameters, from 9 inches upward. The influence which the new tie form will have upon the size of trees cut for tie purposes ought to be a marked one. It certainly would discourage the cutting of pole ties to a very considerable extent. It would not pay to make a tie out of a small tree, when by leaving it for a few years two ties could be made from the same tree. In other words, the present policy of cutting trees 11 or 12 inches in diameter would be found less profitable than cutting trees 16 or 17 inches in diameter. There is probably no other branch of the lumber industry in which so many small trees are annually destroyed, and the possible growth of forests retarded to such an extent as in the manufacture of ties. The practice of sawing ties from logs is going to be more and more prevalent as the old feeling that a sawed tie is not worth having disappears. The cutting of these trees will, moreover, make possible the use of large quantities of timber which now is practically wasted, and from which the lumberman has no return. This is particularly true of tops.

The subject of track fastenings is discussed in the remainder of the bulletin, because the writer believes that only with much modified systems of fastening can ties of most of the softer woods be made to last sufficiently long to pay for chemical treatment. With the present style of spike the soft wood tie does not hold with sufficient firmness to prevent undulations and creeping of the rail, which result in a more or less rapid wearing out of the tie. In driving the spike into the softer woods the fibres are broken to an unusual extent. As a result they do not withstand the lateral pressure of the rail, and consequently the spike hole

is rapidly increased to such an extent that the spike no longer holds. Water collects in the enlarged hole and decay sets in. Whenever a spike becomes so loose that it no longer holds, it is pulled out and driven in at another point. This constant respiking rapidly ruins the tie. In place of the ordinary spike the screw spike, such as is now used in Europe, is recommended. Screwed into a hole specially bored for it, it holds the rail firmly and prevents the injurious effects of the straight spike.

In tie plates the principal functions are to distribute the load from the rail on the tie, and to prevent the mechanical abrasion of the tie as far as possible. For the softer and inferior woods it is recommended that wherever possible a flat steel tie plate be used without spikes or flanges on the base of the plate, and that tests be made with wooden tie plates, one-fourth, one-half and five-eighths inches in thickness, 6 to 7 inches long, and the width of the rail base under which they are used.

Forest Resources of Texas: Wm. L. Bray, U. S. Bureau of Forestry.

The general impression in regard to Texas has been that it is a prairie country rather than a forested state, and while this is largely true, still this report shows that the forests are of no small importance. The existence of the forest and its composition are to a large extent dependent on the rainfall, and from the low plains on the Gulf of Mexico to the plateaus of 4,000 to 5,000 feet and the mountains of 10,000, the rainfall gradually declines from 50 inches per annum to ten inches. The species of trees present a large variety. In the swamp and hay tracts of the lower region are bald cypress, tupelo, gum, magnolia and other characteristic trees of southern lowlands, with their peculiar adaptations to life on lands generally covered by water. The alluvial bottom lands support a valuable hardwood forest comprising different species of oak, ash, gum, cotton-wood, &c. Black walnut has practically all been cut out. The exploitation of the other hardwoods is developing rapidly, as northern manufacturing firms are reaching out farther for supplies. This is one of the new districts from which the supply for Canada will now come. In spite of this it is remarkable that lands are being cleared for settlement in this district by destroying the trees, a wasteful method that most people have considered was long ago relegated to the past. There are about 7,000 square miles of mixed hob-lolly pine and hardwood forest, among which tracts of pure stand of the former give a cut of 12,000 to 15,000 feet to the acre. Short leaf pine is also an important timber tree. The greatest timber producing area in Texas at the present time is that covered by Longleaf pine, comprising a tract of some 5,000 square miles. The stand is practically pure, and the trees make a large and perfect growth, yielding logs of a maximum diameter of from 36 to 40

inches, with a clear length of 60 feet. The soil on which it is found is sandy and most of it probably unfit for agriculture. The output is about three-quarters of a billion feet a year, and at the present rate of lumbering it is estimated that the supply will last for twenty years. The development of this industry is of interest, for southern yellow pine has become one of the chief competitors of white pine in the north. Longleaf pine seeds abundantly, but there is very little seedling growth, owing to the regular and frequent fires.

Farther to the west and on higher ground are found the prairie country and mixed forest growth. A peculiarity noticed here is the meeting of the northern and the southern species of trees, the former being dwarfed and altered so as to be designated under different specific names. In the mountain region Douglas fir and western yellow pine (*Pinus ponderosa*) occur.

The Basket Willow: Wm. F. Hubbard, U. S. Bureau of Forestry.

Willow Culture in England was among the many forms of industry which were temporarily or permanently stimulated by Napoleon's embargo Act. Great Britain had imported her osiers and baskets from Holland until her exclusion from the Continent led to the formation of plantations at home. The Society of Arts directed their attention to the subject, and gave premiums for the establishment of willow plantations. The willow is still considerably grown in England, where the principal cultivator of late years was William Scaling, and such districts as Nottingham and the fens of Cambridgeshire produce osiers of the highest quality; but the general labor conditions and the ease with which willow is imported from other countries have prevented it from being widely cultivated or manufactured. France, Italy, the islands of Sicily and Madeira, Belgium, Holland, Germany, Austria, and Russia, are all large growers of willow, and have a good export trade of osier rods and basket ware. In all these thickly populated countries, which abound in cheap labor, willow growing and basket making have followed the development of other manufactures to a very marked degree.

Willows are adapted to a wide range of soils and climatic conditions, and are therefore among the most widely distributed of trees and shrubs. The genus Salix, to which these plants belong, contains a large number of species, ranging from large trees to a small low plant. From 160 to 170 species are known, inhabiting all regions, from the low grounds and river banks of temperate climates and warm countries to the arid Alpine slopes of mountains and to the boreal regions of both hemispheres. They occur in America from the Arctic Circle to the West Indies and the mountains of Chile. In the Old World they range

from Northern Europe and Asia to Madagascar and South Africa, and to the islands of Java and Sumatra.

The qualities required to constitute a perfect rod are extreme toughness, elasticity, a level, smooth, and brilliant white surface after peeling, good splitting quality, freedom from branches, great length of shoot in proportion to thickness, and a small pith. The development of a species which will produce such rods, and which at the same time is hardy and not liable to ordinary diseases, and a good cropper, is the end for which growers should strive. This demands that the greatest care should be exercised not only in the choice of species, but also in methods of culture. Good varieties give no results under careless methods; even inferior kinds will pay if well tended. It should be the object of every grower to lower the price and better the quality of his willow, for on this depends the future success of American osier culture. If rods equal to the French and cheaper in price can be put on the market, there will be an opportunity for a great expansion of basket and furniture manufactures, and the growers will more than make up in larger sales what they lose in price per pound. The net returns from properly managed plantations are estimated at from $17 to $76 per acre per annum for fourteen years.

The species usually planted are the Welsh or purple willow (*Salix purpurea*), the Lamley or Caspian Willow (*Salix pruinosa acutifolia*), the American green or almond willow (*Salix amygdalina*), and the white osier willow (*Salix viminalis*). This industry might find a place in Ontario, if not elsewhere in Canada.

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THE BOW RIVER VALLEY, FROM THE HOT SPRINGS

Canadian Forestry Journal.

Vol. I. April, 1905. No. 2.

SIXTH ANNUAL MEETING OF THE CANADIAN FORESTRY ASSOCIATION.

THE Sixth Annual Meeting of the Canadian Forestry Association was held in the city of Quebec, on the 9th and 10th March, 1905, and was one of the best attended and most successful meetings yet held. Among those present were Aubrey White, Assistant Commissioner of Crown Lands, Dr. Judson F. Clark, W. H. F. Addison, E. B. Biggar, Editor Pulp and Paper Magazine, H. R. Muir, Canada Lumberman, Toronto; Hon. H. Bostock, F. W. Jones, R. Jardine, Jas. Leamy, of British Columbia; E. Stewart, Dominion Superintendent of Forestry, Dr. Robert Bell, Director of the Geological Survey, Gordon C. Edwards, Norman M. Ross, Roland D. Craig, H. C. Wallin, R. H. Campbell, Ottawa; E. G. Joly de Lotbiniere, H. M. Price, W. C. J. Hall, Monseigneur Laflamme, Hon. P. E. Leblanc, Hon. R. Turner, E. Baillarge, J. C. Langelier, Revd. T. W. Fyles, H. O'Sullivan and others, Quebec; Wm. Little, Hon. Recorder Weir, Douglas Weir, Thos. Walklate, Montreal; J. T. Bertrand, Isle Verte; Col. T. G. Loggie, Fredericton; A. E. Alexander, Campbellton; E. J. Zavitz, Ontario Agricultural College; Professor Filibert Roth, University of Michigan; Dr. C. A. Schenck, Biltmore, N.C.; A. Knechtel, L. S. Emmons, Albany, N.Y.; Angus McLean, Buffalo; W. G. Power, St. Pacome; S. P. Grogan, Batiscan; Mossom M. Boyd, Bobcaygeon; W. C. Wilgress, Huntsville.

Most of the sessions were held in the Council Chamber of the City Hall, which had kindly been placed at the disposal of the Forestry Association by the Mayor and Council of the city of Quebec. The meeting was called to order by the President, Mr.

Aubrey White, and after preliminary business the report of the Board of Directors was read by the Secretary.

The report referred to the kindness of the Dominion Bureau of Forestry in having provided for the publication of the Annual Report, an important contribution to the work of the Association, and which took a heavy financial burden from its somewhat inadequate resources.

During the past year the Association lost several of its members by death, prominent among whom were Mr. John Bertram, Chairman of the Dominion Transportation Commission, Dr. W. H. Muldrew, Dean of the Macdonald Institute, Mr. W. C. Caldwell, M.P.P., of Lanark, and Col. Thos. Higginson, of Vankleek Hill. Feeling reference was also made to the loss sustained by the honored first President of the Association, His Honour Sir Henri Joly de Lotbiniere, and the Vice-President, Mr. E. G. Joly de Lotbiniere, in the death of Lady Joly de Lotbiniere, which had occurred during the year. The Secretary was instructed to convey the sympathies of the Association to the bereaved relatives.

A special effort had been made in the year 1904 to increase the membership by the sending out of circulars and by other means. The results were on the whole satisfactory, and resulted in a good addition to the membership, making the total 562 as against 479 reported at the previous annual meeting. Increases were made in all of the Provinces except Manitoba and Alberta, where there was a slight falling off. Outside of Canada, the United States heads the list with thirty-nine members, and the remainder are scattered among England, Ireland, Newfoundland, India, Honolulu, Germany, Denmark and Austria.

The receipts for 1904 were $1,845.77, and the expenditure $930.66, leaving a balance of $915.11. The Association has again to thank the Governments of the Provinces of Quebec, Ontario and British Columbia, for the generous grants made by them to assist its work.

The Forestry and Colonization Commission of the Province of Quebec, and the Forestry Commission of Prince Edward Island, presented their reports to their respective Governments

in 1904. The Quebec Commission found that there is no antagonism between the holders of timber licenses and real settlers, but that difficulties have been created mainly by those desiring to take up land to speculate in the timber. They therefore urged the division of the public domain into settlement lands and merchantable timber lands, and the setting apart of non-agricultural lands in forest reserves. An extension and improvement of the fire preventive service was also considered by the Commission as a prime necessity.

In Prince Edward Island, the area of public land being but small, the Commission recommended that efforts should be made to encourage private enterprise in the planting of trees for the protection of agriculture and for ornamental purposes. The desirability of education on this subject was urged on the attention of the authorities.

Forest fires as usual caused destruction throughout the Dominion, but had been largely controlled by the fire rangers except in British Columbia where, outside of the Railway Belt, which is protected by Dominion rangers, no fire preventive service exists and the fires were numerous and practically uncontrolled.

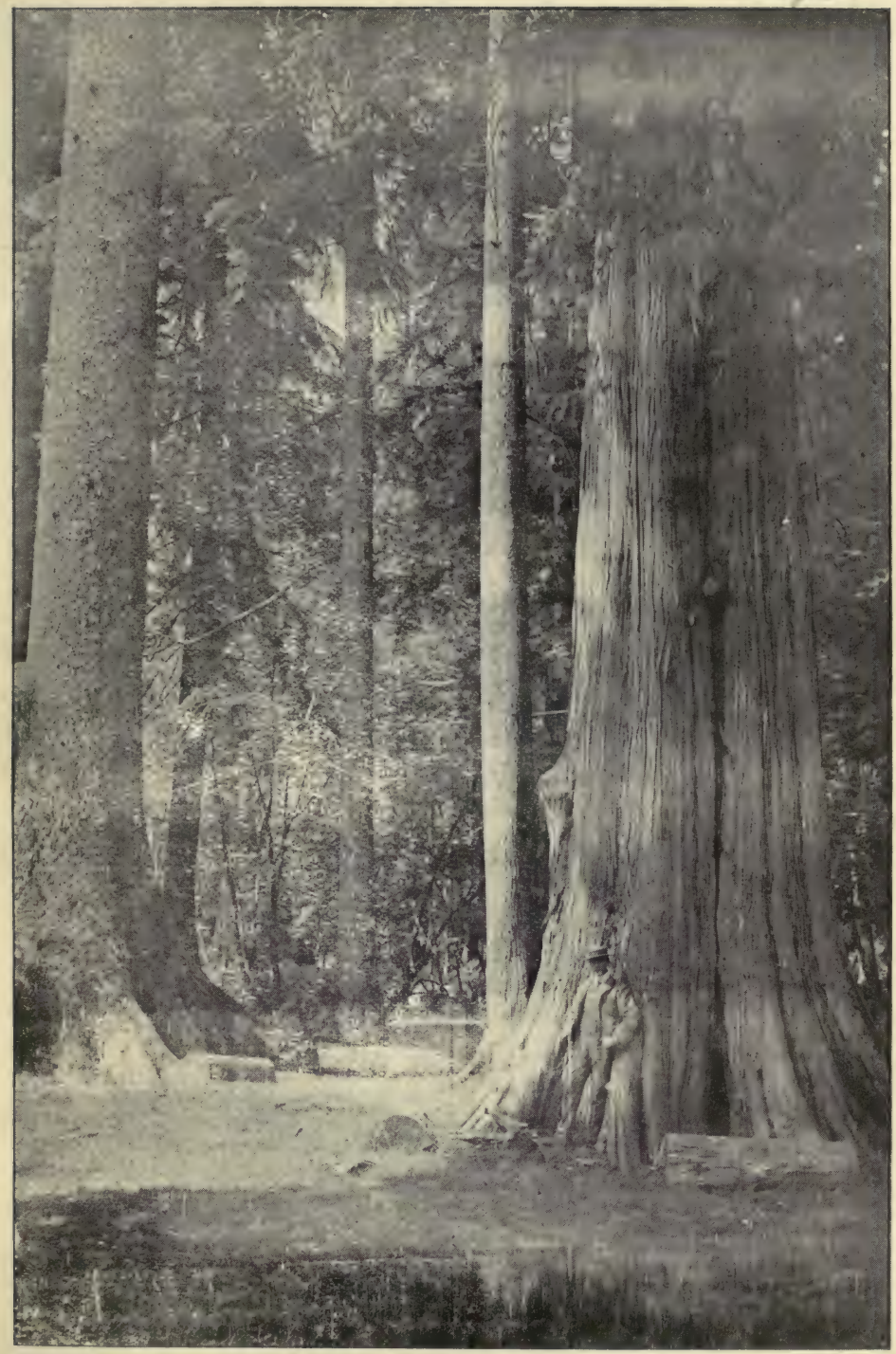
The tree planting scheme under Dominion management continues to develop. During the year 1904, 1,800,000 trees were distributed to 1027 settlers, an average to each of 1752 trees. In 1905, the distribution will be 2,000,000 trees to 1120 settlers. The total distribution to 1905 will be 5,000,000 trees. At the Ontario Agricultural College provision for similar work for the Province of Ontario is being made.

A committee of the Board waited upon His Excellency the Governor General to ask him to be kind enough to act as Patron of the Canadian Forestry Association. His Excellency received the Committee most graciously, and was pleased not only to give his patronage, but far exceeded their expectations by stating that he would be pleased to do anything further in his power to assist the work of the Association, and suggested that, in the event of a meeting being held in Ottawa during the present season, he would be pleased to attend and might even arrange to have it held at Government House. This kindly action of His Excellency and the evidence of his sympathy with movements af-

fecting the well being of the Dominion should give him a high place in the respect and affection of Canadians, and especially of the members of the Forestry Association.

The President, in his address, referred to the pleasure it gave him to preside over the deliberations of the Canadian Forestry Association at its first meeting in the Ancient Capital. Here was the nursery of all the developments that have taken place in every direction throughout the Dominion. Under the French regime the first Crown Timber regulations were promulgated, and some of the problems which confronted the framers of the early laws have come down to the present day. The rights of the settlers and kindred matters are just as live subjects as they were two or three hundred years ago. Mr. White sketched the growth of the forestry movement from the Forest Congress, held in Montreal in 1882, to the meeting of the American Forestry Association in Quebec in 1890, and the establishment of the Canadian Forestry Association in 1900. He impressed the two great features of present importance in forestry as the provision for a proper fire preventive service and a division between the agricultural lands and those suited only for the growth of timber.

The first paper submitted was one on "Forest Fires in British Columbia," prepared by Professor R. W. Brock, of Queen's University. Anyone travelling through the Province is at once struck by the beauty and value of the timber and no less by the terrible havoc wrought upon it by forest fires. British Columbia, as a whole, may be said to be forest-clad, but the growth of trees is more luxuriant on the western slopes of the mountain ranges and the interior plateau contains wide stretches of open grass-covered hills and valleys. The higher mountain ranges rise above the tree line, and merchantable timber is confined to the valleys and to the mountain sides to a limited height. While British Columbia has in the aggregate a vast supply of timber, the only timber that has an immediate market value is that which is near transportation. The percentage of this lost by fire must be appallingly large and unless active steps are taken to prevent this destruction, only a relatively small amount of the timber now standing will ever reach the market. So numerous are the fires in a dry season that the whole country side may be



CEDAR TREES (*Thuya gigantea*) IN STANLEY PARK, VANCOUVER, B.C.

(By permission of Dominion Superintendent of Forestry)

buried under a dense pall of smoke. In a dry season like last year the fire is apt to consume everything. Last summer Professor Brock climbed up a hillside through fine green timber and about a week later came down the same place wading knee-deep in ashes. Not a vestige of anything combustible in the soil had been left, the hillside was as bare as the bottom of an alkali pond. Lightning, camp fires, smudges, sparks from locomotives, fires started for clearing land, cause forest fires, and some are set deliberately to clear the land for prospecting. At present one of the most serious handicaps in combatting the fires is lack of organization. It seems to be nobody's business to put out fires. The cost of protective measures should not be excessive nor should it be any barrier where so much is at stake.

Mr. Jas. Leamy, Dominion Crown Timber Agent at New Westminster, described the fire ranging system in operation in the Railway Belt in British Columbia under Dominion jurisdiction, which has resulted in the saving of a great deal of valuable timber. Even during the dry season of last year the loss was comparatively small. This was accomplished by the work of only eight rangers over an area five hundred miles in length and forty miles wide. There is need for a larger number of rangers to adequately supervise this large tract. Hon. Hewitt Bostock, R. Jardine, of the British Columbia Mills Timber & Trading Co'y., and F. W. Jones, of the Columbia River Lumber Co'y., spoke in the highest terms of the work accomplished under Mr. Leamy, and expressed their readiness, as holders of timber lands in the Railway Belt, to pay their share of an increased expenditure for a protective service.

Dr. C. A. Schenck, of Biltmore, North Carolina, urged the necessity for basing forestry on business principles, and expressed his pleasure at seeing that in Canada the movement was backed by the business men. He was glad to see that they realized the importance and value of the question. Dr. Schenck also impressed the desirability of delimiting the forest and agricultural lands and the reservation of forest land by the Government.

The paper on "Forest Insects," presented by Revd. Thos. W. Fyles, of Levis, on Thursday afternoon, was exceedingly in-

teresting, and was well illustrated by a number of colored drawings of the insects described. Dr. Fyles' attention was first drawn to the subject of forest insects by their depredations in the woods of the parish in Quebec, where he was first settled. The careless tapping of the maple trees by a former proprietor of his land had made them the abode of horntails and beetles, while the brush and fallen trees of the surrounding woods were infested with many varieties of destructive insects.

Dr. Fyles divided the insects under two great heads, namely: biting insects, Mandibulata, and sucking insects, Haustellata. To the former class belong the borers in the tree trunks, the twig girdlers and the leaf devourers; to the latter, the cicadas, the scale insects and the plant lice. It is difficult to tell which of the two orders is more hurtful to vegetation. The insects which have come from foreign sources are the most to be dreaded. The larch sawfly that destroyed the tamarack of our northern forests is an example of this. The Gypsy Moth in Massachusetts caused an expenditure by the Legislature, in four years, of $275,000 in the effort to exterminate it. The Tent Caterpillars and Tussock Moths are well known insects, destructive to the leaves of trees. The white grub and the cicadas feed upon the roots of plants. The cicada is an interesting insect from its long sojourn underground, lasting from three to seventeen years according to the species, feeding upon the roots of trees. Its loud stridulations are one of the most characteristic sounds of the summer.

The borers do a great deal of damage to timber and as an evidence of the manner in which they may be transported from place to place, Dr. Fyles related the case of one which dropped from the frame of a door in his own house, after having survived all the processes of finishing the wood. It must not be supposed that nature has left these borers to multiply and work their will without a check. There are a number of ichneumon flies engaged in reducing their numbers. Insectivorous birds and predaceous insects under ordinary circumstances keep the spoilers within bounds. And man may give his assistance to the same end by, for instance, preserving the insectivorous birds.

Professor Roth emphasized the importance of a study of for

est insects, from the experience of the United States in the Black Hills Forest Reserve. There the trees were dying mysteriously. An investigation by the Government entomologist established that it was the work of an insect, and from his knowledge of its life history, he was able to suggest remedial measures, which have resulted in checking the destruction and saving a great deal of valuable timber.

Col. T. G. Loggie, of the Crown Lands Department, Fredericton, submitted a paper on "New Brunswick's Forests," which contained a great deal of interesting information about that province. The area of New Brunswick is 17¾ million acres, of which 7¼ are Crown Lands. The settled portions of the province are principally along the river valleys and coast line; the interior forming one vast timber preserve and embracing a territory eighty miles wide and one hundred miles long, without habitation of any kind save the lumberman's or trapper's shanty, and no sound except the ring of the woodman's axe or the call of the hunter. Here is a domain fairly free from the ravages of fire, and timbered with many kinds of valuable timber. The greater part of this territory is unfit for cultivation, lying mainly on the granite and boulder formation. Everywhere over this belt both black and white spruce abound, with some pine and vast quantities of hardwoods, that have scarcely been touched, also large quantities of the largest and finest cedars in Eastern Canada. In the district to the south and extending to the Bay of Fundy, the cut has been heavy and fires have done serious damage. In the effort to check forest fires, an Act was passed in 1885, but as the expenditure on a protective service is limited to $2,000 a year it has been impossible to do effective work.

One of the difficulties of administration has been settling or squatting on timber lands by persons who have no intention to make a permanent residence, but merely wish to obtain timber. One of the greatest needs is the separation of purely agricultural lands from those fitted only for timber growth. In this connection Col. Loggie indicated on a map of New Brunswick the district which it was desirable to immediately include in such a reserve.

Col. Loggie summed up his suggestions in regard to the for-

est policy of New Brunswick, under the following heads: (1) more effectual means for protection from fires; (2) the separation of timber lands from agricultural lands; (3) a carefully selected corps of foresters, permanently employed; (4) restrictions as to the cutting of undersized timber, and concluded as follows:—

"New Brunswick has yet a noble heritage in her forests. Let us then work together to preserve this heritage so that we ourselves and future generations may reap the benefits which nature has so lavishly bestowed. In conclusion let us not forget the old Scotch saying:—

"Be aye stickin' in a tree, it'll be growin' when ye're sleepin'."

Great interest was excited by the reading of a telegram received by the President from Hon. W. C. Edwards, in which it was stated that Sir Wilfrid Laurier wished to have a Forestry Convention in Ottawa, during the coming summer or autumn. A resolution expressing the gratification of the Association at this announcement, and its readiness to assist in the proposed convention was unanimously adopted.

The banquet tendered to the visiting delegates at the Chateau Frontenac on Thursday evening, by the members of the Association in Quebec, was an unqualified success, and hearty thanks were tendered to the hosts for their splendid reception. Excellent speeches were made in response to the toasts by representatives of the Dominion, the different Provinces and the United States. Perhaps the brightest remark was made by Monseigneur Laflamme when, referring to the paper on Forest Insects read earlier in the day, he stated that three very destructive bugs had not been mentioned, namely *Ignoratio communis, Indifferentia generalis and Influentia politica.* For the two former, education and public discussion are the remedies. For the last the Reverend Abbe had no specific to offer.

On Friday morning a paper on Forestry in Nova Scotia, prepared by Hon. J. W. Longley, Commissioner of Crown Lands, was, in the absence of Dr. Longley, read by the Secretary. The quantity of land available

for lumbering purposes in Nova Scotia has never been, and is not now, large. The Province itself is small and a considerable portion of it has been cultivated and improved. In years gone by the Government was in the habit of granting land for lumbering purposes outright to lumbermen at 40 cents an acre, and the grant was absolute and conveyed the fee simple of the land to the grantee. Most of the large lumbering concerns hold their lands in this way. In 1899 a system of leases was adopted, the term being twenty years, and the dues 40 cents per acre where the timber to be cut was restricted to a minimum of ten inches in diameter, and 50 cents where a minimum of six inches was fixed. These fees were doubled in 1904. Conservative lumbering has given good results in Nova Scotia, where the growth of spruce appears to be rapid, but forest fires have caused great destruction. A Fire Act was passed in 1883, but was ineffective until a Fire Warden Service was established last year. The Act has been brought into effect in nine counties and in these municipalities no fire of any consequence occurred during the last season though it was an uncommonly dry one. The Act provides that no bush fire shall be set without previous notice to the Chief Ranger and with his consent, and this part of the Act is being cheerfully complied with by all persons clearing lands in these municipalities. The question of the possibility of special work in reforestation and the setting apart of forest reserves are two matters which are receiving consideration at present. The extent of ungranted forest land in Nova Scotia is 1,516,631 acres.

Mr. J. C. Langelier's review of the "Forest Wealth of the Province of Quebec," was an able and exhaustive one, to which no summary can do justice. Mr. Langelier divided the forest region into the northern district, lying north of the 48th parallel and the St. Lawrence and forming the most important forest area, the home of the spruce; the central district lying to the north of the St. Lawrence River, in which the white pine ranks first in importance; and the southern district, south of the River. Calculating the revenue from the timber on Government lands in these districts at $420,000,000 at the regular rates of dues, Mr. Langelier gave a possible revenue of $4,200,000 for one hundred years. All the forests of Quebec are accessible by water except

those in the Abittibbi and Mistassini districts, and even for these Mr. Langelier sees an outlet by way of Hudson Bay to the prairies of the Northwest. The opinions of leading lumbermen were quoted to show the increasing value of all species of timber trees and particularly spruce. This is due partly to the demand from the United States, which is increasing and will undoubtedly continue to do so despite all calculations to prove the contrary. As to the time for which the present forests will last, a calculation is made which ranges from 25 years for hardwoods to 82 years for pine and 334 years for pulpwood. This does not take account of destructive or reproductive forces that may affect the consumption. Fire, indiscriminate settlement, unwise or unlawful cutting, waste in lumbering operations, the power of self-reproduction, and the extension of railways through the forest are in this respect factors of potent efficacy and deserving of the most serious consideration. If fire is allowed to continue its work of destruction, it will not be safe to extend the period for the duration of pine beyond fifty years. The spruce might last indefinitely if unfortunately the results that might be expected are not nullified by an irrational system of colonization, allowing settlement to take place in and destroy what are purely timber lands. The forest policy for Quebec Province at the present moment, as outlined by Mr. Langelier, is to protect the forests from fire and the inroads of timber pirates raiding the forest under the pretense of promoting colonization. All efforts should tend to organization against fire and the classification of our public domain into woodlands and farming lands with the view of securing free access to the latter by bona fide settlers. In the Province of Quebec in 1903 $50,000 was spent to protect from fire public buildings worth $3,000,000; $20,000 was spent to protect fish and game, which yield a revenue of $63,119; while only $17,000, part of which was paid by the lumbermen, was expended to protect the forests yielding a revenue of $1,241,814.

On Friday afternoon a trip was made to the Montmorency Falls and was much enjoyed. Here, as elsewhere, the visitors were impressed with the fact that the ability to entertain is one for which the good old city of Quebec can still well sustain its old time high reputation.

In the evening, an illustrated lecture by Dr. Judson F. Clark, Forester to the Ontario Bureau of Forestry, on "The Forest as a National Resource," and a talk by W. H. F. Addison, of Yale Forest School, on "A Forest School," were given in Morrin College Hall, before a good audience. Mr. Addison gave an interesting sketch of the work done in a forest school. Dr. Clark's lecture was an able presentation of the influence and place of the forest in the national life, and the appropriate illustrations made still clearer his well-sustained argument for dealing with it on large and broad lines.

The election of officers resulted as follows:—Patron, His Excellency the Governor General; Honorary President, Aubrey White; President, E. G. Joly de Lotbiniere; Vice-President, E. Stewart; Provincial Vice-Presidents, Prince Edward Island, Revd. A. E. Burke; Nova Scotia, Hon. J. W. Longley; New Brunswick, His Honour Lieutenant-Governor Snowball; Quebec, Hon. S. N. Parent; Ontario, The Commissioner of Crown Lands; Manitoba, Hon. J. H. Agnew; Assiniboia, His Honour Lieutenant-Governor Forget; Alberta, Wm. Pearce; Athabaska, F. D. Wilson; British Columbia, Hon. H. Bostock; Secretary-Treasurer, R. H. Campbell; Board of Directors, J. R. Booth, Hiram Robinson, H. M. Price, Monseigneur Laflamme, Dr. Robert Bell, Dr. Wm. Saunders, Thos. Southworth.

Thos. Conant, of Oshawa, Ont., an active member of the Canadian Forestry Association, died at his home on the 14th March last. Mr. Conant was well known as a writer, having published several works on pioneer life in Canada. He had done considerable experimentation in walnut tree culture on his property, and always took a warm interest in the work of the Forestry Association.

FORESTRY IN RELATION TO MINING.

By Professor J. C. Gwillim, School of Mining,
Kingston. Ont.

THE forests of the present and future are likely to be found in the rough places of the earth, such places as mountainous districts and the rocky thin-soiled regions, which at least afford refuge and nourishment for the hardy conifers.

It is in such districts that mines are largely found. A natural condition, not a coincidence, associates metallic minerals with rocky and mountainous places. In such districts, often inaccessible and undesirable from other points of view, the mines alone make a demand upon the forests. As time goes on the more accessible forests will be cut out and replaced by permanent industries. The land so won will seldom revert to forest, or be planted with trees. The last resource of the lumberman will be in the awkward places, such as surround mining districts. Here the axe and fire of the mining industry will have largely forestalled him.

The mining operations spare nothing above a few inches in diameter up to two feet; they lay tribute to the surrounding hillsides for lagging, stulls and sawn timbers. These are placed in the mines to support operations temporarily; they quickly rot, collapse, and are of no more use. The mine itself on the average is of only a few years' duration. The miner having robbed the forests above and the mineral below passes on leaving the wilderness to mend his destruction.

The nomadic tribes of Siberia are reported to consider mining a sacrilege and insult to the earth. To hoist its mineral treasures to the light of day, while casting its green trees into the dark passages of a mine, does seem a violence to nature.

Considering for a moment the demands of a large mine, producing say 100,000 tons of ore per annum. The cost in timbers is from 5 cents to 30 cents per ton of ore in Canada, or about one to two lineal feet of 12 inch timber per ton. At one lineal foot per ton this would be one million two hundred thousand feet board measure. This demand soon denudes the adjacent forests and calls

for importation. The Rossland Mines of British Columbia, for instance, bring in Douglas Fir from the adjacent State of Washington, at a cost of about eight cents per lineal foot for suitable timbers.

The addition of a mining town, lumber for flumes, ties for railways and tramways, considerably increases the draft upon the forest; for the mining industry is in its nature seldom permanent; hence wood is used for almost all structures. The careless fires of the associated prospector consume large areas of the forest. This burnt and standing timber for a time is well adapted to mining purposes, being seasoned and light, but who can time forest fires to meet the demands of the mines? Thousands of miles of half-standing, half-fallen trees may be seen in British Columbia. This burnt-over ground is recognized as helping the prospector to find minerals by reason of the bareness left by such fires. The exceeding dryness of last summer in British Columbia added greatly to the burnt areas, the forests burning from the valleys up to the timber line.

A tax of even five cents per ton for timber is more than many of the great mines can afford, the margin of profit being so small. Many expedients are used to avoid timbering; the excavations are allowed to cave in, or are filled with waste rock, at less expense. Amongst the woods best fitted to withstand the rapid deterioration in mines are the conifers, especially the Douglas Fir of the Pacific Slope, the Spruce, Hemlock and Mountain Tamarac (*Larix occidentalis*). These are the principal timbers of the Canadian mountains and some of the Western States. The last is a very fine tree, often two feet in diameter, without limbs for fifty feet. It appears to reach its best westwards of the East Kootenay Valley.

The Douglas Fir of the Pacific Coast is exported to the South African mines, as also the Eucalyptus or gum tree of Australia, and the Kauri Pine of New Zealand. All of these mentioned are resinous trees, best suited for the short life and duty of mine timbers; artificial preservatives are rarely used. Peeling some months before use is sometimes done with good results, as at the Le Roi Mine.

The main supply of props used in the Bankhead coal mines, Alberta, is derived from burnt standing spruce and Banksian pine. This still affords good material after over twenty years without life, but much is fallen and completely rotten.

The Crow's Nest Collieries, B.C., are using up their burnt timber with economy, endeavouring as much as possible, to take the earliest burnt first, and use up each generation before it decays.

It is commonly stated that timber at the upper altitudes is apt to break short, to be brashy. This may be due to the less regular grain and growth at these places. Mr. E. R. Noakes, a mining engineer, at one time in charge of the Espirituo Santo Mine at Darien, gives countenance to the prevailing opinion in that country that the phase of the moon at time of cutting affects the rotting of mine timbers. The waning moon was considered most preservative.

The conifers are naturally found in places where mining is also found. They furnish light, easily-worked material, and last as well as any need.

In the annual address of Mr. F. C. Whitman, the President of the Board of Trade of Annapolis Royal, the following statement is made in regard to the protection of the forests from fire:

"There is now a well established body of men under the supervision of a chief fire ranger in Western Nova Scotia; and the loss by forest fires this past year has practically been nil, as compared with an actual loss in our County of Annapolis in the previous year of $150,000, and proportionate losses in other counties. There is to-day a marked increase in the values of timber lands, in part at least caused by the better protection now afforded."

Canyon on Pelly River. Poplar and spruce on slopes and benches.

Pelly River. Groves of White spruce on Alluvial Flats.

FORESTS OF THE YUKON TERRITORY.

By J. Keele, Geological Survey,
Ottawa.

THE following note refers to that portion of the Yukon Territory, situated between the Pelly River on the south, and northward to the McQuestion River.

The forests of this district consist of only about eleven species which attain the dimensions of trees. These are the white spruce (*Picea alba*), the black spruce (*Picea nigra*), the balsam fir (*Abies subalpina*), the balsam poplar (*Populus balsamifera*), the aspen (*Populus tremuloides*), the black pine (*Pinus murrayana*), three species of birch and some species of willow. The varying conditions under which these trees grow greatly affect their size and distribution.

