Canadian Forestry Journal

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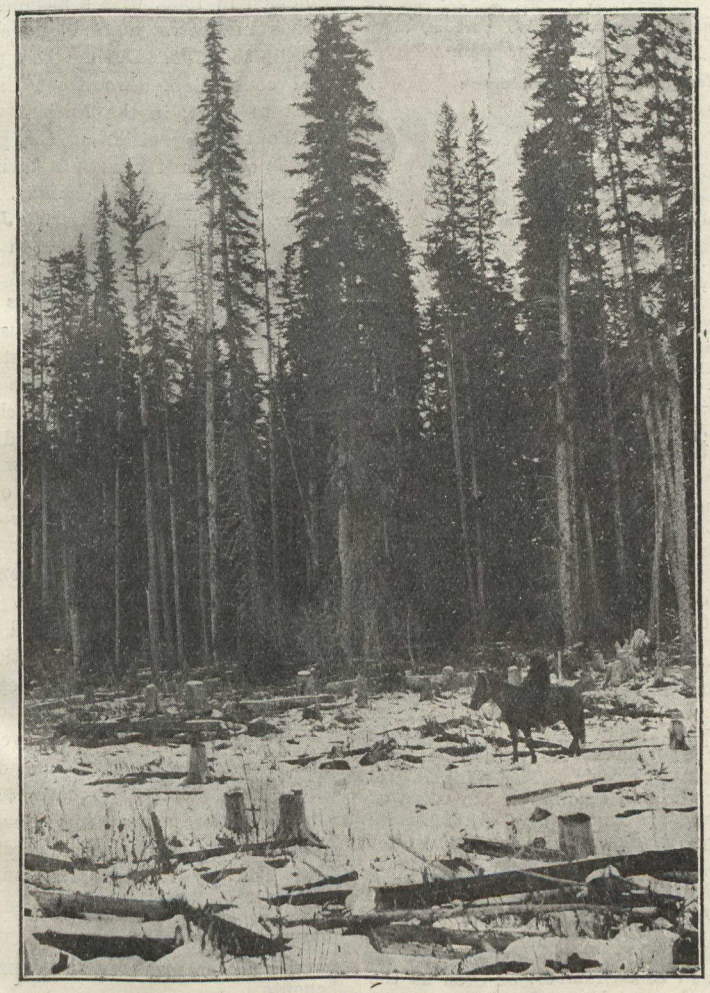

Engelmann Spruce in Crow's Nest Valley, Alta.

OTTAWA, CANADA.

Fixing the Value of Shade Trees.

The Appellate Division of the New York Supreme Court has confirmed a judgment of the lower court, fixing what may be called a good round value on trees in the city.

A construction company doing some work on a street found that the trees hindered their progress. They thereupon cut down the trees without so much as considering for one moment their value to the owner's property.

Suit was at once brought against the company, the damages being laid at $500 for each tree cut down. The plaintiff recovered for the full amount as the value of the trees, and the court added $1,000 more for punitive damages. It was this verdict which was carried to the Appellate Court and has been sustained.

Five hundred dollars may seem a large sum for a tree in the city, but it must be remembered that the value of the tree as kindling wood or as lumber, or even as the material for house-trim or furniture, is not the thing to be considered. The tree required many years to grow. It not only adorned the property, but it afforded health, comfort, enjoyment and protection to its owners. Its place, when destroyed, could not be filled by another tree inside of fifteen, twenty or thirty years, and all this time the owners of the property are deprived of its benefits.

When the courts take all these facts into consideration and assess construction companies $500 for each large tree wilfully destroyed by them, trees will be safer and the work of shade tree commissions will be better protected and more highly respected.

—*Newark (N.J.) Evening News.*

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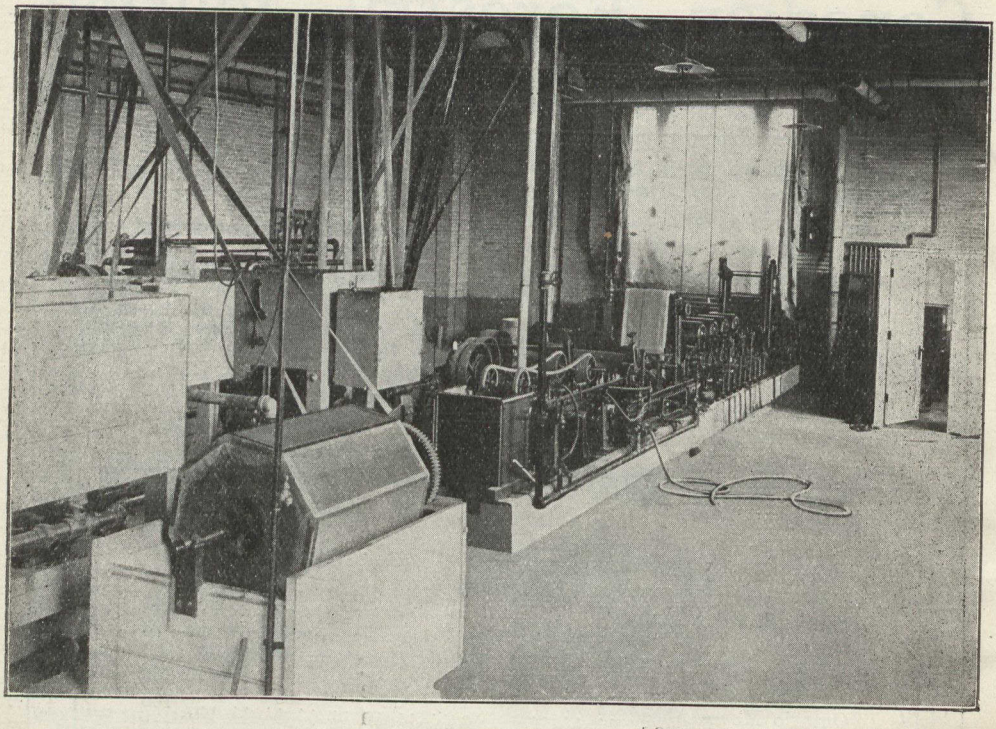
Experiment in Wood-using Industries.

Some Account of the Wood Products Laboratory at Madison, Wisc.

In this issue the *Journal* takes pleasure in presenting to its readers a number of illustrations showing the different branches of the Forest Products laboratory of the United States Forest Service, located at Madison, Wisc., U.S.A., and carried on in connection with the state University of Wisconsin.

This laboratory was opened on June 4, 1910, the inaugural exercises being held in the presence of a large number of visitors, representing not only the U. S. Forest Service and the university, but also most of the larger associations of lumbermen and other makers of wood products, railways and other interested bodies.



[*Courtesy American Forestry.*

Experimental Pulp and Paper Mill, U.S. Forest Products Laboratory.

The laboratory building itself is a substantial two-story brick building, 180 feet by 80 feet in size. The state of Wisconsin erected the building and supplies water, light, heat and power. The United States federal government, through the Forest Service, provides the equipment, the staff, and all other maintenance. The railways furnish free carriage for the supplies of the laboratory, and lumbermen and other associations and companies are giving material of great value for experimental purposes.

The work of the laboratory, exclusive of the section of Maintenance, is divided into eight sections, namely, (1) Timber Physics, (2) Timber Tests, (3) Wood Preservation, (4) Wood Distillation, (5) Wood Pulp, (6) Chemistry, (7) Engineering, and (8) Pathology. (The last-named is conducted in connection with the Bureau of Plant Pathology, at Washington.)

The section of Timber Physics has as its work the study of the structural and physical properties of wood and the ascertainment of how these properties are affected by different methods of drying and handling. The equipment of the section includes microscopes, microtomes and other apparatus required for microscopical work, apparatus for taking microphotographs, a cylinder designed for the study of the different methods of drying wood and an experimental dry-kiln, balances, ovens, calorimeters and other miscellaneous equipment.

In the section of timber tests studies are made of the strength, stiffness, hardness and other mechanical properties of commercial wood. Tests are made on woods that have been treated with preservatives and other substances, to determine the effect of the preservative treatment upon the mechanical

properties of the natural wood. Tests here made of the relative strength, toughness, hardness and other properties of different woods will be of value in finding substitutes for woods now becoming scarce. Tests as to the influence of knots, checks and other defects in lumber will be of value to architects, engineers and others in making specifications and grading rules for structural timber. Tests of the strength of wood under different loads will assist in determining the working stress that may be placed upon timber structures.

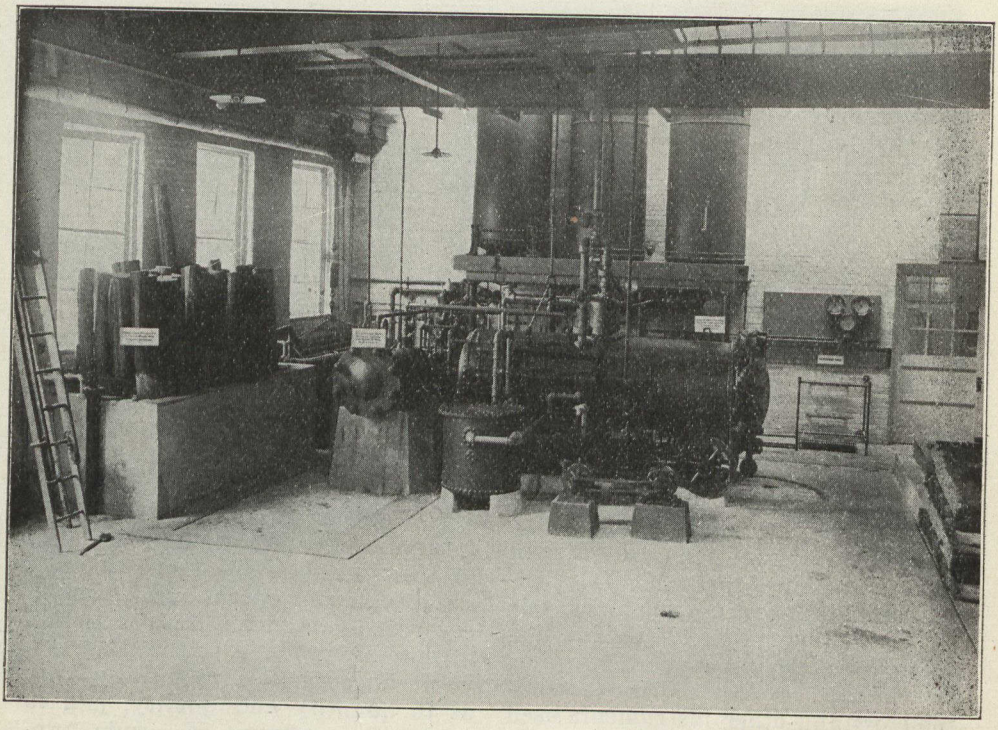
The equipment of this laboratory includes one 200,000-lb. extension-base Reihle testing machine, one 150,000-lb. extension-base Olsen testing machine, three 30,000-lb. Olsen universal testing machines, one 60,000-inch-pound Reihle torsion machine, one Dory abrasion machine, one impact testing machine, deflectometers and other instruments used in testing structural materials.

