



No. 1—A White Oak Weed.

Frontispiece.

Canadian Forestry Journal.

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No. 3.

CANADIAN FORESTRY CONVENTION.

VANCOUVER, B.C., 25TH, 26TH AND 27TH SEPTEMBER, 1906.

On the invitation of the British Columbia Lumber and Shingle Manufacturers' Association, a meeting of the Canadian Forestry Association will be held at Vancouver, B.C., on the 25th, 26th and 27th September next. This invitation was submitted to the Canadian Forestry Association at its Annual Meeting held in March last, and it was then decided that the invitation should be accepted. The British Columbia Lumbermen's Association is making every preparation to welcome the delegates to the meeting and to make their visit as pleasant and interesting as possible. This is the first meeting of the Forestry Association to be held in British Columbia, and it is particularly desirable that a large number should attend from the Eastern Provinces to show their interest in forestry and their appreciation of the kindness of the British Columbia Lumbermen's Association.

A splendid opportunity will be given to see the forests of British Columbia, and the scenery, both of coast and mountain, which is unrivalled in the world. As the Exhibition at New Westminster will be held in the following week there will be an opportunity for seeing a collection of the best products of the Province. This Exhibition is specially noted for the exhibits of fruit and live stock in addition to the products of the mine and the forest.

His Excellency, Earl Grey, Governor-General of the Dominion, has kindly accepted an invitation to and will open the Convention.

EASTERN PROVINCES.

The Railway Companies have granted only the usual summer tourist rate for this Convention for points east of British Columbia. Particulars as to rates may be obtained from local ticket offices.

Tickets may be purchased any time up to the 15th September but for Winnipeg and points west, may be used up to the date of the Convention. The final return limit is 31st October. Stop-over privileges will be granted both going and returning at points west of Winnipeg. All tickets must be executed for return passage at destination by joint agent, for which a fee of fifty cents will be charged. Tickets to other coast points than Vancouver are sold at the same rates, and it would be well for those attending the Forestry Convention to secure tickets through to Victoria.

BRITISH COLUMBIA.

The usual convention arrangements have been granted for points in the Province of British Columbia.

Delegates must purchase first-class full rate (not temporarily reduced) one way tickets to place of meeting (or, to nearest junction station, if through tickets cannot be obtained) and obtain certificates to that effect on Standard Certificate form. TICKET AGENTS ARE SUPPLIED WITH STANDARD CERTIFICATES AND ARE INSTRUCTED TO ISSUE THEM ON APPLICATION.

Where delegates have to travel over more than one railway to reach place of meeting, they will require to purchase tickets and obtain certificates as above from each railway unless otherwise arranged for, and the issue of through tickets authorized.

The Secretary of the Convention is required to certify on each Standard Certificate, over his personal signature, that the person named on the certificate attended the convention, and to state thereon the actual number of delegates who paid railway fare coming to the Convention and who hold STANDARD CERTIFICATES TO THAT EFFECT.

On surrender of Standard Certificates, properly filled and executed, to Ticket Agent at the place where the Convention is held (or at the nearest junction if tickets for the going journey were purchased to it) at least ten minutes prior to time train is due to leave, continuous passage tickets (NOT GOOD TO STOP OVER) for the return trip will be issued, at rates set forth below, on the conditions of the certificate and BY THE SAME ROUTE AS ON THE GOING TRIP.

RATES WILL BE AS FOLLOWS:

If one hundred (100) or more delegates hold Standard Certificates, correctly filled in and certified as directed, they will be returned to their original starting point free.

If twenty-five (25) delegates hold Standard Certificates, correctly filled in as directed, they will be returned to their original starting point at one-third of the one way first-class fare (not temporarily reduced).

If twenty-four (24) or less delegates hold Standard Certificates, correctly filled in and certified as directed, they will be returned to their original starting point at two-thirds the one way first-class fare.

CERTIFICATES WILL NOT BE HONORED.

1. If ticket for going trip is purchased more than three (3) days (Sundays excluded) before the date of the opening of the Convention.

2. Unless ticket for going trip is purchased within three days prior to the Convention (Sundays excluded) or during the continuance of the meeting.

3. If not signed at the meeting by the authorized Secretary whose signature appears below.

4. Unless surrendered to Ticket Agent, and ticket for return trip purchased within three days (Sundays excluded) after the adjournment of the Convention.

5. Unless presented to the Ticket Agent not less than ten minutes before train is due to leave.

No certificates except of the standard form (procured from railway agent when purchasing ticket) will be honored.

The Programme in outline is as follows:—

TUESDAY, 25TH SEPTEMBER, 1906.

Arrival and reception of visiting members of the Canadian Forestry Association.

Inspection of Lumber and Shingle Mills.

8.30 p.m.—Public Reception to His Excellency the Governor-General.

WEDNESDAY, 26TH SEPTEMBER, 1906.

10 a.m.—Opening of the Convention;
Preliminary business;
Addresses, papers, &c.

2 p.m.—Addresses, papers, &c.

9 p.m.—Banquet.

THURSDAY, 27TH SEPTEMBER, 1906.

10 a.m.—Addresses, papers, &c.

2 p.m.—Addresses, papers, &c.

Papers and addresses will be given by R. H. Alexander, Secretary of the British Columbia Lumber and Shingle Manufacturers' Association; F. W. Jones, President of the British

Columbia Mountain Lumbermen's Association; E. Stewart, President of the Canadian Forestry Association and Dominion Superintendent of Forestry; Overton W. Price, Assistant Forester for the United States; Dr. Judson F. Clark, Forester for the Province of Ontario; Roland D. Craig, Inspector of Dominion Forest Reserves.

The Secretary will be pleased to furnish any further particulars as far as possible.

The Canadian Pacific Railway Co. has begun tree planting on quite an extensive scale along its western lines. A contract has been let for a small acreage of breaking near Wolseley on which it is the intention to experiment with tamarack for ties. A piece of ground is also to be planted at Medicine Hat with jack pine and tamarack for the same purpose. Over 100 miles of trees are to be planted between Winnipeg and Calgary, for snow breaks, and at several stations trees are to be planted around the station grounds, and prizes are to be offered the section foremen who make the best showing. This work, if carried on successfully, ought to encourage tree planting among the farmers of the west.

The area set aside for forest reserve purposes has more than doubled in the United States since 1904. In that year it comprised less than 50,000,000 acres, while now more than 100,000,000 acres are reserved. In some states the exemption of large areas from taxation means in the future a serious loss of revenue to the counties in which the reserves are situated. In order to remedy what seemed to be an injustice the Forest Service submitted a Bill to Congress to grant 10 per cent. of the total receipts from forest reserves to the counties in which they are situated. These receipts for the year ending June 30th were \$767,219.96, and they are expected to increase immensely from year to year. The 10 per cent. contributed to the county funds is safe-guarded in the act by a provision that it must be spent entirely for the maintenance of schools and public roads.

THE TIMBER PIRATE.

The article of Senator Edwards, published elsewhere in this issue, covers completely the important subject with which it deals—the destruction of valuable timber as a result of the operations of those who make a pretence of settling lands in timbered areas. The matter is mentioned here not in the hope that we can add anything to what Senator Edwards has said, but with the object of urging every reader of the *Forestry Journal* to use his influence to bring about a better public policy than that which now prevails. Opinions may differ as to the best method of accomplishing this reform, but, if the people insist that the question shall not be shelved until reform has actually been accomplished, our legislators will certainly solve the problem satisfactorily.

The fact that, in certain portions of the Dominion, the fire-ranger system has greatly reduced the forest waste is no reason why efforts to make a clear distinction between the real settler and the timber pirate disguised as a settler should be relaxed. This pretended settlement is a cause of steady loss and a constant menace to the most valuable forests we have. The unavoidable dangers are bad enough; but this worst one of all can be removed if the people of Canada will realize the startling fact that the same men who are robbing them of little patches of timber have endangered and are still by their very presence endangering millions upon millions of public forest property.

The incorporation of the Northern New York Forestry Association last June is evidence of the rapidly growing interest that is being taken in the preservation of the forest and in the replanting of waste lands. The chief object of the organization is to collect and distribute information on these points. The Association will make a special study of the best means of removing the mature timber from the forest without injury to the younger trees and will oppose the policy of those who advocate the leaving large forest areas untouched. Many lumbermen and operators took a prominent part in the organization of the Association.

THE UNIVERSITY BILL.

One of the most important bills passed by the Ontario Legislature at its last session was the University Bill. Last October a Royal Commission on the University of Toronto was appointed and after a thorough investigation of the needs of the University a report was issued in time for the Government to act while Parliament was in session. The members of the Commission were Messrs. J. W. Flavelle (Chairman), Goldwin Smith, W. R. Meredith, B. E. Walker, H. J. Cody, D. Bruce Macdonald and A. H. U. Colquhoun (Secretary). The work of the Commission was so satisfactory that all but one of its recommendations were adopted by the government and embodied in the University Bill. This recommendation referred to an endowment in land. The Commission wrote: "By the settlement of the Provincial boundary we have obtained control of what is called New Ontario. It does not, therefore, seem unreasonable to express the hope that out of this enormous area at least a million acres will be set aside for the University and University College."

In introducing the University Bill, Premier Whitney said that the matter of land endowment was reserved for further consideration, and that inasmuch as the Government had recently been getting back some lands from the railways, it might be that they would have some lands for the University. He further said that he thought the Government was not prepared to deal with the matter at the present session or words to that effect.

The importance of such an endowment is so great that in our opinion the future of Forestry in Canada depends in no small degree upon the decision that is finally come to by the Ontario Government. We publish elsewhere the recommendations of the Commission relative to instruction in forestry. These recommendations were adopted by the Government and a school of Forestry will be established in connection with the University.

Instruction in forestry must be practical and experimental as well as theoretical. There must be forest lands upon which cutting may be begun at once in order that the earliest students may receive all the benefits to be derived from a course in forestry, and there must be other lands upon which experiments running over long periods of years may be made. These lands should comprise large areas in different parts of the province so that in addition to serving their main purpose they would prove an object lesson to lumbermen and others holding timber lands in their vicinity. If the recommendation of the Commis-

sion be acted upon and a million acres of government land be set aside as a university endowment, half the amount might be made up of virgin forest and half of lumbered and burned over lands. The virgin forest should include pine, spruce and hardwood lands. The lands that have been lumbered or burned over would afford ample opportunity for experimental work. For immediate practical results virgin forest is essential. The appalling waste, the reckless disregard of future needs which characterize most, if not all, forest operations in Canada, will continue until practical demonstration can be made on a large scale of the cutting and selling of the forest crop under conditions which would ensure the perpetuity of the forest and at the same time yield the full value of the trees cut. Such demonstration could be made every year by those who were responsible for the administration of the endowment lands, the amount of timber cut depending of course upon the needs of the University. In other words an endowment of virgin forest lands would make a large and annually increasing revenue available from the first.

Of almost equal importance with the endowment itself is the tenure under which the lands might be held by the Board of Governors of the University. If the public interests were safeguarded in such a way as to make it impossible for the Board of Governors, or those acting for them, to permanently injure the forest while realizing on the standing timber, the lands might be given to the University outright, but in any case no satisfactory results could be hoped for under a grant of less than fifty years. A lease for one hundred years would be better, with provision for renewal if all the conditions under which the grant was made had been lived up to. If it were provided that all proposed sales of timber should be approved by the Lieutenant Governor-in-Council and that after a careful estimate of the growing timber no more should be cut each year than would be replaced by the annual growth, the management of the land might safely be left to the Board of Governors, the greater part of the administrative work falling, of course, to its Forest Department.

Good results cannot be expected of any school of forestry which has not under its control forest lands upon which practical work can be carried on and the most practical side of forestry in a new country like Canada is not re-forestation but conservation. To cut the trees that may be marketed with profit, to market them to the best advantage, and to preserve the young standing timber should be the chief work of those who have the management of large forest areas. Should the University Board of Governors be given control of the lands they have asked for, the work of their Forest Department would be of inestimable value to the government departments administering forest lands, not in Ontario alone, but in every part of the Dominion.

SO-CALLED SETTLEMENT IN FOREST AREAS.

BY HON. W. C. EDWARDS.

There is little that is new to be said upon the subject of the injury done to our forests by the system, or lack of system, which allows people, under pretence of making and carrying on farms, to endanger an immense wealth of standing timber. The evil has been exposed again and again, and every day brings new illustrations of the loss to the public to which it gives rise. It is evident, however, that the public have not yet learned the lesson—though they have paid dearly for the schooling—and it is necessary to take every opportunity to make known the facts in order that they may help to create a public opinion which will compel the adoption of a wise policy.

It is necessary to make it plain, first of all, that no complaint is made concerning the bona fide settlers on land fairly suitable for agriculture. The man who makes and carries on a farm is a useful man, and room and opportunity must be provided for him. Even though a genuine settler may occasionally start a forest fire which will destroy far more than that settler's own value to the community, it is not fair to consider the matter in that light. On the whole, the settlement of good agricultural lands, even in timbered areas, is valuable work for the country, and unavoidable accidents, or even ordinary display of human heedlessness, must be allowed for in connection with the work. That which is to be condemned is the mere pretence of settlement, which goes on as a means of plundering the public timber wealth of the country. In districts quite unfit for agriculture men will take up land under the pretence of settlement. They comply with the necessary forms, hold the land long enough to sell the timber upon it, and then abandon their "farms." The few acres on which such a man pretends to settle may be surrounded to the depth of miles with standing timber which either belongs to the public or in which the public has a direct financial interest because royalty must be paid upon every foot of it that is made into lumber. Being a plunderer who merely assumes the disguise of a settler this man has no interest in the immensely valuable timber by which he is surrounded. If, by carelessness in carrying on his own petty and illegitimate operations, he should start a fire which destroys thousands or millions of dollars' worth of timber, he loses nothing, nor can he be punished in any way unless the fact can be established that the disaster was directly due to his wilful or

negligent action—a danger which is practically non-existent, for proof in such cases is impossible.

It is a fact which has often been stated, and is now pretty well accepted by those who have made even a cursory study of the subject, that, for every tree which has been cut down by the lumberman and manufactured into articles of commercial value, at least twenty trees have been destroyed by bush fires—absolutely wasted. I speak with confidence on this subject so far as the forests of Eastern Canada are concerned, and I believe that those familiar with conditions in the great forests of the West will agree that the proportion of waste that I have given holds for that portion of the country also. The loss to the country in this way is beyond all calculation. There is no more saddening example in our country of needless waste than this destruction by fire of immense tracts of timber which, if now standing, would form one of our most valuable assets.