The white spruce is the most widely distributed and the most useful tree in the Yukon Territory. It makes a fair quality of lumber, which is used for various purposes by miners and prospectors. Huge quantities of white spruce are made into cordwood and piled at intervals on the banks of navigable rivers as fuel for steamboats. Thousands of cords in sixteen-foot lengths are floated down the Yukon, Stewart and Klondike rivers every autumn to Dawson to be used as firewood. The white spruce is seen at its best on the islands and alluvial flats of the main rivers, where they form fine groves of merchantable timber, easy of access to the lumberman. The size of its general growth on these flats is from eight to twenty-four inches, and individuals frequently attain a size of thirty inches in diameter at the butt, and logs sixty feet long, with a diameter of one foot at the smaller end, can be obtained. Up the slopes of the valleys, the white spruce, under favourable conditions, will continue to be a very fine forest tree. These conditions are, a sufficient depth of finely-divided loose material, and gentle slopes facing the direction which will allow the trees to receive the maximum amount of sunlight.

During the months of June and July the length of the day

over the district referred to, is from twenty to twenty-two hours, and the spruce in favoured situations, attain a considerable size, even at altitudes of 2,000 feet above the valley.

On slopes facing north and in the smaller and shaded creek-valleys and gulches, the spruce forest consists of poles from four to eight inches thick.

The black spruce is abundant on the swampy portions of the valley bottoms, and on moss-covered slopes facing northward. This tree has a tendency to fork at the top, and seldom grows to a large size.

At the headwaters of streams, i.e. the low broad divides, which are characteristic of portions of the district, the black spruce often forms large groves. This upland plateau country generally contains a few small lakes which are kept full by rills formed by the constant thawing of the ground during the summer months.

The pine of the district is not an important forest tree; it has a limited range and is much smaller than the white spruce, the general size being from four to six inches; it is seldom seen larger than nine inches in diameter.

It grows in thin groves upon the dry benches which border the Lewis, Pelly and MacMillan rivers, at a height of from forty to 300 feet above the streams.

The northern limit of the pine in the Yukon valley is at the mouth of the Pelly river, but in the country to the east of the Yukon, it extends farther north. From the McMillan river it extends by way of Kalzas Valley northward towards the Stewart. North of the Stewart, small groves of pines were seen by the writer in the valley of Mayo river above Minto creek and on the shore of Mayo lake. This is the most northern occurrence that has been observed. The eastern limit of the pine was observed on the MacMillan river, about fifty miles up the south fork.

Next in importance to the spruce is the balsam; this tree is never seen on the river flats of low elevation, but occurs on high valley bottoms and on the mountain slopes. It seems to thrive best at an elevation of about 1,200 feet above the valley; it occasionally grows as large as eighteen inches in diameter. It de-

creases in size below and above this elevation, and becomes distorted and scrubby at tree line.

Between the Pelly river and the north fork of the McQuestion the timber line has been variously estimated at from 4,200 to 4,700 feet above sea level. In these localities the only tree represented was the balsam, the spruce generally disappearing a few hundred feet below.

In the Klondike district, timber line only reaches an elevation of 3,500 feet above sea level. The last tree seen here is the spruce, balsam being altogther absent.

The poplar (*Populus balsamifera*) grows on the islands and alluvial flats of the main rivers; it occurs mixed with the spruce, or in thin fringes along the gravel bars, and in small forest groves. It is seen in all stages of growth from a small shrub to a considerable forest tree. It gives out an agreeable and refreshing odour during the early summer; it is also known as the "balm of Gilead."

The aspen is specially characteristic of dry, open grassy hillsides facing southward, of which there is a great extent on the Yukon, Pelly and Stewart valleys.

The birch in the Yukon Territory never forms extensive groves, but grows singly or in small groups with the black and white spruce. Most of the birch is small, being mere poles, but one species (*Betula resinifera*) sometimes attains a diameter of eight or even ten inches and is valuable for stove wood.

The willow, being the principal food of the moose, rarely attains the size of a forest tree, but occasionally willow trees are seen in the neighborhood of old Indian villages.

In the spruce forests of the valleys, dry willow trees are found entangled in the living spruce in great quantity. These willows are often three or four inches in diameter and ten to twenty feet high. They evidently protected the spruce seedlings but were finally overshadowed by them. This supply of dry wood is of great benefit to the voyageur as it ensures a good camp fire in wet weather and during winter travel.

The most widely distributed shrub is the dwarf birch (*Betula glandulosa*), it grows densely on portions of the mountainous

slopes, and reaches above timber line. The miners call this shrub "buckbrush." The moose sometimes eat it when they cannot obtain willows.

Along the river banks the alder, willow and brier-rose are abundant.

Generally speaking, travelling on foot is easy through the forests of the Yukon. There is not the dense growth so often encountered in the north and east.

The thin growth is probably due to the permanently frozen ground just below the forest floor. The tree roots are unable to strike down, and the trees, as they grow taller, are compelled to buttress themselves against wind pressure by the spread of their roots. As the roots spread over the surface, only a limited number of trees can exist on a given area, and the weaker trees decay for lack of sufficient nourishment.

In the Klondike district, Professor Macoun has observed that trees on southward-facing slopes, at a height of 1,500 to 2,000 feet above Dawson, are not only better grown and larger but also have roots which strike deeper than trees of the valley flats. He explains that this is due to the sunshine not being cut off from this elevation by the hills on the opposite side of the valley as it often is on the valley bottom, and as a result of this a deeper layer of loose material is thawed out on the higher elevations.

Considerable forest fires occurred immediately after the influx of gold seekers in 1897 and '98, and since then fires have been frequent every summer. Most of the fires were due to careless and inexperienced campers; many are due lately to miners who take no precaution against the spreading of fire when clearing their claims.

A serious disadvantage on many gold-bearing creeks is the scarcity of water for mining operations. This is sometimes the result of burning the forest covering and moss on the headwaters and slopes above the stream, so that the moisture is no longer conserved and sent down the hillsides in a steady supply during the summer. Landslides sometimes occur on hillsides as a result of forest denudation, especially on slopes where the rock waste

or gravel has a matrix of clay. This material thaws out rapidly when deprived of its covering of moss and trees. When thawed to a certain depth, masses of the loose material are apt to slip into the creek bottom and interfere with mining operations.

Indians were apparently quite numerous in this district long before the coming of the white man. Vestiges of ancient camps are often met with in various parts of the district where there is not one recent sign. It is probable that the Indians burned large areas of forest for hunting purposes, for in the clearings thus made the moose is easily seen and stalked. The Indians are now few in number and hunt over very limited portions of the districts.

Early in September, the leaves of the poplar, birch and willow turn to an almost uniform tone of golden yellow, and a simple colour scheme of green and gold continues for a few weeks.

Mr. J. C. Hallman, of New Dundee, Ontario, writes urging that action should be taken by the Canadian Forestry Association to elaborate some system for remedying the evils of overclearing, which he states are so plain in Western Ontario, that people are getting alarmed at the situation, and are asking for remedies. Mr. Hallman has taken this for a subject at Farmers' Institutes for some years, and finds that a great deal of interest is taken in it and that it raises a great deal of discussion. He considers it the greatest question that older Ontario has to solve in the near future.

The Ontario Government, through the Agricultural College, are taking steps to meet this issue, but it is to be regretted that the larger problem of the lumber industry, has somewhat overshadowed this equally important one in the deliberations of the Canadian Forestry Association.

CARE OF STREET TREES.

Roland D. Craig, F.E., Dominion Forestry Branch.

THE attractiveness of a town or city depends very largely upon the trees planted along its streets. They are among the first things which a stranger notices in formulating his impressions as to whether it is a good place to live in or not. One does not need to be a lover of nature to appreciate the refreshing shade of a row of trees along the sidewalk on a hot summer day, or the protection afforded from the cold winds in winter. What a relief and rest the weary eyes find in the verdure of a plantation of trees after the glaring pavements and shining windows of a bare street. Trees, by transpiring through their leaves large quantities of moisture and by the coolness of their own bodies, exert an important influence in reducing the temperature in summer. They also exert a beneficial influence by absorbing poisonous carbonic acid gas from the air, and giving in return pure oxygen for the use of man.

Though one of the most important factors in making the life of urban populations healthy and happy, the trees of our streets, as a rule receive very little consideration on the part of municipal authorities. In many cases the planting and care of the trees is left to the individual citizens, in front of whose property the streets run, and in few places are men trained in tree culture employed to look after this important work, and for this reason many well meant efforts result in failure. It is the object of the writer to point out briefly a few of the mistakes commonly made in the management of street trees, and to make some suggestions which may be of use to those who are interested in this work.

Lack of Uniformity.

The appearance of many of our streets is spoiled by a lack of uniformity in planting, especially where it is left to the individual property owners. One man plants elms, the next maples, the next horse chestnuts and probably the next two none at all, so that all order and harmony is lost and it results very frequently in the slower-growing trees being suppressed by their neighbors

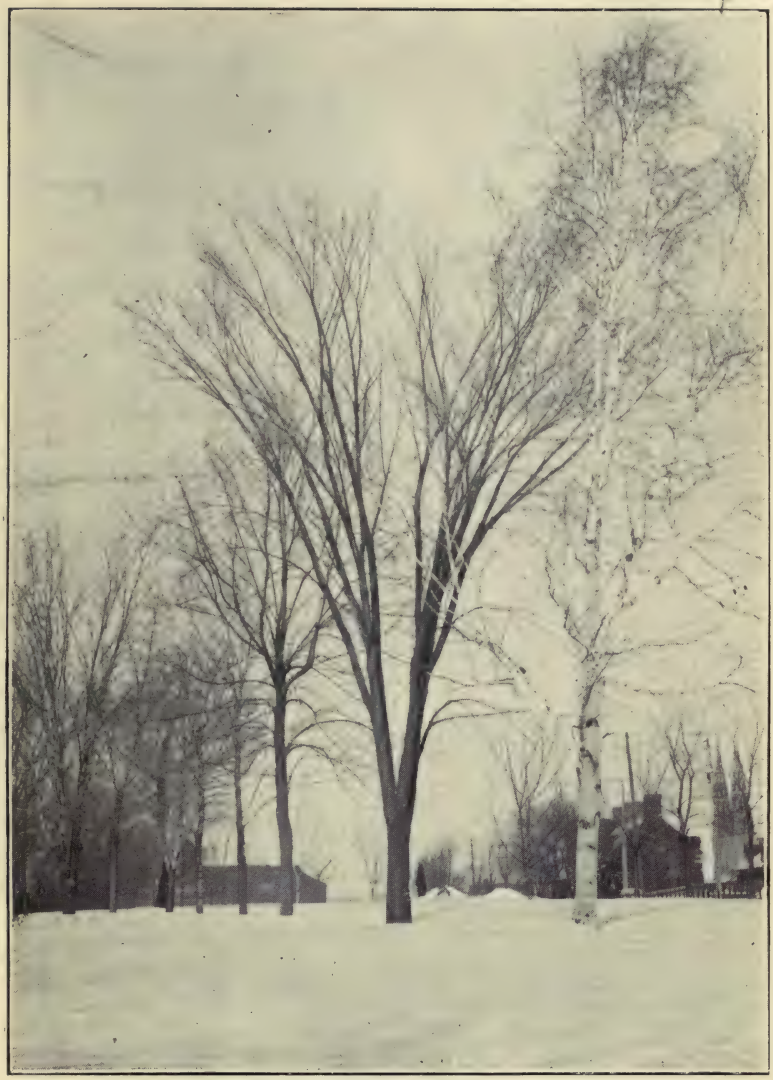


FIG. 1—A Mixed Row, showing different habits of growth of Birch, Elm, Ash and Maple.

At tree line on hills near Stewart River.

overtopping them. For the best landscape effect and for the best development of the trees themselves it is advisable to use only one species on a street.

Uniformity should also be secured in the distance apart at which trees are planted, and they should be as nearly as possible even sized. In Washington, they keep in the city nursery trees of all sizes, so that when one dies on the street it is replaced by one of equal size. This practice can be followed profitably only while the trees are comparatively small, as the transplanting of large trees is very expensive.

Selection of Species.

In selecting species of trees for street planting regard should be given to their different habits of growth, light, air and water requirements. Where the streets are narrow, smaller more upright trees, such as the Norway maple or cottonwood should be selected; on wide streets, the tall elm, with its spreading crown, the sugar maple or the linden are better adapted. On high, dry situations species which require less water, such as the scarlet oak or horse chestnut, thrive better than elms or maples. The horse chestnut seems to withstand smoke and other injurious gases better than other species.

Selection of Planting Stock.

It is of the greatest importance to secure thrifty well-developed stock for planting. Too frequently the young saplings are just dug from the woods, their roots chopped down to a convenient size, and the top cut back, so that the shape of the tree is spoiled for a time. Every tree which is to be planted on the street should be grown in a nursery and transplanted several times, so that the roots will be trained to grow in a compact form, before being finally placed on the street. In the nursery too, by judicious crowding, straight, tall and clean trunks can be developed, thereby lessening the amount of pruning necessary in after life.

Too Close Planting.

One of the most common mistakes made in street planting is placing the trees too close together, so that their crowns do

not develop symetrically and the vigor of the trees is impaired. Thirty to thirty-five feet is close enough to plant large trees, like the elm, hard maples and lindens; horse chestnuts, cottonwoods and box elders, may be grown closer together. It is sometimes advisable to plant quick-growing trees, such as the cottonwood or box elder, between the elms or maples, in order to fill up the spaces while these trees are young, and to secure the benefit of the shade as soon as possible. These trees should, however, be removed before they interfere with the permanent trees.

On paved streets the trees suffer greatly from lack of air and water, and it is advisable to leave at least three feet all around the base of the tree unpaved, so that air and water may reach the roots. Another thing to bear in mind when planting is to place the trees out of reach of horses standing at the curb. A great many of our trees are injured by horses biting off the bark or rubbing against the tree. It is better not only on this account, but on account of the larger feeding surface the roots are able to reach if the trees are set between the sidewalk and the private grounds rather than outside the sidewalk. Until the trees are 8 to 10 inches in diameter, they should be protected by wire tree guards.

Pruning.

Pruning is a necessary evil in the care of street trees. On the street trees are in an unnatural environment, and with the abundance of light and air tend to develop too much crown for the usually scant plant food supply. The liability of these more or less isolated trees to injury from snow and ice pressure and from wind, also makes it advisable to so guide the growth of the crown that there will be as little danger from these sources as possible. With this in view it is wise to preserve well defined central axes in trees like the birch, maple and ash, which naturally possess such and in the elms, which normally assume a vase form, large horizontal branches should be prevented from developing and the crown should be supported by three or four main branches grown as nearly vertical as possible.

Start Pruning Early.

Pruning should be commenced when the tree is young and the branches small, so that the necessary amputations will be small.

Heavy pruning, such as shown in Figs 2 and 3, seldom results in anything but a brush-heap of a top or a stunted and weakened tree.

Leaving Stubs.

The most pernicious practice in pruning as it is usually done is the leaving of short stubs of branches, which, deprived of communication with the leaves, die and remain as decaying plugs of wood in the trunk, from which rot soon spreads to the heart of the tree, and not infrequently results in the death of the tree. All amputations should be made flush with the wood of the stem so that the wound can be readily grown over with new wood, and the surface should be perfectly smooth to prevent water carrying disease germs from lodging in the irregularities and starting decay. The danger from decay may be almost entirely eliminated by applying a coat of coal tar on the wound immediately after the cutting. This disinfects the surface and prevents water from soaking into the wood. Other substances, such as white lead or ordinary paint may be used, but coal tar is much the best.

When heavy pruning is necessary and it is desirable to guide the branching by leaving short branches, as in Fig 3, small leaf bearing branches, called sap-lifters, should be left at the end of the stub to keep up the circulation of sap and thereby prevent the death of the stub.

Time for Pruning.

Pruning, if carefully conducted, may be done at any time of the year, but in the fall after the leaves have fallen is the best time as a rule. At that time it is easier to see the arrangement of the branches. You secure also the full season's work of the leaves in storing up food material, and all the benefit of the rapid spring growth in healing over the wounds and in the production of desirable branches.

Treatment of Decayed Spots in the Trunk.

The life of a tree may often be saved even when decay is quite well advanced by first removing carefully all decayed wood, then painting the surface with coal tar to disinfect it, and if there is a cavity it should be filled up with cement, much as a dentist

would fill a tooth. The wound will as a rule heal over, enclosing the filling, and the tree will be practically as healthy as ever. This practice is followed in treating the live-oaks in California with great success.

Cleaning.

All dead branches should be removed without delay for, if left on the tree, they act as centers from which decay will spread.

To recapitulate what has already been said—plant uniformly with good thrifty nursery stock of the species best adapted to the situation; plant the trees far enough apart to enable each tree to reach its highest development ; prune systematically and carefully, paying particular attention to the removal of all stubs and dead branches which are liable to act as starting points for decay; disinfect all wounds with coal tar.

The following note is from the American Forestry Quarterly:—

Austria's total forest area is about 24,000,000 acres, of which hardly eight per cent belong to the State, but altogether over 10 per cent. are under State administration. Private forests comprise over 14 million acres, and the remainder is owned by communities and institutes. The proportion of coniferous, deciduous and mixed forest, is about as 6 to 2 to 1.8. The average annual accretion is 46 cubic feet per acre for the timber forest, with 20 per cent. work wood. 3,571 foresters and 27,000 rangers are employed. Day wages for men at planting work vary from 24 cents to 80 cents in one region, from 65 cents to $1.25 in another region. In Austria, besides a great variety of wood consuming factories, there are over 61,000 sawmills and 253 pulp mills, the latter using over 400,000 cords of wood.

FIG. 2—A Young Maple. The form has been spoiled and the life blighted by careless cutting of the main stem.

FIG. 3—Elm pruned too severely. The life is endangered by leaving stubs of branches.

FIG. 4—Elm pruned too severely. The form is permanently spoiled.

THE AMERICAN FOREST CONGRESS.

THE Forest Congress held at Washington, 2nd to 6th January, 1905, is one of the most important steps in the history of the forestry movement in the United States which has been taken in recent years, and its significance is well summed up in the following paragraph from the address of the President of the United States, at the session held in the National Theatre, on Thursday afternoon :—

" The great significance of this congress comes from the fact that henceforth the movement for the conservative use of the forest is to come mainly from within not from without; from the men who are actively interested in the use of the forest in one way or another, even more than from those whose interest is philanthropic and general. The difference means to a large extent the difference between mere agitation and actual execution, between the hope of accomplishment and the thing done. We believe that at last forces have been set in motion which will convert the once distant prospect of the conservation of the forest by wise use into the practical accomplishment of that great end; and of this most hopeful and significant fact the coming together of this congress is the sufficient proof."

The delegates, to the number of about four hundred, came from all parts of the United States and Canada also had a good representation. There were present scientific and literary men, business and professional men, those interested practically and those whose interest was theoretical, and ladies also were noticeable in goodly numbers.

The attendance at the sessions of the Congress was well sustained throughout, the hall of the Armories, which will seat an audience of four hundred, being filled on all occasions. The special features of the programme, which illustrate the above quoted statement from the President, were the addresses and papers from leading lumbermen, railroad representatives, mining engineers and other prominent business men.

The opening Session was presided over by Hon. Jas. Wilson,

Secretary of Agriculture, in whose Department the Bureau of Forestry is located. Mr. Wilson, as President of the American Forestry Association, by which the Congress was convoked, gave the delegates a hearty welcome, and pointed out the great significance of the Congress, a body of men representing great and varied interests, gathered together to discuss temperately and farsightedly the policy and the methods under which the highest permanent usefulness of the forest can be maintained. As Mr. Wilson pointed out: the extension of railroads, the settlement of the public domain, the building of cities, towns and villages, the use of wood in paper making and the opening of the mines call for more wood every year, and the forests respond to the demand. There are only a few large reserves left from which to draw supplies. The extreme east, the extreme west, and the Gulf coast are now the sources of commercial supply. The industries of the country will be carried on at greater expense as wood becomes scarcer, and the substitutes become dearer. Agriculture, commerce and mining will greatly miss the cheap supply of wood to which they have been accustomed.

The Report of the Board of Directors of the American Forestry Association, presented at this Session, gave a resume of the present position of forest legislation in the United States, and some points may be noticed particularly with such additional explanations as may be necessary to make the subject clearer to Canadians.

The Forest Reserves of the United States now number sixty-one, and embrace a total area of 63,348,656 acres. The policy of selling the mature, dead and down timber in the reserves, has been adopted, and during the past year 377 sales were held, realizing $58,000. These sales, combined with the privilege allowed settlers to take without cost, for their individual use, timber from the Forest Reserves for domestic purposes, have resulted in clearing the reserves of much dead and down timber, and in every way improved their condition. The forest rangers in the reserves have done excellent work in preventing fires. The grazing privileges in the Forest Reserves are of special value in the west, especially where sheep are grazed, and where the highlands included in the reserve are required for summer range. Excessive

numbers of sheep and careless methods of herding had done much injury to the forest lands, and the matter is now controlled by permit, no stock being allowed to graze in the reserves except by special authority from the General Land Office. Last year 843 permits for 1,806,722 sheep were granted on twenty reservations, and 5,822 permits to graze 610,091 cattle and horses in 48 reserves.

A peculiar feature of the administration of the reserves is that the survey work is carried out by the Geological Survey, the control of the lands is in the General Land Office, while the forest experts are in the Bureau of Forestry. The latter Bureau can assist in the management of the reserves only as called on by the Land Office. Consolidation of the administration is therefore urged, and a resolution supporting it was passed by the Forest Congress. This has since been carried into effect by Congress.

The administration by the Federal Government of forest lands which have not been included in reservations has never been placed on any logical or sound basis. In 1831 Congress made it a felony to cut or remove timber from public lands without due permission, but homesteaders had the right to use the timber on their land for domestic purposes, and miners had the same right for individual necessities. Timber dealers who trespassed were required, if detected, to pay stumpage or the timber was seized. In 1878 came the much-quoted Timber and Stone Act, by which timber land unfit for cultivation or land valuable for stone only, in California, Oregon, Nevada and Washington, might be sold to citizens at $2.50 per acre, but not more than 160 acres to one individual or company. It was also provided that timber or mineral lands might be taken for domestic purposes by residents in Colorado, Nevada, New Mexico, Arizona, Utah, Wyoming, Dakota, Idaho or Montana. The Homestead Act provides for a free grant of 160 acres after five years' residence, but this may be commuted at the end of six months on proof of residence and cultivation and the land purchased at the legal rate. There being no direct method for the lumberman to obtain the timber the two acts mentioned were used for this purpose, and of necessity resulted in fraudulent methods, the employees of the lumber firms and others being used as dummies.

The report urged the consolidation of the forestry work in the Bureau of Forestry, and the repeal of the Timber and Stone Act, with the substitution of an Act providing for the sale of timber by public competition.

After the preliminary business of the first morning's session was disposed of the Congress took up the consideration of the Importance of the Public Forest Lands to Irrigation. In the Western States, as in part of Western Canada, there are large tracts of land that depend for their agricultural possibilities on a supply of water for irrigation, and the sources of supply in the Sierras and the Rocky Mountains are largely controlled and regulated by the forests growing upon them. This intimate relation is felt by the people of the West, and the subject was introduced by the Secretary of the National Irrigation Association, who voiced an urgent demand that the wholesale destruction of timbered watersheds should be prevented, and that action should be taken to reforest lands where the value of the water supply would warrant such a step. Another question of interest to the West was grazing in relation to the forest reserves which was dealt with by representatives of the Stock Association. Cattle and sheep are allowed to graze in the forest reserves under permit and special instructions. Investigation of the ranges has shown that damage caused by live stock is usually due to over-stocking, grazing too early in the season, or the manner in which the stock is handled, all of which can be directly charged to the previous lack of any system of management rather than to the sheep and cattle.

The Lumber Industry and the Forest, the next subject brought before the convention, was given over into the hands of the lumbermen and the Lumber Associations. Three lumber companies were represented by their Presidents or Vice-Presidents in the list of papers presented, and as many of the Lumber Manufacturers' Associations were also heard. This session was presided over by Mr. N. W. McLeod, President of the National Lumber Manufacturers' Association. From all came a strong declaration of the interest of the lumbermen in forestry, and at the same time a statement that this had not always been their attitude. The change has been due to two causes specially. First, to a clearer understanding by the advocates of forestry

methods of the elements, and especially the economic element, involved in forest management and consequently a more sympathetic attitude toward the lumberman. And, second, the increased value of forest products and timber stumpage, impressing upon the lumbermen that all the value of his timber holding does not rest in the present, but that it is to his advantage to take measures to preserve and perpetuate the forest. The lumbermen are therefore desirous of obtaining all possible information which will assist them in attaining this end, and are prepared to receive light from foresters or from any other source. The supply of hardwoods for manufacturing purposes is also giving the manufacturing establishments concern and they too added their voice in urging consideration of the future resources.

The Railway Companies had the floor on Thursday morning under the Chairmanship of Mr. Howard Elliott, President of the Northern Pacific Railway Company, and three of the papers were by representatives of other railway companies. The railways use large quantities of timber in connection with the equipment of their lines, their total annual consumption for the United States being probably three billion feet, which would mean the denuding of about one million acres or the annual product of fifty million acres. Ninety million ties are required annually. The railways see the sources of supply steadily diminishing, while the prices and their requirements are as steadily increasing. They therefore ask the question: How can the demand be met? The Pennsylvania Railroad has made an attempt to answer it by planting trees along their right of way and other lands held by them. The situation may also be helped by preservative treatment to increase the life of the timbers used. This may mean a doubling or quadrupling of the period of use of a tie, while the addition to the cost is small. A red oak tie lasting five years and costing forty cents, may be treated at a cost of sixteen cents, so as to double its life and make it equal to a white oak tie, costing, untreated, eighty-five cents. Experimental work in this line is being done by the Bureau of Forestry.

In addition, the Relation of Forestry to Mining was considered, and thus the practical and business aspects of forestry and its relation to other great industries were discussed and empha-

sized by the representatives of these industries. It was a significant fact of the Congress that leading men in railway organization, in lumbering and manufacturing enterprises, were prepared to come to such a meeting and give time and thought to the consideration of the forest supply, and showed more clearly than anything else could do the demand and the reason for the movement which the Congress represented.

The meeting held in the National Theatre, which was presided over by Hon. Jas. Wilson, was an effort to reach a wider constituency than could be influenced by the regular meetings of the Forest Congress. An address by President Roosevelt was sufficient to attract an audience that filled the theatre. The President is not an orator, but he is a clear, forcible speaker, evidently earnestly seized with the importance of the question with which he is for the moment dealing and desirous of driving its truth home to the minds of his hearers.

"The producers, the manufacturers, and the great common carriers of the nation had long failed to realize their true and vital relation to the great forests of the United States, and forests and industries both suffered from that failure. But the time of indifference and misunderstanding has gone by."

"No man is a true lover of his country whose confidence in its progress and greatness is limited to the period of his own life, and we cannot afford, for one instant, to forget that our country is only at the beginning of its growth. Unless the forests of the United States can be made ready to meet the vast demands which this growth will inevitably bring, commercial disaster is inevitable."

"If the present rate of forest destruction is allowed to continue a timber famine is obviously inevitable. Fire, wasteful and destructive forms of lumbering and legitimate use, are together destroying our forest resources far more rapidly than they are being replaced."

Such were some of the statements in which the President expressed his views of the situation. But the anomaly, at least to those used to a British form of government, is that, no matter how strongly the executive may consider a certain course advis-

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able, it does not necessarily follow that that will have any effect on legislation, and in fact in regard to the defects in the organization of the forest service and in the forest laws that urgently require remedy, the government is helpless until Congress is prepared to act.

M. Jusserand, the French Ambassador, at this meeting, gave one of the best addresses of the Congress. He described the forest as the great friend which supplied the early wants of mankind, giving the first fuel, helping to the rearing of the first real house. And, now, after the lapse of thousands of years, the forest continues the great friend, so adequate is it to our wants. The forest has proved itself a friend to France in reclothing the bared and wasted mountain sides and rescuing the fertile lands of the valleys from destruction, in restraining the destructive power of the winds, in stopping the advancing flow of that great sea of sand from the ocean, which engulfed farms and towns and threatened to make the country a desert. To quote M. Jusserand's own words:—

"The importance of such plantations (i.e. forest plantations on mountain slopes) is more and more apparent. We see destruction and poverty invade the parts where they have not been observed; wealth and comfort grow in those where the rules have been observed. Where there is a just proportion of forest ground, the temperature is more equal, the yielding of water springs more regular, and observations in the south of France have shown that, since the Esteral has been reforested the destruction caused by that terrible wind, called the Mistral, has diminished. The sea coasts of France were being gradually invaded by the sand, and the wind carried the death powder farther inland as years passed on. In 1810 we tried forestry, and the forest showed itself, as usual, the friend of man; the sand country has entirely disappeared, as well on the ocean as on the channel, and the desolate regions of yore are now wealthy, pleasant ones, where people even flock for their recreation and their health."

The size of the Congress resulted in one defect, that it was difficult to carry out a discussion of practical problems. This was partly met by a series of lectures to forestry students, follow-

ing the week of the Congress, and by other smaller conferences, two of which were held at the Shoreham, the headquarters of the Canadian delegates. The disposal of slash after lumbering operations, was one of the questions discussed. Mr. Pinchot stated that from investigations made in the Cache Lake Reserve the Bureau of Forestry had found that the burning of slash could be done at 25c. a thousand. Dr. Schenck, however, pointed out that with a stand of 5,000 feet to the acre, this meant for an area of 200,000 acres an expenditure of $250,000. which was equal to an annual expenditure of $14,000, and he therefore concluded that it would be better to put the money into providing a fire preventive service. The expense and the danger from careless handling of the fire seemed, in the general opinion, to render this method of disposing of the slash inadvisable, though the question was still left an open one. In California slash burning is viewed with favor. A delegate from that State mentioned, that on one tract of 30,000 acres, where cutting had been carried on for eight years, the slash had been burned along the road, or on about 1,000 acres, at the rate of 12 cents per acre.

Canada was well represented at the Congress, those present being Dr. Robt. Bell, Professor John Macoun, Dr. Jas. Fletcher, E. Stewart, Norman M. Ross and R. H. Campbell, Ottawa; Aubrey White, Dr. Judson F. Clark, Dr. A. T. Drummond, J. H. Faull, Toronto; G. Y. Chown, Kingston. Professor W. N. Hutt, now of Maryland Agricultural College, formerly of Toronto, was also present. Mr. White addressed the Congress at the opening session, giving greetings from Canada, and explaining the methods of timber administration in the Dominion. Mr. Stewart also spoke of the forestry work in the West and invited members of the Congress to attend the annual meeting of the Canadian Forestry Association to be held in Quebec.

GROWING DEMAND FOR FOREST TREE SEEDS.

THE Forestry Branch of the Department of the Interior has frequently been asked by nurserymen, both in America and Europe, and also by private individuals, as to where various forest tree seeds can be purchased in quantity in Canada.

The Canadian white pine is becoming more and more widely planted in European forests, greatly increasing the demand for this kind of seed. The quality of the American seed seems better than of that gathered in Europe and is claimed to produce stronger and healthier stock. The jack pine (*Pinus banksiana*) also seems to be in great demand during recent years, the seed in Europe selling for a very high price compared to that of other conifers.

The seeds of both these varieties can be secured with little trouble, and the demand seems to be rapidly increasing, both at home and abroad. One German firm writes that they require annually from one to two thousand pounds of white pine seed, the price paid per pound, cleaned, being generally 50c. An American nurseryman also makes enquiry for 200 pounds of the same seed.

The usual method of obtaining seed from the thinner-scaled cones such as white pine and white spruce, is to gather the cones just as soon as the seed is ripe which can be determined by cutting open the cones. If ripe, the seeds will be filled with firm, white meat. The seed is generally ripe some weeks before the cones appear to be so, and if left too long is liable to be lost, as on hot days the scales open as soon as they become dry and allow the seed to drop out.

After the cones are picked they should be spread out in the sun, when they will gradually open. This process is hastened if the cones are put under glass frames similar to those used on hot beds. The seed is easily extracted by vigorously agitating the cones for a few minutes. The seed is finally cleaned by separating it from the wings by passing it through a kind of fanning mill.

The cones of Banksian and other thick-scaled pines require a considerable amount of heat before they will open sufficiently to permit the escape of the seed. The jack pine cones have to be subjected to a heat of from 120° to 140° Far. for from two to four hours, when the seed can be easily shaken out.

There seems to be an increasing interest throughout Canada and the United States in the matter of forest plantations, which is bound to create a market in the near future for all classes of seedling forest trees. There is no better source from which a supply of these seeds can be obtained than Canada. All the varieties which are of most economic value are native here, and from the geographical situation of the forests, Canadian seed should produce a much more desirable quality of stock than can be raised from that collected farther south.

It will without doubt pay our Canadian seedsmen to devote some attention to this branch of the seed business, which if carried on under a proper system, should develop very rapidly, especially in connection with supplying the demand in European countries.

This season an important extension is being made to the work of the Forestry Branch, by commencing a systematic study of the forests in the Dominion Forest Reserves. This summer a field party, under the supervision of Mr. R. D. Craig, will be at work in the Turtle Mountain Forest Reserve, and probably later in the season in the Moose Mountain or Riding Mountain Reserve. The object is to ascertain the extent of forested and burned areas, the quantity of standing timber, and the silvicultural characteristics of the various species of trees found there. This latter will include a study of the rate of growth by stem analyses, and a study of the reproduction under different conditions of soil, exposure, seed trees. It is expected from the data collected to be able to establish regulations for cutting so that the forests may be improved rather than destroyed by use.

NOTES.

Mr. Geo. D. Mendell, of Victoria, Australia, writing in the Bendigo Independent, makes an urgent appeal to the Australians to take up the question of forest preservation. Mr. Mendell visited Canada recently and evidently has a high appreciation for what has been done here, as he holds Canada up to the admiration of Australia as a shining example of progress and intelligent foresight. As it is rather pleasant to be represented in this role and it may strengthen the interest in the question of forestry to know how others look upon what we are doing, a few sentences from the article may be uoted. Mr. Mendell says:—

"It is only about six years since the Canadian Government woke to the fact that one of its most valuable assets, its timber, was being prodigally wasted. Ever alert to the possibilities and future of trade, in which respect Canada imitates America and supplies Australia, and especially Victoria, with an admirable object lesson, the Government established a Forestry Department and passed laws to make its work effective. The Canadians regard forestry as the foster mother rather than the handmaiden of agriculture, and the puzzle to the observer, unconnected with either science, at first sight is that forestry is not considered the equal, the peer of agriculture, and just as carefully studied in an agricultural community like Victoria."

Mr. Mendell also refers to the Canadian Forestry Association, and urges the organization of a similar society in Victoria.

"There are, as you know full well, two great classes of forests and no more. There is the wild forest and there is the civilized forest. People who know forests only through books, I mean through bad books, not the books written by members of this assembly, fancy that the wild forest is the thing. A time was too when people thought that the wild man, the man in a state of nature, was a nest of virtue and that, leading a kind of simple life, he led also, of necessity, a model life. The truth is quite

different; virtue, like all plants of price, needs cultivation; forests need the eye, the mind and the heart of man. Instead of being full of the most beautiful and useful trees the wild forest offers a prodigiously small quantity of good trees; many have outlived their period of use and they prevent the growth of others; many have grown crooked; wicked ones have injured the righteous."—*M. Jusserand, at the American Forest Congress.*

At a meeting of the Western Horticultural Society, held at Winnipeg, on the 24th January last, the following resolution was passed:—

Resolved that this Society desires to express to the Honourable the Minister of the Interior its approbation of his work as shown in the creation of a Forestry Branch in connection with his Department.

Also desires to express its conviction that the educational work carried on in the encouraging of tree planting has been of great value in helping the settlers to build for themselves comfortable homes.

And further, that the demonstrations made by his officers of the possibilities of tree culture on the great plains of Western Canada will render even more inviting to the prospective settler the fertility of the soil and also convince him of the healthfulness of the climate.