The wood-preservation laboratory's work involves the study of wood-destroying fungi and also the preservatives used to lengthen the life of wood and their effects on the wood. Its equipment includes a reproduction of a fully equipped commercial timber-treating plant. In it are included one treating cylinder three and a half feet in diameter and twelve feet in length and a small experimental cylinder one and a half feet in diameter and three feet long. The apparatus is connected with a system of tanks, force, air and vacuum pumps for handling these preservatives and forcing them into the wood. An apparatus for the simpler 'open-tank' treatment is also provided. For the study of the specific effects of the preservatives on the wood a 'fungus-pit' is provided; this contains chambers in which wood can be placed and thoroughly inculated with the destructive fungi. Woods treated with the different preservatives are then placed in this pit, and isolated in chambers. The efficiency of the wood treatment is indicated by the ability of the wood treated to ward off the attacks of the fungi under these conditions.

The wood-distillation laboratory is equipped with a steam distillation and extraction retort, one oil-jacketed destructive distillation retort and three product continuous refining still and accessory apparatus. The work of the laboratory deals with the extraction of alcohol, turpentine, wood creosote, acetates and other products from wood. The design of the laboratory is to conduct experiments to determine what products of this kind can be secured from different woods and the best processes of obtaining them, to study the design and operation of machinery best adapted for the production of these by-products so that they can be produced most economically, both as to quantity and quality, and to study the refining of crude products.

The equipment of the wood-pulp laboratory includes a working model of all the apparatus of the pulp and paper mill, except the mill for making ground-wood pulp. (This has been subsequently located at Wausau, Wisc.) This extends even to a small, but complete, Fourdrinier paper machine, making a roll of paper fifteen inches wide. Its work includes methods of making ground-wood pulp to determine whether or not commercial pulp can be made from species other than spruce; the practicability of treating different woods with the sulphite and soda processes; the qualities of paper which can be made from different grades of the various sulphite, soda and ground-wood fibers, and the practicability of using different forms of wood waste for the manufacture of pulp and other fibre products.

The section of chemistry has a well equipped laboratory and is en-



[*Courtesy American Forestry.*

Wood Preservation Room, U.S. Forest Products Laboratory.
Open-tank treatment on left; commercial treating plant in centre.

gaged in investigating such problems as the analysis and grading of commercial creosote, the analysis and grading of wood turpentine, and methods of analyzing treated wood to determine the kind and quantity of preservative in it.

The section of engineering has to do with the design of machines and apparatus to be used in saving wood waste, and so complete the work of other laboratories which have found that certain wood waste is capable of being utilized. This section takes up such work as the design of an experimental grinder for the manufacture of ground-wood pulp from woods other than spruce; the design of a dry-kiln for experimental purposes; the design of a hack for shallow chipping in turpentine experiments and the preparation of standard designs for different types of treating plants.

Some Results.

The work of the laboratory has shown good results. In little more than a year after its establishment important discoveries had been made. It was found, by the wood pulp section that jack pine and hemlock were satisfactory for ground-wood pulp, with the ordinary commercial equipment, slight variations in the process of manufacture only being necessary. Jack pine, dead or green tamarack and wood waste have been found satisfactory for chemical pulp, and good Kraft paper has been made from the clear waste of Western yellow pine and Southern yellow pine.

Western yellow pine has been tried for the production of various resinous products, and is found to produce more resin per year than the Southern yellow pine. A still has been devised for the manufac-

ture of turpentine from red or Norway pine by distillation which will remove the objectionable odor that this product has hitherto possessed.

Many tests have been made of the strength of various timbers, and the result of some of these has been incorporated in the building laws of the state of New York. Tests of fire-killed Douglas fir have shown that this species does not suffer appreciably in strength from being killed in this way, so long as it remains sound.

Experiments in wood preservation have shown that, by varying the temperature and pressure in a vacuum-pressure plant it is possible to treat spruce and hickory, which under ordinary methods of manipulation cannot be treated.

In the work on wood seasoning, experiments in the kiln-drying process resulted in the devising of a kiln in which the temperature, humidity and circulation of the air can be controlled. In the section of wood preservation, commercial creosotes were examined and analyzed, so that the purchasing public might know just what they were getting.

Many circulars have been published during the past two years and a half showing the results of the work of the laboratory. Among these are to be found such titles as the following: 'Experiments with Jack Pine and Hemlock for Mechanical Pulp' (Thickens); 'Commercial Creosotes' (Winslow); 'Strength Tests of Cross-arms' (Wilson); 'Progress Report on Wood-paving Experiments in Minneapolis' (Bond); 'The Absorption of Creosote by the Cell Walls of Wood' (Teesdale) and Quantity and Quality of Creosote Found in Two Treated Piles after Long Service' (Bateman). Many other studies are under way which will be found useful to various wood-using industries.

Nearly eight per cent. of the basswood lumber cut in Canada is manufactured into boxes.

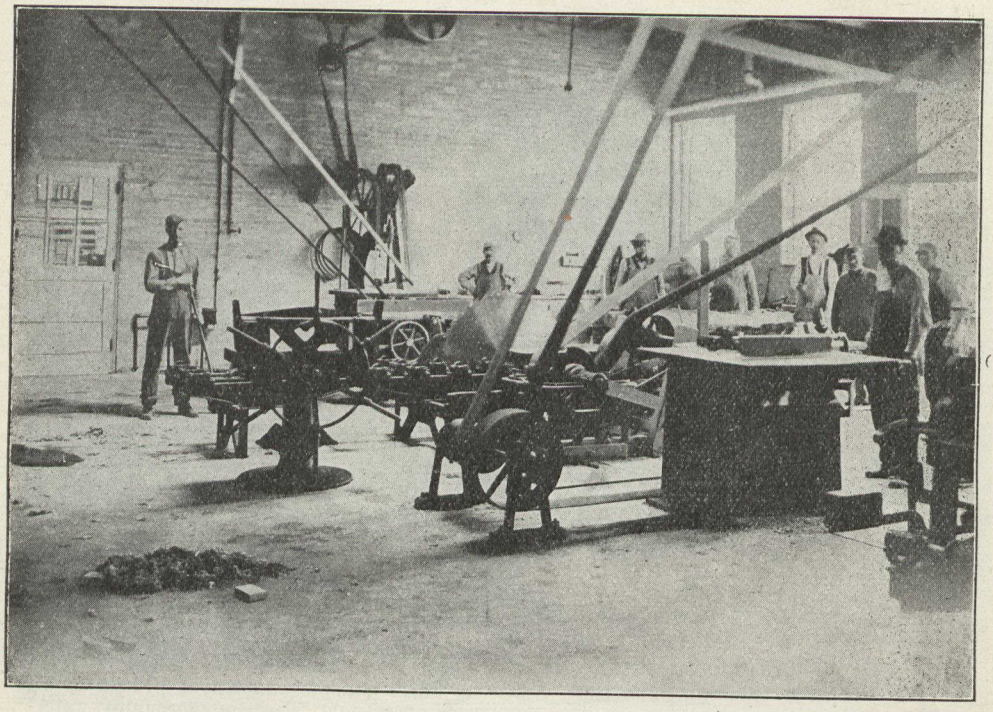
SOME GERMAN SHADE TREE PLANTING.

One of the pleasantest and most striking features of Frankfort-on-the-Main, Prussia, is its wealth of verdure. In addition to the famous Palmengarten, the Zoological Garden, and a host of parks and squares, the 'Anlagen,' or parks laid out on the site of the former outer wall torn down about the beginning of the nineteenth century, encircle the center of the town. The residence part of the city is beautified by its numerous gardens, nearly all residences having a garden, often a spacious lawn, between street and house. The principal streets and highways are planted with shade trees. The planting of shade trees is carried on under the supervision of the 'Stadt-Gaertnerei,' an office having charge of public parks, etc. Similar conditions prevail in other German cities.

The trees are generally planted at intervals of 8 meters (26 feet). Trees with spreading crowns are set a little farther apart, while those which do not spread are planted nearer together. Trees are planted with great care. The ground is prepared by digging a hole about 6 feet square and 3 feet deep, which is filled with the earth in which the particular tree prospers. In case of drought trees are thoroughly watered once a week or once in two weeks. The branches are trimmed in winter.—*U. S. Consular Report.*

The soil of the clay areas is found to be very fertile, and already a considerable portion of the township has been taken up by settlers. In most cases the land is very readily cleared and brought under cultivation, owing to the *successive forest fires* having removed the original heavy growth of timber, while the second growth has not yet reached any great size and is easily removed.—*Report on the Geology of a Portion of Fabre Township, Pontiac County, Quebec, by Robert Harvie, jr., M.Sc.*

Fabre township is bounded on the west by Lake Timiskaming, into which drain the only two streams in the area of any considerable size—Lavallee and Young creeks. Since almost all the forest has been removed, the snow and rain waters run off both quickly and completely, with the result that there are very few smaller streams tributary to those just noted, and, in consequence, in a large number of cases, the settlers are obliged to get their supplies of water from wells.—*Report on the Geology of a Portion of Fabre Township, Pontiac County, Quebec, by Robert Harvie, jr., M. Sc.*



[*Courtesy American Forestry.*

The Wood-working Shop, U.S. Forest Products Laboratory.

A Canadian Wood-products Laboratory.

Progress of the Project and Some of the Work it May Effect.

The Canadian Forestry Association, it will be remembered, at its meeting in February, 1912, passed a resolution endorsing the proposal to establish an experimental laboratory in connection with the Dominion Forestry Branch. Even before that the matter had been discussed in the Branch and preliminary inquiries made as to the establishment of such a laboratory, the lines of work to be taken up and the facilities at present existing in the Dominion to carry out such investigations.