The public formerly regarded forest fires as natural phenomena or as visitations of an inscrutable Providence. But, just as it has been learned that epidemics of disease are due to human ignorance or carelessness, and can be prevented, so it is now pretty generally understood that forest fires, as a rule, have their origin, not in natural and ungovernable causes, but in the heedlessness or negligence of men. And, of all those who are guilty on this count, the worst by far is the man who makes pretence of settling as a farmer on land which should be continued in forest growth. In 1904 I made the formal and deliberate statement to the Quebec Commission on Colonization, that, in my opinion, at least ninety per cent. of the forest destruction in Ontario and Quebec had been due to settlers setting fires for the purpose of clearing the land. I have not changed that opinion nor do I see how one can reach any other conclusion who has had means of estimating what fearful destruction even one careless person can cause. I quoted to the Quebec Commission one case within my own knowledge, the destruction of a large portion of the most valuable pinery on the River Eagle, a branch of the Gatineau, by a settler clearing land for a potato field. It would be laughable, if it were not so sad, to think that, while the settler raised a crop worth, perhaps, \$5.00, the public suffered a loss of at least \$1,000,000. This is not an isolated instance, even in the amount of waste, for equally destructive fires, arising from the same cause, are known in many portions of Eastern Canada.

There is a way to clear land by burning without destroying the country. By setting the fire in proper relation to the direction of the wind, carefully watching the fires set, and taking other simple precautions, fire can be restricted within any desired area. The bona fide settler, the man who is really making

a home for himself and his family and who looks forward to spending a lifetime of growing prosperity in the home he is creating, is ready to take these precautions, for they are all in his own interest. But the so-called settler who has taken up a little patch of land merely that he may rob the country of the timber that stands upon it, is in a hurry to realize his gains, and expects to abandon the place as soon as he has done so; consequently, he has no more regard for the rights and interests of others than has any other pirate.

It is very satisfactory to be able to state that the fire-ranger system adopted by the Provinces of Ontario and Quebec is greatly reducing the destruction caused by forest fires. As that system is more fully established and covers a wider range of territory its beneficial results become more apparent. Countless acts of carelessness on the part of settlers, prospectors, sportsmen and others, which, in former days, would have resulted in widespread fires, are prevented or their injurious results checked in good time. The constant increase, in recent years, in the value of standing timber, means that the saving due to careful supervision is greater than it would have been in former times when a great portion of the timbered area had little or no value, owing to lack of facilities for bringing the product to market.

On the other hand, this increase in value means that there is all the greater inducement to the so-called settler to carry on his nefarious schemes. There is a tendency also to systematize this form of robbery, certain parties keeping as their employees or retainers a number of men who make a practice of securing timber lands by this illegitimate means of pretended settlement. The more valuable the standing timber becomes, the greater is the inducement to schemers of all kinds to find means of capturing the timber on the public domain without rendering an equivalent to the public either in money or in service. This means that the law should be made more and more stringent—on the simple principle that the more valuable the thing to be guarded, the more careful should be the watch that is maintained.

The public would be more alive to the importance of this matter, I believe, were it not for an indefinite opinion—but one strongly held—in the minds of many people that our timber resources are “inexhaustible.” With the keeping down of fires and the improved methods of taking off the crop, I believe it is possible to go on cutting spruce in our eastern forests for an indefinite time. But the same is not true of our pine, the crop upon which our calculations of forest wealth in the past have mainly been based. The pine tree does not grow so large or yield such good timber in the northern country as it does in the region where the most extensive lumbering

operations are now carried on. This means that our pine supply is by no means "inexhaustible," as so many are apt to think. At the rate at which destruction now goes on, the pine of eastern Canada will, in time, follow the pine of Michigan, which as many will remember, was spoken of as "inexhaustible" not so very many years ago. The more the waste by fire is prevented the better chance we shall have to keep our spruce as a perpetual source of revenue and to prolong the returns from our pine. And, if fires are to be prevented, it is not enough to maintain a fire-ranging system to put out fires,—the man who most frequently starts the fires, the pretended settler, must be eliminated.

Though I have dwelt upon the saving of the standing timber, that is not, by any means, the only point to be considered. No matter how valuable the standing timber, it would be disastrous to the country to turn it all into money. Upon the maintenance of the forest depends the proper balance in the flow of our waters. This is a vital point in agriculture and in all the industries based upon agriculture. But the point of immediate importance is the maintenance of our water-powers. Considering their force, their wide distribution and the ease with which they can be developed, the water-powers of Canada, I believe, are second to none in the world in immediately prospective value. People used to smile when they heard me say, some years ago, that, because of its timber and its water-powers, the Province of Quebec must soon be regarded as richer than any other Province or than any State of the American Union. Industry has now reached the stage of development at which the value of the rivers in Quebec that rush down from the mountains to the sea is about to be generally realized. Take away the forest and you take away these water-powers as commercially useful agencies,—the water may still flow, but it will be in the form of freshets in the spring and rivulets in the autumn, a form which could no more be made useful than the cyclones of Dakota can be made useful. There is no danger that lumbering, as it is now carried on by the best firms, will denude the country so as to unbalance the regular flow of the streams. The trees taken off are those which, while they are most valuable in the market, can best be spared from the forest. They are quickly replaced by younger growths which prevent the too-rapid melting of the snows and preserve the forest floor which acts as a vast sponge in keeping back the too-rapid outflow of the waters.

The problem of our forest wealth can be answered by keeping down the ravages of fire; and the problem of keeping out, or putting down, fire can be answered by our present methods together with the elimination of the timber pirate who operates in the disguise of a settler.

SOME TYPES OF FOREST WEEDS

JUDSON F. CLARK.

From the Standard Dictionary we learn that a "weed" is "any unsightly or troublesome herbaceous plant that is at the same time useless or comparatively so . . . ; especially such a plant as is positively noxious or injurious to crops, . . . also any herbaceous plant out of place." Had the lexicographer omitted the word "herbaceous" his definition would, I think, describe the greatest bane of rural life to a nicety. To adapt the definition thus amended to forest conditions we must read "wood crops" instead of simply "crops." A shorter definition of the term "forest weed" would be "a plant which is injurious to the reproduction, growth, or quality of wood crops."

I recall having once been taught that all agricultural bugs fall into two classes, viz.: those which feed by eating the plant, and those that live by sucking the plant juices. The individual bugs of each class were said to be very numerous, but the treatment of all was simplicity itself, namely, to feed the "biters" with paris green and bathe the "suckers" with kerosene emulsion. Plants which are injurious to the reproduction, growth, or quality of wood crops resemble the agricultural bugs, in that they fall into two classes, both as regards their life habits and methods of treatment. Herbaceous plants and shrubs form one class, and undesirable trees the second.

The herbs and shrubs are alike in that they are absolutely dependent for their existence on the light that is able to penetrate through the "canopy" or "crown cover" of the forest. Many herbs and shrubs are killed by even moderate shade, others are killed only by a comparatively dense shading. No herb or shrub can thrive sufficiently to cause appreciable harm under a close crown cover of many of our native forest trees. The hard maple and the beech among the hardwoods, and the hemlock, spruce, and fir among the conifers are especially notable for the density of their shade. The absolute necessity of light for plant development on the one hand and the possibility of shading the forest soil on the other at once suggests the remedy for herbaceous and shrubby forest weeds, which is to establish or maintain a crown cover of at least moderate density where such weeds are troublesome or likely to be so. In the case of groves of trees having open crowns, such as the black walnut, or tulip, or old oak stands, underplanting with beech or hard maple is sometimes resorted to to destroy the weeds and to protect the soil from sun and wind.



No. 5—A White Pine Weed.
(Courtesy of U. S. Forest Service.)



No. 3—A Black Cherry Weed.



No. 7—An Undergrowth which is not Weed Growth.



No. 6—Weed Ironwoods.

By virtue of their ability to form part of the crown cover and thus insure their light supply, the weed trees constitute a special class requiring radically different treatment. Here again, however, no matter how varied the kind, age, or quality of the weed trees, the practical forester has but one remedy, and that remedy is the ax. Figures 1-6 illustrate several types of this class of forest weeds.

In Figure 1 is seen a particularly bad example of a white oak weed. This tree, with its much branched and hollow trunk, is entirely worthless, except for fuel, and even for this purpose it is hardly holding its own, the annual loss by decay fully offsetting the gain by growth. Meanwhile it is shading to death seven white pine saplings, any one of which could occupy the space to excellent advantage. Very evidently the proper treatment is to fell the oak, taking care to save at least one, but better several, of the pines.

This should of course have been done many years ago. The pines, though not more than two to four inches in diameter, are all over 40 years old, their small size being entirely due to the limited supply of light which was available under the huge crown of the oak.

Figure 2 shows a struggle for possession of a small opening in the forest between a chestnut and a white pine, with all the advantage in favor of the chestnut. In fact it is evidently but a matter of time when the pine will be entirely destroyed by its rival. The chestnut, like the white oak and pine, is an exceedingly valuable forest tree. This particular specimen is, however, to be regarded as a weed in that it is of inferior form and is hindering the development of what is undoubtedly a more valuable neighbor.

Figure 3 illustrates a large black cherry standing over a splendid reproduction of white pine. Any tree shading so fine a stand of young pines would necessarily be classed as a weed, especially if the soil were sandy as is the case where this photo was taken. The cherry being sufficiently large for logs, this "improvement cutting" should be a very profitable move whether viewed from the standpoint of present returns or that of future revenue.

Figure 4 illustrates the baneful influence of an older and inferior tree in a young hardwood stand. As is readily seen, this tree is itself almost wholly worthless and incapable of improvement. Originally the reproduction of young hardwood trees, so well shown in the background, obtained light equally well immediately around this tree. The seedlings were, however, gradually shaded to death and finally disappeared. A few of the more hardy ones still survive, but are stunted almost or quite

beyond recovery. Viewed from the forester's standpoint, there is here a portion of excellent forest land which has for twenty years been wholly non-productive. The removal of the weed tree which is the cause of the trouble will be immediately followed by a vigorous natural reproduction by seeding from the neighboring trees.

In Figure 5 we have a good example of what foresters call "advance growth." The meadow on the right has been seeded from the trees on the left. The first seed year was—on account of grazing, unfavorable weather conditions, or other cause—productive of but slight result, a tree here and there being all that survived. A second seed crop was more fortunate and resulted in a splendid stand of young trees all over the meadow. Under the circumstances the two older trees shown standing together in the centre of the illustration are forest weeds. If they remain they will, because of their advantage in height over their near neighbors, grow to be broad-topped branchy trees, producing a very inferior grade of lumber. If they are removed at once the gap will be quickly closed by the growth of the younger trees, which, being of fairly even height and standing closely together, will grow tall and straight. The lower branches will, because of the density of the shading, die before they become large and finally drop off, thus improving the quality of the wood produced.

Figure 6 illustrates the condition of many Western Ontario woodlots. For many years this woodlot was not grazed, and contained a fine growth of young timber of a dozen species. 11 years ago it was opened for cattle grazing, and has been used for this purpose to a greater or less extent every season since. During the early years of the grazing it was noticed that there was a great destruction of the young trees, but as there seemed to be plenty remaining, it was thought that no great harm was done. When this photo was taken, an examination was made of about four acres, with the result that there were seen many hundreds of hop hornbeam and blue beech (Ironwoods), some six or seven elm, but not a single ash, oak, basswood, or maple, although many large seed trees of these species were present. The small trees shown in the figure are ironwoods exclusively. The hop hornbeam and blue beech are so nearly worthless for forest purposes that they are always regarded as weeds, the more so in that they are prolific producers of seed and can thrive in a comparatively dense shade, often occupying the ground almost to the exclusion of better species. Live stock do not care for their foliage, hence they are unduly favored where even light grazing is practised.

Figure 7 gives a view along a line fence between woodlots in Huron County, Ontario. The lot on the left has been heavily



No. 2—A Chestnut Weed.



No. 4—A Soft Maple Weed.

grazed, that on the right has not been grazed for 9 years. Many farmers regard an undergrowth of young trees such as is shown on the right as so much weed growth, and it is by no means uncommon to find owners desirous of improving their woodlots, going to considerable trouble and expense to clean up such growth. This is a very great mistake. An undergrowth of young forest trees not only insures the perpetuity of the woodlot—furnishing young trees to immediately occupy the places opened by the removal of mature trees—but greatly contributes to the vigor of growth of the larger trees present by shading the soil from sun and wind. The function of the undergrowth in shading the soil from the light is to prevent the growth of moisture-robbing weeds and to conserve the humus content in the soil. The exclusion of the wind prevents direct evaporation, and enables the fallen leaves to lie in place to form a protective surface mulch, which is alike valuable as a conserver of moisture and as a fertilizer.

The forest reserves of the United States estimated to be worth \$250,000,000 in cash are now being administered at a cost of less than one-third of 1 per cent of their value, while increase in that value of not less than 10 per cent. a year is taking place. Receipts from sales of timber are increasing so rapidly that in the near future the forest reserves will be self-sustaining.

That forest planting on waste lands and watersheds will prove profitable is the opinion of many large industrial companies in the United States. The rapidly diminishing supply of railroad ties, mine timber and lumber, has made the necessity of planting clear to far-sighted users of forest products. Among these are the H. C. Frick Coke Company, The Keystone Coal and Iron Company, The Pennsylvania Railroad Company, The Johnstown Water Company, The Monroe Water Supply Company and the Pennsylvania and Lehigh Coal and Navigation Company. The water supply companies have been forced to take action on account of the decreasing water supply, due to the denudation of the forest. The U. S. Forest Service cooperates to the extent of sending a technical forester to make a preliminary examination of the lands on which planting is contemplated. This determines whether planting is advisable. If the preliminary report is favorable, a detailed plan for planting and nursery work can be made at a cost to the owner of the actual expenses of the work.

THE DECIDUOUS WOODS OF BRITISH COLUMBIA.*

BY J. R. ANDERSON.

BROAD-LEAVED MAPLE—*Acer macrophyllum*.—This tree is so named on account of the extraordinary size of its leaves, one authenticated specimen which I collected measured $16\frac{1}{2}$ inches from the point at which the stem joins the leaf, to the tip of the leaf, and $12\frac{1}{2}$ inches across. The flowers come early, before the leaves, and are of a yellowish white in crowded pendant racemes. The leaves turn a golden yellow in the autumn. This is probably the commonest and best of this class of our woods. Its range is all over the lower lands of Vancouver Island, the Gulf Islands and the mainland to the westward of the coast range. It grows to a large size, the trunks frequently attaining a diameter of three and four feet, and when growing close together, or with other trees, very straight and tall. When growing singly in the open it forms a magnificent shade tree, one remarkable specimen near Victoria, covering a space of probably eighty feet in diameter. Other specimens at Alberni, by actual measurement, cover spaces of sixty feet and over. The wood is close grained, takes a fine polish and is well adapted for furniture, inside finishing and carriage building. That part, which, by reason of an abnormal growth, is known as "Bird's Eye Maple," is very beautiful. Although utilized by furniture makers, and in some cases for inside work, it is comparatively little used and is only cut by one or two mills to supply the demand. The natives, where this wood occurred, used it to a considerable extent for paddles, and for some articles of domestic purposes.