The Canada Lumberman has reached its twenty-fifth anniversary and celebrated the event by the issue of a special number, giving a history of the development of The Lumberman and the lumber industry since it began its career. In its initial number in 1880 it stated its objects, in addition to the furnishing of trade information, to be as set out in the following quotation:—

"Canada is indeed a wooden country, but its woods are fast disappearing, and one of the prime elements of its early growth is being ruthlessly destroyed by the old style of management on the part of the Government and the reckless indifference of the people. It will be the duty of The Lumberman to point out the

injuries annually inflicted on the wooden wealth of Canada by reckless tree felling, and the still more reckless starting of forest fires, whether by sportsmen or settlers. Even in the latter particular our journal may, by assisting in arousing public opinion, be the means of saving millions of dollars to the country in a single year."

The Lumberman has lived to see and assist in the formation of a better public sentiment on this question, and great improvement in the methods of administration. The Lumberman has shown itself progresive and broad-spirited and that it has the support generally of those interested in forestry and the lumber industry is shown in the assistance given by those who prepared the many able articles that appear in the special issue. The Canadian Forestry Association is indebted to The Lumberman for support and interest in the forestry movement and may well offer all good wishes for continued prosperity and expanding usefulness.

"*Canada First,*" is the name of a new magazine representing the Canadian Preference League, which began publication with the present year. The objects of the League are to give practical preference to Canadian goods and Canadian institutions, to foster the growth of Canadian sentiment, and to educate public opinion in this direction in every legitimate way. Naturally the Canadian forest is a subject of premier interest to a league formed with such objects, and it is considered in a well-written article on "Canada's Forest Wealth." The subject is dealt with in a sane and discriminating manner, and in this and other respects the magazine is a credit to and should be of great assistance in the advancement of the objects of the league.

Following is an extract from an article on "The Climate of Manitoba and the Northwest Territories," by R. F. Stupart, Director of the Dominion Meteorlogical Survey:—

"In Manitoba the rainfall is greater than in any portion of the Northwest Territories. The normal annual precipitation for the Province is approximately 22 inches, and the May and August

rainfall 11.5 inches; drought is therefore not much to be feared here but westward the danger increases. From Regina westward to Medicine Hat and northward to Saskatoon, there are very few rainfall records of over a few years, but there is fair evidence that the average annual precipitation over this area nowhere exceeds 15 inches, and at many points is less than that amount. By reference to the table it will be seen that the records of 18 years indicate an average rainfall of 11 inches in Saskatchewan, and 12 inches in Alberta, which, with a snowfall of about 55 inches, gives a total precipitation of 16 or 17 inches over the larger part of Saskatchewan, and 17 or 18 inches in Alberta. But it is to be remembered that the seasonal precipitation in the far west is very variable. At Calgary in 1892, the total precipitation of the year was but 7.91 inches, while last year it was 34 inches. For five years the rainfall has been ample in this region, but for many years prior to 1897, it was scant, and in several of the years irrigation appeared necessary for successful crops. We may fairly assume that there will be a return to the dry conditions, and that the Government is acting in a most judicious manner in providing for irrigation in parts of Alberta.

"The writer is of the opinion that the Chinook has played an important role in producing a treeless prairie land in Southern Alberta and Assiniboia, and that the tendency for wooded lands in Northern Alberta, and northward, is largely due to the dimishing frequency of the Chinook with increasing latitude. The effect of the Chinook in Southern Alberta and Assiniboia is to keep the prairies almost bare of snow during the winter, and to leave it quite bare during the early spring, while farther north, as the Chinook is less frequent, the snow lies deep in winter, melts and waters the ground in early spring, providing moisture for trees at a time when moisture is most beneficial. Observation appears to warrant the statement that rainfall is much more variable near the mountains than it is farther east, also in southern portions of the Territories than in northern portions. In the Territories north of Edmonton, values of rain and snow have been deduced from between 6 and 10 years observations, and from these it appears probable that the normal precipitation throughout Alberta and northward into the Mackenzie River basin is not very differ-

ent except that in the higher latitudes the proportion of snow is greater."

The following extract from the report on the Botanical and Afforestation Department of Hong Kong is of particular interest, as showing the value of a systematic policy in the matter of reforestation:—

The time has now arrived for the colony to profit to the full extent by the foresight of the Government of a former generation.

In the late seventies tree planting was seriously undertaken, and from the year 1882 to 1885 the annual expenditure of $12,000 was expressly sanctioned for afforestation, and from 200,000 to 300,000 young pines were planted each year. As the island became more completely covered with plantations, the operations and annual votes gradually diminished, until the present time, when the planting of a few thousand trees can be covered by a small portion of the tree-planting vote of $3,450. As a result of this policy there are now nearly 5,000 acres of pine upon the island, and the oldest plantations, now between twenty and thirty years old, are ready to fell and replant.

The pine plantations are of very various ages and sizes and much time has been devoted during the year to a careful examination of them and subsequently to delineating them on maps and schedules so that a systematic working plan can be drawn up to ensure, as far as possible, a uniform annual outturn of timber. The surface of the island has been divided for this purpose into seven main divisions, and each of these into six to eight blocks, containing from 50 to 300 acres of pine plantations each. The primary object of this preliminary inspection of the plantations was to obtain statistics upon which to found a working plan for the future, but the results have a further interest as showing what return the Government have for their outlay of former years.—*Agricultural News, Barbadoes.*

Hon. A. B. Warburton in a letter to the Charlottetown Patriot, writes in regard to the failure of the hay and straw crops

in 1904, and ascribes the failure mainly to the bare, unprotected state of the meadows and grain fields. The woods have been cut away to such an extent that the fields are exposed to the full force of the sun and of every wind that blows, and the question is asked whether or not the failure of the past year is not in the main to be found in this very fact, that the unprotected lands were dried by the spring and early summer winds. One farmer told Mr. Warburton that the only good field of hay he had was one at the back of his farm which was well sheltered by woods and that those not sheltered had been almost complete failures.

Though the subject requires fuller investigation the influence of sheltering trees on moisture conditions are very noticeable. To quote but one instance of many recently cited in Forestry and Irrigation, from the results of experiments made by the Agricultural Experimental Stations in Wisconsin in 1894: to the leeward of a piece of black oak woods, of an average height of 15 to 25 feet, the results showed an evaporation at one foot above the surface of the ground varying from 11.1 cubic centimetres at twenty feet from the grove to 18.5 cubic centimetres at 300 feet, beyond which distance the amount remained constant. The observations were made during an hour of sunshine in the middle of the day. Thus at 300 feet the evaporation was 66 per cent. greater than at 20 feet.

Mr. T. M. Robinson writes from Gravenhurst, Ontario, as follows:—

"There are millions of acres in Muskoka and this back country that are useless for agriculture, over which second growth timber is asserting itself, and which would in a few years, if suitably protected, prove to be of great value to the country. The protection of the new growth of trees is a duty devolving upon not only the legislators of Canada, but also upon the present generation of Canadians, who have reaped such a large harvest from the woods of their country.

"It is safe to say that in the forty years that I have known Muskoka, the white pine has receded two hundred miles, with practically no effort to protect the second growth. I am pleased to

be able to say however that there appears to be a gradual awakening to the importance of this question, even when least expected, for recently in a gathering of ordinary settlers, the conversation turned to the growth of white pine over burned land, and it was of great interest to listen to the testimony of those present, who had begun to observe the rapid growth made after the first ten years. I consider the outlook more hopeful and every effort should be made to spread the knowledge of the subject of forestry."

Copies of the proceedings of the American Forestry Congress, held at Washington, during the first week of January, may be obtained from H. M. Suter, the Secretary of the American Forestry Association, whose address is 500 Twelfth St., N.W., Washington, D.C. The price of the report, bound in cloth, is $1.25, and five or more copies will be sent to one address for $1.00 each.

Among the recommendations of the American Forest Congress, was one suggesting an amendment to the Homestead law, requiring the planting under the supervision of the Forestry Bureau of at least five per cent. of the area of the homestead before final title is acquired.

In Bavaria, the statistice for the years 1899 to 1901, show a total forest area of 6,500,000 acres, of which 36% is State land, and 50% in private hands. The total income was $10,000,000 and the expenditure $4,560,000 leaving a net return of $2.35 per acre. In 1901, the cut in the State forests was at the rate of 106 cubic feet per acre, and the net result per acre over $4.00.

In Prussia the financial result for last year of the forest administration makes an excellent showing and together with the railroad administration has averted, not only the expected necessity of a loan of $17,000,000, but left a surplus. Prussia in its government railroads, forests, mines, farms, &c., possesses an active investment, which is worth twice the Government debt.

The forest budget for 1903, closed with a surplus of over $12,000,000, an increase of about $2,500,000 above the preceding year.

For 1904 the income from the seven million acres of State forest is estimated at twelve million dollars, of which $70,000 was expended for educational and scientific purposes, and $1,300,000 for purchase of lands and special improvements.

Since 1883 the waste area in the hands of the State increased by 34,000 acres, the total acquired in the twenty years being about 215,000 acres, of which 85,000 acres or 1.43% of the Prussian forest domain remain in waste condition, the reforestation having proceeded at the rate of about 9,000 acres per year for the twenty years.

In Russia the income from the State forests in the middle of last century amounted to about $500,000, in 1892 it was $10,000,000, and in 1901 over $28,000,000, in addition to $10,000,000 worth of free wood. The net income was $23,000,000. a remarkable increase due to a number of causes, but largely to better management. Of the 650,000,000 acres of forest controlled by the State, only about ten per cent. are worked under working plans. Only $50,000 or one-half of one per cent. goes to planting, as against 7.5 per cent. in Prussia.—*American Forestry Quarterly.*

The colored illustrations in this issue of the Forestry Journal are from a pamphlet descriptive of the Rocky Mountains Park of Canada, which has been issued by the Department of the Interior, and are used by kind permission of the Department. The Canadian National Park, which is unsurpassed in the beauty and boldness of its scenery, is becoming a favorite resort for pleasure seekers.

REVIEWS.

Report of the Forester for 1904—*U. S. Bureau of Forestry,* 38 *pages.*

This is a general report of the work carried on by the Bureau in its various divisions during the year ending June 30, 1904, with an outline of what it is proposed to undertake during the present year. A considerable amount of work was done in surveying new Forest Reserves, making studies of forest conditions in various states, running valuation surveys over several thousands of acres, etc. In co-operation with private holders of timber lands working plans for 1,068,000 acres were made. Planting was begun on the Dismal River Reserve, in Nebraska, a sandy, treeless tract unfit for agriculture, by setting out 100,000 young pines. Next spring about 1,500,000 seedlings are to be set out.

A great deal of attention has been given to the study of timber preservation principally in connection with railway ties and piling, made of various kinds of pine, fir and spruce. Timber tests have also been completed, from which a large number of data concerning the strength of structural timbers have been obtained.

Up to the present the work of the Bureau has been confined largely to investigation work, and the collection of information relative to forest growth throughout the States. Now that the reserves have been handed over from the Interior Department, solving the questions involved in their management will probably be the chief occupation of the foresters of the Bureau in the future.

The Luquillo Forest Reserve, Porto Rico U. S. Forestry Bureau. Bul. No. 54. *By John Gifford, D. Oec. Contains* 33 *pages, descriptive text, map showing situation of reserve,* 7 *plates and an appendix of* 12 *pages, giving text and short description of the trees of Port Rico.*

The bulletin is the report of a preliminary examination of the Luquillo Forest Reserve, situated at the east end of the island of Porto Rico, and set aside in January, 1903. The reserve is supposed to contain 65,950 acres, of which only about 20,000 acres is Federal forest land. The highest mountains on the island are within the boundaries of the reserve, which is evidently intended primarily to protect the water supply for the surrounding districts. From a general description of the forest 10,000 acres are estimated as timber lands, said to contain 25,000,000 board feet, the remaining 10,000 acres consisting of mountain peaks and palm lands. Very little lumbering so far has been done in the district, most of the wood used in the island being pine imported from the United States. The principal forest tree of economic importance seems to be the Tabanuco (*Dacryodes hexandra,* Griseb), the wood of which is somewhat similar to that of yellow poplar or tulip tree of the Eastern States.

The report enumerates the general industries of the district, discusses transportation facilities and necessity for good roads, concluding with recommendations for the management of the reserve.

Progress Report on the Strength of Structural Timber. By W. Kendrick Hatt, Ph.D. Bureau of Forestry Circular No. 32; 28 pages.

This is a partial report of the results of some of the tests at present being carried on by the Bureau to determine the mechanical properties of various commercial timbers of the United States. Another publication will be brought out shortly giving detailed descriptions of methods used in making the tests, with a more complete report of all the results obtained. The tests have been limited to: (1) Species that promise to be on the market for an indefinite time: (2) Actual market products: and (3) Such purely scientific work as forms the basis for correct methods of test. The species undergoing investigation are: The Pacific Coast Red Fir (*Pseudotsuga taxifolia*); Western Hemlock (*Tsuga heterophylla*); Red Gum (*Liquidambur styraciflua*); and Loblolly Pine (*Pinus taeda*). The loblolly pine and Pacific Coast timbers are tested in the form of large sticks. such as bridge stringers. These are subjected to the various

strains which they would be called upon to resist if placed in actual construction works.

Short descriptions of the woods of the various species under test are given with the investigations made in each case. A number of tables show in figures the actual results obtained.

The Forests of the Hawaiian Islands; Wm. L. Hall, U. S. Bureau of Forestry.

In Hawaii the best timber tree is the Koa, a highly prized cabinet wood, with a color varying through rich shades of red and brown and with a fine and distinct grain, but the forests are of as much importance on account of their influence on other industries as for their direct products. Those business interests which, like rice and sugar production, are largely dependent upon the mountains for a supply of irrigation water, naturally in most cases strongly favor preserving the mountain forests. So strong has been the interest of some of the sugar companies in the preservation of the forests that they of their own account have maintained large forest reserves above their plantations. Since 1882, the Government has undertaken work in the planting of denuded tracts.

Chestnut in Southern Maryland; Raphael Zon, United States Bureau of Forestry.

Chestnut occurs in Canada only in Western Ontario, so that this bulletin is somewhat narrowed in interest for the Dominion. In Maryland the chestnut has been saved from extinction largely from its sprouting capacity. The conditions for the reproduction of chestnut from seed are unfavorable, owing to the demand for the nuts. The capacity to produce sprouts from the stump or from the roots is possessed almost exclusively by hardwoods, and sprouting from the stump or stool, generally known as the "coppice" method of management, is that by which the chestnut is generally reproduced. Stumps one foot high show the best results, and winter or early spring is probably the best time for cutting. Coppice chestnut furnishes better timber for working than chestnut from the seed; it is heavier, less spongy, and

straighter grained, is easier split and stands exposure to the air longer. Chestnut commences to bear seed when eight to ten years old, and continues to do so to a very old age, but regular and plentiful crops begin only after the twentieth year. The yield per tree averages between 1½ and 3 bushels or even more. The chestnut is a long-lived tree, attaining an age of 400 to 600 years.

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CANADIAN FORESTRY CONVENTION.

OTTAWA, ONT.

JANUARY 10th, 11th and 12th, 1906.

A Canadian Forestry Convention has been called by Sir Wilfrid Laurier, Premier of the Dominion, to meet in Ottawa on the 10th, 11th and 12th January, 1906, to consider the forests of Canada and means for their preservation and reproduction.

His Excellency Earl Grey, Governor-General of Canada, has been pleased to accept the position of Honorary President of the Convention and in doing so expressed his interest in its objects and his best wishes for its success. Sir Wilfrid Laurier has consented to act as President and the Vice-Presidents will be His Honour Sir Henri Joly de Lotbiniere, Lieutenant-Governor of British Columbia, and Mr. R. L. Borden, M.P. This official list shows that the Convention has the support of the leaders of the Dominion in national affairs and demonstrates clearly its national character.

Fuller details of the organization will be given at a later date. Its *personnel* will include all citizens interested in forestry and specially members of legislative bodies in the Dominion, members of the Canadian Forestry Association, Forestry Officials, representatives of Lumbermen's Associations, Farmers' Institutes, Educational Institutions, Mining and Engineering Societies, Fish and Game Associations. Forestry Bureaus and Associations in the United States will also be asked to send representatives.

The Convention will be under the auspices of the Canadian Forestry Association and the carrying out of the arrangements will be in the Association's charge. The Secretary of the Forestry Association will be Secretary for the Convention and further information may be obtained from him. In the next issue of the Forestry Journal announcement will be made in regard to railway arrangements, programme and other details.

It must be gratifying to the members of the Canadian Forestry Association and the friends of the forestry movement in general to see this public recognition of its importance. The opportunity for advancing the cause in which they are engaged and the interests of the country is invaluable. It is to be hoped that all will unite to make this Convention a success in numbers and in every other respect.

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THE ART OF FORESTRY.

A. Harold Unwin, D. Oec., Forester.
Benin City, West Africa.

III. FOREST EXPLOITATION.

Giving the above its more appropriate name of forest utilization, one is led to the main object in Forestry i.e. of using *all* the woody growth in a forest.

In olden times in Europe just those trees which had any value were cut down and removed, leaving broken, decayed, diseased or at that time useless species of trees.

One of the best examples of this was the cutting, until recently (twenty years ago) of the largest spruce trees in the Bavarian Forest. Now this has consisted from time immemorial of silver fir (similar to balsam), spruce and beech; on the whole the beech and spruce predominating. Another well known fact is that fir wood is quite inferior to spruce for flooring or any purpose.

The result of this early method has been to reduce the number of spruce and, although the climatic conditions of growth are most favourable to its growth, it is suppressed by not being able to stand so much shade as either beech or fir.

With great labour and expense the old and rotten firs and beeches are gradually being got rid of and the spruce re-introduced.

If previously, as well as taking the spruce, some of the silver fir and beeches had been girdled and thus killed, the spruce could have held its place. The forest would have been much more valuable than it is at present and would also have saved the large yearly expense now entailed in clearing away the useless material in introducing the spruce on a large scale.

Of course it might be argued that it would not pay to do this girdling, but that is scarcely the case as the return proportionally is not very much greater now than it was then. Besides that it is much more expensive to do such extra work now than it was then.

In connection with the last named forest as soon as it was definitely worked (1870) it was found that locally very little timber was required, especially little or no fir timber. Sawmills were then started to make boards suitable for the Rhine Provinces, and this was done with such success that these supplies are now indispensible. The industries were thus permanently located in that forest, and their output is naturally limited by the permanent outturn of timber, which that forest is capable of yielding, and which is gradually increasing. The primeval forest by no means yields the maximum quantity of lumber per acre. In the above way lumberman and forester work together to mutual advantage.

A rather parallel process is at present going on in the mixed forests west of Ottawa. That is to say, where white pine is scattered in small groups or singly in large areas of hardwood, such as beech, maple, blue beech (hornbeam) and yellow birch. Of these at the present, the yellow birch is the only species of value or rather that it pays to bring out. The pine is taken, leaving little or none; its place is largely filled by poplar or hardwood. The pine by reason of its original small numbers has not the same chance of reseeding itself, hence such areas become practically valueless. It is of course rather presuming to say that beech, blue beech, etc., will have no value, but still the past seems to indicate that there is little hope of their value being so great as to justify their permanent production; at any rate on such areas as they at present occupy.

Even under a careful plan of artificially helping the pine to

keep its place always sufficient hardwood will remain to supply the very limited market. 85% of all timber used all over the civilized countries of the world is coniferous, and only 15% hardwood, consisting of over fully 200 species. Even in the tropics pitch pine of the Southern United States is largely used, local timber either being too hard or liable to attack by ants.

From the above it will be seen that where the pine is found singly or in small groups, removing it as soon as the old stand is cut, and then cutting the surrounding trees to give a start or clearing any existent growth of hardwood threatening to overgrow the seedlings, will be the only way to procure a future crop as good, and indeed in many respects, better, than the one before.

If a means were found to profitably carbonize or otherwise use the hardwoods the problem would at once become different, as the pine would then have an equal chance with the poplars, etc., of reseeding the areas thus cut over.

With the modern pulp mill as well as saw plant, a forest becomes much more valuable and capable of management with an eye to the future, as well as to the exploiting for present needs. Again this time element, such a potent and yet most essential factor in forestry, crops up and indeed in such a way that it cannot be denied.

The question arises whose business is it to look after a future lot of lumber, which the present man does not need, but which everyone sooner or later very much wants. Scarcely the present owner or user of the forest, he does not live long enough to reap all the benefits of his provident policy.

A corporation may, if it is organized with an idea of being carried on permanently or nearly so; nevertheless it has its shareholders to consider, and they want their dividend to be a large one, and they only hold the shares speculatively, or at most, until they see something still better to put their money into. It therefore devolves upon the representatives of the whole country *i.e.* the government, to safeguard these very vital interests.

In some countries, notably Russia, the government has car-

ried this a little too far, and become sawmiller and lumber manufacturer in general to the community. This is scarcely compatible with modern ideas of trade and is bad economically.

Under other countries, notably Germany, the forest department has become wood cutter and general producer of all forest products in the *rough*. This is admissible, but demands a very large organized staff going into details, with regard to felling, cutting into lengths and bringing to roads or other place of transport. The timber is what is known as "sold in the wood." This on the whole gives the best results. Another method is to sell on the stump, leaving felling, etc., to the buyer, an easy and yet poor method from the point of view of forest reproduction. On the whole the best method for all parties concerned is the second mentioned, though in some countries, namely India, the last named has worked admirably.

Each country thus adopts what most suits its needs, but the idea underlying that chosen method is the same, that of wisely constantly using the forest products as they financially gradually mature, only to be renewed again and again.

The growing trees of a forest are therefore not a fixed but a very slow movable capital.

A change has been made in the law of the Province of Quebec by which a free grant of 160 acres of land was made to the father of twelve children. It was found that these grants were being made use of by speculators who wished to obtain control of timber lands, and that the objects of the Act were not being served while the Province was losing the timber lands. In order to put an end to this speculation, the Act was changed last year, so as to offer a bonus of $50 in lieu of land. Nearly four thousand claims were made for this bonus, not only from farmers, but from residents of cities, towns and villages, who would never have thought of applying for the land if the Act had not been amended. A further amendment has therefore been made, providing that the bonus shall be paid to those whose claims have been recognized up to the date of the passing of the Act.

FOREST FIRES IN BRITISH COLUMBIA IN 1904.

Mr. J. R. Anderson, Deputy Minister of Agriculture for British Columbia, has kindly placed at the disposal of the Forestry Association, the reports received from the agents of that department, in regard to the forest fires throughout the Province generally during the year 1904. As has been made known through the medium of the press, the forest fires in British Columbia, during the past year, were of special severity owing to the dry season. Throughout most of the summer in some districts a pall of smoke hung over the country sufficient to obscure the view and prevent surveying operations. The direct loss to the Province was large, and the effect on the mining and other industries requiring wood supplies will soon make itself felt. The question of dealing with these fires is one of the most important ones which can be given consideration by the Province of British Columbia at the present time. The revenue derived by the Province from these forests during 1904 was $446,276, a substantial increase over the previous year's revenue, which amounted to $347,004. In regard to lumber supplies the future is in the hands of British Columbia, her forests of virgin timber are still great and valuable, the development of the western territories, and the industrial growth of the Dominion generally will make large and increasing demands upon them, and properly administered, they should make British Columbia the richest member of the confederation. At no distant day the public revenue from the forests may be expected to reach a million instead of half a million dollars, and will not then have reached the limit of the possibilities. Capitalize such a revenue and the Province might well spend a large sum in providing protection from fire without going beyond what would be a low rate of insurance. Experience has demonstrated that the forests can be protected and failure to take effective measures to do so can, in the light of present knowledge of the subject, be hardly less than criminal.

For the New Westminster District the report of the agent

states that the bush fires were the most destructive since the year 1893. The area burned has been very extensive and the value of timber destroyed is probably not less than half a million dollars. The worst fires were in the northern part and are believed to have been due to the carelessness of prospectors, particularly persons prospecting for coal. Some fires arose from want of care on the part of persons clearing land, but the damage done in these cases was comparatively small. Five persons were prosecuted under the Bush Fires Act, and three persons were obtained. This report urges the appointment of fire wardens and that no person should be allowed to set out a fire without permission of the warden.

In Southern Vancouver Island the fires were numerous during the month of August when high winds prevailed. In some cases a great deal of valuable timber was burnt and bridges and buildings were also destroyed. There seems to be considerable carelessness in the handling of fire and the railways are responsible for their share. One report states that the fires are mainly due to sparks from locomotives used for hauling out the timber from the logging camps, and along the line of the Esquimalt and Nanaimo Railway.

On the northern coast there were no fires at Port Simpson as the rainfall was heavy, but in the Atlin district there were several small fires due to prospectors. In regard to these the agent states that while these fires, as such, did not attain any great force or volume, a fire of any volume whatever is regrettable in such a sparsely timbered section and any damage whatever is serious.

In the Cariboo District, the central northern part of the Province, there were a number of small fires through the settled districts, and in nearly every case the fires originated from careless campers travelling; whites, Siwashes and Chinese are all alike and equally careless in regard to camp fires, and it is about impossible to get and convict the right party. Forest fires were observed to the north and east burning for days but their cause and extent could only be conjectured. "Bush Fires Act" notices are posted through all the settled district.

Coming south to the Lillooet District, the central district north of the railway, the reports show that this part of the country suffered severely. One agent states that this was the most deadly year since 1869, caused by an almost total absence of rain. A quotation may be made from his report. He says:—

"Bush fires commenced early on account of the extreme dryness of everything, and as a matter of fact I saw smouldering remains on Nov. 3rd, on my way to and from Lillooet the other day. Men—white, black, brown and yellow—are responsible for these fires, by the utter carelessness and want of thought that is inherent in nearly every human being. I tried for a conviction against three whites last August before two justices of the peace, but was met with the Scotch verdict "not proven" although they were the originators of a most dangerous fire without a doubt. High up in the mountains the Indian is responsible. He fires there for a crop of tender young grass in the fall for the deer. In the valley of the Fraser he fires, in accordance with the custom, to light the salmon on their way up the river. It does not appear that it has dawned on him to any extent that the paleface at the mouth of the river is responsible for their absence. With regard to the estimated destruction this year; that is simply beyond my power, to say nothing of the consequent destruction and loss, which may be approximately arrived at, in the event of a hard winter, next April by counting heads of dead and dying domestic animals on the various ranges which are already appallingly bare throughout the entire district."

The mountains round the town of Lillooet were burned, in several places from base to summit, extending over large areas. At other places forest fires raged for a long time travelling long distances.

In the northern part of Yale District, being the central tract immediately south of the railway, the fires were not of serious proportions, the persons located in that district having evidently been trained to carefulness.

In the southern part of Yale the report from Grand Forks, near the international boundary, states that a vast extent of the country was run over by fires during the past season, in fact at

one time the whole surrounding country appeared to be suffering, but how far the fires reached back it was impossible to say as no one seemed to know where they ended. In response to the request for an estimate of the destruction the agent states that this is fairly a poser, but there is no doubt that a great amount of destruction was done by the past summer's fires. To say nothing of the loss to miners and prospectors of their buildings, tools, &c., the destruction of timber and young forest was most deplorable.

A significant fact in view of the rapid railway development in Canada at the present time, is that given in the following paragraph:—

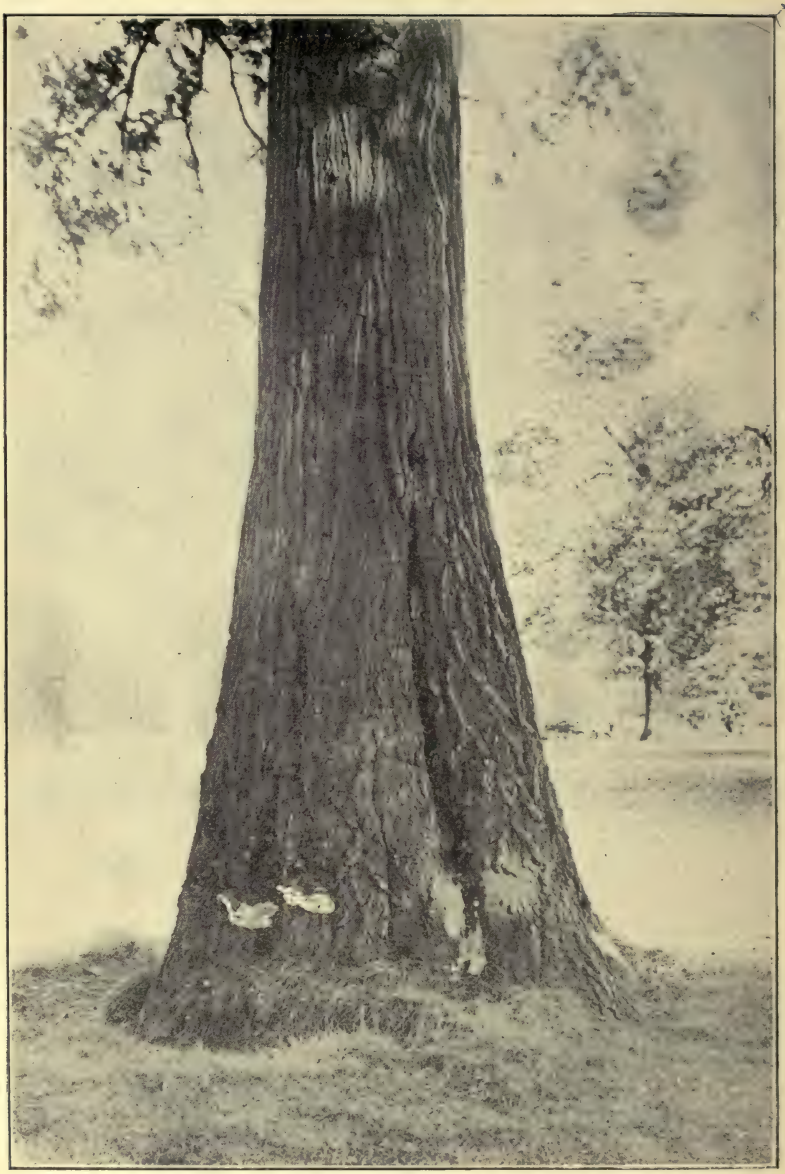
"The most serious of the three (fires) occurred near Ehott, and was supposed to be caused *by the fires getting away from the men clearing the right of way on the new railway line* of the Great Northern Railway Co. from Grand Forks to Phoenix. This fire burned for a considerable time among fallen timber, and though efforts were immediately made to check it, it was only after a rainfall that any successful stop was put to it."

The agent reporting from West Kootenay does not attempt to give any description of the fires or the loss, merely stating that it must have been considerable. He does not think that a fire warden service could be made large enough to be effective and winds up with the suggestion that "perhaps the most effective prevention would be a heavy and opportune rain." Whether this is a suggestion to the Government of British Columbia to go into the rain-making business is not clear, but it certainly sounds like the counsel of despair.

This is a general statement of the reports received and while the details are necessarily not definite, they show clearly that the loss to the Province has been large and point to the necessity of some more decisive action than has yet been taken.

WHITE PINE IN GERMANY.

Natural reproductions, from trees 120 years old, showing gradual removal of the old crop.



A diseased Red Oak—Fig. 1

DISEASES OF TIMBER.

J. Horace Faull, Ph. D., University of Toronto, Toronto.

Trees while living are subject to the attacks of various plant enemies, mainly fungi and bacteria, and when dead are immediately set upon by a legion of other members of the same groups. Biologically, the first set are parasites, for they derive their nourishment from the life streams or stores of their hosts, and the latter are saprophytes, for they obtain their livelihood from dead tissues and plant remains. The parasite is of interest to the biologist in that it presents a three-sided struggle in the fight for existence, the struggle between the parasite and the host on the one hand, and between the host and its uninfected fellows on the other. More than one termination is possible in such a struggle, but in most cases the greatest desideratum of the economist is the evolution of a form that is proof against attack. The saprophyte is of interest because it is a factor in the breaking up of complex organic compounds (incidentally ridding the earth of vegetable debris), and restoring again to soil and air the simple food materials essential to the existence of present and future generations. Without the restoration of these all life would soon cease to be, for the reserves of unused food substances in nature are too small to allow for a break in their circulation.

The forester, the lumberman, and the wood-consumer, look at these wood-attacking bacteria and fungi from a somewhat different standpoint. To them the parasites are the causes of the deformation, stunting, and death of greater or smaller quantities of timber, decreasing and depreciating the supply, and providing material for destructive fires; and the saprophytes are the cause of certain rots and discolorations, resulting frequently in the ruin of sawn but unused timber, and the necessity for the untimely renewal of such as has been put into use. There is hence a demand made by them of the economic botanist for two things, first, the prevention of further infection in the forests, and

second, the treatment of wood products to ensure reasonable service.

The parts of the trees attacked and the immediate effects produced are various. In some cases the disease works in the roots, rendering treatment extremely difficult. In other cases the fungus may grow in the soil at first, and then entering by the roots work its way up through the stem, its presence becoming apparent only when the tree begins to die or the fruiting bodies of the fungus are found at its surface. More frequently the spores of the parasite infect the host at some wounded spot or region of careless pruning, and as in the last instance may live in the host unsuspected for years. Such a case is represented in figures 1 and 2, in which the fruiting bodies of a polyporus are shown upon the surface of the trunk of a red oak. The removal of these plague spots should be attended to promptly when they make their appearance on trees in streets and parks. The carelessness displayed in the treatment of shade trees is lamentable, people and animals being allowed to wound and maltreat them, thereby exposing them to the almost certain entrance of destructive fungi. The smallness of the number of undiseased and undeformed trees along the streets of most cities is deplorable, and altogether inexcusable. Illustration 3 tells its own story.

Sometimes the disease reveals its presence by swellings, or other malformations. Even in the case of the red oak in Figure 1, it is observable that the base of the trunk is abnormally enlarged. This local stimulation to growth is not at all uncommon. A rather interesting example of deformity is to be seen in the so-called witches' brooms of the balsam fir (photograph 4), the cherry, alder, some of the birches, and a few others. Generally the infected area becomes swollen, and all of the buds, including the dormant ones, develop, forming a dense mass of distorted and stunted branchlets. Another manifestation of disease and its effects is represented in Figures 5, 6 and 7. The host in this particular example was black spruce, and the parasite a rust that attacked the leaves. In Figure 5 there is one uninfected leaf, and the spore cups of the rust are shown growing upon all of the rest. Nearly all of the leaves on the diseased trees, which

included most of the trees in the swamp, were attacked, the disease being evident at some distance away, because of the yellow color of the foliage. Early in September the leaves dropped, and the trees robbed of their foliar organs soon died. No sooner were they dead than various saprophytes began their work, a shelf-fungus, as in Figure 7, being one of the most frequent invaders.

The wide-spread occurrence of these diseases is probably greater than most people imagine. In the instance that I have cited as coming under my own observation a considerable portion of the swamp suffered. In Queen's Park, Toronto, few sound oaks are to be found, nearly all being sapped by a Polyporus. Recently a research, instituted by the United States Government in South Dakota, showed that half of the standing timber in the forests of that State, including the Black Hills Forest Reserve, had been killed by a certain disease, and that unless means were speedily taken to check the trouble, the remaining trees would go in the same way.

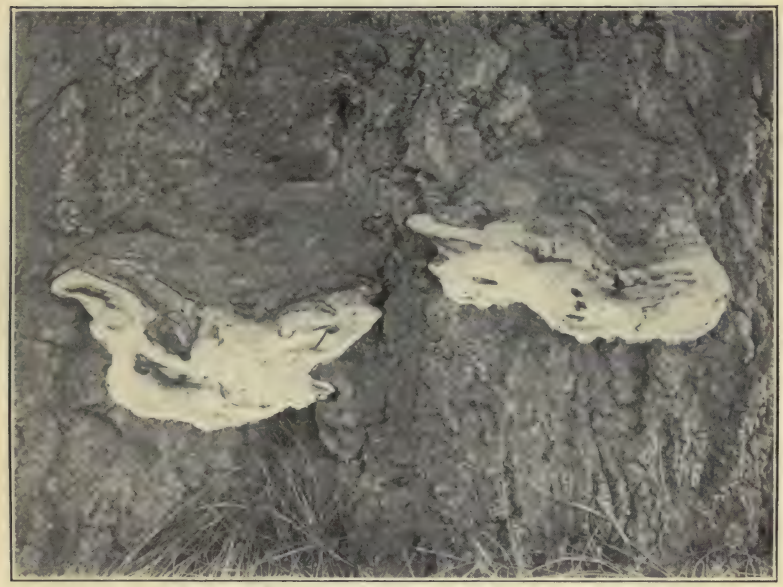
Happily the effects are not usually as dire as in the last instance mentioned, but even a casual observation of a forest shows that many branches die from one cause or another, and that here and there a tree has succumbed. The direct loss may not be great, but dry fuel is furnished for fires, the results of which may be disastrous. A safe remedy where it can be applied, is to remove mature timber, for it is most liable to disease, and all infected timber, no matter of what age. Unfortunately such a procedure has not yet been found practicable on the reserves in Ontario.