McGill University was known to have done some work in wood-testing and other lines, and after some discussion it was decided to effect, if practicable, an arrangement with the university for the use of its apparatus, the Branch furnishing other necessaries. Experiments in the manufacture of wood-pulp are also mooted, as well as work in wood preservation.

The more such work is considered, the more it seems to be in the general interest that such experimental work should be carried on. In many of the bulletins of the Branch work in wood preservation has been urged, especially in regard to ties and poles, and it has been shown what important savings could be effected in annual maintenance, were the policy to be generally adopted of using these materials on-

ly after preservative treatment. Reference need only be made to Bulletins 13, 14, 21 and 22. This saving has already begun, two of the transcontinental lines having inaugurated the treatment of a certain proportion, at least, of their timber.

In the prairie provinces, too, where wood is so scarce, and where, for instance, almost any kind of stick is pressed into use for fencing, a tremendous saving could be effected were a practical apparatus brought into use by which fence-posts could be treated and their lives prolonged to say, double the present length.

Another question of interest to Canadians, especially in the West, is the possibility of substituting Douglas fir for the Southern pine, so much of which is now imported from the United States. Tests made of the two timbers seem to indicate that the Douglas fir, as regards its mechanical qualities, such as resistance to bending and compression, etc., is almost, if not quite, equal to its rival, while in regard to physical qualities, such as ease of working, capacity for taking a high polish and appearance generally the native wood can successfully compete with the imported.

Other problems, such, for instance, as the devising of a suitable means for treating wood in comparatively small quantities for use in paving, for smaller communities, readily suggest themselves. The manufacturers of wood-pulp also have many problems of their own, and it is apparent that were such a laboratory established there would be no lack of questions for solution.

Cordial support from manufacturers using wood is practically assured. The Canadian Manufacturers Association has been approached as to its attitude on the subject, and is found to be favourable. So much in favour of the project is the Lumbermen and Shingle Manufacturers Association of British Columbia that they have already offered to supply material gratis for tests. Meanwhile the project continues to make substantial, if slow, progress, and it is hoped that before long Canada, too, will have established, probably in connection with some of its larger universities, an efficient laboratory such as the United States already possesses at Madison.

USE OF CEMENT IN CANADA.

With the great rise in price of wood during recent years cement has come into a leading place as a wood-substitute. The following table, taken from Mr. Richard Grigg's report to the Department of Trade and Commerce, shows the increase in use during the five years from 1904 to 1908 (inclusive), and also the way in which Canadian cement manufacture has increased while the import has at the same time lessened:—

Year.	Cement manufactured in Canada.	Cement imported into Canada.	Cement consumed in Canada.
	Barrels	Barrels	Barrels
1904	908,990	784,630	1,694,988
1905	1,541,568	917,558	2.264,106
1906	2,152,562	666,931	2,785,695
1907	2,491,513	672,630	3,108,723
1908	3,495,561	469,049	3,134,338

A BEAVER'S WORKING DAY.

(Harper's Weekly.)

A young beaver in Regents Park Gardens, London, was once placed at work upon a tree twelve feet long and two feet six inches thick, just as the town clocks sounded the hour of noon. The beaver began by barking the tree a foot above the ground. That done, he attacked the wood. He worked hard, alternating his labor with dips in his bathing-pond. He bathed and labored alternately until 4 o'clock in the afternoon, when he ate his supper of bread and carrots and paddled about in his pond until half-past 5 o'clock. Ten minutes later, when only one inch of the tree's diameter remained intact, he bore upon his work, and the tree fell. Before it fell the beaver ran as men run when they have fired a blast. Then, as the tree lay on the ground, he portioned it out mentally and again began to gnaw.

He worked at intervals all night; cut the log into three parts, rolled two of the portions into the water, and reserved the other third for his permanent shelter. The work done, he took a bath.

Forest Research in India.

In connection with the Indian Forest Service, research work is being developed by the Forest Research Institute at Dehra Dun, where is also located the Forest School for training the lower grade of forest officers. The constitution of the institute was announced by order of the government of India in 1906, six officers being provided for. The list of officers has been somewhat modified since that time, and is now constituted as follows:—(1) Silviculturist, (2) Forest Zoologist, (3) Forest Botanist, (4) Forest Chemist, and (5) Forest Economist.

Prior to this date research work had to a certain extent been done by forest officers as opportunity presented itself, (especially on leave) and some work of considerable merit accomplished, e.g., the late Sir Dietrich Brandis's "Forest Flora of India." Owing, however, to lack of any recognized medium for publication much valuable original work done by departmental officers was lost.

The progress of research work, however, has not come up to the hopes entertained, owing, partly, to lack of funds, partly, to the officers having had much of their time taken up in educational work.

Among the results of the research work, however, have been the introduction of a better system of working sâl and teak forests, improved methods in the distillation of turpentine, and important investigations in paper-making. Investigations into the question of woods useful for match-making have resulted in the establishment of at least one match-factory.

Many bulletins have been issued by the Institute on various lines of forest research, some of these, e.g., 'Indian Woods and Their Uses' (Troup) being large works in themselves. A large Research Institute building is to be erected, at a cost of 160,000 rupees (about $52,000), the land—one of the finest sites in Dehra Dun—having been secured some time ago.

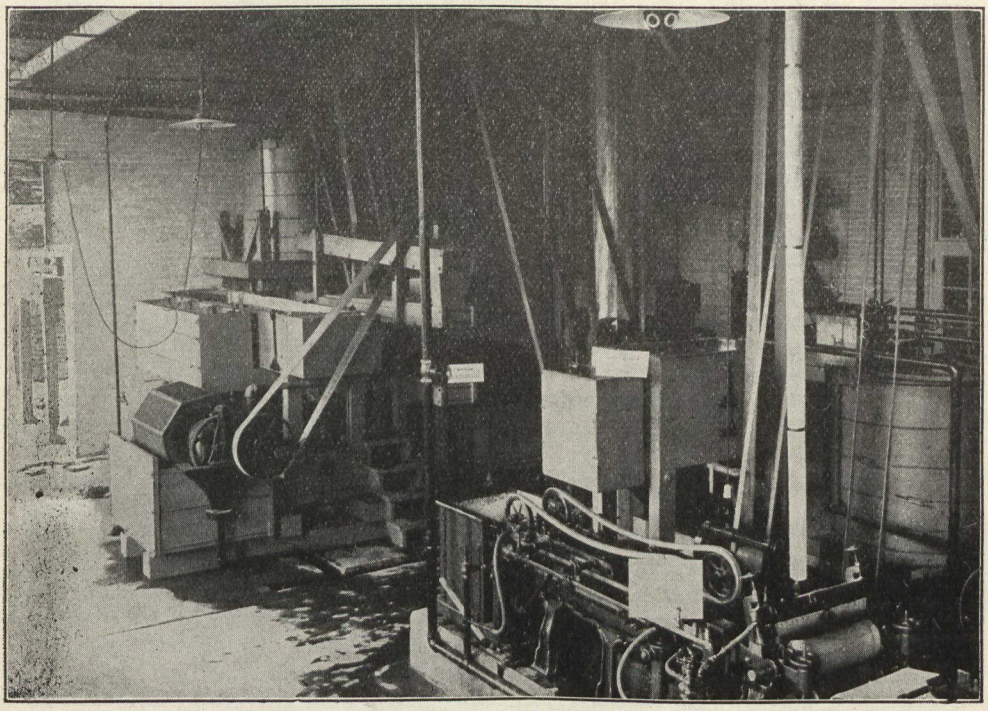
IN GERMAN FORESTS.

It is very interesting, too, at this time of the year, to watch the woodcutters at work slaying, skinning, and trimming the giants of the forest. The timber from the Schwarzwald is a tremendous source of revenue to the State. Freiberg is fortunate in owning the large tracts of forest immediately surrounding the town whence it derives a large income.

In our walks we see hundreds upon hundreds of these trees, mostly firs, and beech, bereft of bark, lying prone ready for transportation. So long, so straight are they, I often wonder if they will all be used for ships' masts. Odd sorts of trees, smaller, or crooked ones, it would seem, are cut up for firewood, for we also see yard-length logs stacked for fifty yards or more beside the paths.

On two days in the week the peasants are permitted to collect the twigs, bark, and chips for firewood, but permits must be procured from the town. The two days appointed for the purpose are also the days when the school children have half holidays. In these mid-November days, therefore, a very common sight in the loneliest depths of the woods is a whole family, grandparents, parents, and numerous children, with all sorts of improvised push carts, collecting their firewood for the winter.—Louise H. Birchall in *Toronto Star.*

Already about 30,000 Scots pines have been planted at the source of the Carthage water-supply near Indian River in New York State. Ten thousand more trees are being planted this year, and it is the intention of the village of Carthage to reforest the entire two thousand acres of land owned by the municipalities at this place. The municipality expects to derive benefit both in the conservation of its water-supply and also in the shape of timber for sale.



[*Courtesy American Forestry.*

One End of Pulp and Paper Mill, U.S. Forest Products Laboratory.

Les Dunes et les Landes de Gascogne.

Sur les rivages du golfe de Gascogne, en France, la mer rejette d'énormes quantités de sable. D'ou vient ce sable? Un peu de l'érosion des flots sur les fonds sousmarins et sur toutes les falaises de la côte — pour la plus grande partie, des *délaissés* (1) de la Gironde. C'est le dernier produit de l'érosion des montagnes apporté peu à peu par la Garonne et tous ses affluents. Les courants marins viennent mordre ces dépôts sableux et le flot des marées les épand sur les rivages. Le vent d'ouest s'en empare à son tour et chasse le sable vers l'intérieur des terres où il ne tarde pas à former des monticules allongés qu'on appelle des *dunes*.

Ces dunes sont instables, comme les éléments mobiles dont elles sont constituées. Elles se déplacent peu à peu sous l'effort continu du vent qui soulève incessamment la poussière sableuse pour la transporter plus loin. Vers la fin du siècle dernier (*i.e.*, 18ième) les dunes s'étaient avancées à plus de 5 kilomètres de la côte. Elles recouvraient les cultures, les forêts, barraient les cours d'eau et les forçaient à s'étaler en nappes marécageuses. Ainsi s'était formé entre la Pointe de Grave et Bayonne un désert de 200 kilomètres de long sur une largeur moyenne de 5 kilomètres.