THE SMOOTH MAPLE.—A smaller tree which is sometimes erroneously called Vine Maple, is *Acer glabrum*, with two other synonyms. On Vancouver Island and the lower mainland it sometimes attains to the dignity of a tree. The leaf is five-pointed, flowers few, on the coast, but plentiful inland, where it never attains a size larger than a large bush. I may say that according to my recent investigations, I feel a doubt as to the identity of the inland tree with that of the coast. The wood of this variety is white and close grained, but it has never to my knowledge been put to any practical use; this, however, may be accounted for by the fact that it does not occur in any great quantities. This maple is very ornamental, and makes a fine

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shade, and as it does not grow to any great size, is well adapted for small grounds. The leaves in the autumn turn red, sometimes striped with yellow.

VINE MAPLE—*Acer circinatum*.—This tree, as its name indicates, grows small and crooked, much in the shape of a vine. Its range is confined to the mainland, to the westward of the Coast Range of mountains, where it grows in dense impenetrable thickets, and does not occur on Vancouver Island or to the eastward of the Coast Range on the mainland. It seldom exceeds 8 inches in diameter at the butt, and is a most useful wood to the settler, as, the wood being tough, it makes excellent wagon tongues, handles for implements, ox bows, and various things of that kind. The natives made use of it for various household utensils, such as spoons, dishes, etc. The bark is smooth and green, the leaves are seven-pointed, nearly round, turning to a beautiful scarlet in the autumn; the flowers, which occur in loose corymbs, are a dark red, and the seeds are in twos, with the wings spread at right angles.

WESTERN OR RED ALDER—*Alnus rubra*.—So called on account of the sap, which turns to a dull red when exposed to the air, and was used by the natives as a dye for basket work, mats, etc. The habitat of this tree is the low rich valleys, where it generally grows in large groves, attaining a size from 10 inches to three and even four feet at the base, and height of 50 to 100 feet. The bark is white on the outside, smooth on the younger trees and roughened, with wart-like excrescences in the older trees. The range is principally along the sea coast of the mainland and Vancouver Island. The tree can hardly be called a handsome one, being of a rather stiff, formal character. The leaves are a dark green, often whitish on the under side, oval in shape, and falling on the approach of winter without turning color. Like some other trees of this family, it bears staminate and pistillate flowers separately, the former in the shape of what are popularly known as catkins, emitting quantities of yellow pollen in the spring. The wood, which is of a light brownish color, nearly white, resembles black walnut in grain, and is used stained to the proper shade, in imitation of that wood, for furniture, inside finishings, bannisters, etc. The natives used this wood, which is easily worked, for various purposes of domestic economy. Spoons, dishes, boxes and furniture, such as they required, and the inner bark as before mentioned, as a dye.

MOUNTAIN ALDER—*Alnus rhombifolia*.—This is a small insignificant tree or bush, generally growing along water courses on the steep sides of high mountains, taking the place often of larger trees, which have been destroyed by avalanches, but occurring sometimes on the low lands on margins of lakes. It seldom or never grows straight, usually in a contorted form, especially when

growing in localities where snow lies deep, and avalanches occur. The wood is soft and pliable, and the tree is therefore well-adapted to withstand the rough treatment of alpine regions. The leaf is a bright glossy green, covered with a somewhat aromatic gummy substance, which extends to the stems. The wood is worthless, and is only used for fires where no better is to be obtained.

POPLAR OR COTTONWOOD—*Populus trichocarpa*,—so called on account of the cottony material which carries the seed, is a common tree throughout the province, on low lying lands in the vicinity of water. It attains to a large size in favourable localities, three to four feet in diameter being common, and attaining a great height in dense forests, along river banks, and on low islands. The wood is very little used, being white and soft, without any great quality to recommend it. The principal use it has been put to is for the manufacture of excelsior, for which purpose it is well adapted. It has also been used for boxes, being very light, but the objection to its use for this purpose, I am informed, is that it turns dark after being sawed. Probably this difficulty could be overcome by allowing the wood to season in the log, or by other methods. It, also, I am informed, makes excellent pulp for paper. The bark turned inside out is used by the Kootenay Indians in the construction of their peculiarly shaped canoes. The young buds exude a brown gummy substance, very aromatic, and hence the tree is frequently known as Balm of Gilead. The leaves, which are somewhat cordate, or heart-shaped and pointed, attain a large size, on young trees, from 10 to 11 inches long, and 7 inches broad, bright green on the upper sides and white on the under sides; these leaves, when shaken by the wind, give a very curious appearance, and suggest a white-flowered tree. On older trees the leaves are much smaller. Growing in the open, this is a handsome tree, much more so than the stiff-growing Lombardy Poplar, which is so frequently planted in our grounds.

ASPEN-LEAVED POPLAR—*Populus tremuloides*.—So called on account of the tremulous effect of the leaves, which become agitated with the least breath of air. I know of no pleasanter sound than the rustle of these leaves, when, after crossing a hot, treeless prairie, one finds oneself by the side of a stream shaded with this beautiful tree. It probably is more wide in its distribution than any other tree, occurring as it does from the Atlantic to the Pacific, and forming the principal source of wood supply in Manitoba, Alberta, and Saskatchewan, where the groves, or forests, are designated "bluffs." In some parts of our own province also, it constitutes the principal wood for fences and fires. The bark is usually smooth and white, the leaves nearly round and slightly pointed; the wood is soft and decays

quickly; it, however, even in its green state, makes excellent firewood. Its habitat is usually on the margins of streams and low-lying land, but it also occurs on the high lands, both of the mainland and islands. It usually attains a size of six to twelve inches, but is often larger, and from twenty to seventy-five or a hundred feet high in this province. The sap, which is stripped from the wood in the spring, by the natives for food, by means of a bone implement made from the rib bone of a deer, is quite sweet and of rather a pleasant flavour. The ribbon-like strips of sap are sometimes laid crosswise of each other, dried in the sun and kept for future use.

WILLOW, known botanically under the generic name of *Salix*, is a genus which has not been well worked out, and I therefore will not trouble you with details which probably are of no practical interest. The largest of the willows in this country is that known as Hooker's Willow (*Salix Hookeriana*). It occurs commonly on Vancouver Island and the lower mainland, often near water, but it is quite ubiquitous in its habits. It often attains a size of 12 inches at the butt, but never any great height. The wood resembles the variety used in England to make cricket bats, and would probably answer the purpose well. The habitat of the genus *Salix* is almost invariably near water or wet land; it comprises a large number of species, some of which are tiny plants, barely an inch high. The latter occur only on high mountains near the snow line.

WESTERN WHITE OAK—*Quercus Garryana*.—Sometimes called *Quercus Jacobi*. The range of this tree is altogether confined to Vancouver Island and Gulf Islands, not a single specimen occurring on our mainland, but it appears in the adjacent States of Washington and Oregon, extending to California. Patches of it occur on the southern end of Vancouver Island and for about one hundred and fifty miles north. In some places it attains a size of from three to four feet in diameter with good straight trunks, from which logs can be obtained from ten to twenty feet in length. It is likewise a highly ornamental and shade tree. The wood resembles English oak in appearance, having a beautiful grain, but it has never been much used, principally I believe on account of the difficulty of seasoning it properly, or rather the necessary room and capital for storing it away for several years. It is used to a limited degree by cabinet makers for ornamental furniture and other purposes of that kind. The bark is usually whitish in appearance, deeply scored in the older trees, affording excellent shelter for the eggs of the Oak Tree Looper, which, during the last two years, devastated the oak forests in the vicinity of Victoria. The leaf bears a considerable resemblance to that of the English Oak. The acorn, prepared in a peculiar

manner which it is unnecessary to describe particularly, is used as an article of food by the natives further south.

ARBUTUS OR MADRONA—*Arbutus Menziesii*.—This is quite a common tree on Vancouver and Gulf islands, and on some parts of the coast line on the mainland. It is a striking looking tree with its red bark and evergreen leaves, most ornamental for large grounds. As a rule it does not attain a great size, especially when growing on exposed rocks, and headlands, but trees a foot in diameter are common, although as a rule twisted and crooked. When growing in forests, however, it grows fairly straight, and sometimes attains a large size. On the Alberni road, in the vicinity of Nanoose Bay, many fine specimens are to be seen. When travelling in company with Dr. Fletcher and the Rev. Mr. Taylor, some time ago, I took the measurement of one tree which was ten feet five inches in circumference. I am not aware that the wood of this tree has been put to any particular use, it is hard, fine and close grained, takes a good polish, but is apt to warp and check if cut before being well seasoned. By the natives it was used for gambling sticks and rollers, the latter being in the form of discs some two inches in diameter, which are divided into two parts and concealed in a kind of oakum made of cedar bark. I cannot describe the game, but the discs are rolled over a mat, one of the discs being, I believe, the king. The laurel-shaped leaves of this tree are a beautiful bright green, remaining on the tree for two years, so that there is a constant succession of evergreen leaves. The flowers are borne in dense compound racemes, whitish yellow, with a strong odor of honey, which they evidently produce in large quantities, as bees frequent the trees in great numbers. The fruit, a beautiful red, somewhat roughened on the surface, resembling small strawberries, is greatly relished by grouse and other birds in the autumn.

DOGWOOD—*Cornus Nuttallii*.—A highly ornamental tree with immense white flowers is fairly abundant throughout the islands and the coast of the mainland. It often attains a size of twelve inches in diameter, and a height of thirty feet or thereabouts, and has a fine-grained, hard and pinkish wood, which takes a good polish, not used to my knowledge, except in isolated cases, for ornamental work. The fruit is borne in dense spherical heads of 30 or 40 drupes, which turn red as they ripen and form an article of food for birds of various kinds, including grouse. The leaves are of dull green, turning to a dull red when touched with frost. The bark is smooth and somewhat white—a tree well worth cultivating, but rather difficult to transplant.

BUCKTHORN—*Rhamnus Purshiana*.—Sometimes called Bearberry, and from that often wrongly called Barberry. Is not an uncommon tree on the islands of Vancouver and the Gulf, and on

the coast of the mainland. It attains a size of about a foot in diameter, but is more frequently smaller. The wood is of a light yellow color, close-grained and hard. Not used, except for ornamental purposes. The bark, which is the medicinal Cascara Sagrada of commerce, has been collected in large quantities in the adjoining States, where, on account of the wasteful methods practised, the tree is fast disappearing, and frequent enquiries have been made as to its occurrence in this province and the chances for obtaining a supply of the bark. I have discouraged all enquirers as I am of opinion that such matters should be strictly supervised and if possible, made a source of revenue. The bark is white and smooth, the leaves a beautiful dark green, the fruit black, about the size of a pea, and much affected by wild pigeons.

CRAB APPLE—*Pirus rivularis*, with a synonym of *Malus rivularis* grows commonly in swamps on the mainland, to the westward of the Coast Range, on Vancouver Island and the Gulf islands. It seldom attains a larger size than nine inches, the wood is hard and close grained, and is principally used for rollers in mills and for like purposes. The bark is dark and somewhat roughened, the leaves resemble those of the domestic apple, somewhat smaller, the flowers are white, resembling apple blossoms, and sweet-smelling. The fruit is intensely acid, and makes good jelly. The natives use it cooked, mixed with oolachan grease, and in that form it is considered a great delicacy. Crab stocks are sometimes used for grafting apples upon, and succeed very well, when good healthy stocks are used.

WHITE THORN—*Crataegus rivularis*, and possibly another variety, is found in most parts of the province, growing to a size of six inches, and from twelve to fifteen feet high. The wood is not used for any purpose; it is an excessively thorny tree with a white bark, the leaves a bright green, flowers white in corymbs, and very ill-smelling, something like bad fish. Prof. Sargent, the American authority on forestry, has been working on this genus, and makes out 115 varieties. Pears may be grafted on the White Thorn, but I found in one instance, that Bartletts, although attaining a fine size, quite lost their identity, and were quite useless.

BIRCH—*Betula papyrifera* or *B. occidentalis*.—There is some confusion as to the proper designation of our large western variety. Its range is principally on the mainland, some few specimens occurring in scattered localities on Vancouver Island. In some places it grows to quite a large tree, two to two and a half feet through, but generally it does not attain a larger size than 8 to 10 inches. The bark is quite white, on the outside, and was used by the natives of the interior in the construction of canoes, baskets, etc.; the wood is white, but has not been used for any particular purpose but fire-wood. It makes a fine orna-

mental tree, and is well worth cultivating. There are other varieties, one with dark brown bark, growing on the margins of lakes and streams, not so large as the first named, and another, a mere bush.

CHERRY—*Prunus emarginata*.—The range of this tree is principally on Vancouver Island and the lower mainland, although smaller specimens occur in parts of the upper mainland. In the first-named sections, it ordinarily attains a size of from six to twelve inches, and probably forty feet high. The bark, a reddish brown color, was used by the natives for fastening the feathers to their arrows when they used those weapons for shooting aquatic animals, as the water does not affect it as is the case with sinew, which was ordinarily used; it was, and is now, also used in the ornamental part of basket work, mats, etc. Growing in the open and when covered with its white blossoms or red fruit, it forms an ornamental tree. The fruit is, however, inedible, being very bitter and astringent. A prototype of *P. emarginata*, resembling it in every particular, occurs at Nelson, and probably in other parts, the fruit of which is acid, without any trace of bitterness, and is used for jelly-making. The only other congener of this genus is the Choke Cherry, (*Prunus demissa*) a mere bush. It is plentiful in the upper country, and occurs in isolated patches on Vancouver Island.

That the homestead lands of the United States are nearly exhausted is shown by a Bill which went into effect July 1st, which makes provisions for homesteads on forest reserves. To most Canadians this will seem a retrograde measure, though the conditions are so different in the two countries that what may be considered a necessity in the United States need not be thought of in Canada. With the exception of certain counties in California and South Dakota, the new regulations apply to all forest reserves. They provide that where lands comprised in a forest reserve are chiefly valuable for agriculture and may be occupied for agricultural purposes, without injury to the forest reserve, and which are not needed for public purposes, they may be opened up for entry in accordance with the provisions of the homestead laws and the new Act. The Act goes so far as to provide that even when the land is covered by merchantable timber, it may be opened for settlement upon strong evidence of its value for agricultural purposes, both as to production and accessibility to a market.

THE DOMINION FOREST RESERVES ACT.

The establishment of a number of Forest Reserves upon Dominion Lands by the Forest Reserves Act passed at the last session of the Dominion Parliament is the result of a movement which began about the year 1893. At that time the Minister of the Interior took up the question of Forest Reservations, and a report thereon was made by the Crown Timber Agent at Winnipeg.

In his report he had the following statement in regard to the reservation of timbered lands and districts: "The problem for consideration, as to the best course to pursue in order to set aside and maintain a proper proportion of the timbered lands, is one of varying difficulty. A careful adjustment between the present needs of the population for wood material, and the needs of future generations, and of a forest cover for hydrologic purposes appears desirable. It may be discussed under two heads.