The successful treatment of cut and sawn timber for the prevention of disease, is one of the problems that bids fair to solution. Such timber is very liable to rot, especially if used in a moist place. This is true of wood covered wholly or in part by soil, as in the case of telegraph or telephone poles, fence posts, railroad ties, bridge and foundation timbers, planks for pavements and so on. Frequently, too, timber often discolors, thereby depreciating in market value. Thus "green" and "blue" wood not uncommonly occur, the color in each case being due to the presence of certain fungi, that either contain a pigment within

themselves or secrete a dye that stains the wood. Some woods are much more resistant to attack than others. One of the chief causes of this is the presence of an antiseptic substance in the tissues that was produced when the plant was in life.

The only thing needed to render all cut woods immune from attack is to treat them with some preservative that will mechanically prevent the entrance of fungi and bacteria, or that will act as an antiseptic. From the practical side, such treatment must not only effect that end, but to say the least, should not injure the physical properties of the wood essential to wear, and must be within a certain cost. A few experiments have been made, and with some success. Thus it has been found that the life of white oak may be lengthened out to about 15 years after treatment with creosote and other preservatives. Untreated, they last about 10 years. Similarly some of the softer woods have been treated with advantage, indeed, some otherwise quite unfit for railroad ties, have been made to take the place of the rapidly disappearing oak. These experiments are hopeful, and give promise of an economical production of serviceable woods in an age in which economy is absolutely necessary if the supply is to be maintained.

The subject (of forestry) is of importance far beyond the general understanding of the public. The growth of population in the United States has practically covered all the land which can be cultivated with a profit without artificial moisture. Irrigation and forestry are the two subjects which are to have a greater effect on the future prosperity of the United States than any other public questions either within or without Congress.—*Jas. J. Hill, President of the Great Northern Railway, in Report of American Forest Congress.*



Two Plague Spots.—Fig. 2

A tree which has received serious injury to the bark.
A type of many street trees—Fig. 3

THE GASPESIAN FOREST RESERVE.

The following report recommending the setting apart of a Timber Reserve, has been submitted by Mr. W. C. J. Hall, of the Crown Lands Department, Quebec, to the Commissioner of Lands:—

I would beg respectfully to represent to the Hon. Minister that in the Gaspe Peninsula there exists an opportunity of creating a forest reservation which would possess unrivalled advantageous features for the perpetuating of the forests therein comprised, and the maintenance for all time of the water supply of that region.

I question very much if on the continent of America a better site could be found for exploiting the system of Forest Reserves than in this locality, a system which the United States has adopted unreservedly, and which the Dominion of Canada is fast awakening to, *e.g.*, to-day in the Province of Ontario the Government has set aside territory unsuitable for profitable agriculture to the extent of no less than 5¾ millions of acres, and I have no doubt the intention is to keep on increasing the reserves.

In Germany the State forests comprise an area of thirty-five millions of acres, but they have been practising forestry for one hundred and fifty years.

By the term "Forest Reserve" I would point out that it is not the intention to prohibit the cutting of mature and ripe growth. This can be allowed in the ordinary way under "Timber License," as exists to-day. But by creating such reserves in suitable localities the Government is in a position to enact remedial legislation if it be found that removal of the mature growth is not succeeded by a crop of like species.

It is claimed by some that after cutting the mature coniferous growth the deciduous trees preponderate and snuff out the existence of the smaller coniferous growth existing under the canopy of the broad-leaved varieties.

Should this prove to be the case, then the Government could study the subject and adopt the best means for inducing a succession of the conifers, which varieties of timber are best adapted for the requirements of this country, being so easily floated to the manufacturing points.

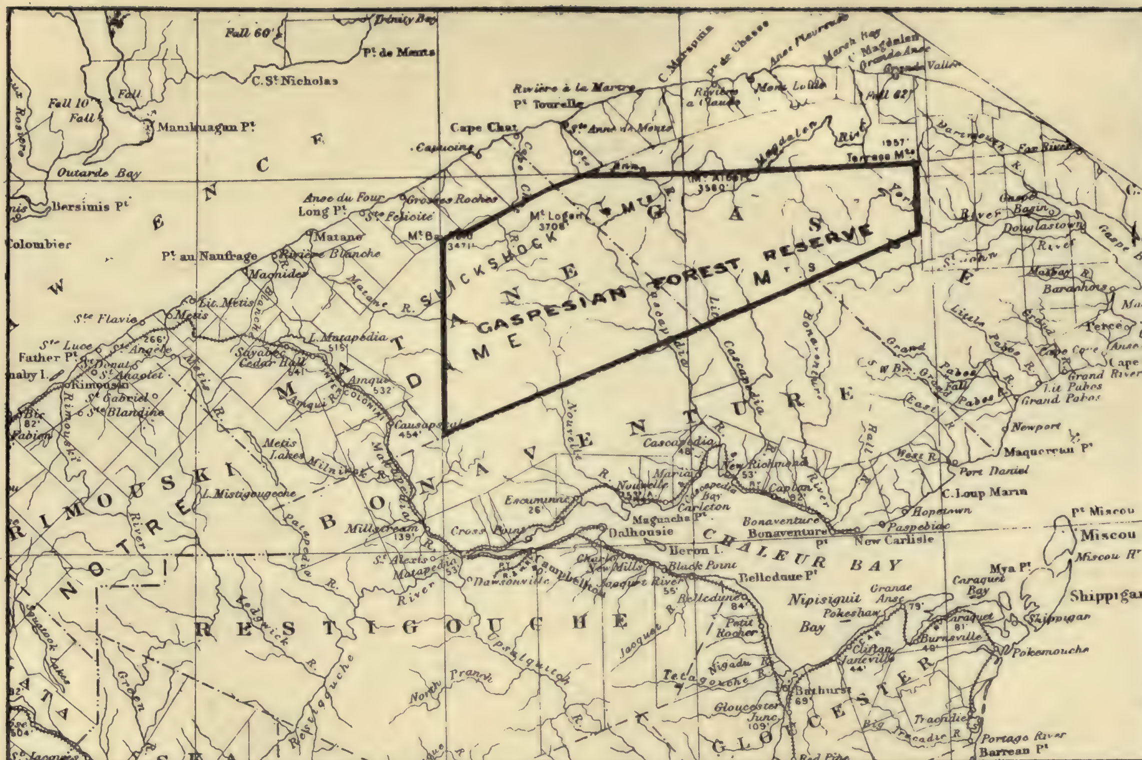
The White Spruce, the predominating variety of timber in this Province, is so prolific a seeder naturally, that many are of the opinion that, provided mature growth only be cut, crop after crop can be taken at intervals of the same variety off the same territory. If this be the true state of the case, then the perpetuating of our Spruce Forests is a forestry problem easily solved. We have only to exercise ordinary care and we will continue to maintain the position now held, viz., the most extensive spruce growing country.

I submit a district map of the Gaspe Peninsula with the territory outlined in green which I would suggest being created a reserve. A glance thereat will show how vitally important it is to this locality to have the sources of rivers left in forest. About a dozen large streams take their rise in the Shick-Shock Mountains which form, as it were, a backbone to the peninsula; these streams run in all directions from the main apex, *i.e.*, the said mountains.

We all know the character of the soil in this district, viz., sandy loam and friable, until one reaches the foothills of the mountains. Imagine the consequences if the sources of these rivers were denuded of forest growth—disastrous floods in the spring, the streams nearly dry in the summer time, the soil carried away from the declivities in immense quantities by the freshets, and finally the whole territory rendered, comparatively speaking, a desert and uninhabitable.

Should the projected railway from Casupscull to Gaspe Bay be completed there would be an additional reason for protecting lands to the north of same, as we have had experience of a bitter nature as to the forest fires by operation of railways.

At the present time it is quite true that there is no danger to be apprehended of lack of timber or water in the Gaspe Penin-


GASPESIAN FOREST RESERVE
CHALEUR BAY
Dalhousie
Bathurst
Campbellton
Carleton
New Carlisle
Matane
Rimouski
Cape Chat
Shippigan
Miscou I.
Douglastown
Newport
Port Daniel
Bonaventure
New Richmond
Caraquet
Outarde Bay
C. St. Nicholas
Pt. de Monts
Manikuagan Pt.
Bersimis Pt.
Colombier
Pt. au Naufrage
Ste. Flavie
Father Pt.
Metis
Cascapedia
Nipisiguit Bay
Restigouche

sula, but it is more prudent to take precautionary measures now before any particular locality suffers than to wait until matters are in the same condition as in the western part of the Eastern Townships, the Chaudiere River, the St. Francis and the small rivers flowing north into the St. Lawrence.

I myself have seen the old stumps of fifty or seventy-five years ago being exploited for firewood southwest of Montreal. I have met men who, visiting these places, which they were familiar with many years ago, were unable to find the brooks and streams they used to fish in, nothing being observable but dry beds partly grown with weeds.

The territory I should suggest being created a forest reserve can be described as follows:—

"Commencing at the intersection of the 67th meridian, thence along the rear line of Bonaventure County, thence on the same bearing to the 65th meridian at Lac Edouard; thence north along the 65th meridian to the 49th parallel; thence east along the 49th parallel to the intersection with rear line of Township Cap Chat, hence following rear line of Townships Romieu and Dalibaire and Cherbourg to the 67th meridian; thence south along the 67th meridian to the place of beginning, comprising an area of about 2,500 square miles, or say 1,500,000 acres, more or less."

Quite a large percentage of this territory is under license to cut timber, and if created a reserve these limits would immediately be enhanced in value by reason of such action; better bids woud be obtainable for the lands not already licensed when put up for sale,—any lumberman being willing to pay more for a limit in a reserve than an equally well timbered berth outside of it where there is danger of encroachment by settlers. And as regards settlers and colonization, such reservations of river sources and watersheds are directly in the true interests of such movements—at least the very best and most learned authorities are unanimous on this point.

The natural irrigation of the Gaspe Peninsula, as it exists to-day, is perfect. By all means let us maintain it.

To demonstrate the remarkable concentration of river sources

in the Gaspe Peninsula, I give herewith a list of the prominent streams which take their rise in the interior, viz., the Rivers Matane, Cap Chat, Ste. Anne, Magdalen, Dartmouth, York, St. John, Bonaventure, Little Cascapedia, Nouvelle Escuminac, Casupscull.

At the risk of repetition I would reiterate that it is highly important to preserve such a system as the above represents until at least the demands of colonization have entirely acquired and put to profitable use the lands lying outside of the boundaries of the suggested reserve.

As a matter of secondary importance only to the preservation of the forests and water supply, I would remark that the said territory furnishes a magnificent opportunity to create a hunting and fishing reserve, which would be of the greatest possible annual value to the residents. Were this tract properly protected I venture to say that in a comparatively short time it would become as well patronized by sportsmen as the northern part of the State of Maine is to-day—and we are all familiar with the statistics here alluded to, since they figure on more than six figures as direct and indirect revenue annually from this source.

An appropriate appellation for the Reserve would be, say, "The Gaspeian Forest Reserve."

I would remark that in other parts of the Province it would be well to create such reserves, but this can be gone into later.

In accordance with the recommendations made in the above quoted report an Order in Council was passed by the Government of the Province of Quebec on the 28th April, 1905, setting apart a Forest Reserve as described under the name of "The Gaspesian Forest Reserve." The Order states the objects of the reserve to be the preservation of the forests whilst permitting the cutting of timber as provided by the regulations now or hereafter in force, thus ensuring the maintenance of natural irrigation as exists at present and which is necessary for the most successful prosecution of the agricultural industry and for the protection and perpetuation of the fish and game in said region.

Witches' Broom of Balsam Fir—Fig. 4.

A Group of P. E. Island Birches.

THE GENERAL AWAKENING AS TO FORESTRY.

The *Farmer's Advocate* pertinently animadverts on the sad system of deforestation in full swing all over Canada, and, recalling some of the trite yet unanswerable arguments against such short-sightedness and neglect, suggests as an encouragement to tree culture and wood preservation, the passing of an act, in Ontario, to exempt woodland from taxation. We presume that the preserves of lumber kings or wood producers on a large scale, operating their limits on sane principles, and making abundant returns, would not be comprehended in this paternal legislation. There might be a difficulty in applying the fostering law with exactitude, but anything which may teach the unthinking the value of the wood area of the farm, to the farm itsef, must prove of incalculable benefit to the country. The state, too, should regulate as it does in older lands, this mania for clearance where clearance is not desirable; and where, by it, the water sources, health and protection of the community are seriously threatened. Wherever the lands are still vested in the Crown, it is criminal at this stage, and with the evil results of it plainly before us, to permit of greater denudation than has already taken place. There are certainly strong reasons, from the position of the General Government, for retaining the administration of the lands in the new provinces of Alberta and Saskatchewan, but none appeals to us more strongly than that advanced in favor of a retention and extension of the woodlands of the north. Federally, it would have been impossible to have left Prince Edward Island in the sad position she is in to-day for want of forest. The Local Administrations of the past without a formal bureau of agriculture, apparently without any knowledge of important conditions of, and requisites to sane living, with only a desire to bridge over the present difficulty by the sacrifice of everything within reach did not hesitate to lend itself here to a system of colonization which, as everyone knows, has jeopardized very largely provincial life and prosperity. The Government of the day if ever so well disposed, is practically impotent in the premises.

Only in the manner suggested by our Ontario confrere, can it now help us; and so far as we are concerned, we shall urge upon them and the public generally, the good sense and patriotism of such a move.

BUT THE FEDERAL GOVERNMENT

must find some means, even outside the regular way, of stimulating a return to proper methods here. The proportion of forest and field is impaired seriously, but under educative and paternal influences, can be practically restored in a short term of years. A land of rich and varied forest when the white man's foot first touched the soil of Isle St. John, there is a natural tendency to recover its place to an extent equal to all hygeinic, agronomic and economic needs quickly; and areas protected from the pasturing cattle, seeded from neighboring bearers, grow up thick with a mixed stand of beautiful trees. Let Ottawa only quietly insinuate its influence for good in this matter then, if the door is not open to authoritative action, and much good will be the result. This province could not resist a desire so beneficent; and the good once done, the asset is surely a national one.

SIR WILFRID, FORESTER.

We were delighted, in a conversation with the head of the Canadian Government the other day, to discover that Sir Wilfrid Laurier is a warm friend of systematic forestry and an enthusiastic lover of trees. In all his varied accomplishments, and admittedly he has many, there is none that does him more honor, nothing more becoming, nothing which bespeaks the warm heart and those gentle feelings which imperceptibly bind men together. He well remembers the calmer and more peaceful days of early manhood, when, in the quiet village which claimed his Quebec home, he planted, tended, and thoroughly enjoyed not only the fructifers of the orchard; but, also, the stately shade trees from the adjacent hillside. Everything grew he touched, and thus, his early enthusiasm absorbed by greater things for the moment, has never diminished in the slightest degree. In him the friends of forestry, and they are Canada's best friends, will ever find a sincere and generous patron. There is great need of a broad and

provident forest policy for this Dominion. We are going into the great northland forests now, and the mistakes of older Canada must not be repeated. To provide against this and to plan wisely for the future of this grand country a formal head in the departmental economy of the government is an urgent necessity. This will better advance the common weal. We know that Sir Wilfrid can be relied on to listen to any reasonable proposition for the betterment of our forestry relations,—aye, he will not only listen, but he will formulate himself, we trow, a new policy which will repress on the lips of future generations with regard to the beautiful forest, the sad avowal of so many in the older provinces, face to face with desolate waste—"too late! too late!"

FORESTRY CONGRESS.

There is to be a National Congress at Ottawa next November. Sir Wilfrid has already signified his sympathy with the movement. Not only that, he intends being in it and of it; and for this has the high precedent of President Roosevelt. We know that his influence, his example, his warm word, and above all, the cheerfulness with which he will give of the Nation's revenues to greatly increase them by wise forestry regulation, will quickly, if not completely retrieve the lost ground in this important interest, and thus permit him to earn a new title to every just man's gratitude.

EXEMPTION A DESIDERATUM.

The idea of exemption in the *Advocate's* mind should not in the meantime be lost sight of, in the provinces. Nowhere so urgently as here should our rulers act. The taxes are not exorbitant, but taxes are always unwelcome. The release of woodland under certain conditions, should be a good thing. The wood-lot might speedily come to be recognized as a public benefaction and the youth of the land, from advertising through the exemption, disposed to study the underlying principle. Then, unpastured woodlands, which alone deserve the special care of the Government, would be speedily increased in area, and agriculture, hygiene, esthetics, and general economics favored beyond dispute. Let us hear from our legislators then in some practical way along these lines.—*Father Burke, of P. E. I., in the Maritime Farmer.*

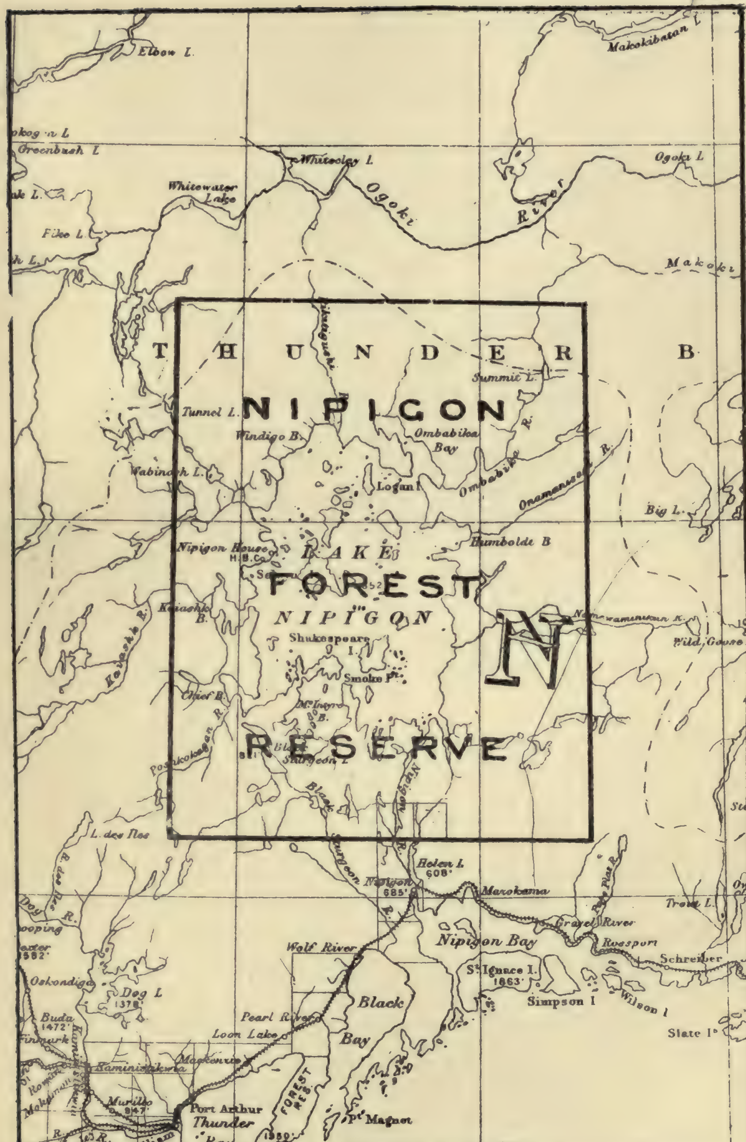
THE NIPIGON TIMBER RESERVE.

By Order in Council, dated the 7th June, 1905, the Government of the Province of Ontario, has set apart the Nipigon Timber Reserve, surrounding Lake Nipigon, north of Lake Superior, as shown on the sketch on another page and described as follows:—

"Commencing at the southeast angle of the Township of "Ledger, east of the Nipigon River in the District of Thunder "Bay, thence due east astronomically twenty-two miles, thence "due north astronomically ninety-eight miles, thence due west as-"tronomically seventy-three miles, thence due south astrono-"mically ninety-eight miles, thence due east astronomically to "the southwest angle of the Township of Purdom, thence due "east astronomically along the south boundary of the Township "of Purdom, and along the south boundary of the Township of "Ledger, a distance of fifty-one miles in all, to the place of be-"ginning, containing by admeasurement seven thousand one "hundred and fifty-four square miles."

There are of course the usual exceptions of lands already patented, Indian reserves, &c. The total area of the reserve, including water, is about four and a half million acres.

The country surrounding Lake Nipigon and now included in the reserve is mostly of Laurentian or Huronian rock formation and except in the western portion of the reserve, has but few tracts of good agricultural land, these, where they occur, being situated along the river valleys. It is not a district that can ever support an agricultural community in large numbers, although where the land is suitable it is possible to raise crops of some value. At the Hudson Bay posts and the missions, efforts in this direction have been made with success, and as the climate is stated to be similiar to that at Lake Temiscaming, there seems no reason for doubt on the question. Barley, potatoes and other vegetables and small fruits ripen readily at Nipigon House. The Nipigon district obtrudes on the line of the great northern clay



Elbow L.
Makokibatan L
Greenbush L
Whiteclay L.
Ogoki L
Whitewater Lake
Ogoki River
Fike L.
Makoki
T H U N D E R B
NIPIGON
Summit L.
Tunnel L.
Windigo B.
Ombabika Bay
Ombabika R.
Wabinosh L.
Logan I.
Onamanisagi R.
Big L.
Nipigon House H.B.Co.
LAKE
Humboldt B
FOREST
NIPIGON
Shakespeare I.
Wild Goose
Smoke Pt.
Chief B.
McIntyre B.
RESERVE
Sturgeon L
Poshkokagan R.
L. des Iles
R. des Iles
Dog R.
Helen L 608'
Nipigon 685'
Marokama
Trout L.
Gravel River
Rossport
Nipigon Bay
Wolf River
Schreiber
St. Ignace I. 1863'
Simpson I
Wilson I
Oskondiga
Dog L 1378'
Black Bay
Slate Is
Buda 1472'
Pearl River
Loon Lake
Finmark
Kaministikwia
Mackenzie
Murillo
Port Arthur
Thunder Bay
FOREST RES.
Pt. Magnet

belt, through which the new transcontinental railway line is to run and causes a deviation to the north. It is now accessible from the Canadian Pacific Railway by way of the Nipigon River, and is already a favourite resort of sportsmen. The Nipigon trout is famous and is a great attraction to all lovers of the rod.

While the agricultural value of most of the district is of little moment and its mineral resources are yet uncertain, the value as a timber preserve is unquestionable, although the pine is not now the characteristic tree in that region. The forest consists mainly of spruce, tamarac, jackpine and birch. Considerable areas have been burned over but are renewing the forest where second fires have not completed the work of destruction by sweeping away the new growth. There are still good timber areas, as that along the Ombabika River which enters the north-east corner of the lake, in which it is estimated that there are 1,484,000 acres of pulpwood aggregating 56,346,400 cords. With protection from fire it may be expected that this reserve will in time become again well timbered throughout its area, and will be of great value not only on account of the pulpwood but also for the supply of ties for the railway development which that district may expect in the not distant future.

A description of the district along the Ombabika River is given as follows:—

"In commencing our work we went up the Ombabika River and, as we ascended this river, as far as we could see from our canoe, both banks are well timbered. The land along the banks is mostly sandy; and about ten miles up this river from Lake Nipigon I was instructed to make my first exploration at right angles from the river, and in this trip for the first mile was rolling sandy soil timbered with white birch, spruce and poplar, and then a rocky country evidently an old *brulé,* as it is now grown up with small jack pine and scrub spruce, and the timber in this exploration would only cut out about ten cords of wood per acre. On the north-west side of the river, and some three or four miles farther up stream in this exploration the timber is much better and the land rolling, with some nice sandy loam flats broken by rocky ridges, and I put the pulpwood, jack pine and spruce only,

at about twenty cords per acre. The balance of timber is white birch, some poplar and balsam. Farther up the Ombabika River and south we found a splendid spruce and jack pine growth around Robinson Lake. This lake is about eight or nine miles south-east of the river and flows into the Ombabika River by a stream called Robinson River. This stream flows through a valley of low marshy land, with a rolling rocky country back from the river and well timbered. Two streams flowing from north-east are tributary to Robinson Lake, with splendid spruce along both streams as far as I saw them. The land in this exploration is not farming land. I put the cut of pulpwood at about thirty-five cords per acre. The balance of the timber is small tamarac and poplar. Ascending the river to Summit Lake and exploring both sides of the river, no farming land is found. There are some flats along the banks, but they are low and swampy and produce some fine large thrifty tamarac. Back from the river the land is rolling and rocky in the low places. We found splendid spruce, and some poplar, and on the slopes and tops of hills white birch and jack pine. From the forks, that is from the mouth of Robinson River, to Summit Lake, a cut of thirty-five to forty cords per acre is about what we would get there. Then we have a fine lot of good tamarac, the remainder of timber being balsam, poplar and white birch."

On the numerous rivers flowing into the lake and on the Nipigon River flowing from it are many water powers of good fall and volume, and which will be useful for manufacturing purposes, or in the time, which it is to be hoped for the sake of the forests is not too far distant, when steam power on railways will be succeeded by electricity. The preservation of the forest will mean the life of these waters.

In the district surrounding Lake Nipigon large game are not plentiful. Few moose or caribou are found, owing probably to the Indians hunting them recklessly and also to the burnt-over condition of much of the country. It is stated that a few years ago the caribou used to be plentiful, while moose were not to be found at all. Recently the moose have been growing more plentiful while the caribou have been disappearing. The country af-

fords splendid grazing ground for these large animals. Small shrubs are plentiful, while the moss for the caribou is found covering large areas.

The smaller fur-bearing animals, such as mink, otter, beaver, martin, muskrat and fox are plentiful, and are trapped in large numbers by the Indians for the Hudson Bay Company.

One curious fact in regard to the fauna of this region is given in the following extract from a report made in 1900:—

"Red deer and wolves first made their appearance near Port Arthur about three or four years ago. They are still very scarce but a number of them have been killed. Mr Hodder, Indian agent at Port Arthur, showed me the skin of the first wolf seen near that place. An Indian had killed the beast and had asked Mr. Hodder what kind of an animal it was. A number of men I met expressed the belief that the red deer had been driven into the district by the forest fires that had raged in the northern states, and the theory appears quite feasible as they were not found in the vicinity until after one of these great fires."

Considerable controversy has arisen in British Columbia over a lease of lands on the Coast and the North of Vancouver Island, which the Provincial Government proposes to grant to the Western Canada Pulp & Paper Co. The area concerned is some 163,000 acres, and a protest against the lease has been made by the B. C. Loggers' Association, on the ground that the timber in that district consists mainly of cedar, and that there is very little wood suitable for pulp making. The Pulp Company, on the other hand, contend that any of the trees, even cedar, can be used in the manufacture of pulp and paper, no matter what their size. Any wood can, of course, be used for pulp, but the question is as to the best and most economical use, and in as far as cedar is concerned, the large trees of British Columbia might profitably be put to other purposes.

THE POPLARS.

The poplars, generically known as *Populus,* are large fast-growing trees which are represented in Canada by several species, commonly occurring. The balsam and the aspen poplar are usually the most common, and are found in nearly all parts of the Dominion, the aspen especially springing up after fires. Besides their quick growth, a reason for their rapid spread is the nature of the seed envelope, which is of light cottony texture, and by which the seeds are carried for long distances on the wind. This habit has made these trees objectionable for street purposes, as when the seeds are falling the roads are covered with the white cotton. The habit of spreading by suckers, which is specially noticeable in the balsam poplar, also causes them to be looked on with disfavour. The poplars are subject to insect attack, and the wood is soft and easily broken, so that they have but few advantages to commend them for ornamntal purposes, the chief one being their fast growth.

The poplars are found in temperate or northern regions, but range as far south as Northern Mexico and Lower California. There are nine species in North America, but their main habitat is toward the north. The poplar is the oldest type of dicotyledonous plants yet identified, being common in North America in the cretaceous period.

Perhaps the best known species generally in Canada is the Aspen Poplar (*Populus tremuloides*), known in the west as the white poplar. It springs up everywhere, especially after fires, and with its white trunk and light green shimmering foliage forms a beautiful contrast to the dark coniferous trees amongst which it grows. The trembling of the leaves is one of the most noticeable characteristics of this tree, and has given it its specific name. The peculiar movement of the leaves is occasioned by the fact that the petioles or leaf stems are flattened laterally, and as a result the slightest motion of the air causes them to tremble violently. As this is more or less characteristic of the poplars it may have

given rise also to the generic name of *Populus*, or people, as representing the restless, moving, whispering crowd of the populace. Glancing in the bright sunlight, nothing could be more beautiful than the tremulous motion of the leaves of the aspen, but to a person unused to the sound, nothing is more weird than the continual rustling and whispering of the foliage when the silence of night has fallen. To the uninitiated it is continual presage of a rain shower, or, if he be of an imaginative temperament, he may endow the trees with life and hear strange mutterings in an unknown tongue. There is a tradition that the wood of the cross was taken from this tree, and that it is in consequence of this that it is always trembling with shame. Among the French Canadians the aspen is regarded with a superstitious reverence, and they do not care to use it for ordinary purposes.

Populas tremuloides is the most widely distributed tree of North America, springing up easily everywhere, but the north seems to be its natural habitat, for there it reaches its best development. In Eastern Canada and the north eastern states it rarely exceeds fifty feet in height. In the western prairie region it reaches a height of sometimes one hundred feet, with as great a diameter as three feet at the ground, although the average is not more than twelve to eighteen inches. The wood is close-grained but soft, and neither strong nor durable. In the east it is made into wood pulp for the manufacture of paper, and in the west is employed for general purposes. It forms the most convenient fuel for many of the northern districts and has an important place in the economy of nature. Germinating quickly and growing rapidly, it forms a cover for denuded soil, and gives protection to the young trees of longer-lived species.

The leaves are broadly ovate and abruptly pointed at the tips. The edges are serrate with small teeth. The foliage is dark green on the upper surface, and in the autumn changes to a golden yellow, which lights up the sombre northern landscapes in a most beautiful way. The flowers, as with other species of the poplar, appear in the spring in aments or catkins, the fertile and infertile flowers being separate. The light bark often makes it difficult at a distance to distinguish this tree from white birch.

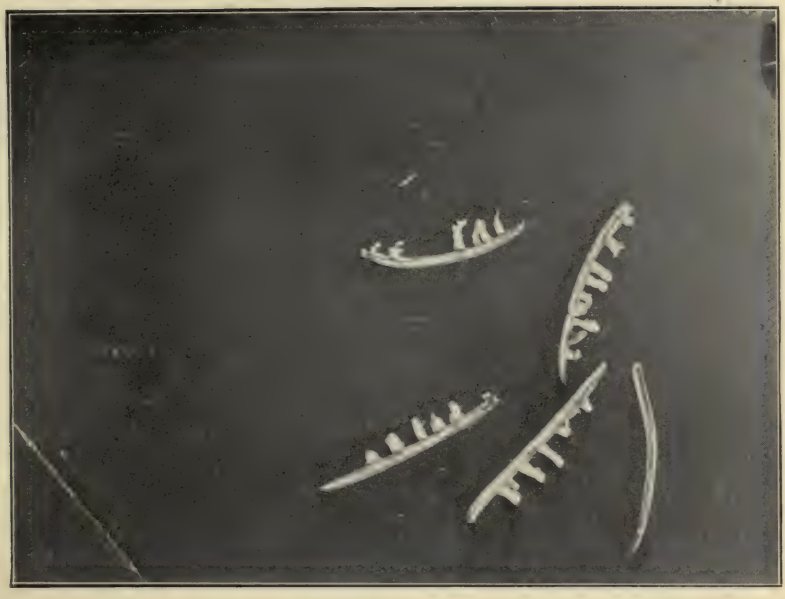
Growing commonly with the Aspen Poplar, but not so num-

erous, is the Large Toothed Poplar, *Populus grandidentata,* Michaux. This name suggests the most marked characteristic which distinguishes it from the aspen, namely the widely-spread teeth with which the edges of the leaves are prominently serrate. The bark is not as light in color, and the wood is light, soft and close-grained, but not strong. It is not considered as vauable a species as the first described, but is used for largely the same purposes.

In the Cottonwood (*Populus deltoidea,* Marshall; *Populus monilifera,* Aiton) the leaves resemble somewhat those already described. They are deltoid or broadly ovate, and the edges are coarsely crenate or bluntly toothed, being in this respect between the leaves of the aspen and the large-toothed poplars. The base is broad and usually truncate or straight, though sometimes heart shaped. The aments or catkins of the pistillate or fertile flower often reach a foot in length and their resemblance to a necklace has given occasion for the specific name, *monilifera* or necklace-bearing. This tree ranges from Quebec to the base of the Rocky Mountains, but it is on the western plains that it has been found most valuable. It was the chief dependence of the early settlers of the Western States, and is being found useful also in Western Canada. It has been distributed largely by the Forestry Branch of the Department of the Interior to farmers for setting out in shelter belts and woodlots. Good success has been had with it except in south-eastern Manitoba, where it has been found subject to rust. Growing naturally, it attains the best development in the river bottoms and moist, rather heavy soil is its favourite location. It is sometimes killed back by the frost, but this is probably the result of immature growth on account of wet seasons in the fall.

The cottonwood grows to one hundred feet in height and sometimes seven or eight in diameter. With its height and spreading head it makes a splendid shelter, and, as it grows rapidly, is soon sufficiently developed to make its effect felt. The wood is light, but it is useful for fuel and general purposes. The heartwood is dark brown and the sapwood nearly white.

Leaving the other native poplars for future consideration,



Needles of Black Spruce: four of them infected with rust.—Fig. 5

Black Spruce killed by rust —Fig. 6

"Shelf Fungi" on a dead Black Spruce.—Fig. 7

mention may be made of two introduced species which were at one time in great favour.

A row of Lombardy poplars (*Populus dilatata*) was a frequent feature of the agricultural landscape of Ontario and the Eastern States, and although it is practically useless for any purpose, the stiff, military appearance of a row of such trees made a striking and not unpleasing feature of the landscape. The Lombardy poplar, as its name indicates, was introduced from Italy, through France, was strongly advocated by Joseph Jefferson, and was soon distributed through the Eastern States and Canada. One reason for the favour it found was that its tall spire-like form was supposed to be a protection from lightning to the buildings in the vicinity, although the belief in its usefulness for this purpose has gone the way of the faith in the lightning rod. The characteristic upward growth of the branches gives this tree an unfailingly individual appearance which makes it easily distinguishable. They never spread, and a row of these trees requires only a narrow space. The leaf is rather broader than long, and tapers toward both ends, the point being long and sharp.

Another introduced tree is the White Poplar or abele. It was frequently planted as an ornamental tree and its foliage, dark green and shining on the upper surface and cottony underneath, gave it a very attractive appearance. But its persistent and troublesome habit of spreading by suckers, and the shower of down which covered the ground when the seeds were falling, has caused it to fall into disfavour The leaves are easily distinguished by their lobed shape, much resembling the leaves of the maple.

The present season has not so far been marked by any great number of forest fires. In Cape Breton a fire occurred in the spring which threatened to assume serious proportions. During June, New Brunswick was visited with a fire that destroyed considerable timber, including some on Mr. Gibson's limits. It is reported that extensive fires have occurred on the Yukon River and on Prince of Wales Island. A recent fire has also taken place in the Temagami Reserve in Ontario, along the line of the Government Railway.