Ce désert s'agrandissait toujours aux dépens des terres riveraines.

(1) *Délaissés* de la Gironde. Se dit de la portion du lit couverte de graviers ou de limons et abandonnée temporairement par le courant des eaux.

Déjà plusieurs villages avaient été ensevelis. Déjà le bourg de Teste apparaissait comme menacé de destruction dans un avenir prochain. Déjà on avait pu calculer que dans un nombre de siècles déterminé par la marche annuelle de l'envahissement (20 mètres environ) les sables atteindraient par terre le port de Bordeaux, déjà menacé directement par les apports du fleuve.

En 1787 un grand ingénieur, Brémontier, s'aidant des observations et de quelques essais faits précédemment dans la région, traça et parvint à faire mettre à exécution un programme de travaux en vue de fixer par la végétation forestière les sables envahisseurs. Sur cette arène mobile, là où la nature, réduite à ses seules forces, s'était arrêtée, impuissante, l'intelligence, la volonté opiniâtre d'un homme réussirent.

Par des clayonnages disposés à l'encontre du vent de l'ouest, par des couvertures de branchages que des crochets de bois fixaient au sol, par des semis de plantes herbacées ou semi-ligneuses: le *gourbet,* le *genêt* et l'*ajonc,* on parvint à fixer momentanément les sables et à donner aux jeunes semis de *pin maritime* l'abri et la protection temporaires qui seuls pouvaient leur permettre de se développer.

Là où l'on ne voyait ni un arbre, ni un buisson, ni une touffe d'herbe, s'étendent aujourd'hui les ondulations verdoyantes d'une immense *pineraie* (1). Là où la gorge desséchée ne respirait que la poussière sableuse soulevée par le vent, règne maintenant une atmosphère humide, tout imprégnée de parfums de résine. Là où l'homme voyait avec terreur le sable stérile s'avancer chaque jour, menaçant d'ensevelir ses cultures, ses vignes, sa demeure, se trouve pour lui une inépuisable source de profits.

Toute une population est occupée à exploiter, façonner, transporter des bois et surtout extraire de ces pineraies de pin maritime cette matière précieuse — la résine — qui sert à la préparation de tant de produits industriels. (1)

Cette transformation de la zone des dunes prépara et provoqua une autre transformation non moins importante. Derrière ces monticules de sable qui s'étendaient tout le long des rivages, s'était formée cette immense zone marécageuse connue sous le nom de *Landes de Gascogne.* Au désert sablonneux et aride du littoral succédait le steppe humide et malsain, presque désert aussi; rien de plus triste que l'aspect de cette vaste plaine inculte, en hiver à demi envahie par les eaux, — en été couverte d'ajoncs, de bruyères et de grandes herbes desséchées par le soleil. On l'a représentée souvent avec ses larges et mélancoliques horizons, ses troupeaux de moutons étiolés que des bergers perchés sur de hautes échasses, le teint hâlé, la face amaigrie, promenaient à travers la lande, et çà et là, sur de petites éminences, à l'abri d'un bouquet de pins (pignada), une misérable chaumière ou un pauvre village dont les habitants luttent péniblement contre la misère et la fièvre. — Ici encore l'homme a triomphé de la nature — après avoir vaincu le désert, il a vaincu le marais.

Une homme dont le nom vient à côté de celui de Brémontier, l'ingénieur Chambrelent, entreprit de remettre en valeur ces landes stériles. C'est l'arbre forestier, le pin maritime surtout, qui fut encore l'instrument de régénération.

Mais pour qu'il pût réussir sur ce sol inondé, une grande partie de l'année, il fallait tout d'abord par un vaste réseau de canaux d'assainisse-

(1) *Pineraie.* Bois de pins.

(1) Applications de la résine: couleurs, vernis, savons, bougies, torches de résine, cires à cacheter, goudrons, poix, noir de fumée, graisse végétale ou graisse de résine pour machines, encres d'imprimerie, etc. — calfatage des navires — injection des bois — industrie du dégraissage — préparation de vêtements caoutchoutés et imperméables, — soudure de certains métaux, utilisations médicinales et thérapeutiques, etc.

ment assurer le libre écoulement des eaux stagnantes.

Et pour qu'il pût donner lieu plus tard à des exploitations fructueuses, il fallait des routes de pénétration, des chemins de fer.

En une quinzaine d'années, ce magnifique programme de restauration, qui s'étendait à plus de 600,000 hectares, fut presque complètement réalisé, et à la forêt bienfaisante des dunes, s'ajouta l'immense forêt landaise, plus bienfaisante encore: car si l'invasion des sables faisait reculer l'homme, le chassait de son pays, de son habitation, le marais faisait pis, il le tuait, lui infusait le lent poison de la fièvre.

Or la forêt, complétant les résultats des canaux d'écoulement et d'évacuation des eaux, fit bientôt de cette région l'une des plus saines du globe. Là où un médecin employait autrefois pour soigner sa clientèle 1 kilogramme de sulfate de quinine, 100 grammes lui suffisent aujourd'hui. Là où la vie moyenne de 1853 à 1859 était de 34 ans 9 mois, elle est maintenant d'après les statistiques portant sur le nombre des décès et l'âge des décédés de 38 *ans* 11 *mois et* 19 *jours*. Plus de 4 ans d'existence gagnés par chaque citoyen de la patrie landaise! Et quelle transformation plus merveilleuse encore dans son existence elle-même! Quel prodigieux accroissement d'aisance, de bien-être, de prospérité! La cahute sordide en bois ou en chaume où, pendant l'hiver, l'habitant sans feu grelotte du froid, de la fièvre et parfois de la faim, où toute la famille dévorée par la scrofule, la pellagre, s'entasse dans une promiscuité misérable, est remplacée par des maisons en pierres, propres, saines, confortables, où dans les cheminées, pendant les froides journées, flambe constamment la flamme pétillante du bois résineux.

C'est qu'il vient de l'argent maintenant dans ce pauvre pays!

L'argent semble sortir de terre, et il en sort bien, en effet. Ce sont ces bois de pins qui le produisent, qui le font jaillir du sol et le répandent sur toute la contrée, comme ils répandent leur graine et leur parfum de résine. Ces bois, toute la population est employée à les exploiter, à les façonner, à les transporter sur les routes qui partout sillonnent le pays. On en extrait la résine comme pour les bois des dunes. On les débite en étais de mines, en traverses de chemins de fer; on en fait des poteaux télégraphiques, des pavés de bois, de la pâte à papier. Des chemins de fer les conduisent jusqu'à Bordeaux et de là ils se répandent dans toute la France et à Paris principalement, où ils sont utilisés pour le chauffage des fours des boulangers et pour les pavages en bois; en Angleterre, où ils font concurrence aux bois de Suède et Norvège; en Espagne; sur toutes les côtes de la Méditerranée et jusque dans les deux Amériques. Autrefois cette immense surface de 800,000 hectares comprenant les dunes et les landes de Gascogne était presque sans valeur. Autrefois les landes les plus rapprochées des villages ne trouvaient pas acheteur à 50 ou 60 francs l'hectare. On raconte même que dans les régions les plus désertes, quand on voulait vendre une terre, on conduisait l'acheteur sur une éminence et on lui cédait pour quelques francs toute l'étendue où il pouvait faire entendre sa voix.

Aujourd'hui cette immense surface, plantée presque partout de pins maritimes, exporte ses produits aux quatre coins du monde. Elle aura bientôt une valeur de plus de 1,000 francs l'hectare, soit au total de près d'un milliard de francs. Elle paye aux habitants, sous forme de rentes, de salaires, de profits industriels et commerciaux, un tribut annuel de plus de cinquante millions de francs!

Et tout cela c'est à l'arbre, c'est à la forêt qu'elle le doit!

Forest Insect Conditions in the Riding Mountains, Manitoba.

By J. M. Swaine, Assistant Entomolog ist for Forest Insects, C.E.F., Ottawa.

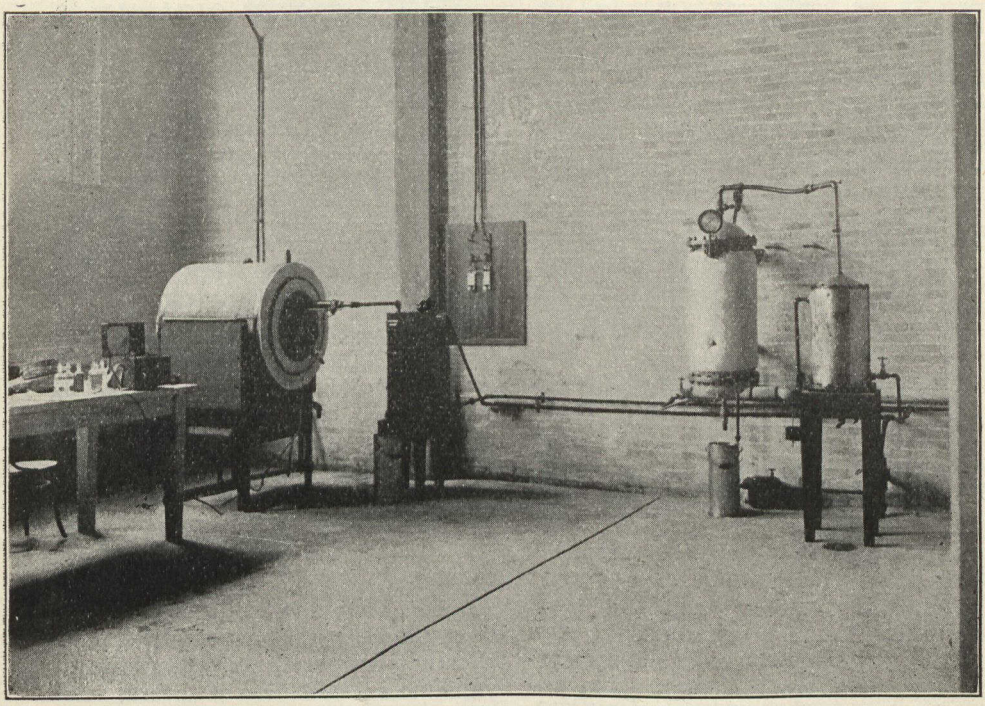
During May of this year the writer visited the Riding Mountain forest reserve, Manitoba, with the objects of introducing European parasites of the larch saw-fly and studying the forest-insect conditions of the region. The weather was excessively wet and cold throughout the month. On the upper plateau there were practically no buds started before the end of May, and insects were nearly all still in hibernation.