"First, the best plan to adopt as regards unsettled lands not suitable for agriculture.

"Second, the maintenance and preservation of such smaller areas of wood as are to be found on the sections in localities more favorable to agriculture, and which are or will eventually become, the property of settlers in such localities.

"Upon the first branch of the subject I may say, primarily, there is a widespread and general desire among the farming community and settlers in the country that the greatest precaution should be taken to preserve such tracts of bush land, and that it would be advisable to withdraw from settlement any large areas of land obviously unsuited to agriculture, and maintain them permanently in timber, under proper regulations, instead of allowing them to be stripped of all merchantable timber in a wasteful and improvident manner, and then abandoned as waste lands.

"The reservation of such areas would render necessary a transfer and exchange for others, of such sections as have been set apart and accepted by the different railway companies under their land grants. Upon this point I may say that I am of the opinion that if all the wooded districts in the country had been entirely retained in the hands of Crown their administration could have been effected with much greater facility and success. The disadvantages of the present system are many and obvious.

"As has been pointed out in previous communications upon this subject, the question of the preservation of the timbered districts is one of far reaching potentiality. All experience goes to prove that in this and every other country from which information and reports have been gathered, that the most serious and disastrous results to agriculture, have inevitably followed the deforestation of the timbered lands.

"I wish therefore to state here briefly that I am of the distinct opinion that in localities which are reliant solely upon a certain area or block of bush land for their supply of necessary wood, that such area should be maintained, preserved, and guarded as and for wood reservations, for the use of the people for all time; and also because of the unfavorable influence their destruction and removal would undoubtedly exercise upon the climatic conditions of the country."

The agent submitted several recommendations in regard to reservations in the Province of Manitoba, and it was finally decided that the policy of setting apart reserves should be adopted. The first reservations made were Turtle Mountain Reserve in Southern Manitoba, and Riding Mountain and Lake Manitoba West reserves in Northern Manitoba, which were set apart by order of the Minister of the Interior on the 13th of July, 1895.

Other reservations were made from time to time, but as these reserves were set apart merely by order of the Minister, lands could be withdrawn therefrom by the same authority and it was considered advisable that a more permanent character should be given to the reservations. With that end in view it was decided by the Government that the reserves should be set apart by Act of Parliament. This has now been done and no lands can now be withdrawn from the reserves except by special Act of Parliament.

The purposes for which the reserves are established are to protect the headwaters of the streams and so ensure a constant water supply; to provide a supply of wood for the settlers, and to serve such additional beneficial purposes as may be brought about by the influence of large areas of forest, protecting the country from winds or other adverse climatic influences.

Of the reserves situated in Manitoba, the Turtle Mountain Timber Reserve covers a district of somewhat elevated land covered mainly by aspen and balsam poplar. It also includes a number of lakes and will serve the double purpose of being a pleasure resort and a source of supply for the wood and smaller timber required by the settlers. This reserve has been somewhat severely cut and part of it has been burnt. One serious difficulty in protecting it has been the fact that fires frequently came from south of the international boundary along which



Norway Spruce Wind-break protecting a Peach Orchard.

the reserve is located, and over which the Forest Ranger has no control.

The Riding Mountain, Duck Mountain and Porcupine Hills reserves, in the northern part of Manitoba, are all of the same general character. The land is high and broken with ravines. These tracts formed a part of the best wooded portion of the Province of Manitoba and have been lumbered over for a number of years. The principal species of trees are spruce, aspen and balsam poplar, white birch, tamarack and Manitoba or ash-leaved maple.

Some of the lands within these reserves are still held under timber license, and the timber limits are being operated at the present time. Part of these reserves, especially the Riding Mountain and Duck Mountain reserves, have been burnt over, the fires coming in mainly from the west side. There are however still considerable areas of mature green timber in these reserves. They will be a very important factor as the source of supply for timber for the settlers in these localities, and will also serve the purpose of protecting the headwaters of the streams. In fact the greater part of the streams flowing through the Province of Manitoba have their headwaters within these reserves.

Lake Manitoba West Reserve was timbered with spruce, poplar and tamarack. It has been largely denuded of timber.

Porcupine Reserve No. 2 is located in the Province of Saskatchewan and has been mentioned as a separate reserve but is contiguous to the one in Manitoba and is of practically the same character.

Moose Mountain and Beaver Hill reserves in Saskatchewan contain mostly aspen and balsam poplar. They are located in the prairie country and therefore are very important for the supply of the districts in which they are located. The settlers come from long distances to obtain wood for fuel and construction purposes from these reserves. They will also be very useful as summer resorts.

In the Province of Alberta there is a reserve at the western end of the Cypress Hills. This is in the middle of what is generally known as the semi-arid district of the West. There was considerable timber in the valleys of the western slopes of these hills, but it has nearly all been cut off although there is still a mill operating in this district. The timber is mainly *Pinus Murrayana*, and if it is given proper protection there will, so far as present indications show, be no serious difficulty about the natural reproduction of the forest.

The Cooking Lake Reserve in the same Province is situated southeast of Edmonton and includes a tract of lake and rough land. The land is not at all suited for agricultural purposes

but there has been considerable settlement in the vicinity, and fires have run through most of the reserve. The timber is spruce and poplar.

The Kootenay Lakes Forest Reserve is on the eastern slope of the Rocky Mountains near the international boundary. The area is small and its chief value is as a park. There has been considerable prospecting for petroleum in the vicinity of this reserve.

In the Railway Belt in British Columbia most of the reserves established by the Act are in the Kamloops District which is the dry belt of British Columbia. This is the central portion of the Province and the rain coming from the ocean is precipitated on the mountains lying between the coast and the interior, with the result that the rainfall in the Kamloops District is small. These reserves have therefore been established mainly for the purpose of conserving the water supply. The hills covered by these reserves rise to a height of something like 6000 feet, and are generally too elevated to be of use for successful farming operations. Their influence on the flow of the streams is however very important for agricultural operations, in the valleys below, as, in order to ensure successful agriculture, it is necessary to depend to a greater or lesser extent on the application of water to the land by artificial means. The principal species of trees found in these reserves are the Douglas fir and black pine (*Pinus Murrayana*).

The Donald Forest Reserve lying farther east in the Province of British Columbia is not so important for water supply but is in a splendid timber and scenic district.

The Governor of West Virginia writing in support of the proposed establishment of the Appalachian Forest Reserve and the White Mountain Forest Reserve says: "In all mountain countries the destruction of the forests has been a destruction of the country. 'After the timber the flood.' The soil hardens like a slate roof and the water runs off. It is the amount of water which enters the soil, not the precipitation, which makes a region a garden or a desert. The soil is destroyed, the streams dwindle to nothing, or at times are irresistible torrents spreading devastation and terror along their courses. . . . In a denuded country the streams are yellow, the soil carried to the sea, navigation impeded thereby, water-power imperilled, food fish and other aquatic life killed and scenic beauty destroyed."

DISPOSAL OF TIMBER ON THE DOMINION FOREST AND GAME RESERVES.

The praiseworthy action of the Dominion Government in setting aside 5310 sq. miles as permanent forest reserves encourages the hope that the same progressive forestry will be followed not only in the protection but in the utilization of the forests on these reserves.

That large areas of public property should be given to speculators or even legitimate lumbermen for all time to come for the paltry consideration of a bonus based on the present value of the timber in a local and changing market seems hardly in keeping with good husbandry.

According to the system in vogue the Government sells, not only the present stand, but all succeeding stands so long as the limit holder pays the small ground rent of \$5.00 per sq. mile. The bonus may be looked upon as a speculative price paid for the control of public lands for an indefinite period and it is safe to say that it seldom, if ever, reaches the value of the present stand. A case has recently come under observation where a limit of 18 sq. miles was sold for \$176.04 and from which the limit holder says he cuts approximately 4,000,000 ft. B.M. per sq. mile or 72,000,000 ft. in all. Making all possible allowance for meadow land, burned-over land, muskegs, etc., he must have bought the timber for less than 1 c. per 1000 plus of course the royalty of 50c. per 1000. This lumber he sells at about \$15.00 per M.

The most objectionable feature of the present system is, however, the long tenure of the land granted to the licensee. With the rapid rise in the price of wood it seems only reasonable that the people of Canada should receive at least a share of this increase in value instead of having the timber sold at a 50 to 100 year old market price. Under the present system a limit holder may not be required to cut a stick and the growth of the timber and value accretion will more than pay the interest on the small initial investment and the ground rent. Such a limit holder would come under the class of speculators who are essentially non-producers and are a drawback to the industrial welfare of the country.

What we would suggest as a reform in the method of disposal of Crown Timber is the sale of timber on the stumpage basis with a limited time in which to remove the crop. From the standpoint of a forester a system such as outlined below would

not only be more effective in the preservation of the forests but be eminently more just to the people of Canada whose property is being sold.

In the first place no timber should be sold until it is mature, then it should be removed with as little delay as possible. Before being placed on the market the timber should be measured by the forestry department and a working plan formulated, for no set of rules can be suitable for all of the varying conditions found in Canadian forests. It might be advisable especially where the forest is chiefly for protection to mark all the trees to be cut. After measurement the timber could be advertised for sale stating the size of the block, quantity and conditions of the timber to be cut and the regulations regarding diameter limit, height of stump, disposal of debris, etc., which may be necessary.

The blocks should be small, rarely if ever over one township but in order not to discourage the erection of mills, operators should be assured that more blocks would be placed on the market when the timber on the first becomes exhausted.

The time allowed for removal should of course vary according to the size of the block and accessibility of the timber but in order that the Government receive what it should of the increase in value, the periods should not be more than ten years. At the end of that period the timber remaining uncut might be again put on the market or held by the Government as the silvicultural conditions suggest. In this way the revenue from the forests would be adjusted at least every ten years and be somewhat commensurate with the true value of the timber. At the same time the period should not be so short that the limit holder would be forced to cut when the market is dull, and he deserves a share of the unearned increment for his risk.

A reserve bid might be held by the Government in order to prevent the depression of the price below the actual value by lack of competition, and the licensee should be required to deposit bonds to the extent of say 30% to 40% of the value of the timber as estimated in the working plan, in order to ensure fulfilment of contract. The balance of the payments to be made annually as the timber is cut.

It would seem advisable that the Government, as landlord, should build and own permanent improvements such as the main trails, important dams and drains. In case of a change of licensees at the expiration of a lease disputes as to the value of temporary improvements could be decided by the Minister of the Interior.

The only Federal tax that the limit-holder should be required to pay is one-half of the cost of guarding his limit from fire in order that he may be interested in having this service effective.

If the timber is sold on the stumpage basis it will be necessary that every log be scaled and marked by Government scalers and a heavy penalty should be imposed for taking logs out without the Government mark. By this means the Government would have reliable first-hand information as to the cut and would not have to depend on the statement of the buyer.

The right to cancel the license at any time for non-fulfilment of contract, carelessness with fire, etc., should be reserved.

We would advocate the expansion of this system to the management of the limits already sold especially those within the forest and game reserves, giving the limit-holders ten years in which to prepare for the change and if necessary compensating them for any loss sustained by the change.

There is no doubt that the sale of timber on a stumpage basis with a limited time for its removal would be of great benefit to the country and we believe also that the lumbermen would find it advantageous since they would know that they were bidding on and would pay only for what they cut. The risk of loss from fire or encroachment of settlers would be removed and they would be working on a simple direct business proposition.

Effective administration in 1905 reduced the burned area on national forest reserves in the United States to one-fourth of what it was in 1904. The forest reserves came under the administration of the Forest Service, February 1st, 1905, and the new administration and regulations have worked wonders in the safe-guarding of the forests. All the reserve officers, except forest guards, are civil-service employees. Their salaries range from \$720 to \$2,500. Every forest supervisor is authorized in person or through a subordinate to hire temporary men, purchase material and supplies and pay for their transportation from place to place to extinguish a fire. Forest rangers are required to report monthly, and at the end of the year the supervisor submits an annual fire report to the Washington office.

THE SCOTCH PINE (*PINUS SYLVESTRIS*) IN CANADA.

BY W. T. MACOUN, HORTICULTURIST, EXPERIMENTAL
FARM, OTTAWA.

At the Central Experimental Farm, Ottawa, there are four European trees which are more prominent than any other exotic trees in hardiness and vigor, and which appear to thrive equally as well as native species. These are the Norway Maple (*Acer platanoides*), the European Larch (*Larix Europæa*), the Norway Spruce (*Picea excelsa*), and the Scotch Pine (*Pinus sylvestris*). Every spring the bare ground, and even the lawns, are covered with seedlings of the Norway Maple springing up where the seed has fallen during the previous autumn, showing how rapidly this tree would establish itself were it permitted to do so. The European Larch succeeds almost equally as well on the high land as in low places; in sandy soil as in clay soil, and is one of the most rapid growing trees on the Experimental Farm. The Norway Spruce is the most rapid growing evergreen which has been tested and also succeeds well in a great variety of soils.

The Scotch Pine, or Northern Pine (*Pinus sylvestris*), to which we wish to draw especial attention in this article, also succeeds well in soils varying from heavy clay loam to sandy loam. It is a rapid grower and very hardy and may prove a useful species for more extensive planting in Canada.

The Scotch Pine is a native of northern Europe and northern and western Asia, and for timber purposes is to European countries what the White Pine is to Canada. The timber is largely exported from Europe to England and is known in commerce under a variety of names, among the principal being Northern Pine, Red Fir, Yellow Fir, Dantzic Fir, Riga Fir, Swedish Fir and Norway Fir, many of these names originating from the ports of shipment. This species of pine is, however, very variable, both in general appearance and in the character of the wood, and marked differences are found in the timber from different parts of northern Europe.

The Scotch Pine is more nearly related to our native Red Pine (*Pinus resinosa*) than to the White Pine (*Pinus Strobus*), although it bears little resemblance to either. The leaves of the tree are bluish green, from two to three inches in length and are more or less twisted. They grow in pairs. The cones, which are about two inches long, are borne either singly or in clusters of two or three on short stalks. The timber is yellowish or

whitish, sometimes slightly tinged with red, is soft and readily worked. Owing to the variability of this species, care should be taken when buying seed, as the ease with which seed can be procured from the dwarf or scrubby forms makes it more profitable for those who gather it to get it from such sources, and the trees grown from such seed are not likely to be as good as those from tall, straight trees.

Of the recognized brands of Scotch Pine timber which are exported from Europe the Dantzic Fir is the best. It is grown principally in Prussia and Prussian Poland and the neighboring borders of Russia. The trees in these districts reach a height of 70 to 100 feet. The timber is used for much the same purposes as the White Pine and is employed in the construction of buildings, for flooring, rafters, joists, etc. It is used much in ship building, in the construction of bridges, and is also used for railway sleepers.