NOTES.

The report of the Commissioner of Crown Lands for Ontario for the year 1904, shows a total revenue from Woods and Forests of $2,650,782; $1,664,268 being received on account of bonuses, $919,471 on account of timber dues and $64,997 on account of ground rent. There were 318 fire rangers on duty in the forest exclusive of those in Algonquin Park and the Forest Reserves. The cost of this service for the year was $82,589, of which the Department paid $42,989.

Of the 318 rangers 290 were distributed over licensed territory, 12 on the Temiscaming and Northern Ontario Railway and 16 elsewhere on lands of the Crown not under license. The rangers along the line of the Temiscaming and Northern Ontario Railway were under the supervision of a Chief Ranger, who was clothed with magisterial powers, so as to try promptly any offenders against the Fire Act. A ranger was also placed on the construction of the branch of the Canadian Pacific Railway between Romford Station and Byng Inlet on the unlicensed lands, and one was on the head waters of the Missanabie and Moose Rivers, so as to post up notices on the portages and have a general supervision of parties using these waterways.

No serious fires occurred on licensed lands. There were two fires in the Temagami region, one near Net Lake, which would certainly have developed into a very serious fire had it not been promptly suppressed by the rangers on the spot. The other was on Horse Island in Lake Temagami, which was suppressed by the rangers in the reserve, which would no doubt have assumed very serious proportions had it not been suppressed by the rangers.

The Superintendent of Algonquin National Park in Ontario reports that in 1904 the capercailzie introduced the previous year were seen in several places. They evidently made direct for the

heavy pine sections. Several of them were seen at different times during the summer by parties in different sections of the park. Two of the rangers reported seeing a mother with a very fine lot of chickens. They were enabled to examine them closely seeing them on two different occasions. The successful propagation of this famous Scotch grouse should be a great attraction to the park and will furnish a new and useful game bird in that district.

The quantities of wood cut in the Adirondack and Catskill forests during 1904 were 699,287,760 feet, spruce leading with 161 million feet, hemlock 69 million, white pine 36 million and hardwoods 68 million. In the Adirondacks 481,876 cords were used for pulpwood, four-fifths of which was spruce. The consumption of wood for pulp has increased from 5,835,844 feet in 1890 to 289,125,600 feet in 1904.

Of how much of the northern part of Canada can the same description be given as the following, from a report of the Geological Survey on a portion of the Rainy River district:—

"Comparatively a great part of the country embraced in the area mapped has been ravaged by fire within the last half century. These devastating fires, which do so much to mar the beauty of the scenery and destroy the timber, are too often caused by the carelessness of explorers, prospectors and hunters. The Indians are very careful to extinguish their fires during the dry season, but it is to be regretted that the fatal carelessness of others cannot be checked. The amount of valuable timber thus destroyed is mutely but strongly attested by the gigantic half-burned dead pines which, towering in the air, add so much to the wildness and desolateness of the scene. Where sufficient time has elapsed a dense second growth has sprung up, consisting, in places, almost entirely of jack pine, thickly clustered, sometimes of more thinly scattered birches and poplars, but generally of all three, with the addition of spruce. Frequent clumps of Norway pine often break the monotony of the burnt country. These trees remain unscathed, and where they are thickly clustered, have often arrested the progress of fires in that direction."

A deputation of holders of timber licenses waited upon the Ontario Government some time ago, to present certain suggestions regarding the protection and conservation of timber. One proposal was that the Government should appoint inspectors to report upon the adaptability of localities situated within districts under timber license, and unless at least ten per cent. of a township is suitable for cultivation, such lands should not be open for settlement under the Free Grant and Homestead Acts, and if already open, should be withdrawn. Instead of a location certificate being granted, the deputation suggested that the applicant should not be located, but should be allowed only to enter upon the lands for the purpose of cutting and clearing and putting under cultivation the two or more acres prescribed by the regulations, building the house and residing upon the lands according to the requirements of the Act, and then, after the expiration of six months, upon furnishing the department with valid proof of residence and improvement, and of his having complied with the provisions of the Act, he should receive the location. The further provision should be made that he is not to be allowed to cut timber except in the actual process of clearing for cultivation, prior to the issue of his patent. The request was also made that rights of licensees to cut timber other than pine, where it is included in the licenses, be not made to cease upon the location as at present, but be suspended from the time of the location, to be revived on abandonment or failure of the locatee to comply with the regulations. Attention was also called to the resolution passed by the Lumbermen's Association, urging that the newer and unexplored districts should be explored in advance of settlement.

Within the last two years a British Syndicate, in which the Harmsworths, who are among the leading newspaper publishers in England, are the prime movers, have been making enquiries with the object of acquiring control of pulpwood lands, and establishing a pulp and paper mill to supply their various enterprises in England. Having looked over the ground in all the eastern Provinces of the Dominion as far as Ontario, they finally came to the conclusion to locate in Newfoundland, the determin-

ing factors in the decision being apparently, in addition to an adequate supply of raw material, the advantage of having an ocean port free to navigation throughout the year, and the practical independence of railroad transportation. There may perhaps be the additional factor that it was possible to obtain a better bargain with the Government of Newfoundland than with the Governments of the eastern Provinces.

The Newfoundland Government has entered into an agreement with the Harmsworth Syndicate, the main provisions of which appear to be the following:—The corporation is permitted to secure a solid block of timbered land, containing 2,000 square miles, for 99 years without rental. The concession makes pulpwood free of dues, other timber being subject to a royalty of fifty cents per thousand feet. It also gives virtual ownership of the land with mineral rights. The company is required to spend a quarter of a million dollars during the first four years, and a million dollars during twenty years. Game and fish are reserved for the public, the natural migration of the caribou is to be left unrestrained and the right of way for roads, railways, telegraph and telephone lines is also reserved.

A strong agitation against the confirmation of this agreement arose in Newfoundland, and the bill has been fought at all stages, and appeal has even been made to the British Government for disallowance. The movement is strengthened by the fact that the bargain made in 1898 with the Reid syndicate, for the building of a railway across the island, gave away large public privileges, without the matter having been submitted to the people, and the feeling that the present agreement is a repetition of the same process.

One of the chief objections made to the bargain is that it does not specifically require the building and operation of a pulpmill within a fixed period, although the grantees are obliged to spend $250,000 in and about the providing of water powers, and the erection of a mill or mills within four years. The reply of the Syndicate to this argument is that many exhaustive investigations have yet to be made as to mechanical and engineering data, and to force their hand might be to cause them to erect a mill that

might be useless, as they say has already occurred in Canada when such a provision was put into force.

The lawyer for the Harmsworths claims that an equally satisfactory explanation exists with regard to every other clause in the bill. His clients, he says, only sought an area extensive enough, and contained within a suitable watershed, to enable the forest growth to be cut scientifically and then reproduced by the most advanced methods of modern arboriculture, while it could be properly policed and protected so that its one substantial asset, from their view point, its standing timber, might be safe-guarded from every vagrant wanderer whose camp fire might destroy it in a single night. The possession of such an area assured to them, and satisfactory legislation to prevent bush fires enacted, together with such concessions as will warrant them in embarking in so large an enterprise in a new and untried country, and they will at once launch out in the establishment of a plant and accessories, which will reach five million dollars in a few years. They have all their plans now perfected for opening up work—engineers and experts engaged to make investigations as to the water powers, flow, ice drift, mill sites, dams and factories; surveyors ready to begin the mapping of the entire watershed; forestry experts to undertake the scientific reforesting of the waste lands, where such can be done, and wood rangers to assume the task of patrolling the borders and seeing the region kept free from bush fires.

As the Newfoundland Government controls the customs as well as the land revenue, it may expect to obtain through the former source, consequent upon the trade development which the contract promises, a return for the concessions made, but it is hardly a wise Government measure to alienate large areas of the forest lands of the Colony, without at least a provision to ensure a direct revenue to the Crown. Stumpage dues would probably be the preferable method of such taxation, as it would thus only keep pace with the development. The future rights of the Colony should certainly be safeguarded in some way, the opportunity for development need not necssarily be set aside, and it is to be hoped that the statesmanship of the island colony will be strong and able enough to work out a solution that will make for its advancement and its future, as well as present, prosperity.

Mr. E. Stewart, Dominion Superintendent of Forestry, has just returned from a trip to Europe, which he made with the purpose of studying forest conditions and management in the more advanced countries of the old world. He visited the scientifically managed forests and the forest schools of France and Germany, and had the opportunity of meeting and discussing forestry questions with some of the leading foresters of those countries, and also Dr. Schlich and Sir Dietrich Brandis in England. The results of such observations will be of much advantage to Mr. Stewart in his administration of the Dominion forests.

The same careful and methodical policy is being introduced in our colonial dominions. There the difficulties are sometimes very great, because the havoc has been more complete. We try, for example, to reinduce trees to give back to Southern Tunis its pristine fertility. Most of it is now a sand desert. What it was in Roman times we know by the ruins and the inscriptions. The capital of the South, Suffetula, as it was called, consists now in scattered ruins in the midst of absolute desert. One of the inscriptions discovered contains a description given by an old Roman veteran of what his villa was. He had retired there after his campaigns, and describes the trees, the plots of grass, and the fluent waters, which adorn his retreat—now buried under the shroud of the desert sand.

The Arab conquest destroyed all the trees there and killed the forest. The punishment was not long to follow. No forest there. No men. Not long after the conquest, the mischief was already considerable, the land was desolate, and an Arab chronicler, seeing the havoc done, recalled in his book the former times of prosperity, adding: "But in those days one could walk from Tripoli to Tunis *in the shade.*"—*M. Jusserand, Ambassador from France, in Report of American Forest Congress.*

The following communication has been received from Mr. W. B. Hoyt, of N. B.:—

"In your annual report for 1904, in a discussion on the distribution of forest seeds, p. 51, Mr. Bertram makes a remark

relative to the distribution of white pine seed, and, incidentally to be applied to other forest seeds, which I think, is very wide of the mark. Mr. Bertram says: "The seeds of the white pine get blown out of those positions....and are carried far and near over the country.....That is the only way white pine seed can distribute itself."

Now there is no doubt that a considerable distribution takes place in this way to near points, but it would only be in an exceptional hurricane that these seeds would carry a mile, or even half that distance.

I think that there is a strong similarity in the methods by which the seeds of the coniferous trees are distributed, so that what will apply to spruce or fir will apply to pine. Now, in my opinion, one important source of distribution is by animals. We know that it is a common habit for squirrels to carry their food to a fallen tree for consumption. We see this done everywhere; it is very rarely that they eat sitting on the ground. Generally they perch on a fallen log or a branch. Now I have frequently noticed a dense growth of sapling spruce or fir in the immediate vicinity of a fallen tree—in many cases you can trace this clump for the full length of a fallen trunk, showing that it has at some time been the favourite feeding ground of a family of squirrels. These squirrels are in turn devoured by owls, foxes and other carnivora, and large quantities of undigested seeds are deposited in their excreta; and as many of them roam over a large field, this method becomes an important source of distribution.

But probably the most important source of distribution, and one, the study of which will lead to the most practical results, is that effected by the spring floods. The seeds dropping on the earth or on the snow, in the early part of the season, are carried by the rivulets which form in the melting of the snow, and are distributed along their entire course, many of them being carried into the larger streams and deposited over large submerged areas in the spring.

The consideration of this mode of distribution should be an important factor in the selection of forest reserves, as, in this way, areas selected on a watershed form not only a kind of re-

servoir for the more equal distribution of the rainfall throughout the year, but act, also, as a natural nursery, producing and distributing a form of flora naturally adapted to the locality.

The Annual Report for 1904 of the Department of Waters and Forests of France furnishes some interesting figures. The area of state forests is 1,169,820 hectares or 2,911,625 acres. The financial returns for 1903, the last available, were 29,373,903 francs or $5,874,780, an average of about $2.00 per acre. The product of the wood cut was 21,247,520 francs, and from other sources 8,126,383 francs. The value of the wood imported into France in 1904 was 167,400,000 francs and the export 53,900,000 francs, leaving an adverse balance of 113,500,000 francs.

The Moosomin, N.W.T. town council, wishing to encourage tree planting upon the streets by private citizens, has passed the following by-law:—"All property owners or tax-payers, who plant trees on the streets, not less than eight feet from the street line, good, healthy maples, ash, or elm, of a size at least two inches through in the trunk, and not less than twelve feet high,—for every one in every twelve and a half feet so planted shall be paid the sum of fifty cents each."

The conditions are that the trees are to be properly planted and staked, and to be to the satisfaction of an inspector appointed by the council. The inspection is to be made in July of the year following the planting of the trees. At the time of the inspection, if the trees are found in a healthy, growing state, the inspector shall issue to the property owner or taxpayer, a certificate of 50c. for each growing tree. This certificate is to be accepted in lieu of cash by the tax collector for the sum specified, when the property owner or tax-payer is paying his taxes for the year in which the inspection is made.

Nearly all the developed mines of the Black Hills are large deposits of comparatively low grade ore, either free milling or cyaniding in its character; frequently both processes are com-

bined in the extraction of the values from the ore. In the successful prosecution of the work required to make a mine productive and remunerative to the owners, the use of timber is an absolute necessity. Its uses are varied. It is required to timber the shafts through which the ore is drawn to the surface. Heavy timbers are also required to take the place of the ore mined, to hold up the roof of the workings, and sustain the sides of the stopes and drifts. The place of every supporting atom taken from the interior of a mine must be filled by some other material which can carry the burden with safety to the lives of the miners employed. This requires timber from the forest. No other material can be substituted for it. The use of iron or steel posts and beams is prohibited by their cost, to say nothing about their inadaptability to the work of underground mining.

It can be truly said that a veritable forest has been used underground in the mines of the Black Hills during the few years they have been in operation, that no more of the forest has been used in their development than has been absolutely necessary, is doubtless true. The grade of the ore, the high wages paid, and the satisfactory returns received in most cases on the investment, prove that the mines have been most economically managed, the timbering being one of the heaviest items of expense in their operation.—*Seth Bullock, Supervisor of the Black Hills Forest Reserve, at American Forest Congress.*

The report of the Swedish Forest Department, for the year 1903, gives the total area of the forests under charge of the department at the close of that year as 16,394,944 acres, or about half the area of England. Of this area, however, about 2,069,475 acres were woods in the hands of communes or other authorities who had the right to the revenue of these lands, so that only the proceeds of about 14,325,469 acres were paid in to the Department. From these 14,325,469 acres must also be deducted 862,023 acres, the revenues of which were handed over to the ecclesiastical authorities, leaving only 13,463,446 acres as the area of the State Forests proper. The latter gave a gross return of 8,673,224 kronor for the year 1903. The cost of management, which included the

making and improvement of roads and the clearing of waterways for floating, etc., amounted to 2,445,532 kronor, leaving a net profit of 6,228,002 kronor, or roughly $1,700,000, being about thirteen cents per acre. It must be borne in mind, however, that the great bulk of the Swedish State Forests are situated in the extreme north of the country where the growth of conifers is slow, and where there are large expanses made up of marsh and other non-forest-bearing ground. Allowance is evidently made for this in the estimate of the value of the Swedish Forests, which is placed at about $26,500,000, or $2.00 per acre, as in the southern part of Sweden which supplies the bulk of the contribution to Great Britain and that of the best quality, $25.00 an acre is not an uncommon price for denuded forest lands.

The following is a copy of a resolution adopted by the Central Farmers' Institute of the Province of British Columbia:—

"Whereas, the delegates of the Central Farmers' Institute in convention assembled are of the opinion that the conservation of the forest wealth of the Province, one of the principal sources of wealth and bearing as it does so intimately on the agricultural interests, is of the first importance,

Be it therefore resolved that the Government be asked to use all means in its power to prevent destruction of forests, whether by fire or by wasteful methods of lumbering,

And be it further resolved that the Government be asked to use its influence with the Dominion Government, or otherwise, to make a reserve of a tract of forest as a National Park to the end that at least a remnant of our original forest may be reserved for posterity,

Resolved, that in the best interests of the country, it is desirable that reserves should be made of forest lands."

Russia seems to find the forest a certain resource to fall back upon in time of financial stress, much in the same way as some of the Canadian provinces. It is stated in Russian newspapers that in view of the financial difficulties in which the Government is

situated, owing to the war and internal discord, the Forestry Department of the Ministry of State Domains has been authorized to sell large quantities of timber in the Province of Vologda, for shipment from the Petchora. At present, only two sawmills are said to be working there. It is expected that as a result of the financial burdens of the war, it will be necessary for Russia to exploit her forests to a large extent, and this may be expected in the forests of the White Sea district for the export trade.

The St. John River is the scene of a dispute which has assumed international proportions, inasmuch as it is based on an international agreement, that no obstruction should be allowed to the free navigation of the portion of the river which forms the boundary between the United States and Canada. A great many logs, cut on the upper part of the St. John River in Maine, are sawn at the mills in New Brunswick on the lower reaches, particularly at St. John. One of the firms operating on the Maine side where the river is the boundary, has built a dam so as to direct the logs into the pond for sorting, and, although the logs belonging to mills lower down are afterwards sent on, the owners object to the delay and consider the dam an interference with the stream in contravention of the international agreement. An effort has been made to include the difficulty in the disputed matters to be taken up by the International Waterways Commission.

REVIEWS.

Report of the Dominion Superintendent of Forestry, 1904. *pp.* 28.

The succeeding reports of the Dominion Forestry Branch tell a story of steady progress. The distribution of trees to farmers in the West reached the number of 1,800,000, bringing up the total distribution to 3,242,750, while the stock in the nurseries is 4,229,557. The satisfactory character of the work done in the setting out of these trees is shown in the fact that the percentage of success is from 80 to 95 per cent. Two special phases of forestry work of the utmost importance to Canada are emphasized by Mr. Stewart in the following paragraphs, which are well worthy of quotation:—

"The early history of Canada is much enlivened by the accounts of the journeys of the pioneer explorer into hitherto unknown regions. The explorer and the missonary during the French regime went hand in hand, and their names are written far beyond where the settler of to-day has yet gone, but private exploration is a thing of the past. Men to-day are too busily engaged in personal advancement to permit of the gratification of a spirit of adventure if such should exist, and the result is that we know practically as little of the heritage we possess beyond the settled districts as we do of Africa or Australia. It is true that the Geological Survey has done all that could be expected of it with the limited means at its disposal, but it seems to me that the day has now come when the people of the country should have the means of knowing the character and natural resources of their own unoccupied possessions. The government should know in advance of settlement the character of the unsettled districts, so as to direct immigration aright; so that mineral lands might be set aside as such; agricultural land devoted to the agriculturist, and land unsuited for agriculture but on which timber is growing reserved permanently for timber."

"The protection of our natural forests is a matter of supreme importance to the whole country, and one that has been almost neglected in the past. The spectacle witnessed by the traveller passing through our unsettled forest country is sad indeed. On every hand he beholds the charred remains of the old time forest. He sees this as he journeys through Nova Scotia, New Brunswick, Quebec, Ontario, the Northwest Territories, and, sad to say, this destruction is not least if not greatest in the giant woods of the Pacific slope. Everywhere this destruction of public property is before his eyes, and it is humiliating to confess, as we must do, that the fires which caused this great loss were not only permitted but in some cases caused by our own people. The settlers in these regions on the one hand laboured with all the energy characteristic of the backwoods pioneer to create wealth, while on the other hand they lighted the torch which resulted in greater loss to the country as a whole than was caused by all the conflagrations that have ever occurred in our settled districts."

The Forestry Branch has now secured land in the vicinity of Indian Head for the location of a forest nursery which will be entirely under its control. This is described in the report of Mr. Ross, the Assistant Superintendent. Mr. Ross also mentions the species of trees that have been found most successful as follows:

"On the whole the trees sent out have done exceedingly well, and with only a few exceptions are carefully attended to. In the reports of the inspectors a more detailed account will be given of the success of the different varieties in each district. The maple, elm, ash and willow seem to do well over the whole of the West. From recent reports the cottonwood in south-eastern Manitoba does not seem to be entirely satisfactory, but in other districts it appears to be the fastest-growing tree we have. The cottonwood is a tree which seems to thrive best on the heavier soils and in moist places. In south-eastern Manitoba, however, the main difficulty seems to be with a rust fungus which affects the foliage; but the district where this is prevalent seems at present to be very limited. The cottonwood too is looked upon with disfavour by many on account of its killing back in the winter. This, however, does not seem to affect the growth of the trees to any extent in the majority of cases. The wet falls

of recent years and the consequent late growth, which does not give the young shoots an opportunity to ripen before the heavy frosts, account no doubt for the rather large amount of killing back during the past seasons. After the trees are three or four years old the winters do not seem to have any effect on them, at least the older trees on the experimental farm here have shown no sign of killing back for several years.

"The Russian poplar we do not distribute very much, as it has been found that after they get to be a few years old they become subject to the attacks of borers and fungi. Mr. Mitchell reports that two-year old trees planted at Gleichen in Alberta and at other points are already being affected by this fungus. When the trees are young it seems to attack the stem at the point where the root commences, and rots the outer wood and the inner layer of bark, thus destroying the circulation of sap.

"The elm and ash, especially the latter, seem to be coming into more general favour. They are both very hardy and are longer lived and produce better timber than either the poplar or willow, although they are slower in growth. The ash is very readily raised from seed, the elm not quite so easily, the seed being scarcer, and, unless sown under proper conditions of soil and moisture, it does not seem to germinate at all evenly; hence we cannot distribute this variety in such large quantities as either the maple or ash, although it is without doubt the best broad leaf tree we have."

The reports of the Inspectors of Tree Planting and of the forest protection officials are appended and give much detailed information.

Forestry Affairs in New York, 1904. *Col. Wm. F. Fox, Superintendent of State Forests, Albany, N.Y.,* 28 *pp.*

The reports of the New York Forest Commission are always interesting on account of the material they contain and the close resemblance between the conditions there and in parts of Canada. New York State was fortunate in the little damage done by fires during 1904, the total loss to state timber being only

$81. One of the worst fires was started from a railway operated by a lumber company and resulted in a loss to the company of $5,000.

In reforestation work a hardwood plantation of some 70 acres was set out consisting of red and pin oak, chestnut, black locust and black walnut. The seedlings were planted seven feet each way instead of four feet as is usual with conifers. The scattering of the seeds of coniferous trees was also tried and the question is one of so much importance that the paragraphs in regard to it are worthy of quotation in full:—

"Another tract was sown with white pine by the seed-spot method. The land selected for this purpose is in Essex County, near the highway running from Lower Saranac Lake to Lake Placid. The growth on this site was so uneven, rough, and overgrown with scrubby brush that the planting of seedlings at regular intervals was not practicable. The seed-spot method consists in breaking up the ground in small circular spots, about two feet wide, and at intervals of eight feet each way, or as near that as the obstacles will permit. A few seeds, ten or twelve, are scattered on the freshly turned ground and lightly covered with earth. When the seedlings thus propagated are two years old they are taken up, with the exception of one which is allowed to remain; the others, so far as needed, are set out immediately in the intervening spaces close at hand, forming thereby a plantation with intervals of four feet each way between the plants. The seed-spot method, owing to its smaller expense, is used also on smooth, level ground, in which case the patches are made at the smaller intervals on the start, thus saving any subsequent transplanting into the spaces.

"Another small tract near the Lake Placid road was sown with white pine seed, scattered broadcast. This method is also preferable on ground where seedlings cannot be set out with advantage, and furthermore, it is the cheapest way to reforest denuded lands. But it has its disadvantages as well; the seeds are often eaten by birds or rodents; and, under the most favourable circumstances, the germination is very apt to be uneven, the sprouts coming up thickly in some places, and scarcely at all in others.

"Still, the broadcast sowing of native spruce, in 1902, under the poplar groves near Aiden Lair, in Essex county, was successful in every respect. Forester Knechtel, who did this sowing, was instructed to make a careful examination of this ground last spring, and make a report on the result. He found the surface under the young poplars—trees twenty-five feet high—thickly covered with little spruce seedlings, and his report was so encouraging that broadcast sowing will be undertaken on a large scale as soon as we can gather a supply of seed from our native spruce for that purpose. The experiment at Aiden Lair indicates that the numerous areas of poplar forest whch now cover many of the old burns can be successfully underplanted with red spruce."

The methods followed in obtaining a supply of seed also give useful data and are described as follows:—

"The year 1904 was a seed year for white pine in New York, and so arrangements were made for gathering a supply, as this species produces seed only at intervals of four or five years. An examination of the pines in Northern New York was made by our foresters last year, when it was found that the little cones which require two years maturing, were forming to an extent that indicated a seed year for 1904. As the native red spruce and Norway pine did not bear cones this year the work of seed gathering was confined to white pine.

"Work was commenced early in September, before the scales on the cones had opened, and a supply was gathered between the 6th and 18th of that month. The men and boys employed were paid 30 cents per bushel delivered in sacks at Willsboro, at which prices they made good wages. At the start only 25 cents was paid, but as other parties on the ground were offering 30 cents per bushel, Mr. Pettis was obliged to pay the same.

"The cones were threshed and dried in a barn near Willsboro, rented temporarily for this purpose, after which the seeds were cleaned and winnowed in a fanning mill of the kind used by farmers."

"A bushel of white pine cones yield on an average a little over one pound of clean seed, which contains about 29,500 grains.

As the foresters received 500 bushels of cones they secured over 500 pounds of clean seed. This supply cost 47½ cents per pound, not including the forester's expenses or the purchase of some material which was charged to the permanent plant, and is available for future work of this kind. As the market price of white pine seed runs from $2.50 to $4.50 per pound, according to the absence of a seed year and its scarcity, it will be seen that the work was timely and economical."

Proceedings of the American Forest Congress. H. M. Suter Publishing Co., Washington, D.C.—pp. 474.

The Report of the Proceedings of the American Forest Congress held in Washington, in January, has been issued. It includes the papers which were read at the Congress and impromptu addresses delivered in the course of the discussion, and altogether is the most complete exposition of the forest problem as it affects the United States, which has yet been placed before the public. The type is clear and easily readable, and the general appearance of the volume is creditable to the publishing firm. Elsewhere are quoted some extracts from a few of the papers.

A Primer of Forestry. Part II—Practical Forestry. By Gifford Pinchot. Bulletin No. 24 *of the U.S. Bureau of Forestry.*

The second volume of the Primer of Forestry, by Mr. Gifford Pinchot, Forester to the United States, has been received. In the first volume the subject was "The Forest." In the present volume the purpose of the work has been further developed in a discussion of "Practical Forestry," which the author defines as follows:—

"The object of practical forestry is precisely to make the forest render its best service to man, in such a way as to increase rather than diminish its usefulness in the future. Forest management and conservative lumbering are other names for practical forestry. Under whatever names it may be known, practical forestry means both the use and the preservation of the forest."

Mr. Pinchot first discusses the uses of the forest and the silvicultural systems at present in use in different countries, and then passes on to consider work in the woods under the divisions of Conservative Lumbering and Planting. The effects of the forests on climate and temperature are the subject of a separate chapter, and the concluding section gives a sketch of the history of forestry abroad and at home. The two volumes form a complete and simple exposition of forestry as it is advocated by its most reliable exponents at the present time.

Canadian National Park, Rocky Mountains.—pp. 63.

In the last number of the Forestry Journal was noted the issue by the Department of the Interior, of a pamphlet descriptive of the Canadian National Park in the Rocky Mountains and there were reproduced two of the colored illustrations therefrom. The Park is situated on the eastern slope of the Rocky Mountains, and comprises an area of 5,732 square miles or 3,668,480 acres. Within its bounds is found a great variety of grand and beautiful scenery of river, lake and mountain. It includes, also, the hot springs at Banff, which are a great attraction to tourists. A large part of the park is forest clad and is given efficient protection from fire by the authorities. Its chief objects, however, are as a pleasure resort, and as a protection to the watershed, and to fish and game. The pamphlet is fully illustrated and its make up is a credit to the Department and to the Rolla L. Crain Company, of Ottawa, from whose office it issued.

Report of the Michigan Forestry Commission, 1903-04.—*pp.* 200.

This report, in addition to the summary report of the Commission, contains a number of papers on special subjects relating to forestry by some of the leading supporters of the movement in the State of Michigan. There are also included the laws of the State concerning forests and forest fires, and the Forest Reserve Manual.

The Commission have charge of the State Forest Reserves, which comprise an area of 34,000 acres. These Reserves consist mainly of light sand lands, interspersed with swampy areas. All the lands were at one time heavily timbered and in the swamps there is still a good stand of cedar and tamarack, interspersed with spruce, pine and other trees. On the higher lands lumbering operations, with their usual debris of tops and branches, were followed by fires, recurring at intervals, which, in time, destroyed all the forest growth and left it to the tenacious shrubs, such as sweet fern, blackberry, etc. Oak sprouts are still, however, found coming up from the stumps and where a few fire-scarred pines remain there are some scattered pine seedlings. Jack pine and Norway, or red pine, are the characteristic trees of most of the area, although white pine also occurs. Protection against fire has been provided for and some fifty acres have been planted with white pine, Norway spruce and Scotch pine, purchased from dealers, and these show a good percentage of success. Provision has been made for a nursery on the reserve which will assist in cheapening the cost of the work to a great extent.

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The Woods North of Prince Albert, Saskatchewan. (See p. 175.)

Photo by W. J. James, Prince Albert. *Frontispiece.*

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CANADIAN FORESTRY CONVENTION.

OTTAWA, 10th, 11th and 12th JANUARY, 1906.

OFFICIAL CALL.

Office of the Prime Minister of Canada,
Ottawa, 21st August, 1905.

To the Public of the Dominion of Canada:

Canada possesses one of the largest areas of virgin forest of any country in the world and is ranked by European experts first, or among the first, of the important sources of the world's timber supply for the future.

The preservation of the streams in perennial and constant flow, which is largely controlled by the forests on the watersheds, will have an important influence on the industrial and agricultural development of the Dominion. The expansion of our electrical and mechanical industries will be regulated to a great extent by water, which forms the greatest source of power in all countries, and some of our western districts are dependent on irrigation to ensure the success of agricultural operations.

In all the older provinces the clearing of the soil has been carried to such an extent that the ill effects on the water supply and on agriculture are clearly marked, while on the western prairies the need of sheltering trees for houses and fields is seriously felt by the settlers.

The early construction of the Transcontinental Railway, and of other railways, through our northern forested districts and the consequent opening of those districts to general traffic, will increase the danger from fire which has already been a most active agent of destruction.

These conditions are not new; they have from time to time received public attention, and during the Session just closed Parliament authorized the summoning of a convention for the more thorough discussion of the same.

I therefore hereby call a public convention to meet in the City of Ottawa on the 10th, 11th and 12th of January, 1906, under the auspices of the Canadian Forestry Association, and to this convention are specially invited:

Members of the Senate and House of Commons,

Lieutenant-Governors of the Provinces,

Members of Legislative Councils and Legislative Assemblies of the Provinces,

Dominion and Provincial Forest Officials,

Members of the Canadian Forestry Association,

Representatives of Lumbermen's Associations,

Representatives of Boards of Trade,

Representatives of Universities,

Representatives of Agricultural Colleges,

Representatives of Farmers' Institutes,

Representatives of Railway Companies,

Representatives of the Canadian Mining Institute,

Representatives of the Canadian Society of Civil Engineers,

Representatives of Associations of Land Surveyors,

Representatives of Fish and Game Associations, and

All others who take an interest in Forestry.

An invitation is also extended to the Bureau of Forestry of the United States, the American Forestry Association and the State Forestry Bureaus and Associations to send representatives to this Convention.

WILFRID LAURIER.

In accordance with the official summons issued by the Right Honourable the Premier of the Dominion, arrangements have been made for a Canadian Forestry Convention to be held in Ottawa on the 10th, 11th and 12th of January next, to consider the forests of the Dominion and their national importance.

This Convention is held under the auspices of the Canadian Forestry Association and the organization and carrying out of the project has been placed in the hands of the Association.

The subjects to be considered at the Convention will be discussed under the following divisions:—

1. The Nation and the Forest.

2. Forestry in relation to Agriculture and Irrigation.

3. The Forest and the Lumber and Pulp Industries.

4. The Relation of our Forests to our other Industries: Railways; Water Powers; Mining; Building Trades; Wood Working Manufactures.

5. Scientific Forestry and Forestry Education.

By the kindness of the Canadian Railway Companies a single fare rate over their roads on the certificate plan will probably be allowed delegates, regardless of the number in attendance. In regard to rates on railways in the United States, announcement will be made later.

Fuller announcement will be made later to the members of the Canadian Forestry Association by circular and for further particulars application may be made to the Secretary of the Convention.

ORGANIZATION OF THE CONVENTION.

Honorary President:

HIS EXCELLENCY THE GOVERNOR GENERAL.

President:

THE RIGHT HONOURABLE SIR WILFRID LAURIER.

Vice-Presidents:

HIS HONOUR SIR HENRI JOLY DE LOTBINIÈRE,
R. L. BORDEN, M.P.

Executive Committee:

His Honour J. B. Snowball,
Lieut.-Governor of New Brunswick.

His Honour Sir D. H. McMillan,
Lieut.-Governor of Manitoba.

His Honour A. E. Forget,
Lieut.-Governor of Saskatchewan.

Hon. Sydney Fisher,
Minister of Agriculture for Canada.

Hon. W. C. Edwards,
President, Quebec Limit Holders' Assn.

Chas. M. Hays,
General Manager, Grand Trunk Railway.

Hon. S. N. Parent,
Chairman, Transcontinental Ry. Commis.

Hon. Nelson Monteith,
Minister of Agriculture for Ontario.

Hiram Robinson,
President, Hawkesbury Lumber Co.

Hon. J. H. Agnew,
Commissioner of Lands for Manitoba.

Hon. F. J. Sweeney,
Surveyor-General of New Brunswick.

John Hendry,
President, B. C. Lumber and Shingle Manufacturers' Association.

Rev. A. E. Burke,
Vice-President, Canadian Forestry Association, Alberton, P. E. I.

H. M. Price,
President, Quebec Pulpwood Association.

Dr. Robert Bell,
Director of the Geological Survey of Canada.

Aubrey White,
Hon. President, Canadian Forestry Assn.

E. G. Joly de Lotbiniere,
President, Canadian Forestry Assn.

E. Stewart,
Dominion Superintendent of Forestry.

M. J. Butler, C.E.,
Deputy Minister of Railways and Canals.

Cecil B. Smith, C.E.,
Chairman, Temiscaming and Northern Ontario Railway Commission.

Thos. Southworth,
Director of Forestry for Ontario.

Dr. Judson F. Clark,
Forester for the Province of Ontario.

Wm. Little,
Westmount, P.Q.

Hon. H. Bostock,
Vice-President of the Canadian Forestry Association.

D. McNicoll,
General Manager, Canadian Pacific Railway.

Hon. A. E. Turgeon,
Commissioner of Lands and Forests, Quebec.

Hon. R. F. Green,
Chief Commissioner of Lands and Works for British Columbia.

Hon. Arthur Drysdale,
Commissioner of Crown Lands for Nova Scotia.

J. R. Booth,
Ottawa.

Hon. A. B. Warburton,
Charlottetown, P.E.I.

B. E. Walker,
General Manager, Bank of Commerce.

F. W. Jones,
President, B. C. Mountain Lumbermen's Association.

Wm. Saunders, LL.D.,
Director of Dominion Experimental Farms.

J. S. Dennis,
Director of Irrigation for the Canadian Pacific Railway Company.

Monsignor J. U. K. Laflamme,
University of Laval.

F. C. Whitman,
President, Western Nova Scotia Lumbermen's Association.

Wm. Pearce,
Vice-President, Canadian Forestry Association, Calgary, Alberta.

Norman M. Ross,
Assistant Superintendent of Forestry for Canada.

F. D. Wilson,
Vice-President of the Canadian Forestry Assn., Fort Vermilion, Alberta.

J. L. Campbell,
President, Western Lumbermen's Association.

Secretary: R. H. CAMPBELL,

Secretary of the Canadian Forestry Association,
Department of the Interior, Ottawa.