In view of the rapid western spread of the larch saw-fly, its great devastations throughout Eastern Canada, and the value of the larch to western farmers, the Entomological Division attempted the colonization in Manitoba of the European parasite of the larch saw-fly, *Mesoleius tenthredinis.* This ichneumon has been particularly efficient in controlling the saw-fly in Great Britain. Through the efforts of Dr. C. G. Hewitt a large supply of parasitized cocoons of the saw-fly was obtained from England. These were planted in two larch swamps in the Riding Mountains, east of Clear Lake. The abnormal lateness of the season this year was unfavourble to the attempt, but effective results are hoped for. It is important to note that the parasitic fungus of the saw-fly, *Isaria farinosa,* was introduced in the same cocoons.

The larch saw-fly, *Nematus erichsonii,* is now widely distributed in the larch of Manitoba. In the Riding Mountain forest reserve, and in the Spruce Woods forest reserve it is abundant, although not yet particularly destructive. It is without doubt spreading to the west and north, and will ultimately extend wherever the larch is found. . The only hope of influencing its control is in the introduction and distribution of its parasite and fungus enemies. Its young or larvae feed upon the larch leaves like caterpillars, and strip and kill the trees when present in large numbers. Although not yet destructive in Northern and Western Manitoba, the saw-fly has committed serious ravages to the larch, in recent years, throughout Western Ontario.

Bark-beetles are present in the reserve in great numbers in fire-injured timber and slash from cuttings. Aside from the larch saw-fly these beetles are the chief insect danger for the future. They are small black, or dark brown, hard-shelled beetles, which excavate tunnels and deposit eggs in the inner bark of living or dying trees. The grubs which hatch from the eggs feed upon the bark, often cutting individual mines. They pupate in the ends of these larval mines, and after maturing to the adult form, eat their way out through the bark, leaving small round holes like shot-holes. Some species are the most destructive of all forest insects.

Only a limited amount of cutting is allowed in the reserve, and this is chiefly in fire-swept areas. There were several considerable burns in the spring of 1911, and in these the bark-beetles were present in spruce and pine, in immense numbers. There were no fires of importance in the reserve this spring, and consequently little cutting of green timber. There is danger of an outbreak of bark-beetles of the genera *Dendroctonus* and *Polygraphus* in the neighbourhood of these 1911 fire areas. One species of these (*Dendroctonus murrayanae* Hopk) has already destroy-



[*Courtesy American Forestry.*

Wood-distillation Room, U.S. Forest Products Laboratory.

ed some timber there; but it is not noticeably common in healthy trees. A few dendroctonus-killed jack pines may be seen along the Clear Lake trail. Conditions are being carefully watched by the officers of the reserve and any outbreaks will receive prompt attention.

The larch dendroctonus, *D. simplex* Lec., is very common throughout the parts visited. It was found in great numbers in dead, standing larches; but whether or not it had been the primary cause of the death of the trees could not be then determined. This species prefers bark in a dying condition, but may become an important auxiliary of the larch saw-fly in future years. *Ips perturbatus* Eichh. and *Ips caelatus* Eichh. are very abundant in fire areas south of Clear lake. They are found there chiefly in white spruce which was badly injured by fire. *Polygraphus rufipennis* Kirby, the spruce bark-beetle, is common everywhere in dying bark of spruce, larch and jack pine. These species are able to kill weakened or injured trees which might otherwise recover. Other species of bark-beetles of lesser interest are abundant in dying bark of spruce, pine and larch.

Timber-beetles of several species are plentiful; *Trypodendron retusus* Lec., the poplar timber-beetle, in poplar, and *T. lineatus* Ratz., the spruce timber-beetle, in spruce and pine, are the most common. These beetles drive their small, round, black tunnels more or less deeply into the wood of dying or recently killed trees and logs, or freshly cut lumber, and reduce its value for all but cheaper purposes. They also assist in the introduction of fungi and bacteria into the wood. Many poplars on the upper plateau are more or less scraped by deer. These scrapings penetrate to the cambium, and present an ideal inoculation-surface for fungi and bacteria.

The poplar timber-beetle enters later on these scraped surfaces, and through its tunnels spores may reach deeper layers.

Damage to killed and injured spruce and pine by cerambycid and buprestid borers is extensive. Piled lumber cut in the fire areas by portable mills showed abundant evidence of their borings. The fires occur usually early in the spring. These beetles lay their eggs in slits or crevices in the bark late in June and in July. They seldom deposit their eggs on barked surfaces. The grubs cut large, rounded or flattened tunnels through the bark and wood.

To prevent the injury by these borers it is necessary to bark the trees, or put them in water when possible, before the young grubs have worked through the bark and into the wood, or to saw before they are deeper than the thickness of the slab. Some species will continue their borings in piled lumber, or even in parts of buildings, for months or even years, if they have penetrated deeply before the logs were sawed.

Every effort should be made to get on the ground as early as possible and to rush the sawing during the first part of the season. Much of the trouble might thus be left in the slab.

Throughout the reserve the poplar is badly infested with fungi, and with boring grubs of the long-horned beetles (*Cerambycidae*). The only conceivable method of controlling either the fungi or the beetles is to cut and burn, at the proper season, all infested trees. Such an operation could not be considered at the present time, and these diseases of the poplar are likely to continue.

About fifty years ago there must have been a considerable outbreak of *Pissodes* beetles (spruce and pine weevils) particularly in white spruce. The grubs of certain species of these weevils destroy the terminal shoots of young trees. One, two or three laterals then develop as terminals and produce a distorted trunk, frequently with two or even three tops. These 'double-tops' are fairly common throughout the parts of the reserve visited, as trees forty or more years of age. No recent work of this kind was seen.

In spite of the inclement season, an important advance was made on this visit in our knowledge of the injurious insects of that region.

It is a pleasure to notice the excellent condition into which the reserve is being put. New ranger-stations were being built, important trails were being cut, and telephone lines laid to connect the ranger-stations with each other and with headquarters. A wide fire-guard already surrounded a large portion of the reserve.

Aside from the value of the wood it contains, and the abundant game which it supports, this reserve is invaluable as the source of several small rivers which sustain the fertility of a wide belt of surrounding wheatlands. The value of such forest reserves, through the West, at the sources of water-supply, cannot be overestimated. Upon the permanence of the reserves practically depends the fertility of the surrounding regions.

DOUGLAS FIR VS. NORWAY SPRUCE.

Some experiments made in the Ardennes with the Douglas fir as compared with the Norway spruce (*Picea excelsa*) gave the following results:—

Douglas fir—Age, 25 years; height, 4 to 16 m. (13 to 52 ft.); average height, 14m (46 ft.); volume per acre, 2,032 cu. ft.

Norway spruce—Age, 25 years; height, 4 to 14m. (13 to 46 ft.); average height, 8m (26 ft.); volume per acre, 812 cu. ft.

These data confirm the great superiority of the Douglas fir with reference also to the quality of the timber. This tree seems particularly well suited to damp climates, such as Belgium. The slower-growing blue Douglas seems less adapted to such a climate.—Bulletin of Ag. Statistics (Canadian edition), Vol. I, No. 8, July 20, 1911.

ONTARIO MOVES AHEAD.

The Ontario government has recently announced an advance step in its forest policy by the appointment of Mr. E. J. Zavitz, M.S.F., to the position of Forestry Commissioner for the province. This is a position just created (so far, at least, as title goes) in the provincial service, and it seems significant that it is attached to the Department of Lands, Forests and Mines. Mr. Zavitz will advise the department as to cutting methods, disposal of brush, and generally as to lumbering methods on Crown lands in the province, and reforestation in general. For the present the work at the Ontario Agricultural College and in waste land planting in Norfolk county will also be under the direction of Mr. Zavitz. This appointment looks like an important forward step in the forest policy of the province and the *Journal* re-echoes the wishes of Mr. Zavitz's many friends for all success in his new office.

MEETING OF DIRECTORS.

Important Interview with the Right Honourable the Prime Minister and the Minister of the Interior.

An important meeting of the Directors of the Canadian Forestry Association was held in the board room of the Ottawa Board of Trade on Dec. 6. As it was not possible for the President, Mr. John Hendry, of Vancouver, to attend, it was expected that the Vice-President, Hon. W. A. Charlton, M.P., would preside, but as he was detained at the House of Commons through imperative parliamentary business, the chair was taken upon motion by Mr. G. Y. Chown, Past President. A number of the Directors unable to be present forwarded their views on the questions coming up for discussion, and these in every case were in line with the decisions reached. As the main object of the meeting was to present to the government the resolutions passed at Victoria, this was arranged and the speakers selected at the first part of the meeting, and after the interview the other matters were disposed of.

The resolutions which affected the work of the Dominion Government, and which were presented on this occasion, dealt with improved regulations desired in regard to (1) disposal of debris; (2) squatting on timber lands; (3) extension of forest reserves, and (4) securing efficiency in the outside forest service. The first three were presented with a few words of explanation, and attention was centred on the last.

At 12.45, according to appointment, the Directors met the Rt. Hon. R. L. Borden, Prime Minister, and Hon. W. J. Roche, Minister of the Interior, in the office of the former, the deputation being composed of Mr. Chown and the following Directors:—Messrs. Wm. Little, Montreal; Hiram Robinson, Ottawa; Thomas Southworth, Toronto; Gordon C. Edwards, Ottawa; Ellwood Wilson, Grand Mere, Que.; Senator Bostock, Denis Murphy, Ottawa; Lt.-Col. Harkom, Melbourne, Que.; W. C. J. Hall, Quebec, and Mr. Geo. Murphy, of Ottawa, the last of whom was especially delegated by the limit holders of British Columbia. The resolutions were presented for the deputation by Mr. Chown, who briefly and ably pointed out the imperative need for securing efficient men in a service so widely scattered and depending so much upon individual initiative, judgment and faithfulness as the forest service. He drew attention to the resolutions passed both at Ottawa and at Vancouver on this subject, and read a telegram from the British Columbia Lumber and Shingle Manufacturers' Association, containing a strong resolution of the same tenor passed by that body on Dec. 5. He was followed by Senator Bostock, who spoke of conditions in British Columbia, and Mr. Ellwood Wilson, who dealt particularly with Quebec. All three handled the subject in a very happy manner, speaking with moderation and conviction.