The Riga Pine is another form of *Pinus sylvestris*, taking its name from the port of shipment in Russia and produced in the interior of Russia. It is a more upright-growing tree than the Dantzic Fir and usually makes a timber freer from knots. It is, however, not so generally sound at the heart as the Dantzic, and hence is not so good for planks and boards. It is, however, but for this defect, almost equal to the Dantzic Fir and it is said that in ordinary specifications for building either Dantzic or Riga may be used, showing that they are regarded as of about equal value.

Timber inferior to the Dantzic and Riga Firs is produced in Sweden and Norway, and a considerable quantity is annually exported from the former country to England, and some also from the latter. These are known as Swedish and Norway Firs. The Scotch Pine, or Scotch Fir, as it is known in Great Britain, is produced there in limited quantities, but of good quality. In some parts of the United States the Scotch Pine has succeeded very well and is now being planted there in large numbers for timber purposes.

In 1887 when tree planting was begun at the Central Experimental Farm, Ottawa, the Scotch Pine was among the species which were planted in the nursery there, and in the following year 424 trees were planted in two blocks. Part of these trees were planted 10 by 10 feet apart and part 5 by 5 feet apart. The trees when planted were about 18 inches in height. The soil was sandy loam mixed with a little gravel and rather wet. The plantation, with the trees 5 by 5 feet apart, was cultivated until 1892, while where the trees were 10 by 10 feet apart cultivation was continued for two years longer. In the autumn of 1905 the trees 5 by 5 feet apart averaged 29 feet in height, with a diameter of 4½ inches, four feet six inches from the ground; and those 10 by

10 feet apart, a height of 27 feet, with a diameter of $5\frac{1}{2}$ inches. The trees planted the closer distance are straighter than those planted further apart, and at the wider distance there has been much greater injury to the tops of the trees by wind. The branches of the trees 5 by 5 feet have died to a height of 12 to 15 feet, while those 10 by 10 feet apart are dead for only 9 to 12 feet.

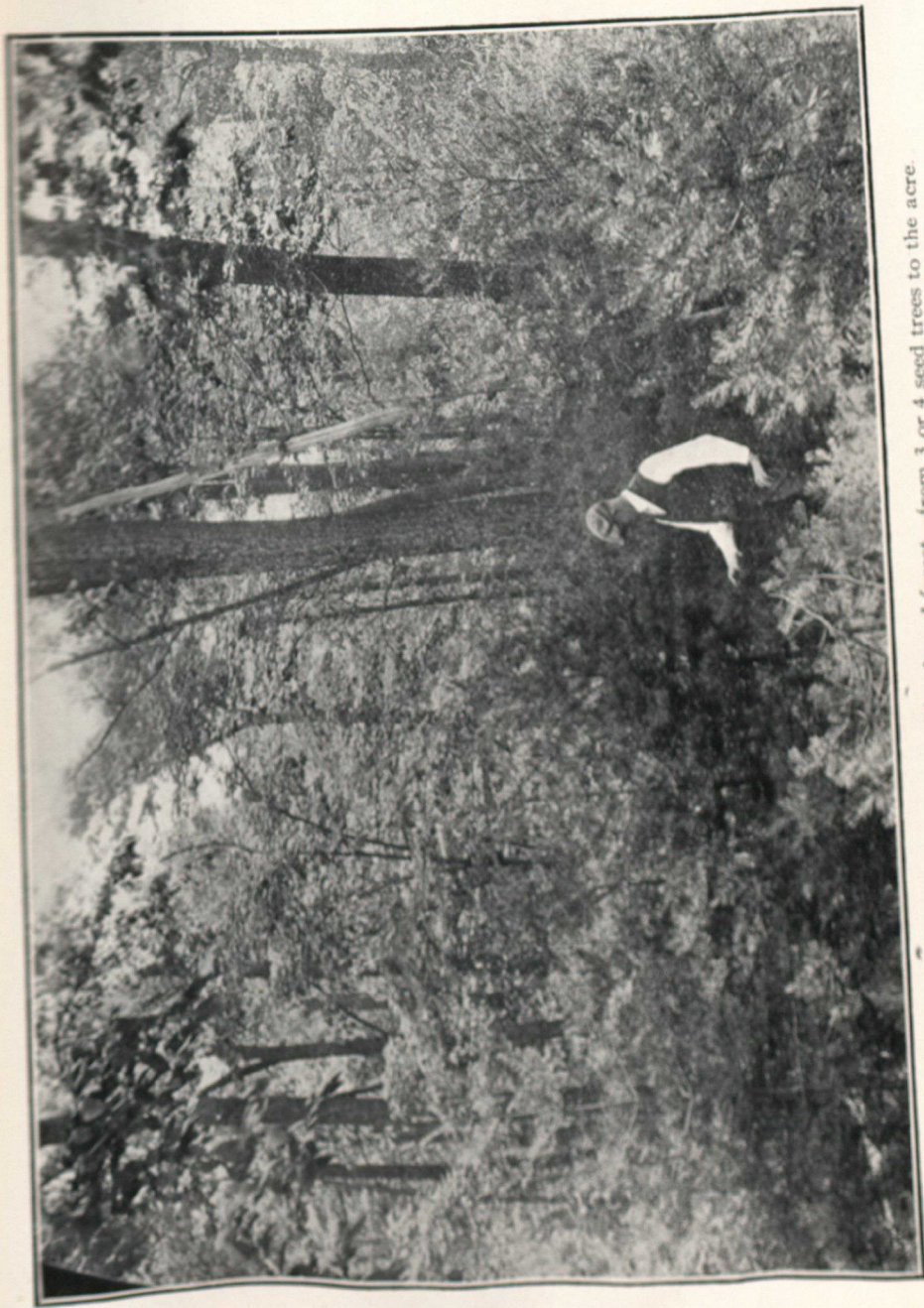
In 1888, after the plantations in the forest belts were made, 636 trees of Scotch Pine remained in the nursery. These were left undisturbed until 1893, when they were thinned out to an average distance of $2\frac{1}{2}$ feet in the row, the rows being 3 feet apart. Further thinning was done from time to time of the trees which became suppressed by the stronger growing specimens. In the autumn of 1905 these trees averaged 30 feet in height, with a diameter of 3 5-6 inches four feet six inches from the ground. The trees in this plantation are very straight with a much smaller proportion of injured tops than in either of the others. The branches have died to a height of 20 to 25 feet. These trees are growing in light, gravelly well drained soil.

In 1888 a number of Scotch Pine were also planted in a mixed plantation of evergreen and deciduous trees, 10 by 5 feet apart. The soil in this plantation is mostly clay loam. The trees averaged in the autumn of 1905, 27 feet 8 inches in height, with a diameter of 7 inches.

White Pine (*Pinus Strobus*) planted in light sandy loam soil with gravel in 1889 when 8 to 10 inches in height, 5 by 5 feet apart, averaged in the fall of 1905, $28\frac{1}{2}$ feet in height, and $4\frac{1}{4}$ inches in diameter, and those 10 by 10 feet apart 28 feet in height and $6\frac{1}{4}$ inches in diameter.

It will be seen that in soil very suitable for White Pine the growth has been about the same as that of Scotch Pine. There are no plantations of White Pine on clay loam at the Experimental Farm, but the individual trees which are growing on clay loam do not show the vigour of the Scotch Pine. It is this adaptability of the latter species to so many conditions of soil and moisture that would make it appear to be a desirable species for planting, especially in soils not very suitable to White Pine.

An interesting feature of the experiments with Scotch Pine at the Central Experimental Farm is the growth of volunteer seedlings among the older trees. If there is any one thing which shows the adaptability of a species to its surroundings it is its reproduction from seed. No other exotic conifer has so far reproduced itself in this way at Ottawa. The Scotch Pine began to fruit in 1896, eight years after planting, and seedlings 6 years of age are now growing under and near these trees. Where the conditions have been most favourable, these seedlings are very abundant.



Reproduction of White Pine in mixed hardwood forest—from 3 or 4 seed trees to the acre.

The Scotch Pine is proving quite hardy at Indian Head, Sask., and may prove a very useful tree for the prairie provinces. The following quotation from a letter received from Mr. Angus MacKay, Superintendent, Experimental Farm, Indian Head, gives his experience with this tree. "The Scotch Pine on the Farm are very hardy and doing extra well. The 3 oldest are 30 feet high and the largest of the 3 is 31 inches around 2 feet from the ground. These were planted in 1889, but I do not know how old they were at the time (probably three or four years old). You will understand that in the early years the seasons were very dry, and little or no growth was made during that time. Lately, they are growing equal to any other variety and surpassing several."

The value of this tree for timber purposes in Canada remains to be seen, but owing to its rapid growth in so great a variety of soils it should prove useful for many purposes. The fact that it fruits so early and heavily may be an indication of a short life here, but some of our native trees which reach a large size and a great age here fruit early also.

As an ornamental tree, the Scotch Pine is not nearly so valuable as the native White Pine, not being so attractive in colour of foliage, nor as graceful in form. It is a spreading grower and as the leader is frequently destroyed by wind when the tree is grown as an individual specimen it becomes still more spreading. The Riga Pine, a variety of the Scotch Pine, is much more graceful, being more upright in growth and apparently not suffering so much from injury by wind.

The August issue of *Forestry and Irrigation* contains statistics on the timber used in the anthracite coal mines of Pennsylvania. Reports were received from 83 per cent. of the anthracite tonnage of the United States and from these the remaining 17 per cent. was computed. The results of the tabulation show that 121,565,000 feet board measure of sawed timber and 52,440,000 cubic feet of round timber were used during 1905. The total value of the round and sawed timber combined was \$5,310,000. Of the species used for round timber, yellow pine furnishes one-half. Oak ranks second. For sawed timber, hemlock holds first place in quantity, with yellow pine ranking second.

THE TAMARACK GROWTH IN THE EASTERN TOWNSHIPS OF THE PROVINCE OF QUEBEC.

THOMAS W. FYLES, D.C.L., F.L.S.

It is a law of nature that no particular growth of plants shall hold possession of the land in perpetuity. Sooner or later destructive agents will break in upon the scene. Insect depredators, drought, fire, storm and flood—*these*, and the axes of the lumbermen, make clearances for occupation by the settler, or for Nature's re-planting. In the latter case we find that the new growth is, generally speaking, different from the old. The following affords a curious exemplification of this fact:—

In 1842, when the Ashburton Treaty was made, a strip, 60 feet wide, was cut along the border, through the tamarack swamps that extend from Canada into New Hampshire and Maine. This strip is now filled up with a new growth; but the forester knows directly when he strikes the line, for he finds a belt in which the poplar (*Populus tremuloides*), the red cherry (*Prunus Pennsylvanica*), and the Moosemissie (*Pyrus Americana*), are growing—the seeds of the first having been carried by the wind into the Boundary, when newly cleared; and those of the last two, by birds.

Thirty years ago it was a fine sight to look, from an elevation, upon the vast area of swamp land, extending through Bury, Lingwick, Hampden, Ditton, and far away. Tamaracks from two feet to two and a half feet in diameter, were the lords of this forest-land. Today: I have the authority of Mr. Ayton Cromwell and Mr. C. C. Lusk, of Cookshire, and Mr. C. H. Ward, of Bury—all experienced foresters—for stating, that not a single first-growth tamarack is to be found in the whole section. And like testimony comes to me from Mr. John D. Johnson, of St. Thomas, and Mr. E. W. Brewster, of Compton, in regard to the districts with which they are respectively acquainted.

How was the destruction brought about? By an agent seemingly insignificant and wholly unexpected—a four-winged fly, belonging to the order, HYMENOPTERA, and named by Hartig, *Nematus Erichsonii*.

This fly is only about eight-tenths of an inch in expanse of wings, and four-tenths in length of body. Its color is black; but it has a broad orange-red band round the abdomen. Its wings are clear, with dark veins, and a conspicuous costal spot on *stigma*.

In the larval stage—which is the destructive stage—the species is a green caterpillar of no great size, having a black head. When it is “full-fed,” it creeps into some retreat, and spins a compact, brown cocoon, about half an inch in length.

It was in the pupal stage, probably, and amongst the roots of young plants of Norway Spruce, that the species was brought to the nurseries of Massachusetts, about the year 1880.

The first notice of the arrival of the *Nematus* in Canada was given by myself, and will be found on the 17th page of the Report of the Ent. Soc. of Ont. for 1883.

When the creatures came to us, they came in their strength—“In numbers numberless.” The *Nematus* Raid, as it was called, was a phenomenon that they who witnessed are not likely to forget. That creatures seemingly so insignificant, brought unwittingly from a country so far away, should, by force of numbers, be able to strip the vast forest of tamarack of its verdure, and leave the trees in a dying state was truly marvellous!

I last saw the creatures in activity about ten years ago, in a grove of young tamarack near the old St. Henri Road, in Levis County. The trees were about twenty feet high; and here and there amongst them was a small colony of *Nematus* larvæ. The grove mentioned has lately been felled, and the land it occupied turned into a pasture.

The *Nematus* larvæ had a preference for the finest growths. The smaller trees of the time were not at first so badly treated by them; and these lingered on, making brave efforts at recovery; but even these have, for the most part, now succumbed. Probably the drought of 1903 gave the finishing blow to them.

Mr. E. B. Brewster tells me that half a mile from Compton Village, there is a tamarack swamp about a mile long and one-eighth of a mile wide. The largest trees in it are ten or twelve inches in diameter. Of all the trees in the swamp, probably 75 per cent are dead, and about 15 per cent. shew some signs of feeble life in tufts of sprouts from the stem. The only apparently healthy trees are on the borders of the swamp, and form a mere narrow fringe to it, one or two trees deep.

Of the dead trees in this swamp, some are only “rampikes” denuded both of branches and bark. To others the branches still cling. Here and there, among the dead trees, a few balsams (*Abies balsamea*) and cedars (*Thuja occidentalis*) are springing up.

When I visited the swamps in Bury in 1891 the rot had struck into the dead trees for two or three inches. For an account of this visit, and a calculation of the damage done by the *Nematus* see the Report of the Entomological Society of Ontario for 1891, page 28.

When the Rutland Railway into Canada was in contemplation, dead tamarack trees lay so thickly in the swamp half way between Alburgh and Noyan that they had to be hauled out of the way, before the survey for the line could be effected. This was in the fall and winter of 1898-9. The authority for this statement is Mr. Alanson Vosburgh, *per* Miss May G. Johnson, of Miranda, P.Q.

In the part of Bury where I saw Maddock's gang getting out the knees for vessels, in 1891, the land has been brought under cultivation.

A few notes to tell further of the kinds of trees that are springing up in place of the tamarack may be desirable.

In the Ditton Swamp, which is about three miles long and a mile broad, the tamaracks, young and old, are all dead. Spruce is taking their place.

In the Spalding Hill Swamp, in Eaton Township, cedar, poplar and some young tamarack are growing.