THE MONTREAL FOREST CONGRESS,

21ST, 22ND AND 23RD AUGUST, 1882.

The calling of the Canadian Forestry Convention for January next, naturally turns attention to the Forest Congress, held in Montreal in 1882, which was the first great meeting to deal with the subject of forestry held in Canada. It was in fact a joint meeting of the American Forest Congress and the American Forestry Association, two separate Societies for the advancement of forestry, and it resulted in a junction of their forces. The selection of Montreal as a meeting place was the result of an invitation given by several Canadians who attended a previous meeting at Cincinnati.

For the organization and success of this meeting, while credit is due to many, the most active part was taken by Mr. Wm. Little, of Westmount, who was the Vice-President of the Congress. He not only gave unsparingly of his time and energy, but also personally bore the greater part of the expense, including the publication of a special edition of the Montreal *Herald*, containing a report of the proceedings and the papers in full. It is to a copy of this special issue that we are indebted for the information from which this article is compiled. Mr. Little is still as strong a supporter of the movement as ever and has held the office of both President and Honorary President of the Canadian Forestry Association.

In looking over the report and the names of those in attendance one is struck with the way in which it links the present with the past. Some of those whose names appear are still prominent, some have passed into history. Among those on the local committee were Hon. (now Sir) H. G. Joly, Principal Dawson, Joseph Doutre, Professor Harrington, G. L. Marler, Hon. A. W. Ogilvie, Sir Hugh Allan, Hon. Louis Beaubien, S. E. Dawson, Hon. John Hamilton, Sir Francis Hincks, Dr. T. Sterry Hunt, James Little, Hon. E. H. Spring-Rice, J. K. Ward, N. S. Whitney, A. T. Drummond. Others who were present were: Dr. B. E. Fernow, J. R. Booth, J. G. H. Bergeron, E. H. Bronson, Hon. Geo. Bryson, W. C. Edwards, Rev. T. W. Fyles, Dr. Wm. H. Hingston, Robt. Hamilton, T. C. Keefer, Jas. Mills, W. G. Perley, A. E. Russell, Wm. Saunders, G. W. Stephens, Peter White, Hon. J. S. C. Wurtele, E. E. Taché, W. R. Thistle.

The papers presented covered a variety of subjects relating to forestry, some of a scientific nature, others descriptive and some dealing with practical applications of principles.

Some were presented by lumbermen, others represented the agricultural interests. Many of them were very valuable, though there was in others considerable more of theorizing than of actual experience. Even these latter, however, were suggestive and at least showed interest and enthusiasm. Several descriptive of the trees of different classes or districts gave useful information for reference purposes. Canada was largely represented on the list.

On Monday evening a meeting of a more popular character was held at the Queen's Hall. At this meeting an address was given by Hon. Henri Joly. Mr. Joly stated that the timber supplies of Canada were considered inexhaustible, and therefore it was difficult to arouse interest on the question. He, however, pointed out that the lumber that Canada supplied to England was not one-fourth of the import while what was sent to other parts of Europe was but as a drop in the sea, and yet cutting had so far advanced that it had reached the height of land between the St. Lawrence and Hudson Bay. Mr. Joly thought that not only should the forests in existence be protected but that something should be done to plant trees where they did not now exist. He instanced his own experience with a forest tract of 100,000 acres. From this he turned out 35,000 to 40,000 spruce logs every year, and by following the rule of not allowing any tree under twelve inches in diameter to be cut he expected to have a supply of spruce in perpetuity. A little joke by Sir Henri, which will be appreciated by anyone conversant with the history of the Province of Quebec, and which was received by the audience with laughter and applause, is well worth repeating, although it contains a heresy according to what are usually accepted as orthodox forestry ideas. Mr. Joly said that some people were of the opinion that our Governments should take hold of this matter as men's lives were too short, but he could assure them that if men's lives were short Government's lives were generally still shorter.

The principal address of the evening was made by F. B. Hough, Chief of the Forestry Division of the United States, and was too comprehensive for any attempt at summary. His statement of the principle on which the question of forestry should be approached is worthy of quotation. He said:

"It has often been said, in a way intended to be amusing, that 'posterity has done nothing for me—why should I care for it?' Now, this is neither wise nor witty. It is not wise, because it is foolish—nor witty, because, like an oft told tale, it has lost all novelty and is at best but a stale and silly joke.

"It is part of true wisdom to look upon this beautiful earth as held by us in trust—it is, at best, only a life lease that a man holds to the estate for which he holds an absolute deed of pos-

session—and it is our solemn duty to so manage this trust as not to dissipate its value or perhaps render it wholly incapable of restoration."

A suggestion made by Dr. Hough, which has perhaps had effect on the policy followed in Canada, was that experimental stations for the testing of trees on the plains of the West should be established. As Dr. Saunders was present at the meeting this hint may have been the starting point for the useful experimental work which has since been done in the Canadian West.

In a paper from the standpoint of the lumbermen Hon. J. K. Ward, of Montreal, pointed out what he considered to be improvements required in the management of the forests. Emphasizing the need of providing for the best use of the standing timber, both by protection and utilization, he made the suggestion: first, that there should be greater economy in manufacturing, both in the mills and in the woods, turning to better account the slabs, &c., in the former, and discouraging the making of square timber as much as possible in the latter; second, that on government lands the law as applied to pine should extend to spruce and tamarack, i.e., that no tree less than 12 inches at the stump should be cut down for commercial purposes; third, that fire should be more closely watched. On the last point the suggestion was made that the Government, which is most interested in the preservation of the forests, should employ as many men as are thought necessary in each agency to look after and trace the origin of fires on the public domain, giving them the power to take evidence so as to bring to punishment those who either wantonly or carelessly set fire to or cause the destruction of valuable property. In regard to settlement Mr. Ward urged that no lands unfit for settlement should be offered for sale and stated his view that in selling lands to settlers it should be made a condition of sale that twenty acres in every hundred should be given free, and that it should be forever kept as woodland.

A special committee had been appointed at a previous meeting to report on forest fires. The report submitted by this committee pointed out the damage done by forest fires. It said that the fires raging season after season through the forests have caused a greater and more irreparable destruction, inflicting deeper harm than the combined lumber industries of the past and the present day. The harm done was not only to the timber but to the soil, the constantly recurring fires resulting in the total destruction of every particle of organic matter in the surface soil, reducing it to a state of aridity and barrenness. The report did not make any suggestion as to a remedy. From several of the lumberman in the convention, however, there

came practical suggestions on this question. The most complete statement was made by Mr. Peter White, M.P., of Pembroke, and may be quoted, as one of the most important results from this Convention was the raising of and the suggestion of a means of solving the problem of protection of the timber from fire. His statement was as follows:—

Experience showed that the forest fires along the Upper Ottawa occur between May and August, those months inclusive, and his suggestion was to prohibit the starting of fires for clearing or other purposes within these four months. He would also suggest the division of the timber lands into districts each under the guardianship of a policeman resident within it; one duty of such functionary being to visit every settler towards the close of winter, say some time in March, to give him all necessary information and caution as to the requirements of the law in regard to this matter. He believed that there was very little incendiarism in the lumbering regions and that the bulk of the fires that occurred originated in ignorance and carelessness. Officials, such as he had suggested the appointment of, ought to keep a careful watch at all the principal avenues of districts liable to be laid waste by fire. He thought that the estimate offered of the loss by this cause, as compared with the product the lumbermen secured, was far too moderate; he believed it would be nearer the mark to say it was ten to one, than to represent the two as approximately equal. As to precautions it might be urged that as the lumbermen had so large an interest at stake they might be looked to to provide the necessary precautions. That was true in a sense, and he had no doubt that those concerned would willingly submit to the imposition of a small tax, if necessary, for the purpose of securing the required protection. The firm with which he himself was associated had for years looked after their own interests in this matter, but it was obvious to every one that it was out of the power of private individuals or business firms to act with the authority and force which the Government could command.

The discussion was continued by Hon. Geo. Bryson, Mr. Thistle, of Ottawa, Hon. J. K.Ward and others who supported Mr. White's statements, and on motion of Hon. Mr. Joly a committee was appointed to formulate recommendations to the Governments on the subject.

To complete this phase of the Convention's work it may be added that the resolutions submitted by this committee were as follows:—

(1) The reservation of all pine and spruce lands unfit for settlement for lumbering purposes exclusively.

(2) The prohibition of burning brush by settlers in the vicinity of fir trees during May, June, September and October.

(3) The division of timbered country into districts, and the appointment of forest police, under a superintendent with magisterial powers, whose duty it shall be to detect and punish offenders and provide for the extinguishing of fires.

(4) The cost of maintenance of this protective force might partially be met by the imposition of a moderate tax on the parties owning or leasing timber lands.

Mr. Wm. Saunders, of London, (now Dr. Wm. Saunders, of Ottawa), read a paper on "The Growth of Poplar Trees for the Manufacture of Paper and Charcoal." Dr. Saunders spoke of the extensive demand for poplar for paper making which in many sections made it difficult to supply the demand from the immediate neighborhood, with the result that this wood, previously of little value, commanded a price nearly or quite equal to that for the most valuable kinds. The paper gave descriptions of the different species of poplar and their distribution. It is a notable commentary on the change which has taken place in paper manufacture since that time to observe that in the discussion on this paper spruce was not even mentioned.

In a communication from Mr. Edward Jack, of Fredericton, N.B., the following interesting statement was made in regard to New Brunswick:—

"For more than twenty years I have been engaged as land surveyor and timber explorer in New Brunswick, and have followed the white pine down to the mountains of North Carolina and East Tennessee and from my experience in the subject of woods can say that the neglect of forestry in New Brunswick and Nova Scotia, as well as in the Province of Quebec, is really lamentable. In New Brunswick we make no distinction between timber and farming lands, allowing and encouraging settlers to locate themselves upon spruce and hemlock land, the damaging result of which policy can be estimated by the loss of hundreds of thousands of dollars, while the unfortunate settler finds himself very often worse off at the end of ten years than he was at the date of settlement. A study of New Brunswick Forestry and a proper map accompanied by a written report would show intending settlers where to place themselves, as our spruce and pine lands, as well as the greater part of our hemlock lands, are unfit for settlement purposes, being poor and requiring much manure to render them productive. One-third of New Brunswick is in the millstone grit formation. This was once covered with spruce, pine and hemlock, being well adapted for the growth of these trees, and had we proper forestry regulations the growth of these woods on the dry and sandy plains of the millstone grit district might be made a constant source of profit and revenue to the Province. * * * * I think we should first find out from the explorations of competent and reliable

persons in what parts of the Province our valuable timber (hard as well as soft) is found, and after the matter has been well discussed, determine on what course of action to pursue. Until this be done it is of little use to attempt the formation of any scheme for forest preservation."

Dr. B. E. Fernow submitted a valuable paper on "Conditions of Forest Growth." In opening he pointed out the difference between agriculture and forestry—that the agriculturist had to bring about an artificial condition of the soil while the forester's aim was to preserve the natural condition. Inasmuch as the trees derive a large proportion of their material from the air, they do not depend to any great extent on the chemical character of the soil. The claim was therefore made that any soil in its natural condition contains sufficient organic material for any timber growth; that therefore the change of species observed on this continent can hardly be attributable to an exhaustion of the soil but rather to its physical condition, its depth and looseness and, depending on these, the capacity of absorbing and retaining moisture, which properties may be increased or even compensated for by a sufficient layer of humus. Attention was also called to the relative light requirements of trees, now so familiar a principle in forestry, as an important item in deciding the plans of management. In summarizing Dr. Fernow stated that the principal effort of the forester must be to preserve and increase the good condition of the soil since upon it depends the productivity of the forest. The measures to be adopted for this purpose are not so much to be sought in direct operations on the soil, but mainly in certain considerations in the selection of species, methods of management, terms of rotation, interlucation, methods of reproduction and in the general care of the forests. Of all methods of management the timber forest with natural reproduction from seed trees is best calculated to maintain the vigor of the soil for the shade enduring species, if the cutting is done with necessary prudence so that the soil is exposed as little as possible. Next to this method comes absolute clearing, with immediate artificial re-seeding or re-planting. This is almost the only method advisable for light foliaged trees. From this statement it will be observed that Dr. Fernow's views have changed in some respects.

Mr. Edward Haycock, President of the Ottawa Iron and Steel Manufacturing Company, Limited, spoke of the importance of the forests to the steel industry in a paper on "Canada's Forests and her future as a Steel Producer." Mr. Haycock stated that in the manufacture of steel for the future, wood charcoal was a necessity.

"Spain, Algeria and the Mediterranean islands with their rich ores have no wood. England is in a similar position, Nor-

way nearly so. Sweden, the present great steel producing region, is rapidly approaching the same position. Germany and France are in the same situation. The United States, with their vast consumption and rapid increase of charcoal blast furnaces, will hardly be able to keep up their supply many years. Russia's freights and internal dissensions kill the possibility of a supply being drawn from her. Where then can the coming "Steel Age" derive its supply from unless from Canada with her extensive woodlands and rich ore beds."

Alas for prophecies!

A paper on "Forest and Fruit Culture in Manitoba," by Mr. J. W. Taylor, United States Consul at Winnipeg, was transmitted by the Government of that Province to be read at the Convention. As to the causes of the present condition of the treeless areas in the West, Mr. Taylor quoted a statement made by Capt. Palliser in 1858 as follows:—

"Large tracts of country now prairie lands have at one time grown valuable forests and their present absence is the result of the repeated ravages of fires. Where a scattered and stunted growth of willows is found as a general rule was ancient forest land, which when dug to a sufficient depth still discloses numerous roots of destroyed timber. It is most lamentable to see so often such masses of valuable timber destroyed, almost invariably by wanton carelessness and mischief. The most trivial sign of one Indian to another has often lost hundreds of acres of forest trees, which might have brought wealth and comfort to the future settler, while it has brought starvation and misery to the Indian tribes themselves by spoiling their hunting grounds."

It was noticed in the Red River Settlement, although the primeval forest along the course of the river consisting largely of oak, elm and ash, had been long cleared away, as much for building the block or timber houses of the early settlers as for fuel, that yet there had been a succession of poplar and other trees of quick growth. Artificial aids to the reproduction of the forest were however adopted such as the Tree Culture Claim Act of the Dominion Government, under which 160 acres of land might be obtained by planting part with trees under certain conditions.

An interesting item in the history of forestry legislation mentioned was an act passed by the Legislature of Manitoba in 1882 by which the residue of the great highways and road allowances, after reserving one chain for road purposes, can be transferred to adjacent owners on the payment of one dollar per acre. The strips of land contiguous to the highways were thirty-three feet on each side in the case of the great highways and eighteen and a half feet in road allowances. Contracts with

the adjoining owners were to be executed by the Minister of Public Works, who was authorized in case of failure of the occupant to properly comply with the requirements of the law, to make such arrangements as will complete the work, charging the expense on the adjoining premises. The occupant was required to break the ground the first year, cultivate to crop during the second year, and plant in trees, seeds or cuttings during the third year. The trees were to be planted in straight lines and not more than twenty feet apart. The following kinds of trees, as being best adapted to the climate might be planted, namely: oak, ash, elm, ash-leaved maple, poplar, balm of gilead, spruce, tamarac, balsam, pine, wild cherry and hawthorn.

Probably the most important result of the Congress was its deliverance on forest fires, as it undoubtedly gave the impulse and suggested the line of action which has been so beneficially adopted throughout Canada in the fire ranging system.

The reports received at the Forestry Branch of the Department of the Interior of the results of the tree planting, which has been done in the West, make a most favorable showing. The number of trees set out under the direction of the Forestry Branch which are now alive and vigorous, will average ninety per cent., while trees in some of the groves planted out in 1902, are now by actual measurement from thirteen to fourteen feet in height.

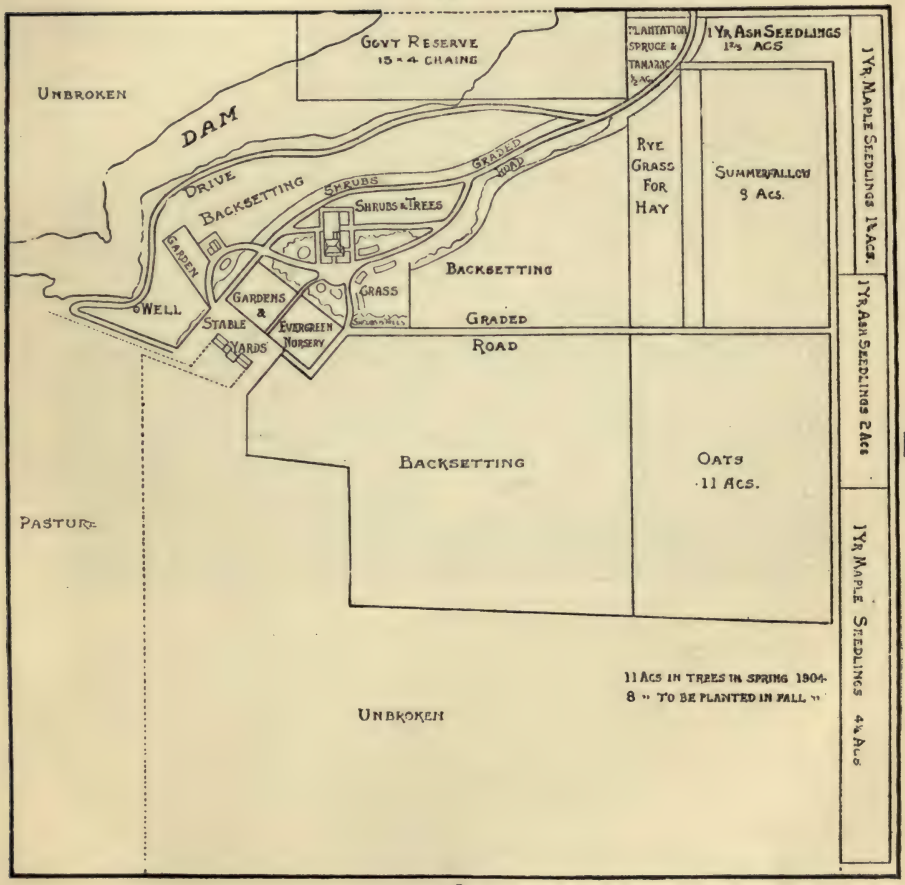
The Woods and Forests Department is just now engaged upon the considerable task of providing for the reafforestation of Windsor Great Park. His Majesty's first interest in sylviculture was aroused when, as a young boy, he assisted his father, the late Prince Consort, to plant out the clumps of elms and oaks at Windsor and Osborne, which have since developed into sturdy plantations. The King has noted with interest the progress made by these early experiments of his, and has accordingly desired to associate his régime with a scientific plan for perpetuating the forest scenery of the Royal precincts. Thus the gaps left in the various avenues of the Great Park by the frosts and winds of recent years are being systematically filled up, a new avenue is created as an approach from the park to Frogmore, and clumps of young forest trees are being planted out upon bare spaces here and there, the intention being in some instances to preserve the symmetry of the plantings first made by the King's illustrious and far-seeing father.—*Timber Trades Journal.*

NURSERY STATION

INDIAN HEAD, ASSA.

1904.

SCALE 9 CHAINS TO 1 INCH.



Nursery Station of Dominion Forestry Branch at Indian Head.

TREE PLANTING IN THE WEST.

Norman M. Ross, Assistant Superintendent of Forestry for Canada.

Five years ago, in the spring of 1901, the Forestry Branch of the Department of the Interior commenced a system of practical co-operation with the settlers on the Western prairies with a view to assisting them in the formation of shelterbelts and woodlots on their farms. In order that the system might be successful it was decided as its main feature, to supply free of charge, seedling stock of hardy forest trees to those who were willing to comply with the regulations of the Department. Since the scheme was put into force the number of settlers desiring to take advantage of this offer has increased very rapidly year by year so that a very large number of seedlings are necessary to supply the increasing demand. This spring something in the neighborhood of two million seedlings were sent out and it is expected that from three to four millions will be required annually in the future.

To grow this number of seedlings of the varieties suited to the country requires a large area of ground. From the experience in the nurseries during the past three years it is found that on an average 80 to 90 thousand seedlings of ash or maple can be grown per acre. The ash are allowed to stay in the nursery two years and the maple only one. About 75% of the trees distributed consist of these two varieties. About 50 or 60 acres will have to be devoted to nursery stock each year to supply the three or four million seedlings which it is thought there will be a demand for. During the past three years a few acres on the Brandon and Indian Head Experimental Farms have been placed at the disposal of the Forestry Branch for nursery purposes. The amount of ground, however, available on these farms is now too limited for the increased work. It was therefore found necessary to select a site for a comparatively large nursery entirely independent of the Experimental Farms.

A quarter section of 160 acres situated a mile south of the town of Indian Head in the new Province of Saskatchewan on the main line of the Canadian Pacific Railway was decided upon as being the most suitable, owing to its proximity to the Experimental Farm where nursery operations were then being carried on. The land was virgin prairie but the soil is lighter than that in the immediate vicinity and

water is obtainable from a large dam on the property. This dam gives a practically unlimited supply, a very important feature in the west where good water is often hard to obtain in any abundance. The land is bare of trees so that there is no natural protection, however this is not much of a drawback as the hardy varieties can be raised successfully without protection while the more tender varieties can be grown on the few acres which have been used during the past seasons on the Experimental Farm and which are well protected. In another year or two sufficient shelter will be provided on the new nursery from the trees planted in the spring of 1904.

In the spring of 1903 a start was made by breaking and backsetting about 30 acres. In 1904, although the soil had not really had sufficient cultivation (as in the Western climate freshly broken sod takes a considerable time to rot), about 12 acres of this ground were planted to permanent shelter and a few sown with seeds of ash and maple to obtain seedlings for distribution. Eight acres were allowed to lie fallow to bring it to a better state for sowing in the fall; the remainder of the cultivated ground being sown to grass for hay and oats for feed for the horses. During the summer of 1904 suitable buildings for the horses, implements and men necessary for the working of the place were erected and an additional 40 acres broken up and prepared for cropping in the following year. The 160 acres was fenced and the main roads and walks graded up and gravelled. The accompanying sketch plan shows how far the work had advanced by the fall of this year. The strip running along the east and part of the north boundaries will be a permanent belt, a similar strip will be planted on the other boundaries as the soil is brought to a fit state of cultivation. The plots for growing the broad leaf seedlings are narrow strips an acre in size, running north and south and will be separated by hedges of caragana which will not be allowed to grow more than six or seven feet high. These hedges will afford ample protection and prevent the snow from drifting off the ground in the winter. About 25 acres will be needed annually for growing hay and oats and any ground not otherwise utilized will be planted to permanent plantations to illustrate the growth of the different varieties, the best mixtures and the best distances apart to plant the trees. From such plantations as these it is hoped to obtain reliable data as to the cost of planting and maintaining a wood lot and the probable revenue which may be derived from the various methods of planting and the different kinds used.

At present about ten acres are occupied by buildings, yards, drives and ornamental grounds. Along the edges of the main drive and round the lawns about 6,000 hardy shrubs were planted this spring (1905), and some two acres in front of the residence

seeded down to grass. It is desired to make this part of the grounds as attractive as possible in order to impress visitors with the beautifying effect of trees and shrubs when planted round otherwise unattractive buildings. The absence of anything of this nature is one of the most prominent features on the majority of prairie farms, in some cases from indifference but in most owing to the general impression that a great deal of skill and labor are necessary to produce a good effect, whereas only the most elementary principles of plant life have to be observed and the labor entailed is surprisingly small compared to the result obtained and the additional value of a property when the grounds are neatly and attractively laid out.

The varieties of trees principally grown for distribution are the native maple or box elder and the native green ash; besides these the native elm and white birch are grown from seed in smaller quantities, Russian poplars and willows from cuttings. A small number of conifers have been raised from seed each year, principally the native white spruce and Scotch pine. Other varieties such as Jack pine, *Pinus cembra*, *Pinus ponderosa*, *Pinus flexilis*, Colorado blue spruce (*Picea pungens*), balsam fir, Norway spruce and European larch are also being tried. The Colorado blue spruce, judging from specimens grown on the Experimental farm and individuals seen elsewhere, is a most promising tree for the North West.

The conifers are grown under a completely different method to that used for raising the broad leaf varieties. The seed of the latter is sown in such a manner that as much of the subsequent cultivation as possible may be done with horses. Drills are made, with a horse cultivator, 30 inches apart, and in these the seed is sown by hand, the drills being covered in again by a harrow toothed cultivator. The horse cultivator is used among the seedlings all summer and in the fall a tree digger is employed for the removal of the crop. Comparatively little hand work is employed as in this country land is comparatively cheap so that at present there is no advantage in growing the seedlings more thickly, horse labor is not so expensive as in some other countries and laborers' wages are very high. Conifer seeds are sown in very carefully prepared seed beds and the young plants protected by lath screens for two years. When two years old the seedlings are transplanted to rows, the rows are made about 10 inches apart and the plants set 3 to 4 inches apart in the row. Cultivation between the rows is done with the double wheel hand hoe. The seedlings remain in the transplanting rows two years and are then ready to set out in permanent plantation. The manual labor entailed in sowing, weeding and transplanting coniferous seedlings together with the length of time they must remain in the nursery, makes the raising of this class of stock

rather expensive as compared with the broad leaf varieties. The evergreen, however, is a tree especially suited to a country where the winters are so long and where thick windbreaks are such an advantage, so that the cultivation of this class of trees should be encouraged as much as possible. Nowhere in the west have conifers been extensively planted, but there is no doubt that several varieties will prove quite hardy and also profitable.

During the past five years something over 5,000,000 seedlings have been distributed from the nurseries of the Forestry Branch. In the future it is the intention to grow all the stock that may be required on the new nursery station at Indian Head which is now well equipped for the purpose and will in a very few years be well sheltered by the trees already planted for windbreaks. Any varieties hardy to the Northwest can then be grown from seed without fear of damage being done by the strong wind storms which at certain seasons of the year are extremely violent.

In the report of the Boer Delegates, Messrs. Jooste, Lane and Rood, on the agriculture and stock farming of Canada, Australia and New Zealand, which has recently been published under the title of "Agriculture within the Empire," they have the following to say in regard to Forestry when summarizing their conclusions:—

"The planting of trees for shelter for stock and for future farm requirements should not by any means be overlooked. In fact this is a very important factor in successful farming. We recommend Cypresses, Pines and Wattles and any of the many varieties of Australian Eucalypts or Gum trees, all of which grow rapidly. Gum trees are especially desirable for fence posts, farm buildings, sheep and cattle pens, &c. It is a good plan to plant small groves of trees here and there about the farm, because a sheltering clump of trees will break the cold winds of winter and afford shade during the hot summer months, besides adding greatly to the beauty of the homestead. We noticed everywhere on our travels that progressive farmers always laid out small plantations, and the results were invariably found to fully repay the trifling initial cost and trouble. For garden hedges the Cypress pine will be found to answer as well as any, being very dense and hardy and standing both extremes of heat and cold."

Forest Nursery at Indian Head.

WOODLAND TAXATION.

Judson F. Clark, Ph.D., Provincial Forester for Ontario.

I.—On Lands in Private Ownership.

The application of forestry methods to the management of woodlands, whether they be the large areas of the lumberman or the woodlot of the farmer, must find its justification in an affirmative answer to the eminently pertinent and practical question: Will it pay?

Among the many points to be considered in determining the answer to this query under any given circumstances, none, with the single exception of protection from fire, should receive more earnest consideration than the present and prospective taxation of the property. The fairest prospect for large returns from a policy of conservative lumbering may be nipped in the bud by a tax rate that makes it in the financial interest of the owner to strip the land of whatever is merchantable at the time, preparatory to abandoning it, much as he may regret having to do so. This, indeed, has been the history of the destruction of many millions of acres of the finest forest lands in North America.

Of prime importance in dealing with all classes of forest lands, the question of woodland taxation has recently acquired added interest in Ontario and other Canadian provinces in view of the necessity of planting on a large scale in the near future to offset the rapid destruction of the woodlots in the farming sections. It is natural that the woodlot owner should take more interest in the tax rate applied to his plantations than that applied to a woodlot already fully grown, for, come what may, years must elapse before he can realize on the crop on which he pays the tax. From the standpoint of the state, however, it is of quite as great public interest that the woodlands already in existence be conservatively managed as that the woodland area be extended by planting.

The principles governing the taxation of woodlands are of course the same, whatever the origin of the forest, once it has passed in fee simple to private ownership, and no distinction should be made in tax rates on this account.

Any discussion of the principles of woodland taxation must have regard to the three following considerations:

1. *The Assessment Basis:*—Whether or not the assessment valuation should apply to the value of the land or the value of the land plus the value of the timber standing on it at the time.

2. *The Rate Basis:*—There is a fundamental difference between levying an annual tax on properties producing an annual income and levying an annual tax on properties producing an income at intervals of a considerable number of years only.

3. *Woodland Tax Exemption:*—Whether there be any special economic reasons why lands bearing wood crops should be taxed at a different rate from lands producing other crops.

I.—The Assessment Basis.

It has been the custom and the law of most states and provinces in North America to include the value of the standing timber with that of the soil in assessing woodlands for taxation purposes. This is both unjust and unwise, and is certain to result detrimentally to woodlands wherever practised.

Forest crops differ from field crops in that the product of any one year's growth cannot be harvested at the end of the growing season, as is the rule with other crops. Thus the portion of wood which is produced during, say, the fifth, tenth, or fifteenth year of a tree's or plantations' growth must remain on the ground until there has accumulated fifty, sixty, or seventy years' growth, when the whole may be sold to advantage. The growth produced during the earlier years of the tree's life is to all intents and purposes simply *stored* in the trunk of the tree until such time as the whole has reached a merchantable size. To add the value of a forty year's growth of pine trees to the value of the soil for taxation purposes is really as unfair in principle as to add the value of the last forty year's grain crops to the assessment valuation of a grain field. The forty years' growth of pine is not there for investment purposes. It is there simply because the nature of the crop requires the accumulation of decades of growth to make the whole merchantable.

It cannot be too clearly kept in mind in this connection that the soil and climate, and they alone, are the natural producing factors whether the crop be wood or wheat. To add the value of standing timber to the assessment is clearly a case of double taxation in that to the value of the producing agent—the soil—has been added the value of its product—the trees.

Unjust in principle, taxation of the growing trees is nothing short of disastrous in practice in that it provides an incentive to prematurely harvest the crop, the proceeds from which may then be invested where it will not be subject to taxation.

Fortunately in Ontario the law requiring that woodlands be assessed according to their sale value—including the timber—has not been generally enforced by the township assessors. The law, however, as it stands is vicious in principle and should

be amended. Timber-land owners in other states and provinces have not always fared so well. The State of Michigan furnishes a particularly instructive object lesson of the results of placing a heavy burden of taxation on standing timber. There on six million acres of non-agricultural lands, which thirty years ago carried one of the finest forests in the whole world, and which to-day are lying almost wholly waste, is to be seen the logical conclusion of the policy of assessing woodlands at a higher rate than that indicated by the capacity of the soil to produce wood crops.

The high taxation made but one kind of lumbering possible —to wit, the cutting clean of whatever was merchantable at the time as fast as it could be marketed, followed by the abandonment of the ruined tracts to the state for taxes. This policy was forced on the lumbermen landowners greatly to their regret and financial loss by the authorities who were responsible for the tax, but who failed to see that they were killing the goose that laid the golden egg. The net result was the transformation of a magnificent pine forest to a wilderness at a cost to the lumbermen of tens of millions of dollars, because of the forced haste in harvesting, but at far greater cost to the state as a whole in the total destruction of the forests on lands wholly unsuited for agriculture, to which must be added the loss of a lumbering industry which, had it been conducted on conservative principles, could have been a source of wealth to its citizens in perpetuity. Wisdom in this matter of taxation has not yet been fully learned, and the destruction of the remnants of Michigan's forests proceeds apace.

II.—The Rate Basis.

In discussing the fundamental difference between the levying of an annual tax on properties capable of producing an annual income, and the levying of an annual tax on properties capable of producing an income at long intervals only, it is well to bear clearly in mind that this is purely a question of mathematics. It can, however, best be understood by studying a concrete case. To make this case as simple as possible the following conditions will be assumed:

1. That the properties to be compared be two plots of land of equal producing capacity, and at present without any crop whatever. By equal producing capacity is meant that each plot shall be capable of producing during the next sixty years a net annual yield at the time of harvest of, say, $10 per year, whether devoted to the production of field crops or wood. If devoted to field crops the $10 would be realized annually, but if devoted to wood production the annual growth of wood must remain in place till the end of the sixty years when the total will be worth $600 net.

2. That one plot, call it No. 1, be devoted for 60 years to the production of farm crops, and that the other, No. 2, be planted to trees to be harvested at 60 years.

3. That money be worth 5% per annum compounded annually to the owner of the lands.

4. That it is desired to adjust the taxation of the two plots so as to bear equally heavily on the production of the farm crops and the wood crop.

The problem: If $1.00 per year be the tax assessed on plot No. 1, devoted to the field crop, what should be the annual tax on the woodlot, plot No. 2?

The relative burden of tax rates on crops can best be discovered by finding in each case *the proportion the amount of the tax bears to the net value of the crop at the time of the harvesting of the crop.* This being so, tax rates on plots Nos. 1 and 2 must be so adjusted as to take an equal proportion of the net value of the crops on Nos. 1 and 2 at the time of harvesting. For example, a tax rate of $1.00 payable yearly on plot No. 1 would be equally burdensome to the owner as a tax of $60.00 payable at the end of every 60 years on plot No. 2. In each case the tax would amount to just 1-10 or 10% of the *net product* at the time of harvest.

Taxes, however, are usually paid annually whether the owner receives an annual or periodic return from his land. $60 payable at the end of every 60 years being the equitable tax rate for plot No. 2, it remains to be found how much would be required to be deposited annually at 5% compound interest to amount to the $60 at the end of 60 years. The equation is

$$\frac{\$60.00}{(1.05)^{60}-1} \times .05 = 17 \text{ cents.}$$

That is, a tax of 17 cents per year paid annually for 60 years on plot No. 2, money being worth 5% per annum, will at the end of the 60 years have amounted to $60, or 1-10 the value of the then maturing crop.

Hence, the conclusion that if money be worth 5% per annum to the farmer, and that it requires 60 years to mature his woodlot plantation—two assumptions which can hardly be doubted—*an equitable tax rate based on the value of the soil for producing purposes should be in the case of woodlands but* 17-100 *or* 17% *of the rate paid on neighboring lands of similar quality used for the production of farm crops.*

The amount of the unfairness of a *similar* annual tax for both plots may be seen by comparing the accumulated value of the tax rate up to the time of harvesting the crops. For this purpose, let the annual tax on each plot be $1.00.

The crops on plot No. 1, being annual crops and having a net annual value of $10, it is clear that 10% of the net product goes to taxes. In the case of No. 2, which is planted to trees, 60 years must elapse before the harvest, and therefore 60 annual payments of $1.00 each. The value of this at the end of 60 years is

$$\frac{1.00}{.05} \times (1.05)^{60} - 1 = \$353.58.$$

Inasmuch as the whole value of the crop is but $600 at that time, it follows that 59% of the entire yield is consumed in taxes instead of but 10%, as should be the case to make the taxes an equal burden on the production of both classes of products.

The higher the interest rate used in the computation, and the longer the time taken to mature the forest crop, the more startling becomes the comparison.

The following table shows in percental values the proportionate taxation which woodlands, yielding periodic crops, can bear as compared with agricultural lands of similar net producing capacity. Column 1 gives rotations from 40 to 100 years; columns 2, 3, and 4 give the percentages according as money is valued at 4, 5, or 6%, per annum.

Rotation	4%	5%	6%
40 years	42.1	33.1	24.9
50 "	32.8	23.9	16.5
60 "	25.2	17.0	10.7
70 "	19.2	11.9	6.8
80 "	14.5	8.3	4.3
90 "	10.9	5.7	2.7
100 "	8.1	3.9	1.6

Thus, for example, with a rotation of 70 years, and money worth 5%, the proper proportion for a woodland tax rate as compared with the tax rate for farm lands, would be 11.9 per cent, or in other terms, if the rate for the cleared lands be 15 mills, the rate for the woodlot should be 1.78 mills on a soil value assessment.