In replying, the Prime Minister said that in preparation for this interview he had secured from the Minister of the Interior a memorandum dealing with the organization of the forest service and its aims. After reading this memorandum to the deputation he said that he was fully seized of the great and increasing importance of the forests of Canada and of the need for a service of the highest efficiency. The Government was giving these matters careful attention, and he thought that the members of the delegation would see in the future that the seed sown to-day had not fallen on stony places. After Mr. Chown and one or two others had given some further explanations to the Minister of the Interior the deputation withdrew well satisfied with the result of their interview.

Some Recent Forestry Books.

Quite a number of important books on forestry have appeared of late, and the *Journal* has pleasure in presenting to its readers the short reviews of some of the most important of these which follow.

New England Forestry.

A significant mark of the advance of forestry on this continent is the increase in the literature of the subject. For years foresters were so busy with practical matters that little or no time was left to write on forestry, except in reports, bulletins and similar publications, and the student in search of information had to pick out the information he wanted from a mass of these. Of late, however, the foresters have had, as it were, time to take breath, to collect and systematize this information, and a forestry literature has had time to grow up, adapted to the conditions of this western continent.

Naturally forest mensuration, owing to its close connection with the utilization of wood, claimed first attention, but of late the would-be silviculturist has been receiving his share, as shown by the publication, last year, of Mr. H. S. Graves's *Principles of Handling Woodlands*, and lately of the subject of this review, Messrs. Hawley and Hawes' *Forestry in New England.** The two books necessarily cover something of the same ground. The difference between them lies in the fact that Mr. Graves's book deals with the subject of silviculture (in the broadest sense) along comparatively general lines, while the authors of the latter work have taken a specific region for treatment and design to give owners of that region practical directions for the treatment of their forests, and, to a lesser degree, of disposing of the products.

The importance of Messrs. Hawley and Hawes's book to Canadians lies in the fact that forest conditions in parts of New England are much the same as those in parts of Canada. Forests in the state of Maine require practically the same treatment as those in New Brunswick and southeastern Quebec; the white pine lands of Ontario, as well as the hardwood lands of the same province, call for the same treatment as corresponding areas in parts of New England. The different forest regions are taken up in Part II of the book, Chapter XIII dealing with the Spruce region, Chapter XIV with the Northern Hardwoods region, Chapter XV with the White Pine area, and Chapter XVI with the Sprout Hardwoods area. Each of these is treated under the following headings:—General Considerations, Forest Types, Methods of Handling the Forest, Logging Methods, Market Conditions, Industries, Character of the Land and Timber Ownership, and Forest Protection. Immediately preceding these chapters is a short treatment of 'Present Forest Conditions', which includes a section on 'How to Find Information Applicable to a Particular Tract.' This should enable a timberowner to decide to which division his forest belongs, and under that division he can identify the type of forest in which his property is included, and further on in the chapter he will find directions given as to the proper treatment of this tract.

The second part of the book contains also chapters on 'The Progress of Forestry in New England' and 'The Yield to be Expected from New England Forests under Proper Management,' and in the appendices are given forest fire statistics, a bibliography of works dealing with forestry in New England, volume, growth and yield tables and log rules.

Part I of the book deals with General Forestry. Starting with Silvics (the general consideration of the conditions affecting the growth of forests) in Chapter I, the authors next take up, in Chapter II, the different silvicultural systems, under the general divisions of reproduction of forests from seed and reproduction from sprouts. In Chapter III the different trees of the region, *e.g.*, White and Red Pine, Spruce, Yellow Birch, etc., are dealt with separately. Chapter IV contains a discussion of practical methods of planting and seeding of forest trees, planting being strongly favored. Improvement Cuttings are discussed in the next chapter under the headings of Cleanings, Liberation Cuttings, Thinnings and Damage Cuttings, with directions for each and for cuttings in general.

The next three chapters deal with Forest Protection. A short chapter of some four pages deals with damage from the larger (vertebrate) animals. Chapter VII deals with Forest Insects and Fungi, briefly treated, *e.g.*, the white pine weevil, spruce-destroying beetle, spruce budworm and larch saw-fly (considerable use being made of the work of Dr. C. G. Hewitt, as published in the 1911 report of the Canadian Forestry Association) and, among the fungi, the chestnut bark disease, white pine blister

**Forestry in New England: A Handbook of Forest Management, by Ralph C. Hawley, M.F., Asst. Professor of Forestry, Yale Univ., and Austin F. Hawes, M.F., State Forester of Vermont. New York: John Wiley & Sons; London: Chapman & Hall. Pp. xv. + 479. Price, $3.50.*

Avenue of Green Ash at the Ranche of Dixon Bros., Maple Creek, Sask. Fifteen Years from the Seed

rust, etc. A chapter (VIII) is also given to forest fires and their extinguishment; estimating the damage done by a forest fire is also briefly treated.

In the chapter on Timber Estimating the use of volume tables is explained, methods suitable for estimating forests of different sizes outlined, and the estimation of the money value of standing timber treated.

A short chapter (X) on Growth of Individual Trees and the Growth of Stands is also given. An index is provided and the book is illustrated by a map of the region and a hundred and forty half-tone cuts.

Wood Identification.

Prof. Record's book* consists of a general discussion of the properties of wood and a key for the identification of the economic woods of the United States.

Part I of the book deals with the structural and physical properties of wood in general. It discusses, in turn, the structure of the tree, the structure of the secondary wood, the nature of the individual elements that go to make up the secondary wood and their arrangement and relation to one another. Peculiarities of wood structure, such as tyloses, pith-flecks and bars of sanio are also dealt with. The writer's definitions of 'grain' and 'texture' should tend to remove the confusion that so often arises from the injudicious use of these terms. In dealing with physical properties the writer merely gives a brief outline of this extensive and little understood subject. The use of the structural and physical properties and of such chemical properties as color and taste for the purpose of identification is clearly indicated.

Part I of the book is, practically speaking, only an elaborate index to the subject of timber physics and the literature relating to it. Following the description of each of the properties of wood is given a list of the available references on that particular question. This should make the book of great value to those who wish to study the subject more exhaustively.

Part II, the identification key, is a very complete compilation of characterstic properties of the individual woods. The grouping and classification generally is both clear and concise. cThe determination of individual species is carried out to an advanced degree by means of microscopic distinctions. Many of these are new, and, if found to be consistently applicable, should prove of great value in distinguishing between the woods of similar species where heretofore such distinction has been difficult or impossible. Species distinctions among coniferous

**Economic Woods of the United States, by Samuel J. Record. New York: John Wiley & Sons; London: Chapman & Hall. $1.25.*

woods are seldom consistent, and, while they may serve to tell certain specimens apart, they cannot be relied on in the majority of cases. This difficulty also applies to deciduous woods, but to a lesser degree, as the individual peculiarities of a species are usually more consistent with these woods. Distinctions that rely on the difference in color between heartwood and sapwood are freely used, in spite of the fact that these are useless with small hand specimens, in the majority of cases. The writer attempts to distinguish between the woods of the four Southern pines and of the different species of spruce, but explains that the distinctions are not always reliable. The gross distinctions are not clearly distinguished from the microscopic ones, and the peculiarities in cross-sections are liable to be confused with those of radial or longitudinal sections. The identification key is also accompanied by a complete list of references to the existing literature.

The book was designed for the use of foresters, timber inspectors and wood-users, but would be of more value as an outline of a course of study than as a handbook. It is a trifle too technical for the average wood-user, but should be invaluable to forestry students.

A forest map of the United States and a series of thirty photo-micrographs of characteristic wood sections is appended, and the introduction contains a brief outline of the methods of preparing specimens for microbotanical study.

The Larch Saw-fly.

The Large Larch Saw-fly, the subject of this bulletin*, is no doubt the most widely known species of insect destructive to forests in Canada, though of late years the Spruce Budworm has come into prominence. Over the whole of Eastern Canada this saw-fly has killed wellnight all the tamarack, or larch, and of late its ravages have spread to the middle western provinces of the Dominion.

The Dominion Department of Agriculture is fortunate in having in its employ, as Dominion Entomologist, in the person of Dr. Hewitt, one who has given to the insect an amount of study and careful investigation such as no other student of entomology has bestowed on it. The results of his investigations up to the present, both in England and Canada, are embodied in this bulletin. The first part of the bulletin is taken up with an account of the history and distribution of the insect, the technical description of it and an account of its life-history. This is followed by a discussion of the injury to trees (through oviposition by the mature insect and through defoliation by the larvae). A point of special interest to foresters is that Dr. Hewitt has found the saw-flies on the Japanese larch (*Larix leptolepis*), generally supposed to be immune. Natural enemies described are field mice and birds. Special attention is given to parasites and predaceous insects; some twenty or more insect parasites and one predaceous insect are described. The study of Dr. Guessow, Dominion Botanist, of the parasitic fungus *Isaria farinosa* is also outlined at some length.

Much of the practical value of the bulletin lies in the section on Preventive and Remedial Measures. Constant vigilance, care in planning a plantation (not planting larch 'pure,' *i.e.*, as the only species in the plantation) is urged, also the encouragement and protection of birds. Remedial measures for small plantations include spraying, destruction of cocoons, hand-picking, jarring the trees and banding.

The most hopeful means of restricting or stopping the spread of the insect is the aiding of the natural enemies of the insect by fostering its natural parasitic enemies. An outline of the work already done at the Central Experimental Farm is given. A short account of the economic value of the larch is included in the bulletin, credit for which is given to the Dominion Forestry Branch.

The author, Dr. Hewitt (Dominion Entomologist, Central Experimental Farm, Ottawa) will be glad to receive information in regard to the insect. Copies of the bulletin may be obtained by applying to the Publications Branch, Department of Agriculture, Ottawa.

**The Large Larch Saw-fly (Nematus erichsonii) with an Account of its Parasites, other Natural Enemies and Means of Control, by C. Gordon Hewitt, D.Sc., Dominion Entomologist. (Dominion Department of Agriculture, Experimental Farms, Bulletin No. 10, second series: Entomological Bulletin No. 5). Ottawa: Government Printing Bureau, 1912. Pp. 42. One colored plate, four half-tone illustrations and 22 figures in the text.*

Dr. Schenk's 'Sylviculture.'