In the Harrison Neighbourhood, in Bury Township, in parts where the soil is sandy, white birch and a few balsams are growing: on wet clay, the poplar appears.

In Long Swamp, which extends through Newport, Hampden, and over to Lingwick, spruce and balsam are growing.

To those who would see a tamarack swamp in its infancy, I would recommend a visit to "The Gomin" which lies to the west of Bergerville, about 4 or 5 miles from Quebec. In the early summer it is all aglow with rhodora, sheep-laurel, orchids and pitcher plants. When I first saw it, in 1886, it was a broad expanse of sphagnum, unoccupied, save on its outskirts, by any larger plants than those I have mentioned. I re-visited the swamp on the 10th of July last, and found that it was dotted all over with young tamarack from a foot to fifteen feet high. On the borders of the swamp near the cultivated land there were tamaracks twenty-five feet high or more.

Doubtless, if left undisturbed, the growth on this tract will, in process of time, become a forest. And so—

"The old order changeth and giveth place to new."

The State Fire Warden estimates that in the State of Washington 42,000,000,000 feet of standing timber has been destroyed by fire, and only 30,000,000,000 logged off. Forest fires, according to this estimate, have destroyed twelve billion more feet of timber than has been cut and sold.

A NEW LOG RULE.

In the last issue of the Forestry Quarterly there appeared a new log rule called by the author, Dr. J. F. Clark, the International Log Rule.

This rule is undoubtedly the most nearly accurate that has yet been proposed and it is to be hoped that it will soon become generally adopted. It is almost incredible that the Doyle and Scribner Rules should have been kept in use so long since they are so glaringly inaccurate, especially for the smaller sizes of logs. When first brought out they were approximately correct for the sizes of logs and methods of milling then in vogue, but now, when smaller logs are used and greater economy exercised in milling they under-scale frequently 100 to 140 per cent.

The International Rule was first worked out mathematically and after allowances had been made for taper, shrinkage in seasoning, saw kerf, and crook it was tested at a mill in the Ottawa Valley on a large number of logs, just as they happened to come to the mill.

As the following table shows, the error of this rule is negligible while those of the other rules used were very serious.

Over-run (+) or under-run (-) of Saw Cut, as compared with scale by

DIAM OF LOGS.	NUMBER OF LOGS.	INTERNAT'N'L			
		DOYLE.	SCRIBNER.	CHAMPLAIN.	1-8.
6-8	28	+143%	+33%	10.3%	+2.6%
7-9	54	+115%	+35%	+8.8%	+2.3%
8-12	101	+72%	+34%	+7.1%	+0.0%
10-17	104	+45%	+23%	+4.7%	-1.1%
18-20	90	+24%	+14%	+6.7%	+0.5%
21-24	126	+18%	+14%	+5.2%	+1.1%
25-33	31	+10%	+9%	+3.3%	-0.5%

The formula upon which this rule is based is $(D^3 \times .22) \div .71 D$. The measurement is made at the small end of the log and the content is figured on the basis of an 8 ft. log in order to prevent the injustice of disregarding the large amount of material which can be cut from the slabs on a long log.

It includes all square edged boards which have a content of 2 feet board measure or over which can be cut from sound logs; in other words, boards which do not fall below the following dimensions:—

3 inches wide and 8 feet long.	5 inches wide and 5 feet long.
4 " " " " 6 " "	6 " " " " 4 " "

THE INTERNATIONAL LOG RULE.

Formula: $(D^2 \times .22) - .71D$ for 4-foot sections.Taper Allowance: $\frac{1}{2}$ inch per 4 feet lineal.Standard scale for saws cutting a $\frac{1}{8}$ -inch kerf.

Dia.	LENGTH OF LOG IN FEET.													Dia.
	8	9	10	11	12	13	14	15	16	17	18	19	20	
3										5	5	5	5	
4				5	5	5	5	5	5	10	10	10	10	5
5	5	5	5	5	10	10	10	10	15	15	15	15	20	5
6	10	10	10	15	15	15	20	20	20	25	25	30	30	5
7	15	15	15	20	20	25	25	30	30	35	35	40	45	5
8	20	20	25	25	30	35	35	40	45	45	50	55	60	5
9	25	30	30	35	40	45	50	50	55	60	65	70	75	5
10	30	35	40	45	50	55	60	65	70	75	85	90	95	10
11	40	45	50	55	65	70	75	80	90	95	105	110	115	11
12	50	55	65	70	75	85	90	100	105	115	125	130	140	12
13	60	65	75	85	90	100	110	120	130	140	145	155	165	13
14	70	80	90	100	110	120	130	140	150	160	175	185	195	14
15	80	90	105	115	125	140	150	160	175	185	200	215	225	15
16	95	105	120	130	145	160	170	185	200	215	230	245	260	16
17	105	120	135	150	165	180	195	210	225	245	260	275	295	17
18	120	135	155	170	185	205	220	240	255	275	295	310	330	18
19	135	155	175	190	210	230	250	270	290	310	330	350	370	19
20	150	170	195	215	235	255	275	300	320	345	365	390	410	20
21	170	190	215	235	260	285	305	330	355	380	405	430	455	21
22	185	210	235	260	285	315	340	365	390	420	445	475	500	22
23	205	230	260	285	315	345	370	400	430	460	490	520	550	23
24	225	255	285	315	345	375	405	440	470	500	535	565	600	24
25	245	275	310	345	375	410	445	475	510	545	580	615	650	25
26	265	300	335	370	405	445	480	520	555	595	630	670	705	26
27	290	325	365	405	440	480	520	560	600	640	680	725	765	27
28	310	350	395	435	475	520	560	605	645	690	735	780	825	28
29	335	380	425	470	510	560	605	650	695	740	790	835	885	29
30	360	405	455	500	550	600	645	695	745	795	845	895	950	30

Dia.	LENGTH OF LOG IN FEET.												Dia.	
	8	9	10	11	12	13	14	15	16	17	18	19		20
31	385	435	485	540	590	640	695	745	800	850	905	960	1015	31
32	410	465	520	575	630	685	740	795	850	910	965	1025	1080	32
33	440	495	555	610	670	730	790	850	905	970	1030	1090	1150	33
34	470	530	590	650	715	775	840	900	965	1030	1095	1160	1225	34
35	495	560	625	690	755	825	890	955	1025	1095	1160	1230	1300	35
36	525	595	665	735	800	875	945	1015	1085	1160	1230	1305	1375	36
37	560	630	705	775	850	925	1000	1075	1150	1225	1300	1380	1455	37
38	590	665	745	820	895	975	1055	1135	1210	1295	1375	1455	1535	38
39	620	705	785	865	945	1030	1110	1195	1280	1365	1450	1535	1620	39
40	655	740	825	910	995	1085	1170	1260	1345	1435	1525	1615	1705	40
41	690	780	870	960	1050	1140	1230	1325	1415	1510	1605	1700	1795	41
42	725	820	915	1010	1100	1200	1295	1390	1490	1585	1685	1785	1885	42
43	760	860	960	1060	1155	1260	1360	1460	1560	1665	1770	1870	1975	43
44	800	900	1005	1110	1215	1320	1425	1530	1635	1745	1855	1960	2070	44
45	835	945	1055	1160	1270	1380	1490	1600	1715	1825	1940	2050	2165	45
46	875	990	1100	1215	1330	1445	1560	1675	1790	1910	2030	2145	2265	46
47	915	1035	1150	1270	1390	1510	1630	1750	1870	1995	2120	2240	2365	47
48	955	1080	1205	1325	1450	1575	1700	1830	1955	2085	2210	2340	2470	48
49	1000	1125	1255	1385	1510	1645	1775	1905	2040	2170	2305	2440	2575	49
50	1040	1175	1310	1440	1575	1715	1850	1985	2125	2265	2400	2540	2680	50
51	1085	1225	1360	1500	1640	1785	1925	2070	2210	2355	2500	2645	2790	51
52	1125	1275	1420	1565	1710	1855	2005	2150	2300	2450	2600	2750	2905	52
53	1170	1325	1475	1625	1775	1930	2085	2235	2390	2545	2705	2860	3015	53
54	1220	1375	1530	1690	1845	2005	2165	2325	2485	2645	2810	2970	3135	54
55	1265	1430	1590	1755	1915	2080	2245	2410	2580	2745	2915	3085	3250	55
56	1315	1480	1650	1820	1985	2160	2330	2500	2675	2850	3025	3200	3375	56
57	1360	1535	1710	1885	2060	2240	2415	2595	2770	2955	3135	3315	3495	57
58	1410	1590	1775	1955	2135	2320	2505	2685	2870	3060	3245	3435	3620	58
59	1460	1650	1835	2025	2210	2400	2590	2780	2975	3165	3360	3555	3750	59
60	1510	1705	1900	2095	2290	2485	2680	2880	3075	3275	3475	3680	3880	60

From a large number of measurements it has been found that the average taper does not vary greatly with different species or in different localities, and in this rule a taper of 1 inch in 8 feet has been allowed.

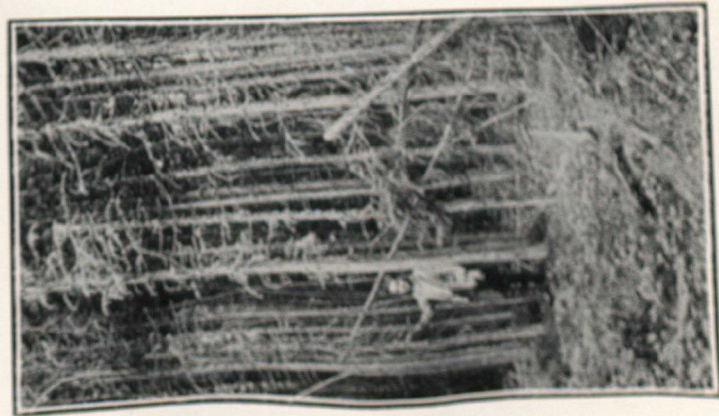
The loss from saw kerf varies of course with the size of the saw, but as his standard Dr. Clark has taken 1-8 inch as the width of the kerf. He also allows 1-16 inch as a factor of safety for shrinkage in seasoning.

It is possible, with very little difficulty, to make corrections to suit local conditions of taper, crook, kerf, or defects. The allowance for rot is left as it should be to the judgment of the scaler.

Coming as it does from a forester who is familiar not only with the mathematical side of the question, but with practical lumber and milling operations, the introduction of this rule is a step towards a reform which is daily becoming more imperative and it should receive the careful consideration of all those who are interested in the exploitation of the forests. We especially recommend it for the consideration of those who have charge of the sale of Government timber.

Timber owners in the State of Washington have raised a fund for protection against fire. No state appropriation was made and the principal lumbermen got together and subscribed \$8,133, which was placed at the disposal of the State Board of Forest Commissioners, and the State Fire Warden to be used in preventing and fighting fire during the dry season. The chief menace to the forests in Washington has been the operation of engines not equipped with proper meshing, as required by law. An attempt will be made this year to have the law strictly enforced. The netting of spark arresters used in coal burning engines should be not less than three mesh No. 12 wire to the inch, and the netting of spark arresters on wood burning engines should be not less than six mesh No. 16 wire to the square inch.

Many of the mill companies in Washington have asked the Forest Commissioners to appoint their woods foremen forest rangers, to serve without compensation from the State. These men have full authority in the fighting of forest fires in their various districts.



80-year old Spruce growing too
densely to do well in Riding
Mountain Forest and
Game Reserve.



White Spruce grown mixed with
Aspen and Balm in Riding
Mountain Forest and
Game Reserve.

AN ACT RESPECTING FOREST RESERVES.*

BILL No. 47.

Whereas it is expedient that reserves of Dominion lands in the provinces of Manitoba, Saskatchewan, Alberta and British Columbia should be made in order to protect and improve the forests for the purpose of maintaining a permanent supply of timber, to maintain conditions favorable to a continuous water supply, and to protect, so far as the Parliament of Canada has jurisdiction, the animals, fish and birds within the respective boundaries of such reserves, and otherwise to provide for the protection of the forests in the said provinces: Therefore, His Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. This Act may be cited as the Dominion Forest Reserves Act.
2. All Dominion lands within the respective boundaries of the reserves mentioned in the schedule to this Act are hereby withdrawn from sale, settlement and occupancy under the provisions of the Dominion Lands Act, or of any other Act, or of any regulations made thereunder with respect to mines or mining or timber or timber licenses or leases or any other matter whatsoever, and after the passing of this Act no Dominion lands within the boundaries of the said reserves shall be sold, leased or otherwise disposed of, or be located or settled upon, and no person shall use or occupy any part of such lands, except under the provisions of this Act or any regulations made thereunder.
3. The said reserves are hereby set apart and established and shall hereafter be and be known as Dominion Forest Reserves, for the maintenance and protection of the timber growing or which may hereafter grow therein, and for the protection, so far as the Parliament of Canada has jurisdiction, of the animals and birds therein, and the fish in the waters therein; but subject to such regulations as may be made under the provisions of section 4 of this Act.
4. The said reserves shall be under the control and management of the Superintendent of Forestry, or such other person as is from time to time in charge of forestry for Canada, subject to the direction of the Minister of the Interior; and the Governor in Council may make regulations, not inconsistent with the provisions of this Act, for the maintenance, protection, care,

* Passed by House of Commons, 1906.

management and utilization of such reserves, and of the timber and minerals therein, and, so far as the Parliament of Canada has jurisdiction, of the animals and birds therein and the fish in the waters therein, and for the prevention of trespass thereon.

ii. Such regulations shall be published for four consecutive weeks in the CANADA GAZETTE, and shall thereupon have the same force and effect as if herein enacted, and the said regulations shall be laid before Parliament during the first fifteen days of the then next session thereof.

5. The Minister of the Interior may appoint forest rangers for the purpose of carrying out the provisions of this Act, and every such ranger shall, for the purpose of this Act, have within the district for which he is appointed all the powers of a justice of the peace.

6. Every such ranger shall, before acting in that capacity, take and subscribe before a judge or notary public, or the Superintendent of Forestry or other person in charge of forestry for Canada, an oath in the words following:—

"I, A. B., a forest ranger in and for the district or territory described in my appointment, do solemnly swear that, to the best of my judgment, I will faithfully, honestly and impartially fulfil, execute and perform the office and duty of such forest ranger according to the true intent and meaning of the Dominion Forest Reserves Act, and of all regulations made or to be made thereunder; so help me God."

7. The Governor in Council may exchange for any land within any such reserve, the title to which is not vested in the Crown in the right of Canada, available Dominion lands situated outside the boundaries of such reserves, and where necessary, may make compensation upon such exchange, and a copy of every order in council authorizing such exchange shall be laid before Parliament during the first fifteen days of the then next session thereof.