The finding, then, of the proportionate tax rate to be applied to woodlands as compared with neighboring farm lands is a purely mathematical consideration, depending wholly on (1) the value of money to the landowner, and (2) the number of years required to bring to maturity an ordinary crop of trees. What rotation and what rate per cent. should be adopted in this province in determining this proportion, admits of some discussion. *Five per cent.* is perhaps a fair return for investment of capital

in woodlands by farmers and lumbermen where there is no danger of loss by fire, and the average Ontario forest tree certainly requires full 60 years to reach maturity. On this basis the equitable rate for woodland taxation will be 17% of that for lands under farm crops, or in other terms, when the ordinary rate is 10 mills, the rate for woodlands should be 1.7 mills.

III.—Woodland Tax Exemption.

There are several reasons which may be urged in favor of the remission of part or all the taxes on such woodlands as are maintained wholly for the production of timber, and which receive sufficient intelligent care to keep them up to a reasonable standard of production. They are

(1) The value of woodlands to the community in general by virtue of the beneficent influence exerted on the climate by moderating the force of heavy winds and by favorably influencing the humidity and temperature of the atmosphere; and by the very favorable influence exerted in regulating the flow of streams.

(2) The long time element in the maturing of a forest crop is a great discouragement in wood production. There is no line of business in which men ordinarily engage which requires the looking forward for more than a decade or at most two decades. Timber growing, however, requires the constant planning in advance for 60, 80, or even 100 years. So profound is the influence of this long time element that the great law of supply and demand is paralyzed. To illustrate: If the demand for wheat increases in relation to the available supply, the price rises, the farmers sow a larger acreage, and presently the increased demand has resulted in an increased supply. The same is true of hogs and horses, or of any other commodity which may be reproduced or even mined, except wood. The demand for wood has steadily and tremendously increased decade by decade for upwards of a century. The prices, notwithstanding the opening up of vast virgin forests which cost man nothing to produce, have steadily risen, and during the last decade, as exhaustion of supplies is seen in the distance, have very rapidly risen. This rise in price has not yet resulted in an increased production of wood, nor will it—judging from the history of nations—ever appreciably increase the production of wood until the evils of a wood famine have long been felt. On the contrary, although increased demand has meant increased prices, increased prices have only meant *increased harvesting*, and increased harvesting has meant and still means in North America that larger areas are annually cut over and cut more closely. This on account of the greater amount of debris left

A typical Ontario Wood Lot.

in the woods, leaves it in a much worse condition for the all but inevitable after-lumbering fire, which all too often leaves the land a waste, hence the net result of the greater demand for wood products in the case of lands held in private ownership is not an increased but a decreased production.

This tendency for an increased demand to result in the decimation of woodlands is not confined to North America, nor our own time, but has been the history of the forest wherever it is held in private ownership unrestrained by state control. There has, however, never been a better illustration of its workings than has been witnessed at our very doors throughout the farming sections of Ontario during the last ten and more particularly during the last five years. The value of standing timber has doubled within a few years with the result that the woodlots have been sacrificed at a hitherto unprecedented rate, and one that has alarmed every thoughtful observer. And yet not one farmer in a thousand, perhaps not one in ten thousand, has done any planting on a commercial scale. More serious still, not one farmer in ten has paid the slightest attention to caring for what woodlands remain. On the contrary, the all but universal practice of grazing the farm woodlands effectually prevents any recovery which nature might essay.

(3) A third plea may well be entered for the removal of all restraint on the production of a commodity which, while so peculiarly in a class by itself so far as regards the laws governing its production, is without exception the most useful raw material of all manufacture, and an indispensable agent in all production and transportation. Aside, indeed, from the character of its population,nothing contributes so much to the material progress and happiness of a nation as an abundant supply of timber at reasonable prices.

In view, then, of the va[l]ue of woodlands to the community as a whole, the peculiar temptations to deforestation due to the long time element involved in the production of timber, and the indispensable character of wood in modern industrial life, the state may well exempt from taxation such private woodlands as are devoted exclusively to wood production, and which come up to a reasonable standard of production.

It stands to reason of course that such tax exemption should be made only in so far as seems necessary to prevent excessive deforestation in the agricultural sections, and to insure a future supply of wood for domestic use.

II.—On Lands Owned by The State.

The Canadian provinces, with the exception of Nova Scotia, have adopted the only safe policy of retaining in fee simple the ownership of the non-agricultural lands for the purposes of wood production.

That this object may be successfully accomplished, it is essential that the lands be kept under a crop of trees by either natural or artificial means. It is quite beyond the scope of this paper to discuss methods of reforesting, but a few general principles will be briefly mentioned, that the influence of taxes on the management and reproduction of the forest may be clearly seen.

The reforesting of non-agricultural lands on a large scale presents many practical difficulties which are not met with, or met with only in a modified form, in restoring woodlots and shelter belts in an agricultural district. The greatest bar to the replanting of denuded or burned areas of non-agricultural lands, is the danger of subsequent destruction of the plantation by fire. This is practically eliminated in farming sections where over-clearance has been practised. The planted woodlot has a further advantage over plantations on wild lands for commercial purposes, (1) in the amount of expenditure necessary in making the plantation, it being possible on farms to do the work at odd times in early spring at a minimum of cost; (2) in the practicability of greatly increasing the financial returns of the plantation by giving it greater care as it developes, such as the removal of inferior trees to favor the development of the better, thinnings, etc. Such attentions are of course wholly out of the question on wild lands where there is no market for the inferior materials which would be removed in these "improvement cuttings"; (3) in the nearness to market, enabling the farmer to dispose of the better grades at much better advantage—the cost of transportation being saved—and to utilize much material profitably which is ordinarily waste in the lumber woods; and (4) in the fact that the farm woodlands, if rightly placed, may have a very great value in favorably influencing the local climate and thereby increasing the profit of farming the neighboring cleared lands, and in enhancing the beauty and value of the farm property.

Commercial tree planting must for the present be very largely limited to agricultural districts. As soon as the fire problem is satisfactorily solved, it will undoubtedly be extended to large areas of wild lands which have been devastated by unwise lumbering and by fire to such an extent that seed trees of the valuable species are not present, thus precluding the hope of satisfactory natural recovery. Wherever the forest still remains, however, *a natural regeneration of the most valuable species by*

a conservative lumbering of the present stand must in all cases be regarded as the basis of the forest policy. Such natural regeneration is to be preferred as being vastly cheaper and in many if not most cases quite as efficient as artificial planting.

All methods of natural re-seeding of forests—and they are many to suit the many varying conditions found in the forest—agree in at least one thing, viz: that trees which, under a clean-cutting system, might be cut and removed at a profit must be left on the the ground in greater or less number that they may maintain the production of the soil by growing to a larger size themselves, and by seeding up the spaces opened by the removal of their neighbors.

Any method of taxation, lease, or sale of woodlands which makes it in the interest of the operator who controls for the time the standing timber to cut clean or to cut the more valuable species only without regard to the future of the forest, is evidently prohibitive of any system of natural re-seeding.

The virgin stands of timber on the public lands of the different Canadian provinces are disposed of under some form of lease or license, which although differing widely in detail, are in all cases practically the same in principle. The timber is paid for under these leases as follows; (1) by a payment of certain "stumpage dues" of so much per M on the amount of material removed at the time of logging; (2) a ground tax or "rent" of so much per square mile per annum; and (3) where the limits have an estimated value over and above the "stumpage dues" and "ground rent," and are put up at public auction, a portion of the value of the timber is paid for in a third form, termed "bonus," which of course varies very greatly according to the location and character of the timber sold. In recent sales in this province the "bonus" has proved to be the largest portion of the market value of the stumpage sold.

Before discussing the influence of these financial conditions on the manner of cutting which the lumberman may adopt, it must be admitted that in justice to himself he must cut according as he will receive the greatest financial return for himself and his family. It may also be assumed that being a lumberman, and in most cases also a mill owner, he has a very real interest in the protection and development of the forest as a log producer in perpetuity. The fact that lumbering in Canada has in the past been almost uniformly destructive to our forests is due not to any lack of interest in the future of the forest on the part of the lumbermen, nor even chiefly to a lack of knowledge of how to care for the woods—though doubtless this has contributed—but primarily to a *lack of security from fire and from theft* (by "timber sharks," who in the guise of settlers steal his timber); and

to *the financial conditions imposed at the time of the sale, and the uncertainty as to what changes in this respect may be made in the future.*

The three ways in which the lumberman pays for his logs have each a special bearing on how it will be most profitable for him to cut the timber. The tendency of the stumpage dues, which are paid only when the logs are actually harvested, is towards conservative cutting. The higher the stumpage dues, the more careful will the lumberman be to select only the more mature timber, certainly no immature timber which has a stumpage value of less than the stumpage dues will be cut. The payment of a portion of the stumpage in the form of a cash-in-advance "bonus" has quite the opposite tendency. Assume, for illustration purposes, a pine stand cutting ten million feet of mature timber which has an average market value of ten dollars per M as it stands, or a total of $100,000. If sold at public auction on a stumpage basis for $10 per M the operator will cut no trees which when manufactured will not yield at least $10 per M over and above the cost of manufacture. Suppose, however, that $80,000 of the purchase price be paid cash in advance in form of "bonus" with the stipulation that the remaining $2.00 per M be paid as stumpage dues when the timber is cut. The same operator who in the first case found it in his interest to cut no trees which were not worth $10 per M on the stump will now find it in his interest to cut whatever may have a stumpage value of $2.00 per *M*. The cutting of the young pines having a stumpage value of between two and ten dollars per M may under circumstances be the main difference between good forestry and destructive lumbering.

The annual payment of a "ground rent" per unit of area held by the lumbermen is worthy of special consideration. The payment of any annual tax on woodlands tends to early cutting and discourages holding for a second crop, hence affects the harvesting unfavorably from the standpoint of practical forestry. How great will be this unfavorable influence depends on the amount of the tax and the rate of interest demanded by the lumberman for the capital invested. Wherever there is a ground rent levied it becomes necessary for the lumberman when planning logging operations to consider carefully whether it will pay him to cut with care that he may return again after a period of years for a second crop—reasonable safety from fire being assured —or whether the tax will eat up the profit of any yield that he may hope for over and above what can now be realized by cutting clean without regard to the future. This is the only point of view from which the lumberman as a business man can regard the logging of the lands under his control, whether they be owned or leased.

The following table gives the annual "ground rent" payment per square mile for the different provinces and on Dominion lands, and the sums to which these annual payments amount for different periods of from 30 to 100 years. In this computation money is reckoned to be worth 6% compounded annually, which is below rather than above the mark for capital invested in immature forests on wild lands.

Relation of Ground Rents to Conservative Lumbering.

		30 yrs	40 yrs	50 yrs	60 yrs	80 yrs	100 yrs
Ontario and Quebec	$ 3 00	251	492	923	1,686	5,611	18,418
Ontario (recent sales) & Dominion lands east of Yale, B.C.	5 00	419	820	1,539	2,809	9,352	30,697
New Brunswick	8 00	670	1,312	2,462	4,495	14,964	49,114
Dominion lands west of Yale	32 00	2,682	5,250	9,848	17,979	59,856	196,458
British Columbia	96 00	8,045	15,749	29,544	53,938	179,568	589,373
	160 00	13,408	26,248	49,240	89,896	299,280	982,288

From this table a lumberman may see at a glance what his tax bill will be when he returns for a second logging on his lands. To make a second logging profitable he must find on his return a stumpage value, *over and above the then government stumpage dues*, sufficient to offset the two following items before he can reap any return other than interest for his invested money:

(1) The value of the trees which he refrained from cutting at the first logging together with compound interest on this value at, say, 6%.

(2) The tax bill, which at $5.00 per annum will have amounted to $ 419 at 30 years
1,539 at 50 years
9,352 at 80 years or
30,697 at 100 years.

Particular attention is directed to the manner in which the tax bill runs up the longer the time between loggings. This is the most significant feature of all taxation where the tax is annual and the return periodic as has already been fully discussed.

The whole influence of a ground rent is towards *early utilization* and *clean cutting* with the *abandonment of the land after the destruction of the forest.* The practical effect of this tendency in any given case will be in proportion to the amount of the tax. In Ontario and Quebec where the rate is $3.00 per square mile over large areas, the injury is least; in British Columbia where the small mill owner must pay $160 per square mile, it is greatest.

Where the tax does not exceed $5.00 per square mile, and there is fair safety from fire and false settlement, its unfavorable influence should not be so great as to deter operators from conservative lumbering, especially on pine lands where stumpage values are comparatively rapidly rising, for where a goodly share of young trees remain on the ground a second logging may be undertaken in perhaps thirty or forty years. The conditions would be exceptionally favorable where an earlier return would be possible unless the lumberman be giving up the idea of continued crops and intends to cut to a smaller diameter at the second logging than at the first.

In view of the fact that first-rate white pine cannot be grown short of upwards of 80 years, it will be seen that in the matter of sowings and plantations the ground rent is a much more serious matter. That this is a very practical question is evidenced by inquiries from limit holders regarding the practicability and cost of reforesting pine lands by these methods. It is evident, however, that a ground rent of $5.00 per year may be a very serious deterrent to artificial reforesting by sowing or planting or even to the use of any of the cheaper methods of natural seeding by the lumberman, for he must meet a tax bill averaging over a thousand dollars per year for the twenty years between the 80th and 100th year of the stand.

New Brunswick with an $8.00 ground rent places a much greater financial obstacle in the way of progressive lumbermen who would care for the forest, but all Eastern and Central Canada is outclassed in this respect by recent legislation on the Pacific Coast where on federal lands the tax is $32.00 and on provincial lands $96.00 and $160.00 per square mile.

The prohibition thus imposed on all hope of holding the lands for future crops may best be emphasized by repeating the amount of the tax bill as shown by the table. Assuming that the British Columbia lumberman has built a mill of sufficient capacity to enjoy the lower rate of $96.00 per square mile per annum, he would find on his return for a second logging a tax bill as follows:—

At	30	years	$8,045 00
"	50	"	29,544 00
"	80	"	179,568 00
"	100	"	589,373 00

Should he be so unfortunate as to be a small mill owner, the above amounts must be increased 40%.

Presumably this extraordinary piece of legislation, exacting a high ground rent and merely nominal stumpage dues (50c. per M), was intended to "develop" the lumber industry. Whatever the motive or intention, the result must be clear to every

student of forest taxation. The lumber industry of the West will under this policy be "developed" as was the lumber industry of Michigan. The finest of the forests will first be taken up and exploited in feverish haste. The lumbermen will be constantly struggling with a problem of "over production," which will cut profits down to the last notch. The forests will be cut without thought of holding them for a second crop, for it would, under such a policy of taxation, be impossible to hope for a satisfactory return. All trees which will now earn a dollar will be cut, and the fierce after-lumbering fires in the huge debris which acompanies western lumbering will complete the work of destruction. As in Michigan the lumber industry, after having been thus artificially "developed", will collapse, and if there still remain other forests to exploit elsewhere, British Columbia may yet do as Michigan is doing to-day—import at a cost of several times her former selling price a poorer substitute for the billions of feet of timber which a few years since were sold practically at cost of logging and milling, and her legislators will be inquiring how many millions of dollars will be required to reforest the denuded mountain sides. Unfortunately, the reforesting of much of this mountain land will be found impracticable, even impossible, for with the burning of the debris, the soil itself will in many cases also be destroyed.

No words can too strongly condemn the policy of the Pacific province. It is, however, simply an exaggerated form of the policy in vogue in older Canada, and in the reckless stripping of British Columbia mountain sides at the present time is a valuable object lesson to all Canada as to the character of the results to be anticipated from the collecting of a portion of the value of the logs sold in the form of a ground rent.

To remove all possible misapprehension from the minds of any who may think that the "bonus" or "ground rent" is other than part payment of the value of the logs sold by a province or the Dominion to the lumbermen, it is perhaps permissible to remark that lumbermen do not pay money out in the form of "bonuses" or "rents" for their health nor for any purpose other than for *logs*, and all their payments to the province, no matter under what form they may be made, are payments of a portion of the estimated value of the already grown or growing logs.

To sum up: the payment of a portion of the value of the stumpage in the form of a cash-in-advance "bonus" is not only disadvantageous to the legitimate lumberman—as distinguished from the limit owner who speculates in the people's forest asset—in that it locks up a large portion of his capital which should normally be used in the development of his business, but it is exceedingly disadvantageous to the forest, especially when a

time limit is set, as has been done in some recent sales, after which there can be no renewal of the annual license. Under these circumstances the lumberman as a business man has no choice except to cut clean whatever has a value above the stumpage dues preparatory to the abandoning of the ruined land. The payment of a portion of the price of the logs in the form of an annual "ground rent" tax is equally mischievous in tendency, and may even in Quebec and Ontario where it is quite low prove a very great bar to the reforesting of waste lands by private enterprise.

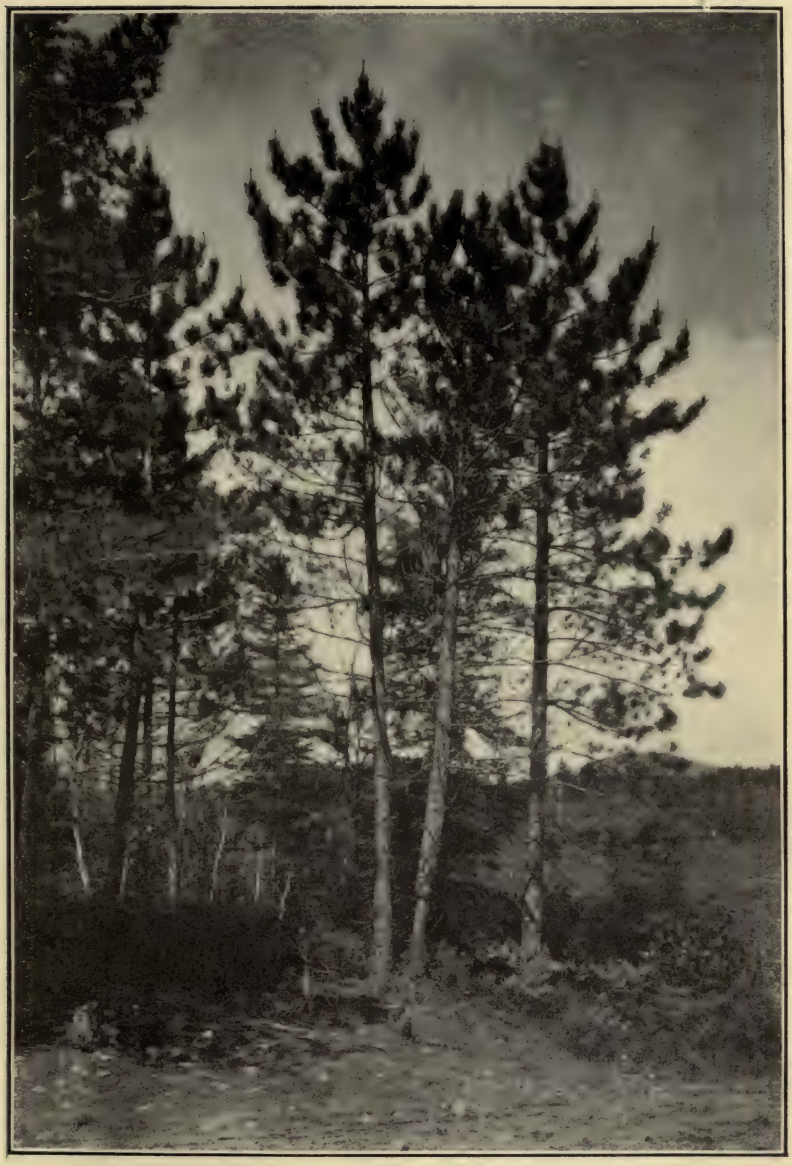
There is no form of sale so conducive to conservative lumbering of forest properties with a view to their development as producers of logs in perpetuity as the placing of the whole payment of the lumberman's price for the logs as stumpage dues of so much per M to be paid when the logs are cut. This is not only theoretically indisputable, but has in practical lumbering operations on both public and private lands been abundantly proven to be satisfactory to buyer and seller, and of the utmost advantage to the forest.

Mr. R. S. Cook, of Prince Albert, has on his grounds at that place a bur oak (*Quercus macrocarpa*) from Manitoba, which is now about sixteen feet in height and in perfect health. Mr. Cook expresses the opinion that this is the most northern oak on the continent.

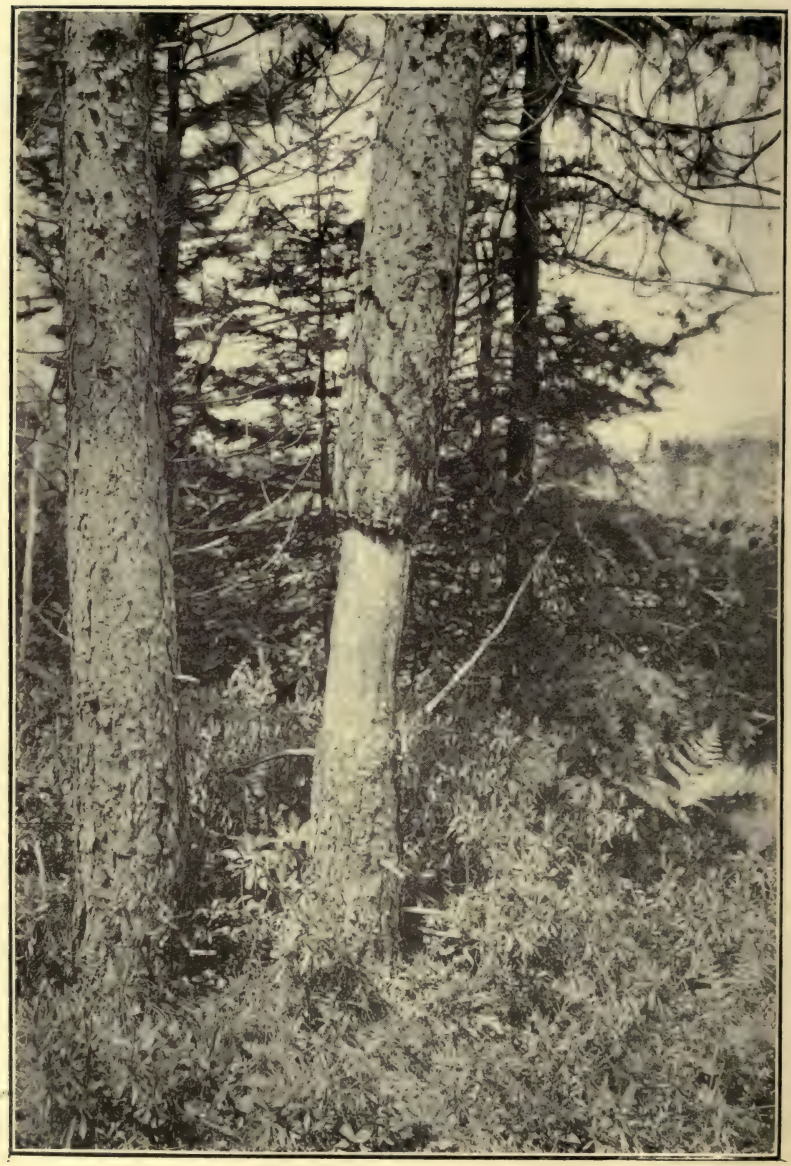
We publish two photographs illustrating the hardiness of Norway Pine, which have been received through the kindness of Mr. A. Knechtel, Forester to the New York Forest, Fish and Game Commission, and which were accompanied by the following note:—

Close to the road leading from Paul Smith's to McColloms' in the Adirondacks, stands a Norway Pine tree which shows a remarkable hardiness. Nine years ago a strip of bark was removed from this tree leaving the trunk entirely bare all around the tree for a length of one foot. The tree is still alive and has during the nine years made a diameter growth of two inches. Its increase has, however, been only above the girdled part. The dimensions are as follows: height of the tree, 30 feet; diameter of the girdled part, 5.23 inches; diameter just above the girdle, 8.3 inches; just below the girdle, 6.4 inches.

The handicap in the struggle for existence is now, however, beginning to be apparent in the growth, as some of the branches have scanty foliage.



A Live Norway Pine Tree Girdled Nine Years Ago.—No. 1.



A Live Norway Pine Tree Girdled Nine Years Ago.—No. 2.

WEST AFRICAN FORESTS AND FORESTRY.

A. Harold Unwin, D. Oec.,
Forester, Benin City, West Africa.

In days gone by when Portugese and British adventurers sailed along the above named coast no one thought very much about the trees they saw, and less about starting any forestry operations there.

Since then times have changed and the Coast (as it is termed) now produces, besides its well known palm oil, quite an appreciable quantity of the world's mahogany supply.

In the above term is included not only six large British Colonies but also several French, German, Portugese and Belgian territories, besides finally the practically independent country of Liberia. The following remarks are, however, confined to the portion extending from Lagos, along the "Bight of Benin" to Calabar reaching back about 200 miles on both banks of the Niger to Idah, usually termed Southern Nigeria, a Protectorate of the British Empire.

Its products are largely palm oil and kernels, but also many others, including especially timber (mahogany, cedar, walnut) and rubber of several kinds.

The forests containing these latter export commodities are of vast extent, but present quite a different picture to either Canadian deciduous forests or the northern coniferous areas, where one so easily gets so many thousand logs of waney timber per mile, besides saw logs. Here one is content with about 400 per mile, and a maximum yield of perhaps 1,200 logs ! ! !

The tropical forest is in fact a vast arboricultural collection. On one square mile quite 50 or even 100 different species of trees (they have not been actually counted) might be found, besides shrubs, creepers, vines and small flowering plants and ferns. Such endless variety alters the forest problem considerably. In the aggregate there are many of each kind, especially of the commoner kinds such as mahogany.

All the land nominally belongs to the people, and is worked through their chiefs, and finally now by the white man with the consent of these latter. Anyone may put in an application for a large or small area (9 square miles up to 400 as recently granted), and lease it for usually seven years. It may, however,

be abandoned before the expiration of that period or renewed for a long time. The lessee gets the right under a deed to cut and take out certain timbers, usually mahogany, cedar and walnut, and any others he may find of value, except ebony.

Locating the merchantable allowable trees next occupies attention. Nothing under twelve feet circumference, if mahogany, may be felled.

The felling operation started, and usually with platforms as the mahogany have large buttress-like roots extending 10 to 15 feet up the stem, half a day to a day's work may bring a good 18 footer of 300 to 400 years' growth to the ground with two Bini axemen hard at it all the time.

The squaring then takes place so that only the best material with scarcely any waney edge on it is left.

Rollers are then laid down from the trees or group of trees gradually extending to the nearest stream, when 70 to 80 natives get a long rope and pull log after log to the water.

Tedious as it may seem, the ground is too soft for trolley and often on the small areas there is not enough timber to make it worth while to put down a light railway, although wages are not so low as to make manual hauling a very cheap operation (labour 9d. a day including food).

The bush labour is usually reckoned at 3 cents a foot B.M., though of course it varies. This is on an average of a mile from the waterside and with good trees. Add another 3 cents a foot for the rafting, freighting and selling expenses, and roughly the total cost is covered.

Prices in England have varied enormously, from $2.50 per foot to 2 cents, and sometimes no bids at all, though last year the average was 7.5 cents per foot all round from this part and a little higher from farther up the coast.

The rafts as they float down the placid rivers, shaded on either side by oil palms, mangroves or wine palms, look very picturesque, especially with little native huts in the centre.

The supervisor on the limit then feels his labour has not been in vain, even with his months of lonely living in his bush bungalow, with a canoe or a mail runner as his only connection with his fellow white men. Occasionally he will be visited by the Government forest officers, otherwise only by his firm's superintending representative.

Black clerks do the lining and only the marking and numbering of both stump and log is undertaken by the European. Another part of the latter's work is, however, the planting of seed and raising of seedlings to be planted to replace those cut down (under the old rules, 20 seedlings for each tree felled). A group

Hauling Timber in West Africa.

The Sturgeon Lake Lumber Co.'s Yard, North of Prince Albert. (See p. 175.)

Photo by W. J. James, Prince Albert

of young trees is made near and around the stump of the old tree and seedlings are also put in along the hauling roads. In this way a future growth is assured. In three years one of the plants has attained a height of 20 feet, and the average is even 15 feet.

Besides this the girth limit insures fresh supplies though the forest is a little abnormal in respect of small trees, but this may only be local, as by no means every portion has been visited.

It will thus be seen that a permanent supply of timber is aimed at and is no doubt secured. But it may be asked at what cost. Roughly, 50 small and 12 large areas have been and are being worked by several different firms paying royalty and export duty, in the aggregate about $15 per tree (not at all heavy with such valuable wood).

Recently, during 1904 and 1903, more than enough was raised in this way to pay for the Forestry Department (vote, 1904-1905, $50,000), which is all the more satisfactory as all the royalty goes to the native chiefs and not into the treasury, which reduces the total raised by quite a fifth.

In a further paper it may be of interest to follow the whole organization in detail.

Through the kindness of Mr. R. S. Cook, of Prince Albert, we are enabled to show in this issue two pictures of forest scenes in the district north of the Saskatchewan River. It will be somewhat of a surprise to those who have considered the western provinces as all prairie land to see the size of the timber that is being cut. The most important forest growth in that district is spruce, but some large aspen poplar may be observed among the standing timber in the photograph. Jack pine is also found on the lighter soil of this district.

A fact of special interest is the discovery by Mr. Wm. McInnes, of the Geological Survey staff, of a new species of birch in the district north of Lake Superior. Specimens of a black birch noted in the previous year were brought home and handed to Professor John Macoun, who submitted them to Dr. C. S. Sargent for determination. Dr. Sargent named this birch *Betula fontinalis*, Sargent, a species formerly confounded with *B. occidentalis*, Nutt. The range of this tree in the sub-arctic region is not yet known. Specimens of this birch were found last year as far north as latitude 53° 35′ north.

THE BALSAM POPLAR.

The Balsam Poplar (*Populus balsamifera*, Linn.), is found growing commonly throughout the Northern United States and Canada, but it reaches its greatest development in the north, especially along the Mackenzie River and its tributaries, where it often reaches a height of one hundred feet and more, with a diameter of six or seven feet. Professor Macoun states that this tree in habit differs very much from the aspen, but in its range it extends even farther north, and instead of being of little value, as the aspen is, it attains a great size and height as far north as the Arctic Circle on the Mackenzie River. West of Manitoba and northward it is usually found growing on alluvium in the river valleys, and in such situations it is often nearly 150 feet high and frequently over 7 feet in diameter. On the Peace River and all streams which unite to form the Mackenzie, it occupies all the islands and low alluvial banks. During the period of flood many trees fall into the rivers by the wearing away of the banks, and a great number of them in the course of time reach the Arctic Ocean. These are eventually cast on the islands and shores and become the chief source from which is derived the fuel supply of arctic travellers. The same may be said of the Yukon Valley, as it is this tree that occupies the valley and islands of that river on all newly formed lands, but in time gives place to spruce as the subsoil becomes cold and moist from the density of the poplar and willow growth. The Riviere aux Liards or Liard River (often erroneously called Laird River), a tributary of the Mackenzie, is named from this tree.

The leaves differ from those of the poplars previously mentioned, by being narrower in proportion to their length. They are ovate-lanceolate, acute or acuminate, dark green and lustrous on the upper surface, pale and often ferruginous on the lower. The usually broadened base is rounded or cordate. The color of the bark is chestnut brown. The aments or catkins appear in early spring, before the leaves, and the seeds are distributed about the end of May or early in June, covering the ground with their snow-white cottony envelope. The wood is light, soft and close-grained, but is not strong. The heart wood is light brown and the sapwood white. Its specific gravity is 0.3635, a cubic foot weighing 22.65 lbs. The leaf buds are saturated with a yellow, balsamic, sticky exudation, which gives the tree its specific name.

P. balsamifera, variety *candicans*, cultivated as a shade tree, differs from the common form in its more spreading branches, forming a broader and more open head, in its broader, heart shaped leaves, which are more closely serrate with gland-tipped teeth, more or less pubescent or hairy when young and at maturity paler on the lower surface. It seems to be still uncertain as to whether this is entirely an introduced variety or is indigenous.

The name Balm of Gilead often applied to this species is derived from the healing virtues ascribed to the balsam of its leaf buds. It was often planted for this express purpose, and was held in high esteem by the amateur physicians of older days. Various preparations of it were recommended by the recipe books, which had such vogue before the day of the doctor and patent medicines. One which lies before us at the present time gives a Balm of Gilead salve prepared with tallow, balm of gilead buds and other ingredients, which is stated to have been in use in this country about forty years with the greatest success.

Two other trees which have also borne the name *P. balsamifera* are western species, which are now generally known as *P. angustifolia*, James, the narrow-leaved poplar or black cottonwood, and *P. trichocarpa*, Hooker, also called black cottonwood or balsam cottonwood. The former is distinguished by its long narrow leaves, lanceolate or ovate-lanceolate and green on both sides. It is a small tree, not usually more than fifty or sixty feet in height, and rarely exceeding eighteen inches in diameter. The slender erect branches form a narrow and usually pyramidal head. The bark is light yellow green. The wood is light, soft and weak. Its range is from New Mexico to Southern Alberta, in which latter it is found along the Milk and Belly Rivers and their tributaries, and also along the Bow River.

P. trichocarpa is the most westerly species, being found on the Pacific coast from Alaska to California. In British Columbia it occurs in the valleys of the Columbia and Fraser Rivers. It is stated by Dr. Dawson, that this tree was used by the Indians of British Columbia for the manufacture of canoes, and the roots were formerly used by the Indians of Oregon and Northern California for making hats and baskets. The leaves are usually broadly ovate, acuminate, rounded or cordate at the broad base, dark green on the upper surface, pale, ferrugineous or silvery on the lower, while the seed pods are tomentose or woolly. This tree reaches 200 feet in height, with a diameter of seven or eight feet. The specific gravity of the wood is 0.3814, a cubic foot weighing 23.77 lbs.

FORESTRY IN ONTARIO.

The report of the Director of Forestry for Ontario for 1903, which was delayed on account of the fire having destroyed the printing office in which it was being set up, has recently been published. It contains a resumé of the situation in regard to the tenure of the timber lands of the Province.

The chief way in which timber lands are held by lumbermen in Ontario is by annual license, renewable from year to year. The lumbermen are allowed to remove the timber, paying dues therefor when cut. In the agricultural districts the lumberman has been the precursor of the settler, affording him employment in the winter and a market for the produce raised on his holding in the summer. As settlement advanced the land was turned over to the individual settlers in small holdings. As settlement progressed north, a portion of the country was reached, the lands in which were found to be little suited to farming, although a great many settlers, misled by the high prices received for produce during lumbering operations, were allowed to settle on these lands, finding when too late that the time had been wasted, and that the land was ill-suited for their purposes. Other areas under license were composed of land that was clearly unfit for farming, and on such territory the licenses have been renewed from year to year.

Although it is probable that the Crown possessed and still possesses the legal right to refuse to renew these licenses at any time, certainly at a period when it might reasonably be supposed that the original timber taken into account when the limit was first put under license had been cut off, yet the practice of renewing the license yearly, which had been in vogue for so many years, led to frequent transfers of these limits from one holder to another, and the cancellation or failure to renew the license would mean that the last purchaser of this limit would naturally be out of pocket on his investment. Hence the difficulty of cancelling these licenses except at a stated time, a long period in the future.

In 1896 a Forest Commission was appointed and in its report recommended the establishment of Forest Reserves, and in accordance with this recommendation, the Forest Reserves Act was passed, which authorizes the Lieutenant-Governor in Council to set aside from time to time such areas of land as are unsuited for agricultural settlement, to be kept perpetually in Forest Reserves. Under this Act there have been set apart

areas aggregating seven million acres, including both forested and burnt over lands.