Under the title of 'The Art of the Second Growth, or American Sylviculture,' Dr. C. A. Schenck, Director of the Biltmore Forest School, has issued a revised (third) edition of his 'Biltmore Lectures on Sylviculture.' The form and arrangement of the work remain the same. As compared with the first edition many emendations are to be noted, and a number of changes in nomenclature, *e.g.*, 'sprout' forest instead of 'coppice' forest, 'composite' instead of 'coppice under standards,' 'seed' forest taking the place of 'high' forest. The book is, as always, a handy manual of the art, and is worthy of a place in every forester's library.

An Elementary Manual.

Prof. Chapman's 'Forestry: An Elementary Treatise'* is truly named an elementary treatise. Mr. Chapman tells little new about forestry, but his book is none the less useful for that. In a popular form he has told the elementary facts about forestry in thirty thousand words — between four and five pages of the average daily newspaper. In the book itself this means eighty pages of large type, easily read because of the nature both of the writing and the printing. Among the subjects dealt with are: Relations of Forestry to Government; Scope of Forestry as a Profession; American Forests; Silviculture; Fire Protection; Tax Laws; Forest Valuation, and Forest Policy.

The book is a brief, clear statement of the position of forestry on this continent and of the objects of those concerned in forest conservation. It is careful to distinguish between what is practicable in Europe and what is possible in America. If the information contained in this little work were widely distributed in America, the problems of forest conservation and utilization on this continent would be much nearer solution than they are to-day.

**Forestry: An Elementary Treatise, by Hermann H. Chapman, M.F., Asst. Professor of Forestry, Yale University. Published by The American Lumberman, Chicago, Ill., U.S.A. Price, $1.25.*

Forest School Notes.

Brief Progress Reports from Three Universities.

Prof. R. B. Miller, of the University of New Brunswick, in a recent letter to the editor, gives the following note as to the work in that university this year:—

We have 25 students here at the U.N.B., and the interest is gradually increasing. By recent action of the Senate, acting upon the advice of Mr. Knechtel and myself, I have been put in charge of securing the college wood upon the college lands (some 160 cords) and will cut it in accordance with forestry regulations. We may also do a little logging on this tract and give the students some practical experience in thinnings, making roads, yarding and scaling logs, etc., right on our own lands. During the last year the students have mapped some 500 acres of the college lands and this winter will work up an estimate from our own volume tables which we will secure while operations are in progress. Three men will graduate this year, Robert K. Shives, Kenneth R. Machum and Harold B. Murray. H. C. Belyea, 1911, and M. F. Howe, a former Sophomore are with Mr. Reginald Bradley as cruisers in the Tobique woods this winter. Prospects for employment for our men in Eastern Canada look very bright at present.

Laval Forest School Notes.

The forest school of Laval University at the present time has the following attendance:—

Class of 1913, 12 students; class of 1914, 15 students; class of 1915, 18 students, making a total of 45. Of these, thirty hold scholarships, which they obtained after passing several examinations in a general contest, which takes place every August. The fifteen others are students who are paying their tuition. Owing to the rapid increase of the school, there has now arisen the question of giving it larger quarters outside of the University. The Government and the authorities of Laval University are studying the problem, and likely the school will have a building of its own

before long. Another contemplated step is the organization of a school for the instruction of forest guards for the government and the lumber companies. A preliminary building is to be built this year at Berthierville, on the nursery grounds, and no doubt within two years the under school will be in operation, as there is a great demand for such instruction.

The lumbermen of Quebec are taking a great interest in the work of education. They have given employment to some of the students during their months of practise, and it is expected that they will co-operate before long in the organization of the chairs of lumbering, wood industries, etc.

University of Toronto Notes.

The Faculty of Forestry, University of Toronto, which graduated twelve students last year, has in the registration for the present academic year filled up its ranks to the number of 44, two old students who had interrupted their course returning and 17 new ones being registered. The graduating class has ten names, the first year of the four-year course eight names, the second year ten, and the third year five, besides eight in the six-year course in various years, and three occasional students.

Most of the graduates found employment with the Forestry Branch of the Dominion Department of the Interior, and a few with the Canadian Pacific Railway Company.

The call for foresters, owing to the sudden organization of the British Columbia Forest Branch, has been so urgent that the Dominion Branch has not been able to retain all its men, and a number have joined the new department. The market for foresters has been brisk with consequent raises in salaries to an unusual level for young men, and altogether a hopeful development for employment is anticipated.

There have been no essential changes in the curriculum as followed hitherto, except that the practice camp has been held at the beginning of the session instead of at the end.

An unusually satisfactory location for the camp was found at Frank's Bay, Lake Nipissing, Ontario, where an old dépôt of the John B. Smith & Sons Lumber Company was at the disposal of the fifteen students who attended the camp, with two instructors, and a virgin stand of red pine (limits of the Strong Lumber Company), to be logged this winter, together with other types, gave excellent opportunity for practice work in forest survey, and gathering data for working plan, studying detail of types, constructing growth tables, etc.

The work was carried out according to careful plans and has been so complete and satisfactory with regard to red pine growth-studies that it is expected to publish the results.

Forestation on National Forests in the United States

By Theodore S. Woolsey, Jr., Asst. Dist. Forester, U. S. Forest Service.

United States government foresters have realized for some time the enormous task before them in order to artificially reforest land that should be perpetually timber-producing. The total area of National Forests is approximately 190,000,000 acres. It is estimated that there are 15,000,000 acres within the forests which have been deforested and that half of this area is reforesting naturally at the rate of 150,000 acres a year. This leaves the enormous total of seven and one half million acres to be planted and sown artificially.

The policy is now pretty well established that watersheds should first be reforested, and then areas where a good stand of timber can be quickly obtained at a low cost and where the local need for timber supplies is

*Based upon the National Forest Manual and upon the report of the Forester for 1911.

greatest. Before commencing work on a large scale, it is felt that intensive experiments must be made in order to decide upon the best methods. To start with, the bulk of the reforestation is to be by direct seeding, concentrated on the best sites in the most favorable districts.

Prior to the fiscal year 1911, 13,775,000 acres had been reforested, mostly on an intensive scale; the result on probably at least ninety per cent of the area has been failure. These early failures were due (1) chiefly to the unfavorable sites; (2) because the work was so scattered that the rodents did an enormous amount of damage; and (3) because of insufficient care in planting and sowing. During the year ending June 30th, 1911, a total of 25,230.51 acres was reforested at an aggregate cost of $133,802.01 or about $5.30 an acre. In considering this low cost, however, it must be borne in mind that most of the area was merely seed-spotted, and probably complete success cannot be expected on more than, perhaps, 5,000 acres.

Two general methods were employed, namely, direct seeding on the best sites and planting thrifty nursery stock on the less favorable sites.* The direct seeding covered a total of 23,235.04 acres. This required an enormous supply of seed which was either collected by local officers or purchased. The conifer seed collected amounted to 52,798.45 lbs. at $1.24 per lb.; the hardwoods, 10,632 lbs. at 11.6c per lb. The conifers purchased amounted to 26,734 lb. at a cost of 78c per lb.; the hardwoods 28,162.5 lb. at 3.6c per lb. The total amount of seed secured amounted to 118,326.95 lb. at a cost of $88,616.60.

It has been determined that the cheapest and best method of securing satisfactory seed is by the purchase of cones, and seed extraction by the local force; seed collection should be concentrated in favorable localities and during favorable years. It has been found cheaper to collect large amounts in good seed-years and store for one or two years, than to collect during unfavorable seasons. Ordinarily, in the western United States, the best season for sowing has been the fall, and, since most of the seed ripens in September, it is necessary to collect seed the year before in order to have it available for fall sowing. The best place to store the seed is in sealed glass jars kept at a moderately low temperature. The Norway spruce seed purchased abroad (at 32c per lb.) has proved very unsatisfactory and there is a general hesitancy in using exotics under ordinary conditions. The deodar seed so generously donated by the Indian Forest Service did not germinate.

The sowing operations have been mainly by three methods: (1) broadcasting; (2) seed-spotting, and (3) corn-planting or dibbling. The broadcasting of coniferous seed on unprepared ground has resulted in failures and in the future most direct seeding will be by the seed-spot method with some corn-planting on very favorable ground. Taking the western United States as a whole, fall seeding has proved more satisfactory than winter or spring seeding, chiefly because fall sowing germinates four to six weeks earlier than spring sowing.

In the future the sites will be mapped in advance and will be poisoned with wheat both before and after sowing to curtail the damage by rodents. The chief species used in sowing are yellow pine, Douglas fir, with smaller amounts of Engelmann spruce, lodgepole pine, sugar pine, black walnut, white oak, and still smaller quantities of maritime pine and cork oak. The average cost of seeding by seed spot methods (spots placed 6 ft. x 6 ft. with twenty to thirty seeds in each spot), is $4.08 per acre, but it is hoped that this cost can be reduced to from $3.50 to $4.00 an acre.

While most of the reforestation will be done by sowing, yet some planting

*Reforestation on distinctly unfavorable sites is not sanctioned.

will be attempted, chiefly for experiment. At present the Forest Service maintains seven large nurseries, with an annual capacity of from one to four million plants in addition to twenty-two small nurseries, and there are now 35,000,000 plants on hand for use during the next two years.

The policy of maintaining large nurseries rather than small ones has been pretty generally adopted, notwithstanding the shipping cost and the danger of the stock drying out in transit. A few years ago a large number of so-called ranger nurseries were established on almost every forest, but this proved expensive and unsatisfactory. Many of the rangers wasted time on their nursery work and it seriously interfered with their regular executive duties. The transplants in the past have averaged from $8.00 to $12.00 in cost per thousand, but it is hoped in the future that two-year-old seedlings (conifers) can be raised at 75c per thousand, and two-year-old stock once transplanted for $1.75 a thousand.

Seedlings will be used only in the more favorable sites, and two-year-old stock, once transplanted, and occasionally three-year-old stock, once transplanted; or three-year-old stock, twice transplanted, on the more unfavorable situations. Yet it must be borne in mind that even planting will be confined to situations where there are excellent chances for success. For example, the Forest Service would not attempt to reforest a dry southern slope until the cool moist northern slopes had been planted. The chief species to be used in planting are yellow pine, Douglas fir, lodgepole pine, sugar pine, Engelmann spruce, with some eucalyptus and a number of other species for purely experimental purposes. The ordinary spacing is 6 feet x 6 feet. In the past plantations have cost, including nursery stock, $20.00 to $22.00 per acre; in the future it is hoped that this cost can be reduced to from $8.00 to $12.00 an acre.