8. Where a road allowance within the boundaries of any such reserve has been vested in the Crown in the right of the province in which it is situated, or has passed under the control of the executive authorities of the province, such road allowance may, with the consent of the Lieutenant Governor of the province in Council, be included in and form part of such reserve and may be closed by any fence which may be erected for the enclosure of such reserve, or any part thereof.

9. Notwithstanding anything in this Act, the Governor in Council may cause to be established through and over any such reserve such roads as are necessary for the convenience of the public, and nothing in this Act or in any regulation made there-

under shall prevent the proper use of such roads by bona fide travellers or by others requiring to cross such reserve in the pursuit of their ordinary business or calling, but nothing in this section shall operate to withdraw such roads from the reserve.

10. During the construction of any railway passing through Dominion lands, the Minister of the Interior may appoint such forest rangers as he deems necessary for the protection from fire of the forests along or adjacent to such railway, and it shall be the duty of every such ranger to enforce the provisions of this Act and any regulations made thereunder, and of any other Act either of the Parliament of Canada or of the province in which such lands are situated, when and in so far as such acts or any regulations made thereunder relate to the prevention of fires and are in force in the district for which such ranger is appointed; and for such purposes and within a tract of five miles on either side of such railway every such ranger shall have all the powers of a justice of the peace, and one-half of the expenses incident to and connected with such fire ranging shall be a debt due to the Crown from the person constructing such railway and shall be payable upon demand of the Minister of the Interior, and may be recovered at the suit of the Crown in any court of competent jurisdiction.

ii. The Governor in Council may make such regulations as he deems necessary or expedient to give full effect to the object and intention of this section.

11. The Governor in Council may secure from the holder of any title to or interest in any land within the limits of a forest reserve a waiver in writing of the exemption of such land from the provisions of any regulations made under this Act for the prevention of trespass and the protection of game, and, where necessary, may make compensation therefor, and from the date of such waiver, and to the extent therein agreed upon, this Act and the regulations made thereunder shall apply to such lands.

12. Except as hereinafter otherwise provided, this Act shall not apply to lands within the boundaries of any reserve set apart and established under the provisions thereof the title to which is not vested in the Crown in the right of Canada at the date of the passing of this Act, and shall not apply to any lands within such boundaries which at that date are held under lease or are subject to a license to cut timber or to any other right or interest therein or affecting the same, so long as such lease or license remains in force or such right or interest continues to exist; Provided that nothing contained in any lease or license heretofore granted shall be deemed to prevent the opera on

of this Act or any regulation made thereunder with respect to the protection of game, the prevention of fires and the preservation and reproduction of timber; and provided further that when any land upon which a lease or license to cut timber has been granted does not contain, or has become denuded of, merchantable standing timber, such land may thereupon be withdrawn from such lease or license upon notice to the lessee or licensee, and such land shall thenceforth be subject to all the provisions of this Act and of any regulations made thereunder

13. Neither the Governor in Council nor the Minister is authorized or empowered for the purposes of this Act to expropriate, purchase or acquire for compensation any right or interest held under license to cut timber.

ii. In the event of the Governor in Council or the Minister being hereafter authorized or empowered for the purposes of this Act to expropriate, purchase or acquire any such right or interest, the compensation payable therefor shall not be assessed or determined, either judicially or by agreement, at any larger or increased amount by reason of the land covered by such right or interest being situate in any forest reserve created under the authority of this Act.

14. Any person violating any provision of this Act or any regulation made thereunder shall, in addition to any civil liability thereby incurred, be liable, on summary conviction, to a penalty of not more than one hundred dollars, and in default of immediate payment of such penalty and of the costs of prosecution such person may be imprisoned, with or without hard labour, for any term not exceeding six months.

SCHEDULE.

The Dominion Forest Reserves set apart and established under the provisions of section 2 of the Dominion Forest Reserves Act, and the boundaries of each of such reserves.

PROVINCE OF BRITISH COLUMBIA.

1. The Long Lake Dominion Forest Reserve, in the railway belt, in the province of British Columbia, consisting of the west half of township 17, range 18; township 17, range 19, except sections 5, 6, 7, 8, 17, 18, 19 and 20 of the said township; the west half of township 18, range 18; township 18, ranges 19 and 20; the south half of township 19, range 19; township 19, range 20, all west of the 6thth meridian, and containing 190 square miles, more or less.

2. The Monteth Hills Dominion Forest Reserve, in the said railway belt, consisting of the north-west quarter of township 16, range 14; the north half of township 16, range 15; sections

24, 25, 26, 27, 34, 35 and 36 in township 16, range 16; the west half of township 17, range 14; township 17, range 15, and the east half of township 17, range 16; all west of the 6th meridian, and containing 106 square miles, more or less.

3. The Martin Mountain Dominion Forest Reserve, in the said railway belt, consisting of sections 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20 and 21 of township 19, range 13; and sections 1, 2, 3, 10, 11 and 12 of township 19, range 14; all west of the 6th meridian, and containing 18 square miles, more or less.

4. The Niskonlith Dominion Forest Reserve, in the said railway belt, consisting of township 21, ranges 14 and 15; the east half of township 21, range 16, except that part included in the Kamloops Indian Reserve; township 22, range 14, west of the 6th meridian; and containing 124½ square miles, more or less.

5. The Tranquille Dominion Forest Reserve, in the said railway belt, consisting of township 22, ranges 18 and 19; that part of township 23, range 18, included in the said railway belt; township 23, range 19; that part of township 24, range 19, included in the said railway belt; all west of the 6th meridian, and containing 149 square miles, more or less.

6. The Hat Creek Dominion Forest Reserve, in the said railway belt, consisting of township 18, range 26; township 18, range 27, except the south-west quarter of the said township; that part of the north half of township 18, range 28, within the said railway belt, not included in the Indian Reserve; the west half of township 19, range 25; the east half of township 19, range 26; township 19, range 27; the easterly first tier of sections in township 19, range 28; that part of the south-west quarter of township 20, range 25, not included in the Cornwall Ranch; the south-east quarter of township 20, range 26; the west half of township 20, range 27; the easterly first tier of sections in township 20, range 28; section 4 of township 22, range 27; that part of the west half of township 21, range 27, within the said railway belt and not included in the Indian Reserve; all west of the 6th meridian; and containing 206 square miles, more or less.

7. The Donald Dominion Forest Reserve, in the said railway belt, consisting of that part of township 28, range 22, which lies north and east of the Canadian Pacific Railway; that part of township 29, range 23, which lies north of the Canadian Pacific Railway; that part of township 29, range 24, which lies north of the Canadian Pacific Railway; the west half of township 29, range 22; all west of the 5th meridian, and containing 72 square miles, more or less.

8. The Larch Hills Dominion Forest Reserve, in the said railway belt, consisting of that part of township 21, range 8, which lies south of Salmon Arm and west of Mara Lake; that part

of township 21, range 9, south of Salmon Arm, except sections 5 and 6; all west of the 6th meridian, and containing 25 square miles, more or less.

PROVINCE OF MANITOBA.

9. The Riding Mountain Dominion Forest Reserve, in the province of Manitoba, consisting of township 18, range 16; of township 19, ranges 16, 17, 19 and 20; of township 20, ranges 17, 18, 19 and 20; of township 21, ranges 17, 18, 19, 20, 21, 22 and 23; of township 22, ranges 18, 19, 20, 21, 22, 23, 24, 25 and 26; of township 23, ranges 24 and 25; of township 24, ranges 26 and 27; of township 25, ranges 26 and 27; the following sections in township 18, range 17, namely, sections 1, 13, 24, 25, 26, 35, and 36, and the east half of section 12; in township 18, range 19, sections 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36; the north-east quarter of township 18, range 20; in township 20, range 21, sections 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36; the north half of township 20, range 22; all of township 23, range 26, except section 6; in township 25, range 25, sections 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, and those parts of sections 31, 32 and 33 which may not be included in the Gambler Indian Reserve, probably one and a half square miles; the west half of township 24, range 25; in township 23, range 23, the following sections, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30; in township 23, range 22, sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24; in township 23, range 21, sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, and the south half of 22; all of that portion of township 23, range 20, lying south and east of the Vermilion River, excepting sections 36 and that part of section 35 lying east of the said river; in township 23, range 19, sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30; in township 23, range 18, sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 29 and 30; in township 22, range 17, sections 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, and the west half of sections 1, 12 and 13; in township 21, range 16, sections 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33, and the south half and north-west quarter of section 14; all of township 20, range 16, except the north-east quarter of section 36; all of township 19, range 18, except the south-west quarter and the west half of the south-east quarter of section 3, and the east half of the south-east quarter of section 4: all of the above being west of the first

principal meridian, and containing in all 1,535 square miles, more or less.

10. The Turtle Mountain Dominion Forest Reserve, in the province of Manitoba, consisting of all of township 1 in ranges 20 and 21, and sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 28, 29, 30 and 31, and the west half of section 27, township 1, range 19, and sections 1, 2, 11, 12, 13, 14, 24, 25, 36, and the east half of section 23 and the south-east quarter of section 26 in township 1, range 22: all west of the first principal meridian and containing $109\frac{1}{4}$ square miles, more or less.

11. The Lake Manitoba West Dominion Forest Reserve, in the province of Manitoba, consisting of township 21 ranges 11, 12 and 13; township 22, ranges 12 and 13; township 23, range 13; and that part of township 23, range 12, not included in the Ebb and Flow Indian Reserve No. 52: all lying west of the first principal meridian and containing 248 square miles, more or less.

12. The Spruce Woods Dominion Forest Reserve, in the province of Manitoba, consisting of all of township 9, range 15; sections 1, 2, 3, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35 and 36, in township 9, range 16; sections 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20 and 21, in township 10, range 15; sections 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 27, 28, 29 and 30, in township 10, range 16; sections 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36, in township 8, range 15; all lying west of the first principal meridian and containing 110 square miles, more or less.

13. The Duck Mountain Dominion Forest Reserve, in the province of Manitoba, consisting of township 27, ranges 24, 25 and 26; township 28, ranges 24, 25 and 26; township 29, range 23, except the easterly tier of sections, and ranges 24, 25, 26, 27; township 30, range 23, except the easterly tier of sections, and ranges 24, 25, 26, 27; township 31, ranges 23, 24, 25, 26, 27; township 32, ranges 24, 25, 26, 27; township 33, ranges 24, 25, 26, 27; township 34, ranges 24, 25, 26; township 35, range 24; sections 19, 20, 29, 30, 31 and 32 of township 26, range 24; north half of township 26, ranges 25 and 26; east half of township 35, range 25; west half of township 33, range 23; west half of township 28, range 23; all west of the 1st principal meridian and containing 1, 251 square miles, more or less.

14. The Porcupine Dominion Forest Reserve No. 1, in the province of Manitoba, consisting of townships 41 and 42, range 27; townships 40, 41 and 42, range 28; the northerly four tiers of sections in township 39; and townships 40, 41 and 42, range

29; all west of the 1st principal meridian, and containing 322 square miles, more or less.

PROVINCE OF SASKATCHEWAN.

15. The Beaver Hills Dominion Forest Reserve, in the province of Saskatchewan, consisting of township 26, ranges 9 and 10, west of the second principal meridian, containing 72 square miles, more or less.

16. The Pines Dominion Forest Reserve, in the province of Saskatchewan, consisting of all of township 47, range 2; all of township 46, range 2, except sections 5 and 6; sections 25, 26, 35 and 36, in township 45, range 2; sections 4, 5, 6, 7, 8, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, and 33, in township 45, range 1; sections 5, 6, 7, 8, 9, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33, and 34, in township 46, range 1; sections 5, 6, 7, 8, 9, 17, 18, 19, 20, 21, 27, 28, 29, 30, 31, 32 and 33, in township 47, range 1; sections 1, 2, 3, 4, 10, 11, 12, 13, 14, 15, and those parts of sections 5, 8, 9 and 16, lying east of the north branch of the Saskatchewan river, in township 48, range 2: all lying west of the 3rd principal meridian and containing 145 square miles, more or less.

17. The Moose Mountain Dominion Forest Reserve, in the province of Saskatchewan, consisting of all of township 10, range 4; all of township 10, range 3, not included in the White Bear Indian Reserve No. 70; sections 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 27, 28, 29, 30, 31, and those parts of sections 7, 8, 9, 10, 11 not included in the White Bear Indian Reserve No. 70 in township 10, range 2; sections 1, 2, 3, 4, 5, 6, 9, 10, 11, the south half of section 7 and the south half and north-east quarter of section 8, in township 11, range 3; sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and the west half of section 12 in township 11, range 4; sections 1, 2, 11, 12, in township 11, range 5; sections 1, 2, 3, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 35 and 36, and those parts of sections 4, 9, 16 and 21 which were not included in the old Indian Reserves Pheasant's Rump No. 68 and the Ocean Man No. 69, in township 10, range 5; sections 24, 25, 26, 34, 35, 36; the north half and south-east quarter of section 23; the north half and south-east quarter of section 27, and that part of the north-east quarter of section 28 and of the east half of section 33, which were not included in the old Ocean Man Indian Reserve No. 69, in township 9, range 5; sections 19, 20, 21, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 and 36, in township 9, range 4; sections 19, 20, 21, 28, 29, 30, 31, 32, 33, and those parts of sections 22, 27 and 34, not included in the White Bear Indian Reserve No. 70 in township 9, range 3: all west of the 2nd principal meridian and containing 163 square miles, more or less.

18. The Porcupine Dominion Forest Reserve No. 2, in the province of Saskatchewan, consisting of townships 39, 40, 41 and 42, range 30; townships 39, 40, 41 and 42, ranges 31 and 32; all west of the first principal meridian, and containing 360 square miles, more or less.

PROVINCE OF ALBERTA.

19. The Cooking Lake Dominion Forest Reserve, in the province of Alberta, consisting of township 52, range 19, west half; township 52, range 20; township 53, range 20; township 54, range 19, sections 18, 19, 30 and 31; township 54, range 20, sections 2, 3, 4, 5, 9, 10, 11, 13, 14, 15, 22, 23, 24, 25, 26, 27, 34, 35 and 36; township 51, range 21, section 7; all lying west of the fourth principal meridian, and containing 114 square miles, more or less.

20. The Cypress Hills Dominion Forest Reserve, in the province of Alberta, consisting of the south half of township 8, range 3, west of the fourth principal meridian.

21. The Kootenay Lakes Dominion Forest Reserve, in the province of Alberta, consisting of the west half of township 1, and the south-west quarter of township 2, range 29, west of the fourth meridian; the east half of township 1, and the south-east quarter of township 2, range 30, west of the fourth meridian, containing 34,560 acres, more or less.