In regard to the term of tenure of lands under license a change was made in 1901, when the renewal of licenses was restricted to a period of ten years. It was found however that the necessity on the part of the lumbermen, who had paid a large sum in advance on this timber, of taking his timber off in so short a time caused rather reckless cutting, and the term in the sale held in 1903, was extended to fifteen years. While in the case of agricultural lands destined to be ultimately settled, and from which the pine timber is required to be sold for public revenue, this plan is probably as good as could be devised, it can readily be understood that the practice that will inevitably be followed by the license holder of taking all the timber off this territory that is big enough to cut at the end of the fifteen year period, will not conduce to the largest revenue to the Crown that could be derived.

The timber lands in Ontario therefore include permanent Forest Reserves, lands under license for an indefinite period, and lands under license for fixed terms.

The reserves so far created lie at the head waters of streams, and the larger forest area will doubtless include the Laurentian country, separating the clay lands of the north from the settled areas of the south, forming the watershed of the rivers flowing north and south, and will probably eventually include forty or fifty millions of acres. What this immense territory kept permanently under forest and operated in a scientific manner will mean in the future of the Province it is hard to estimate. The effect of this large forest on the water supply will be of incomparable benefit to future generations, and the revenue from it under any proper system of management, will be such that the people of Ontario need have no fear of direct taxation until the public expenditures of the Province are enormously in excess of the amount now annually expended.

In this report Mr. C. W. Nash deals in a suggestive way with the question of municipal forest reserves. In the report of 1900-01, an exhaustive statement, compiled from the returns of township assessors, was given from which it appeared that the proportion of woodland to total area in 36 counties was less than twenty per cent. While in many counties the lands are almost all suited for agricu'tural purposes and the wood lot will be about the only form of forest growth, there are large districts in the Province in which a large proportion of the lands are strictly non-agricultural, but where the title to the lands has all but entirely passed from the Crown to private hands. In these districts there are large contiguous areas which are either entirely unfit for the production of any other crop than wood,

or are, at least, much better adapted to being used for wood crops than for other crops. Their present condition is that they are lying almost wholly unproductive and their owners have neither the knowledge of how to again restore them to production by afforestation, nor the capital with which to do it. Nor would they have the power to protect the growing crop were both the skill and capital available to make the start.

The districts of Muskoka, Haliburton and others furnish striking examples of the results of throwing open for settlement territory largely unadapted for agriculture. The settlers upon many of the lots being unable to live solely by cultivating their land have in many cases, when the timber has been removed, abandoned their farms. Much of this land, if managed upon forestry principles, would continue a permanent source of wealth; but under the present system it is simply despoiled of its growth and partly farmed under very disadvantageous conditions, and partly allowed to remain waste, the second growth not being protected. A large proportion of the lots after being denuded of saleable timber are of so little value that the owners allow them to be sold for municipal taxes, and are frequently bought in by the municipalities. Were the townships permitted to retain the ownership of the lots which thus fall into their hands, the nucleus might in this way be established of a system of municipal forest reserves, which would not only supply the public requirements for timber for bridges, culverts, piles and other construction works, but would in time become a considerable source of revenue. As the law stands, however, municipalities can only buy lots offered at tax sales on the condition that they are re-sold within seven years, so that the only result is that the old chaotic and wasteful process of exploitation is again put into operation.

A suggestion is made that in the opening up of new districts, before any new township is thrown open for settlement, the surveyors be instructed to report as to rough and non-agricultural land embraced within its boundaries, with a view to withdrawing such areas from settlement and retaining them as timber reserves.

The question of municipal reserves is certainly one well worthy of consideration. In Germany the communal forests make many of the towns which are fortunate enough to own them, independent of taxation altogether. When money is required for any purpose the town forest is ready to supply the need, and in some cases instead of taxation there is a bonus for the citizens.

Mr. Nash also contributes a paper on the farm wood lot, so that the whole question of forestry in Ontario is fully covered in the report. One of the greatest conveniences a farmer can

have upon his property is a wood lot, well stocked with a variety of thrifty well grown trees, upon which he can draw, as occasion requires, for such wood material as he needs for his own use, with some to spare at times for the market. The uses to which farm grown timber can be put are almost incalculable and the demand is continuous. The wood lot should occupy the poorer parts of the farm, rocky or stony land, the thin-soiled ridges, very dry sand tracts and such wet swampy places as are not well fitted for agricultural purposes.

Various systems of managing a wood lot may be adopted, both to ensure permanence and profit. Where only firewood, fencing, hop poles, box lumber or such small stuff is required, and the wood lot is composed of deciduous trees only, the copse or coppice method, viz., growing from sprouts, will do very well, but if dimension timber is desired, or a growth of pine, spruce, hemlock or other coniferous trees is the object to be attained, the coppice system is not available; in such cases natural seeding or replanting are the only sources to be relied on to keep up the supply. Planting is always troublesome and more or less expensive, but may under certain circumstances, become absolutely necessary. Natural seeding costs nothing, is no trouble and is the most certain and in every way the most satisfactory method of keeping the wood lot up to its best standard of production. A proper proportion of seed bearing trees should therefore be retained in such positions over the whole lot as to ensure their furnishing sufficient seed to replant each portion of the wood lot as the timber is taken off it. This does not mean the maintenance of a lot of old trees upon the land until they shall have lost their usefulness as timber, but merely until such time as the cleared area surrounding them produces a strong growth of saplings from the seed which they have dropped. Provision for this can best be made by doing the annual cutting on a regular system under which the young growth outside the area to be cut over will be safe from injury, and the cleared portion will be at once seeded by the seed-bearing trees left for that purpose. In some parts of the country there are still wood lots in the possession of farmers, which have been regularly and systematically cut over for thirty or forty years, but which show no signs of deterioration, simply because the work has always been properly done with a view to reproduction of the trees, and care has been exercised at all times to avoid the destruction of the saplings.

Included with the report are the series of lectures on Forestry, delivered by Dr. B. E. Fernow at Queen's University in January, 1903.

RECLAIMING SAND DUNES.

In the report for 1904 of Dr. Jas. Fletcher, Dominion Entomologist, occurs the following interesting report in regard to efforts made to reclaim sand dunes in the Province of Quebec:—

A visit was paid to the large tract of shifting sand near Lachute, Que., locally known as the Argenteuil Sand Hill. This is estimated as now covering nearly one thousand acres, stretching along the Ottawa River in an elongated patch about four miles long by half a mile to one mile in width, for the most part entirely destitute of vegetation, but bearing in places clumps of spruce trees, maples, tamaracks and willows. As is usually the case on such areas, the surface is very dry; but a few inches below this there is an abundance of moisture available for the support of any plants which can be protected against the drifting sand.

At the request of Mr. Thomas Christie, M. P., I called upon the various farmers living around this sand hill and examined the work they had been doing in their efforts to control the sand. I found, without exception, that every one of them had taken a keen interest in fighting against the common enemy, and much good work had been done in the way of holding back the drift by planting trees and other vegetation. Since 1898 the attention of the Division has been directed to this tract of land, and a few hundreds of plants of the Beach Grass, and also of Norway and White Spruce trees, have been sent to different farmers to be planted on the sand as an experiment; but no extensive work has been carried on by the department. I was much pleased to see the success which had attended the efforts to grow trees on this apparently barren sand hill. The kinds of trees which were noticed growing wild in the scattered clumps which here and there appear, were White Pine, Tamarack, Canada Balsam, White Spruce, White Cedar, Balm of Gilead, Aspen Poplar and White Birch; and round the edges all the ordinary forest trees of the region are represented. In low spots two or three kinds of willows and the Gray Alder flourish.

Of shrubs which attracted attention by their vigour and the extent to which they had spread out in every direction, special mention may be made of the following kinds which doubtless can be made use of in prosecuting this work. The Willow-leaved Meadowsweet (*Spiræa salicifolia*, L.).—This free-growing bush, which not only produces large numbers of running roots or stolons, but also ripens much seed, was found to be cov-

ering many acres and spreading rapidly over some low spots in the central portion of the sand hill. This is a native shrub, common in all swamps and low lands. The Red Raspberry (*Rubus strigosus*, Mx.).—A form of this common shrub was seen covering a large area on the farm of Mr. Thomas McGregor, who has encouraged its growth, as well as some other native plants which occur with it. The common Blackberry (*Rubus villosus*, Ait.).—Even more luxuriant than the Red Raspberry was the Common High Blackberry, which rooted freely through the sand and threw up many stems. Both of these berry-bearing plants produce heavy crops of excellent fruit, and it seems as though they might prove a valuable resource to farmers, while at the same time performing the important office of providing a barrier against the encroachments of the sand or as a temporary shelter, while more valuable trees are being grown. Roses.—At various places old and vigorous clumps of Sweetbriar, which were evidently many years old, were seen, as well as of the little old-fashioned semi-double Cinnamon Rose. The Smooth Meadow Rose (*Rosa blanda*, Ait.) was found in spots, covering several yards in diameter and showing an unexpected power to grow up and keep its head above the drifting sand. Shrubs which also showed great vigour and which occured in many parts of the sand hill, where evidently they had sprung up spontaneously, were the Red Osier Dogwood (*Cornus stolonifera*, Mx.) and the Beaked Hazel (*Corylus rostrata*, Ait.).

Of the wild herbaceous perennials growing naturally on the sand, and the growth of which had to some extent been encouraged, the most noticeable were the Common Milkweed (*Asclepias cornuti*, Decne.), the Canada Thistle (*Cnicus arvensis*, Scop.), and Couch or Quack grass (*Agropyrum repens*, L.). There were also seen in some places a few plants of the Strawy Sedge (*Carex straminea*, Schk.), the Ox-eye Daisy and the Dandelion.

The trees which have been experimented with to the largest extent by farmers living in the locality are the White Pine, Canada Balsam Fir, the Norway Spruce, the White Spruce and the Tamarack or American Larch. Of these, the last-named has made the most rapid growth, but seems to require more protection than the sturdy spruces. The Balsam Fir has succeeded as well as the spruces, but is a less valuable tree. The Norway Spruce has been planted only to a small extent, a few hundred trees having been sent from this department three years ago. These were planted carefully, and doubtless will succeed; but it is too early as yet to compare them for this purpose with the White Spruce, which is the favorite conifer and is transplanted from the woods in the neighborhood. The greatest satisfaction is expressed by all at the way in which willows have succeeded. The kind used for the most part is the large European Tree-

Willow (*Salix alba*, L.) known mostly in this country under the name of French Willow. Large numbers of these trees have been started from cuttings and have in a single year made a remarkable growth, even from small cuttings put in with little labour in a furrow made by a plough. Such plantations were seen on the farms of Mr. John Doig and Mr. Walter Smith. On the edge of one of Mr. Doig's plantations the sand had been drifted away by the wind so as to expose the roots of one of his trees. These, by actual measurement, extended for forty feet from the central point, showing the great value of the willow as a sand binder, both from its rapid growth and from its great root production.

An observation of much interest, as showing the power of the Canada Balsam to resist destruction by sand, was that this tree, when covered up to a certain extent with sand, threw out large numbers of roots from the branches which were partially submerged. Many samples of such branches were found upon trees which had their roots and trunks covered up with from six to ten feet of sand.

Experiments with Beach Grass and the Sea Lyme Grass have been very satisfactory, particularly where the former has been planted on exposed banks. In low, undisturbed spots the Sea Lyme Grass has succeeded rather better than the Beach Grass. Tufts of both of these grasses were found in some places to have extended four feet in each direction by the end of the second year, and on Mr. Walter Smith's land one clump was found which had a thick growth four feet across in the centre, with five smaller shoots around it and eighteen shoots just showing through the sand, which will produce tufts of leaves next spring at a radius of twelve feet from the centre.

The Canadian Forestry Association owes a great deal to the active work done on its behalf by Mr. William Little, of Westmount and a still further evidence of this is shown in the fact that he has recently induced the Bank of Montreal to make the managers of its offices, numbering some eighty-seven, members of the Association. The thanks of the Association are due to Mr. Little and also to the management of the bank for their public-spirited action.

Trout Lake, Northern Ontario.

Vicinity of Trout Lake after the Fire.

FOREST FIRES IN NORTHERN ONTARIO

IN "CANADA FIRST" FOR AUGUST.

It was about three o'clock in the afternoon, and I was some two miles back in the bush, when a man came down the trail at breakneck speed, "Get out quick," he yelled, and then for the first time that day I smelled smoke. I admit I ran, and it was well I did so, for a roaring, crackling, veritable hell of flame was at my heels in as few moments as it takes me to pen these words.

After as short a time as ever that trail was travelled on, I struck one of the mines, and there all was commotion. Every available pail and receptacle which was water-tight had been pressed into service, and all hands were at work, some felling trees, tops outwards, some going out to meet the fire, cutting down all the birch to keep the inflammable bark from flying and carrying the fire onward, while others patrolled the road, water pail in hand. We met and fought the fire by fire, and for a few moments saved the camps.

Night fell on a scene which beggared description. The whole country seemed on fire. The atmosphere was filled with smoke and ashes, some of the latter burning us as they fell. Our eyes ached, our breath came in gasps from our charcoal charged lungs, and sleep, or even rest, we dare not. The heavens were brilliant with the reflection of the lurid flames, while the forest,—or what was left of it,—was a scorching mass of fire. Devouring tongues of the flame licked the cedars and balsams clean and clear of all foliage, leaving them like ghastly skeletons, and then sprang twenty feet above the highest forest tree, as if to seek others upon which to wreak their wicked vengeance. From tree top to tree top sprang these pillars of flame, until our fire met the main body, and then with a fearful roar, amid which the crash of falling trees could be heard, the fiend swung off to the south, and for the time being we were safe.

But what of the others in the track of the fire? It was the following day before we heard all the news, as blistered and worn out we walked over the still smoking ashes to see how our neighbors had fared. Not a vestige of green caught our eyes; ashes, ashes, that was all, save for the dead skeletons of forest giants—not a bird could be heard, even the rabbits and chipmunks had fled, or had perished. The forest, of a truth, was dead.

Beyond a few isolated tents, we found that all was safe. Fortunately a warning had been sounded in time, and where camps were not on well cleared ground, the flames had been fought with success. In more than one instance, prospectors had to take to their canoes, after dumping their tents and outfits in whichever of the lakes they were camped on, for there was no time to pack, the fire travelled too fast.

One amusing incident occurred. Two fire-rangers, whose names need not be mentioned, left us early in the morning after the fire to return to their own camp. After travelling about a mile on the trail they were met at a turn by a bear, who promptly disputed the right of way with them. Bruin sat down on his haunches, and evidently studied the situation as well as his smoke-filled eyes and brain would let him, and the result of his calculations caused him to stick to his position. There was no way round, and as the rangers were armed only with their axes, they decided to leave him the undisputed possession. Fighting fire was one thing, but fighting a well developed specimen of a bear with axes was quite another, and no doubt, after some forty-eight hours' strenuous labor, discretion in this instance was the better part of valor. The rangers retired disconsolately, resuming their journey later in the day, when Bruin had retired to his native fastness to sleep off his involuntary feed of smoke and ashes.

Unfortunately all practical exploration and prospecting are at an end for some time to come over the burnt area, for the ground is many inches deep in ashes, which rise and fill the lungs at each step; besides covering as with a pall the rocks which it is necessary to search.

How this great fire originated in several places at the same time will never be known, and it would perhaps be unfair to hazard a decided opinion. Suffice it to say that carelessness, at least, on the part of some individuals has resulted in the destruction of vast quantities of valuable timber.

Perhaps the object lesson now brought home will be taken to heart by some of those more ignorant prospectors who have openly prayed for fire, "To make the job more easy, by clearing out the undergrowth." That wicked fallacy has been exposed, at a great cost, but if the lesson has been properly learnt, it will be cheap at the price paid, for it will remove a menace to the valuable timber reserves, which are one of New Ontario's greatest assets.

NOTES.

A meeting of the National Wholesale Lumber Dealers' Association was held in Ottawa, on the 16th, 17th and 18th August. The Convention was more in the nature of a pleasure trip than a business meeting. The two chief questions discussed were insurance and car equipment. On the latter it was decided that joint action should be taken to compel the railway companies to furnish proper equipment as for other industries and shippers. In shipping, the lumbermen have to construct their own racks and stakes on flat cars, such costing about $6 per car, while no allowance is made in freight rates to offset this expenditure.

The meeting was addressed by Mr. E. Stewart, Dominion Superintendent of Forestry, who spoke on the question of the management of pine limits such as are found in Ontario. He urged the desirability of preserving the small timber and of a careful examination and survey of limits to ascertain their condition in respect to the stand and new growth. He concluded as follows:—

Considering all these facts, it seems to me certain that not the least valuable part of many limits is the younger growth, which at present, as I have endeavored to show clearly, does not pay the cost of cutting, and that the owners of timber, especially of white pine, would only be acting with the foresight they show in other matters connected with their business if they gave greater attention to this matter than heretofore. The time has arrived when the man who directs the lumbermen's operations in the woods should have, in addition to his practical knowledge of how to cut and take out logs to the best advantage, also some knowledge of the tree itself; the manner or rate of its growth and how to cut other timber so as to foster that growth. In other words he should be a forester, as well as a practical log man, and it is fortunate that many young men, most of whom have been brought up in our rural districts, are now studying forestry in the colleges of the United States and spending their vacations in our lumber woods, studying the practical part of the business; and I would strongly advise our lumbermen to avail themselves of the services of these young men, rather than import professionals from Europe, who are necessarily less familiar with conditions.

Some of the old enactments in regard to forest protection are both quaint and interesting. Attention is called to one such instance in a recent work on Alfred the Great. The Law-book in use previous to that issued by Alfred was that of King Ina (688-726).

In the case of damage to a wood, this old law drew a distinction between injury by fire and injury by the axe, and that by fire was punished far more heavily than the other, for this assigned reason—that fire is a thief and works silently, whereas the axe announces itself.

"In case anyone burn a tree in a wood, and it come to light who did it let him pay full penalty, let him give sixty shillings, because fire is a thief. If one fell in a wood ever so many trees and it be found out afterwards, let him pay for three trees, each with thirty shillings. He is not required to pay for more of them, however many they might be, because the axe is a reporter and not a thief."

"This contrast could be retorted: for it might be urged that if fire is a thief relatively to the owner of a wood, so is it also relatively to the defendant, for it had started up afresh when he had left the place thinking that all was safe. The worst that could be proved on him was the want of sufficient caution. In fact the law is only good as against arson, wanton or malicious; and for that case it is not severe enough. It may be assumed that in the bulk of cases damage by fire would be undesigned and accidental.

"But where the axe is used there can be no doubt about the motive. The man who fells another man's timber does so plainly with intent to steal, and the noise of the axe is not extenuating but rather aggravating by reason of its audacity.

"In Ina's law all such considerations were prevented by two venerable maxims which said, 'Fire is a thief but the axe is outspoken.' Moreover, as an indication of the national instinct which is favorable to whatever is open and straightforward, it may be interesting; but the distinction was bad as law, and it was abolished by King Alfred. His new law equalized the penalty thus: 'If a man burn or hew another man's wood without leave, let him pay for every great tree with five shillings, and afterwards for each, let there be ever so many, with five pence; and a fine of thirty shillings.' "

The following extracts from an official report of the United States Bureau of Forestry on Forest Conditions in Northern New Hampshire are of interest to Canada:—

The total amount of wood consumed by the mills in this region (310,795,000 ft. B.M.) exceeds the total cut by over

37,000,000 board feet. Moreover, a large part—over 24,000,000 board feet—of the wood cut goes to outside mills; therefore, the actual excess of wood consumed over the amount received from this region is over 61,000,000 board feet, and constitutes nearly 20 per cent, of the wood consumed in Northern New Hampshire. This is explained by the fact that most of the pulp companies are preserving their own supply of timber, preferring to draw upon an outside source, *chiefly Canada*, and that the demand for wood, especially spruce, is greatly in excess of the supply.

The wood consumed by pulp mills in Northern New Hampshire from 1st July, 1902, to 30th June, 1903, was 271,604 cords, 138,131 cords or 50.9 per cent. being from that district, 101,911 cords or 37.5 per cent. from Canada, and 31,562 cords or 11.6 per cent. from Maine.

The combined holdings of timberland by pulp and paper mills in Northern New Hampshire are 488,290 acres. This acreage includes the great bulk of virgin timberland in the region. The owners are thoroughly alive to the importance and farsightedness of a policy of perpetuating their supply of timber and, as a means to this end, with a view to cutting as little as possible from their own land at present, they are getting a large part of their supply from farmers' wood lots and Canada.

The question was asked the various pulp mill owners as to the length of time the present supply of spruce might be expected to last, and also as to the substitution of another species for pulp when the supply should have been exhausted. Their replies certainly indicate that they are not anticipating a spruce famine in the near future, and that they will not worry over a substitute for spruce until the available supply of spruce in Canada is exhausted.

Forest fires have done considerable damage in different localities during the late summer.

As the result of bush fires in Nova Scotia the village of Belmont was almost wiped out of existence in the latter part of August. Newspaper reports give the damage at $35,000, and it was also stated that there would no doubt be considerable distress amongst a number of the losers, some of them having nothing left but the clothing they wore. There had been no rain for some time, and everything was dry enough to burn easily. High winds caused the fires to spread and considerable damage was done in other localities. One fire is stated to have been caused by the gross carelessness of one person, who was trying to clear some land and fired it when the wind was blowing a gale.

In the vicinity of Moncton in New Brunswick, serious fires occurred at the same time, and there has probably been considerable loss of standing timber. Mill property was in great danger and it required the exertions of a large number of men to keep the fire in check. Farm buildings were destroyed in several cases. In Moncton the fire brigade was kept in readiness as the burning leaves and twigs were falling in the town, but fortunately its services were not required. The dry season resulted in a great many fires, most of which probably did not reach large dimensions.

Reports from British Columbia are to the effect that there were large and destructive fires along the coast from Alaska, southward, particularly along the White Pass and Yukon Railway, where they are ascribed to fires carelessly left by campers, and on Vancouver Island.

A despatch from Rossland, of the 4th September, gives a description of what is stated to be the most extensive and destructive forest fire since the founding of the town. It swept a distance of six miles, and its path was a mile wide. It destroyed the standing timber on over 5,000 acres, and it is stated that 32,000,000 feet of timber was burned. The property of several mining companies was threatened and in some cases partially destroyed.

On the question of adulteration of maple sugar, Mr. Madden gave the following testimony before a Committee of the House of Representatives of the United States, which we leave to the discretion of our readers to accept or reject:—

"Now we have found by experience—not by chemical analysis, but by experience—that the maple sugar made from the sap of the maple tree in Ohio is not so strong as the maple sugar made from the sap of the maple tree in Vermont, and that the maple sugar made from the sap of the maple tree in Vermont is not so strong in flavor as that which is made in Canada, in Quebec Province, because it seems that the colder the climate the stronger in flavor the maple sap is.

"Now, we buy these various sugars and reduce them to a liquor to make maple syrup, and I will give you my word, gentleman, if we take a Canadian sugar, which is the highest priced maple sugar we have, it being worth at the present time 12 cents a pound, while Vermont is worth only 8 cents a pound —I give you my word that if we make a liquor by melting that Canadian sugar, without the addition of sugar to reduce the strength of the flavor, it is so strong you could not use it."

REVIEWS.

Report of Dominion Experimental Farms for 1904*: Dr. Wm Saunders, Director. Pp.* 509.

This report comprises, in addition to the general survey by the Director, the reports of the officers having charge of special departments, and of the experimental farms in the different provinces. The report of Mr. W. T. Macoun, the Horticulturist at the Central Experimental Farm, gives some interesting information in regard to the forest belts, as follows:—

"It has been found that the trees which were planted 5 by 5 feet apart, the closest distance used at first, are making the best trees from a forestry standpoint as the side branches are killed much sooner. The trees planted 5 by 5 feet apart are more protected from storms than those farther apart and hence the tops are less injured. They are also a little taller in most cases, but are not so great in diameter as those 10 by 10 feet apart. During the first years of growth there is a great advantage in having the trees close as in order to get thrifty growth the soil should not become hard, nor should the trees be almost smothered with weeds or grass, and to get these good conditions it is necessary to cultivate at first, and the farther the trees are apart the longer one will have to cultivate, thus making the expense greater.

"Until the last three years the trees in the mixed plantation were making the most satisfactory growth, and are yet making better growth than some of the clumps composed of single species, but the rapid growing kinds are developing so fast in the mixed belt that they are overshadowing some of the more valuable trees, and those which cannot endure much shade are being killed. To some extent this overshadowing is prevented by shearing the side branches and letting in more light.

"In some of the clumps of single species the disadvantage of not having two or more kinds mixed is quite as apparent as the disadvantage of having so many kinds mixed in the mixed belt. Ash, Butternut, Black Walnut and Elm, which have thin foliage, do not kill the sod, and the growth on this account is checked. If other heavy foliaged kinds, such as Larch, Spruce, Pine or Box Elder, had been mixed with these the results would have been, almost certainly, much better."

Dr. Jas. Fletcher, the Entomologist, gives descriptions of the principal forest insects observed to have been destructive during the year. The Ash Leaved or Manitoba Maple appears to have had the largest number of enemies. They include the Basswood Looper, which destroys the leaves, the Negundo Twig-borer, which the name sufficiently describes, and the Negundo Plant Louse. In regard to the last, Dr. Fletcher states that when not controlled by spraying with kerosene emulsion or whale oil soap solution, these plant lice do serious injury to the trees they infest; and they are so persistent in their attacks that many lovers of trees in the West have given up the cultivation of the desirable and quick growing Negundo for other trees less subject to insect attack.

Summary Report of the Geological Survey for 1904; *Dr. Robert Bell, Director. Pp.* 392.

This report contains the accounts by the different officers of the survey, of the explorations and surveys made throughout the Dominion during the season. While they relate mainly to the geological features of the country there are some notes in regard to forests and timber that are of interest.

The district at the headwaters of the Albany and Severn Rivers, which will be near the line of the new transcontinental railway, presents some interesting features in tree distribution. Spruce, poplar, banksian pine and birch are found everywhere over the whole district. White and red pine were noted only at the southern part of Lac Seul. One solitary white pine tree occurs on Slate lake, and this appears to be the northern limit of the tree in this district. Ash trees were observed here also for the last time on the way north. The white cedar is a rare tree; and this is its northern limit.

Large areas have been burnt along the route of the Wenasaga river, notably at Wenasaga lake, ten or twelve years ago, and at Big Portage lake, about five years ago: also on Gull lake. North of Cat lake, we enter, at the lower end of Cedar (Kishikas) lake, an area that has been burnt probably eight or nine years ago, and this extends to a few miles below the mouth of the Francis river, or a distance of over thirty-five miles. Eastward it extends at least to Windigo lake, ten or twelve miles to the right of the river, and westward as far as could be seen from the tops of the highest hills. This is generally being reforested with a second growth of banksian pine and poplar.

In very few places, either on the north or the south sides of the height-of-land, do the spruce and tamarack attain such a size as to make them economically important to the lumbering

industry. On the shores and islands of Birch lake the best timber occurs; that on the branches of the Severn river is generally small.

At Fort Hope fairly clear nine-inch lumber was being sawn from trees cut near the shores of Eabamet lake. One tree was felled that gave a log over two feet thick at the butt and 100 feet long. The greater part of the forest is about eighty years old, though in places trees reaching 140 years were found. These old trees were on low-lying areas, that had escaped where the higher and dryer parts were burned, and were not generally large. Their growth-rings showed a rapid increase in size for the first fifteen years and afterwards an extremely slow growth. The large sandy tracts are now, for the most part, covered with an open growth of banksian pine, a tree of small commercial value. When the day comes in Canada for reforesting, these districts might be replanted with pines commercially valuable. Over large areas the spruces would, apparently, if more accessible, be available for wood pulp.

It was thought that the larch saw-fly, which destroyed so much of the tamarack of our northern forests, had ceased its depredations, but Mr. McInnes found it still active in this district. He states that the depredations of the larch saw-fly upon the tamaracks along the Winisk river were noted in the previous year's report. Since that time the ground covered by this insect has been extensive, and some idea of the damage it has done may be given. Last season all trees along the Winisk river, from a point near the mouth to a point within a few miles of the Weibikwei lake, were stripped; south of that area they were untouched. During the present spring and early summer their ravages extended southward to the Albany river and westwards for sixty miles up the Winisk river and to about midway between Eabamet lake and Lake St. Joseph, on the Albany, an area of about 14,000 square miles.

Forest Conditions of Northern New Hampshire, by Alfred K. Chittenden, M.F.; Bulletin No. 55 of the U. S. Bureau of Forestry. Pp. 100.

This is the report of an investigation of the forests of Northern New Hampshire, made under instructions of the U. S. Bureau of Forestry. The territory included in the investigation embraces a total of 1,951,977 acres or 32 per cent. of the entire State. It contains the entire White Mountain region and is drained by four large river systems, the Connecticut, the Penigewasset, the Saco and the Androscoggin, all of which have their origin within this region. The White Mountains occupy

the southern and larger portion of this area, and here the country is very rough and rugged, broken up as it is into many short mountain ranges and deep narrow valleys. The northern part of the area is flatter and contains many lakes and mountains with wide, rolling valleys between. The entire region is essentially a forest country. That the land is, for the most part, better suited to forest production than to agricultural use is evidenced by the thousands of acres of once cultivated land, which have now largely come up to dense forests of second growth spruce and pine. 900,000 acres of the tract are held by large lumber and pulp companies; 756,000 acres by small holders of forest lands, and 244,000 acres are in small agricultural holdings. These lands were sold by the State in years past. The best spruce land brings from $20 to $30 per acre. Second growth spruce land is rapidly increasing in value, and is being bought up by the large lumber and pulp companies. Of the virgin merchantable forest there are only 200,000 acres remaining, out of a total forest land area of 1,684,206 acres, the remainder being cut-over or waste land. The stand of softwoods is estimated at 4,764,000,000 board feet.

The conclusions reached by the investigation are as follows:—

(1) Unless the forests are effectively protected from fire, the value of Northern New Hampshire as a summer resort, now the source of an annual revenue of approximately $8,000,000, and as a source of timber supply, will be seriously affected. The extension from year to year of the total area which has been burned, together with the facts that the great bulk of this land has failed to develop a valuable forest growth, that indeed much of it remains an absolute waste, and that the forest resources of the State are being rapidly depleted, has forced on all thoughtful persons interested, financially or otherwise, the recognition of the fire question, as the question of first importance to the forests of the State.

(2) Safety from forest fires is impossible without the organization of a fire service, and it is suggested that the State should organize such a service, raising the necessary revenue by a tax on the timber lands.

(3) Conservative lumbering under the supervision of trained foresters would pay the large lumber and pulp companies operating in Northern New Hampshire better than the present method. The principal sources of waste at present are in cutting high stumps, in leaving good lumber in the tops, in leaving logs and lodged trees in the woods, in the failure to utilize windthrown and dead timber which is still merchantable, in leaving standing merchantable trees which are sure to be wind-thrown,

in the failure to leave seed trees in favorable localities, and in lack of protection of young growth in logging operations.

(4) The conservative management of farm wood lots is practicable and greatly to be desired.

(5) Forest planting upon denuded lands unsuited for agriculture promises good returns.

(6) There should be a chief fire warden, who should also be State forester, who should maintain a State forest nursery, for the distribution at cost of forest seeds and seedlings, and should bring about by lectures and instruction on the ground a better management of forest lands within the State.

(7) Since an excellent opening exists for the creation of a forest revenue by the purchase of cut-over lands in the mountains, the adoption of a policy looking to this end is recommended. Such lands are for sale at from $1 to $3 per acre.

Future Forest Trees: A. Harold Unwin, D. Oec. Publ. (Munich). T. Fisher Unwin, Publisher. Pp. 108.

This volume by Dr. Unwin, formerly of the Forestry Branch of the Department of the Interior, is issued with the object of presenting in a concise manner the results of numerous experiments, made chiefly in Germany, with some American trees in order to show their forestal value in Europe. The papers of which this book are composed, appeared first in German, but it was considered advisable to make the information available for English readers. Tables are given of the imports of timber into Germany from the United States and Canada, and are followed by a list of the different species of American trees which have been tried in Germany, with a statement of the results of the experiments in each case.

The Selkirk Range; A. O. Wheeler, F.R.G.S. Government Printing Bureau. Pp. 459.

This is a description of the Selkirk Mountains of British Columbia, which are becoming a favorite resort for the traveller who desires also to be a mountaineer. It is narrative in form so as to be easily readable, but gives a mass of valuable and reliable information in regard to the history, topography and natural features of the district. The illustrations include views of the beautiful mountain scenery and of the game and other products of the country, which add much to its handsome appearance.

The Determination of Timber Values, by Edward A. Braniff, Forest Assistant, U. S. Bureau of Forestry. Reprint from Year Book of Department of Agriculture, 1904. *Pp.* 7.

This pamphlet gives the results of experiments made with yellow birch, sugar maple and beech, in the hardwoods, and long leaf pine in the coniferous woods, to ascertain exactly how much more valuable is a particular kind of a tree of a certain size, than another tree of the same kind and smaller size. Trees were followed accurately from the mill to the lumber yard, and the ultimate result of the calculation was that cutting birch and maple trees 17 inches and over, the profit per thousand would be $5.64; trees 8 inches and over, $6.04; trees 19 inches and over, $6.46; 20 inches and over, $6.91. Tables are given of the contents, values, &c., of the trees at the different diameters. The experiments will be continued with other trees. The results of this work will be useful to lumbermen in calculating the value of their hardwoods.

The Maple Sugar Industry, by Wm. F. Fox and W. F. Hubbard, and The Adulterations of Maple Products, by H. W. Wiley. Bulletin No. No. 59, *U. S. Bureau of Forestry.*

This is an interesting sketch of the history and present conditions of the maple sugar industry in the United States. New York, Vermont and Ohio are the great producing States, as they are the chief home of the hard maple (*Acer Saccharinum*) which is the main source of the supply. The black variety has the highest reputation as a sugar producer. Sap is also obtained from the red and silver maples, but is not considered of as high value. The management of a maple sugar wood presents different problems from a lumber forest as the object is not to produce long, straight trunks but to develop good heads of foliage, as the quantity and richness of the sap depend largely on this being provided for. At the same time forest conditions must be maintained. The bulletin gives instructions as to the best methods of treating different kinds of groves so as to bring them into the proper condition to furnish the largest product.

Adulteration appears to be a common practice with maple products, as it is stated that the greater quantity of maple molasses or syrup on the market is adulterated in the true sense of the word. One of the most common adulterants is glucose, but sorghum or sugar cane is also often mixed with it. None of these mixtures are necessarily harmful, but the great objection is that the makers of the genuine article are forced into competition with these extensive adulterations, thus lowering the legitimate price. Every grove of maple trees would be

worth a great deal more to its owner if the laws should be so framed as to eradicate the evil. Such laws would permit the sale of the mixed goods under their proper names, and thus protect both the manufacturer and the consumer. It may be added as an interesting item that chemists have not yet been able to determine the exact chemical composition of the peculiar flavoring of the maple.

Report of an Examination of a Forest Tract in Western North Carolina, by Franklin W. Reed. Bulletin No. 60, *U. S. Bureau of Forestry.*

This is a report of an examination of a forest tract of about 16,000 acres belonging to the Linville Improvement Company, whose main purpose is to develop it as a summer resort. The report suggests plans for deriving a revenue from the timber on the tract, and at the same time preserving and even increasing its beauty.

REPORTS RECEIVED.

The Red Gum, by Alfred K. Chittenden, M.F. Bulletin No. 58, *U. S. Bureau of Forestry.*

Progress of Forestry in 1904, *by Quincy R. Croft, and The Attitude of Lumbermen towards Forest Fires, by E. A. Sterling. Reprinted from the Year Book of the U. S. Department of Agriculture,* 1904.

Terms used in Forestry and Logging. Bulletin No. 61, *U.S. Bureau of Forestry.*

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