The national forests which are situated in the western United States have been divided roughly into six administrative districts. They are as follows:

1. Montana, northeastern Washington, northern Idaho, northwestern South Dakota, northern Michigan, northern Minnesota, and southwestern North Dakota;
2. Colorado, Wyoming, South Dakota, Nebraska, and western Kansas;
3. Arizona, New Mexico, Oklahoma, Arkansas and Florida;
4. Utah, southern Idaho, western Wyoming, eastern and central Nevada, and northwestern Arizona;
5. California;
6. Washington, Oregon and Alaska .

This wide diversity of conditions naturally presents an enormous number of reforestation problems. At present, most of the reforestation is to be confined to the northern districts, namely, 1, 2, 4 and 6. In districts 3 and 5 the work will be chiefly experimental. The present budget calls for the reforestation of 30,000 acres annually; 1,000 acres in the two southernmost districts (3 and 5), and 29,000 in the northern districts. In Washington and Oregon the best results are expected from Douglas fir sown in seed spots; and in district one from yellow pine sown in seed spots. In Southern California the attempt to replace chaparral with a valuable timber species has been unsuccessful, and in the future the reforestation will be confined to higher elevations. The results from eucalyptus plantations in Southern California have been very poor, and the only results that promise success have been with seedlings in pots 2 in. x 2 in. x 8 in., so that they could be planted without disturbing the root system.

In Florida, maritime pine promises to be successful, and the species yields a larger quantity of resin that longleaf pine and grows much more rapidly.

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With the Forest Engineers.

In the B.C. Forest Service.

The following account of the location of the field staff of the British Columbia forest service has been kindly furnished by H. R. MacMillan, Chief Forester:—

Mr. L. R. Andrews was engaged for the month of October and part of November in making a scientific study of the scale in the mills of the interior. His main operations were conducted in the mills along the line of the Crowsnest Pass lines of the Canadian Pacific Railway. He was assisted in this work by Messrs. A. M. Black, Wm. Creighton and Miller. Among other things Mr. Andrews reports excellent market conditions and efforts among some of the mill men to utilize very closely.

Mr. F. W. Beard was in the months July to September in charge of a party north of the Railway Belt between the Barriere and Adams Rivers. In this time he covered between 200 and 300 square miles and discovered considerable good timber not yet under license, as well as between twenty-five and forty square miles of land which would be suitable for fruit-growing. In October and November he took up the work of the detailed examination around Phoenix in the Columbia and Western Land Grant.

Messrs. Caverhill, Edgecombe and Kinghorn have been engaged in the issuing of G.T.P. permits to cut timber on Crown lands along the line of construction for the purposes of tie-making. The feature of these permits is that all brush is to be piled and burned within fifty feet of the right of way, thereby making a total cleared strip of two hundred feet. Mr. Edgecombe's work took him to Tête Jaune Cache, where, as the district forester, he seized 150,000 ties of spruce and jack pine which had been illegally cut, and sold them at $2.50 per M. feet, board measure. This price is indicative of the high stumpage which obtains along the lines of construction in Canada. He also cruised two or three timber sales which are now under negotiation to dispose of the fire-killed timber. He has also been engaged in the collection of royalty on the timber cut. Mr. Caverhill's work around Hazelton and Mr. Kinghorn's around Fort George have been of this nature also.

Mr. J. R. Gareau has been in the Columbia and Windermere Valleys in reconnaissance work. The Valley has been burned over, and is now covered with reproduction. He has now come to take part in the survey of the Columbia and Western Land Grant on the North fork of the Kettle River.

Messrs. H. J. Marvin and A. V. Gilbert have been engaged in a reconnaissance of the timber and agricultural lands in a six-mile strip along the line of the G.T.P. from the Alberta boundary to a point 175 miles West. They have been endeavouring to find what land should be withheld and what timber sold. They have also been reporting on mill-sites along the Fraser river.

Mr. J .D. Gilmour has been cruising timber on lands for sale along the coast. The Forest Branch is now disposing of small bodies of burned timber and other timber that should be sold in order to be removed by operators in the vicinity as a means of saving waste. For one month he was inspecting logging camps to learn how the new Forest Act is affecting operators.

Mr. A. M. Gold, who has come to the Forest Service after a long experience in Denmark, Germany and India, has had charge of a party making a detailed examination of lands near Eholt to determine just what is good for timber and what might be used for agriculture.

Mr. L. S. Higgs this summer was in the Salmon River valley, Vancouver Island, engaged in a determination of the relative amounts of agricultural and timber land. He reports one valley which contains three and a half billion feet (3,500,000,000) of timber. He also reports a valley of fine agricultural land covered with Douglas fir which is over-mature. At the present time he is engaged in the same kind of examination in the Columbia and Western Land Grant near the south end of the Arrow Lakes.

Mr. O. D. Ingall has been cruising timber for sales and examining logging operations in connection with trespass. He is also examining land for which pre-emptions have been received, but which the Department is not quite certain whether or not should be withheld. On Nov. 20th he left for an examination of some lands in San Juan Valley on the West coast of Vancouver Island.

Mr. H. S. Irwin spent three months cruising the timber included in sixteen sales which the Department has on hand. One was in the vicinity of Adams Lake, and the remainder were on the coast. The Forest Act of 1908 designates as timberland all that which bears over 8,000 feet, board measure, per acre (west of the Cascades). Mr. Irwin's work has been to determine whether or not the lands should be allowed to be taken under pre-emption purchase under this regulation.

Mr. E. G. McDougall has had charge of the survey in the Nicola Valley of the Columbia and Western Land Grant. He will also endeavour to discover the extent of

the agricultural land and that which is only fit for growing timber.

Mr. J. B. Mitchell has been in the Omineca Country in the far North of the province making a reconnaissance and a report on the extent and character of the timber and the damage by fires. He is to send in recommendations regarding the methods of protection in the future. He will return to headquarters about Dec. 1st.

Mr. A. G. Mumford was in the country north of the new C.N.P. line near Kamloops. He will send in recommendations regarding the disposition of the land, based on its fitness for agriculture or timber. He has now joined the other members of the surveys branch in a similar examination in the Columbia and Western Land Grant.

Mr. T. H. Plumer has been making a reconnaissance around the Mabel Lake. He reports excellent timber conditions. He will stay the whole winter in the district making a reconnaissance on snowshoes. He has already cached supplies for the long work. His work takes him also to Rock Creek in the C. and W. Grant.

Mr. G. H. Prince has been cruising timber in the Upper Country and has made recommendations on four timber sales and on areas for which applications to purchase had been made. He also is now engaged in the survey of the C. and W. Land Grant.

Mr. W. A. Schell has been cruising timber in connection with timber sales and applications to purchase on the Coast; he is now making an examination near Tête Jaune Cache.

Mr. H. Claughton Wallin, who for some years has been in charge of timber surveys in the B. C. Railway Belt, with headquarters at Vancouver, has been appointed to the charge of timber surveys in the Dominion Forest Service, and has removed to Ottawa. The forest survey division will have charge of survey methods, preparations of instructions for survey parties, and compilation and mapping of the results of the survey.

Messrs. J. D. Gilmour, W. J. Van Dusen, L. R. Andrews and C. MacFayden have resigned from the Dominion Forest Service to accept positions with the British Columbia Forest Branch.

Roy L. Campbell, late editor-in-chief of ''Varsity', is engaged in the publicity work of the British Columbia Forest Branch.

G. A. Gutches, M.S.F., formerly with the Dominion Forestry Branch, paid a short visit to Ottawa just before the Christmas vacation. He was on annual leave (which in the U. S. service is of thirty days' duration). Mr. Gutches is with the Indian Department Forest Service, and his work covers the six Southwestern States.

Forestation on National Forests.

(Continued from Page 162.)

In Arkansas, where shortleaf pine, the oaks, hickories and other broad-leaved species grow luxuriantly, the reforestation is confined to the introduction of more valuable species, such as black walnut, red cedar and locust.

In Arizona, New Mexico and California, yellow pine has been used almost exclusively, and very poor success has resulted except where the soil was moist at elevations above 8,000 feet. It is probable that it will be necessary to use transplants in these states.

The policy underlying this progressive campaign for reforestation may be interesting to members of the Canadian Forest Service, and it is very fortunate that the American Forest Service is so keenly alive to its obligations to reforest unproductive areas even at considerable expense. From the purely financial standpoint, there is no question but that it will not pay. At the end of a rotation of 150 years the compound interest charges at four per cent are going to amount to more than the value of the final product. The financial failure of this reforestation program is certainly realized in the case of yellow pine, because it will probably cost at least $15.00 an acre to start, and at the end of 150 years will not yield more than 15,000 to 25,000 board feet per acre. Yellow pine today is worth only $3.00 per thousand board feet on the stump. Therefore, the increase in stumpage price must be enormous in order to make the operation profitable.

Athabaska Landing is determined to have the first pulp mill in Canada west of the Soo. There is enough pulpwood along the river and north of it to supply the whole prairie country. A syndicate is willing to build a mill, if it can get some timber land—for which purpose a delegation lately went to Ottawa. "We are going to run it in a new way, too, by natural gas," said one of the delegates. "We have one railway running into our town already, the Canadian Northern Railway, and we will have the same line start out towards the Peace River country and Fort McMurray this summer, so there will be no lack of transportation facilities."—*Canadian Finance.*

Nearly five hundred men were appointed as provincial fire-rangers for Ontario, only about twenty per cent of whom were students. The great majority were from the woods and the lumber camps. All the country from the Quebec boundary to Manitoba was covered, especially the country along the Timiskaming and Northern Ontario and the National Transcontinental Railways. In additon to the 491 men thus appointed, a hundred men were later on appointed for work along the Canadian Northern Ontario line, now under construction. The cost of the patrol along the railways is borne jointly by the railways and the province.

Mr. A. Holmgren, of the Swedish forest service, who paid a visit to Canada during the past summer, took a trip to Grandmere, P.Q., and went over the Laurentide Co.'s limits. Mr. Holmgren is the editor of the paper published by the Forestry Association of Norrland, Sweden.

The St. Maurice Valley Fire Protection Association has had a very successful season, and several of the limit-holders of the western part of the province of Quebec are contemplating joining the Association.