A brief reference was made last month to the Act to encourage the planting of forest and fruit trees in the State of Iowa. The Bill provides that on any tract of land in the state the owner or owners may select a permanent forest reservation not less than two acres in continuous area, or a fruit tree reservation not less than one nor more than five acres in area, or both, and that upon compliance with the provisions of the Act the forest reservation shall be assessed on a taxable valuation of one dollar per acre, and the fruit tree reservation on a taxable valuation of one dollar per acre for eight years. In all other cases where trees are planted upon any tract of land, without regard to area for forest, fruit, shade or ornamental purposes, or for wind-breaks, the assessor shall not increase the valuation of such property because of such improvement.

FOREST LAND TAXATION.

To anyone who has anything to do with "Woodland Taxation," the very able and carefully worked up article on that subject in the October number of this journal could not fail to interest and instruct.

In this connection it is interesting to note that up to the present day even such taxation is on an agricultural basis in many of the most civilized parts of the world, and not in such proportion as is suggested by Dr. Judson Clark. The countries in which this is the case are notably Germany, Austria and Great Britain. Of the others I cannot speak from experience, but I believe it is true of France as well. In Great Britain this is one of the obstacles in the way of promoting rational forestry in the place of beautiful but profitless arboriculture. The mitigating feature of the rate, however, is that it was made in the seventeenth century when land values were low in Europe so that today it is not very much felt. Saxony, of all countries, the most unexpected, with its modern forestry organization and fully developed manufacturing industries, still continues on this basis, but happily the rate was fixed in 1636. This, of course, only refers to private lands and estates.

The state forest, on the other hand, is treated quite differently, the timber being sold either standing or after being cut down, and no areas are leased for a term of years, so that no rent is payable. In Austria, Hungary and Roumania, such leases occur, but no rental is payable, only royalties on the quantity of timber cut. The same principle has been applied in India, where a royalty on each different size and quantity allowed to be felled is paid. Here in West Africa, even when areas are leased for five or seven years, the same rule applies. Some years ago, before a forestry department was started, before any foresters were in the country, a rental of \$15 per mile was payable, besides \$2.50 per tree to the chief on whose land the trees were felled and a Government royalty of the same amount. As soon as a Forestry Department was formed, in 1902, with a forester, Mr. A. N. Thompson, of Indian experience, at its head, the law was altered and stands at present as follows:—

A commuted royalty on each tree of about 12 feet girth, varying from \$5 to \$15 according to the variety, is paid. Mahogany and cedar being the most valuable, are liable to the highest royalty, whereas ebony, walnut (no relation of *Juglans nigra*, Canadian or American black walnut) and the common woods of the country pay the least. No rental is payable, but the chiefs

owning the land, get \$2.50 for each tree felled. These regulations vary from year to year, according to the place where cutting is being done. The same system is also followed in Siam.

As an incentive to replanting "cut over" areas in some parts of the Black Forest, not only are plants supplied free of charge or money premiums given for planting, but also remission of all land taxation is granted for twenty years, for the land planted, which means that it is tax free, until it yields a small return again, which it does by that time in the locality referred to.

At the present time a method of getting forest preservation practised, and with it a certain amount of forestry, would be to remit all taxation of land under forest or woodland on farms for ten years and then after that tax it on the 17-100 basis.

Those people who notoriously made no attempt at preserving any woodland on their farms might be made to pay double the prevailing rate. If such a law were handled in a liberal spirit, and not too harshly, much might be done to promote rational woodcraft on the farm. Half the fees made by taxing the non-forestry-inclined-farmers might be given to those who undertook extensive planting operations in the older settled portions of the country. This refers primarily to the Province of Ontario. The land office might co-operate with the Forestry Department in gathering this information as to the planting done each year.

It is to be hoped that others will continue the discussion of this subject of Forest Taxation so that some practical action may be taken as an answer to this most important question bearing on the forestry problem in Canada. Upon it turns largely the future of the forest, and for that reason its importance cannot be overrated.

A. HAROLD UNWIN,

Assistant Conservator of Forests.

Benin City, W. Africa, April 19th, 1906.

EXTRACT FROM REPORT OF THE ROYAL COMMISSION
ON THE UNIVERSITY OF TORONTO.

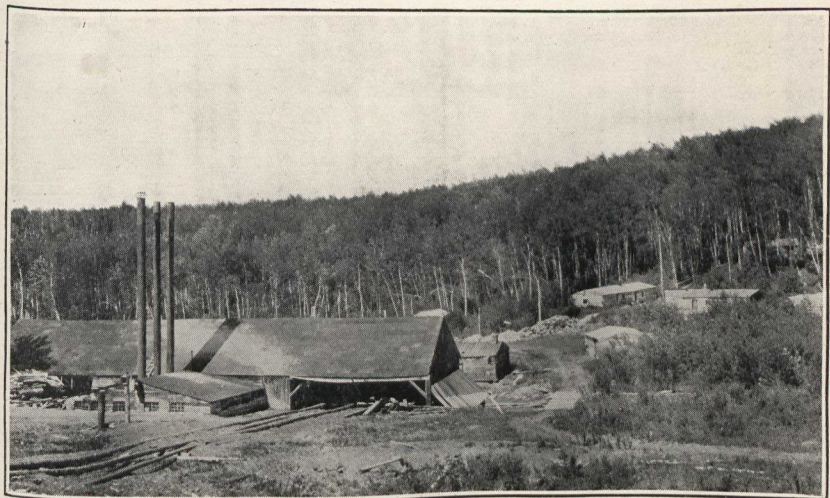
INSTRUCTION IN FORESTRY.

“The distinctively State character of the University entails upon it obligations in respect of all the great provincial interests in which higher education is an important factor. This is eminently true of instruction in forestry. The value to the country of scientific work in forestry has been already recognized upon this continent, but in Canada little has been done to apply systematically the lessons taught equally by sound economic theory and practical experience. It is surprising that Ontario, with its rich areas of timber, has hitherto failed to set up a school of forestry in its own University for the double purpose of providing technical training for young men in an important branch of science, and of benefiting in the conservation of its forest wealth by their knowledge and skill. It would be difficult to mention a case in which the State's duty and interest go more completely hand in hand. In the United States forestry is now an department of the Federal Government's service and is presided over by the Hon. Gifford Pinchot, with whom the Commission has held a conference. Dr. Pinchot has practically created the Forestry course in Yale University, and from that fact and from the knowledge required by his official position in Washington, he is a competent authority upon the whole question. The Commission also consulted, during its visit to Ithaca, Prof. Fernow, who was the founder of the School of Forestry maintained for a time by Cornell University, and who is justly esteemed for his knowledge of forestry.”

“There is no doubt that a great work in forestry can be done in this Province by the University, provided it receives the co-operation and encouragement of the Government. The Agricultural College has already provided for instruction in agricultural forestry, which meets the needs of farmers with wood lots to care for and develop. The larger problem is that which touches the immense Crown domain urgently calling for the application there of the newest discoveries in forestry and for the training of skilled men to conduct experiments on a large scale in order to test methods of reforestation and the conservation of valuable timber. It would, in our judgment, be a lamentable error if the direct value of a Forestry Department in the University to the Province in its administration of timber areas were not ascertained.”



Log Road in the Riding Mountain Forest and Game Reserve,
near Dauphin, Man.



Saw Mill in the Riding Mountain Forest and Game Reserve,
near Dauphin, Man.

“According to the best sources of information to which we have had access, a single chair of Forestry in the University would effect little. One professor could give theoretical instruction, but he could not produce foresters capable of practising their profession. For this field-work is essential. This requires a staff, not of necessity a large one, but adequate to the scope of the work to be done. The Cornell School of Forestry, discontinued owing to a dispute with the State of New York, was a complete University faculty. The Yale School is also a faculty with three full professorships, those of Botany, Civil Engineering and Lumbering, with many instructors who lecture on different kinds of work in the woods. The laboratory equipment cost about \$20,000. At Yale the students must be graduates in Arts. We realize that a beginning may be made without incurring at first all the expenditures of a complete faculty. The University courses in Botany, Chemistry and Engineering could be utilized for the instruction required in these branches and this could be supplemented by a forestry staff of three possessing the special knowledge demanded to carry on both inside and field work. The possession by the Crown of timber lands where practical instruction and experiments could be carried on simplifies the situation, and we recommend that the closest co-operation compatible with the end sought should exist between the University authorities and the Department of Lands. It should likewise be kept in view that the private owners of timber lands have a direct interest in the supply of trained men produced by such a school, and in the results of the experiments made. In the United States the National Lumbermen's Association is subscribing a fund of \$150,000 to endow courses of instruction at Yale. Similar action in Canada should be encouraged. We are strongly of the view that the people of Ontario will endorse the action of the Government in creating a School of Forestry, by means of which the scientific treatment of our forests can be effectively carried out.”

REVIEWS.

*The Determination of Timber Values, by Edward A. Braniff.
Reprinted from U. S. Department of Agriculture Yearbook
for 1904.*

This little pamphlet will be of inestimable service to all lumbermen in estimating the value of growing timber, as by means of the tables furnished by Mr. Braniff little difficulty will be experienced in determining what trees can be cut most profitably. Until recently there was scant data upon which to base such estimates, but Mr. Braniff's experiments were made with such care that his estimates may be depended upon to be as nearly correct as they could be made. They were made, not with single logs, but with whole trees, and the total number from which the output was traced was considerable. The logs composing each tree were sawn one after the other and the lumber graded and tallied as it came from the saws. It was found that there was a very considerable difference in the value per thousand feet of lumber taken from large and small trees. For example, yellow birch thirteen inches in diameter at the stump averages \$9.32 per 1,000 feet for all the wood used, while from trees thirty-one inches in diameter the average was \$17.75, a difference of \$8.43 per 1,000 feet, accounted for partly by the presence in the high diameters of the high-priced grade "firsts and seconds red." Sugar Maple was found to increase in value from \$9.75 for a 13-inch tree to \$13.58 for a 28-inch tree, and beech from \$8.29 for a 13-inch tree to \$9.68 for those of twenty-four inches. The practical value of these experiments lies chiefly in the fact that they make clear the unprofitableness of cutting small trees, and except when the land must be cleared it is plain that lumbermen are working directly against their own interests when they permit indiscriminate cutting.

Summary Report of the Geological Survey of Canada for 1905.

The explorers and geologists sent out by the Geological Survey have exceptional opportunities for noting the distribution of trees and the extent and probable value of forests in little known regions, but the report just issued contains fewer notes of this kind than usual as few of the members of the Geological Survey worked last season in districts in which there are valuable forests.

Mr. R. A. McConnell spent part of the season of 1905 in the basin of the White River, one of the principal western tributaries of the Yukon. He found a sparse forest, the chief trees being black and white spruce, aspen, balsam poplar and birch. As a rule the forest is sparse and ceases at about 4,000 altitude. A short time was also spent on Windy Arm, Tagish Lake. The forest is scanty, but there is a supply of rough lumber within easy distance of the mining camps suitable for ordinary mining purposes.

Between Lake Winnipeg and Hudson Bay, Mr. W. Stewart Dobbs travelled by the usual route from Norway House to God's Lake and then examined the country along the Shamattawa and Pekano Rivers. He found almost everywhere that the forest had been burnt over within the last ten years, and many fires were noted in 1905. Mr. Dobbs reports that these frequent burnings are almost always due to the carelessness of Indians. Several unextinguished camp fires were put out by members of his party. He recommends the establishment of a Forestry Department for the region and believes that with a little training the Indians would make good forest rangers.

Mr. W. McInnes worked in the vicinity of Trout Lake, Keewatin, and about the headquarters of the Attawapiskat and Winisk Rivers. The timber over most of the area explored was found to be of small size, though along the banks of the Winisk River and south of that river, there are considerable areas of spruce, poplar and white birch reaching diameters at the stump of from one foot to fifteen inches.

The Geological Survey of Canada, Annual Report Vol. XIV.
A. P. Low, Director.

Volume XIV of the Geological Survey, the publication of which has been so long delayed owing to structural alterations in the Printing Bureau, has at last made its appearance and, in all respects but one, is of essentially the same character as in former years. That is to say, it contains several reports that have been published many months ago and which, for no reason whatever, are bound together to make a volume. We do not believe that the Sudbury man who wishes to read Dr. Barlow's bulletin on nickel is at all keen on saddling himself with Dr. Adam's views on the wells in the Island of Montreal. And it seems exceedingly improbable that, say a Montreal Brewery Company, interested in deep boring in Hochelaga county, feels it necessary to peruse Mr. McConnell's views on the Nasina series in the Klondike district. This volume, however, is, we understand, the last but

two of the series, the new Director having decided that Vol. XVI will be the last of the series.

The feature that differentiates Vol. XIV from its predecessors is, undoubtedly, the Index. For the first time since these volumes have been published, has a really adequate index been issued with the work and any one who has need to consult scientific books knows what a void a reliable and complete Analytical Index can fill.

The compiler of the Index to Vol. XIV is Editor to the Geological Survey and has now in preparation an Index of the Survey's publications since 1885. We have been permitted to inspect the manuscript of this general Index and can assure our readers that it is compiled with an amount of care and conscientiousness very rare in Government contract work. No trouble has been spared to make the work a reliable reference to the resources of the Dominion as expounded by the Survey officers, and though forestry has not received any more attention than any other branch of the work, it was naturally to forestry that we turned.

Every tree, plant or flower in Canada is assigned to the district or districts in which it is found, so that one has only to look up each particular tree in the Index to know exactly in what locality it flourishes. It has occurred to us that it would be of great service to our readers if we were to print, from time to time, extracts from this work, showing the exact distribution of the common trees in Canada. A very great many references, for example, are assigned to "Spruce"—too many, by far, for us to print in this issue, but the list is divided into the various kinds of spruce, from which we cull, as an illustration, the white variety. It must, however, be mentioned that the work is not yet completed and that the subjoined list does not, therefore, purport to include every district in which white spruce is found.

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Mr. R. D. Craig, Inspector of Forest Reserves, has just returned to Ottawa from the west for a short time.

The Forestry Branch is this year making a detailed survey of the Riding Mountain Forest Reserve with a view to determining the amount of timber on the reserve, the rate of growth of the various species, and general silvicultural and economic conditions. The Riding Mountain is still quite well forested with white and black poplar, spruce, larch, birch and some jack pine, Manitoba maple, ash, elm, and oak. Fires have done a great deal of damage in the past and of late years. Galician and halfbreed squatters have encroached upon the forest and set many destructive fires in order to remove the timber which they think is the cause of the land being withheld from homestead entry. The land is not suitable for profitable agriculture, but is excellent for forestry purposes.

YALE UNIVERSITY FOREST SCHOOL

NEW HAVEN, CONNECTICUT, U. S. A.

A TWO YEARS GRADUATE COURSE is offered, leading to the degree of Master of Forestry. Graduates of Collegiate Institutions of high standing are admitted upon presentation of their College diplomas.

THE SUMMER SCHOOL OF FORESTRY is conducted at Milford, Pike County, Penn. The session in 1906 will open July 5th and continue seven weeks.

FOR FURTHER INFORMATION ADDRESS

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NEW HAVEN, CONN.