1913.

NEW ZEALAND.

ROYAL COMMISSION ON FORESTRY

(REPORT OF THE), TOGETHER WITH MINUTES OF PROCEEDINGS AND OF EVIDENCE.

Presented to both Houses of the General Assembly by Command of His Excellency.

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COMMISSION.

LIVERPOOL, Governor.

To all to whom these presents shall come, and to Henry Douglas Morpeth Haszard, Esq., F.R.G.S., Commissioner of Crown Lands and Chief Surveyor for the Westland Land District; Thomas William Adams, Esq., farmer, of Greendale, Canterbury; Samuel Isaac Clarke, Esq., builder, of Ponsonby, Auckland; Leonard Cockayne, Esq., F.R.S., F.L.S., Ph.D., of Christchurch; Frank Yates Lethbridge, Esq., farmer, Makino Road West, Feilding; and Charles Primrose Murdoch, Esq., woodware-manufacturer, of Auckland: Greeting.

WHEREAS it is desirable to ascertain in what manner the areas of land within the Dominion of New Zealand now under standing forest should be dealt with, and to what extent the existing afforestation operations of the Government of New Zealand are sufficient to satisfy the future demand for timber within the said Dominion, and how far such operations should be extended:

Now know ye that, in exercise of the powers conferred by the Commissions of Inquiry Act, 1908, and of all other powers and authorities enabling me in this behalf, I, Arthur William de Brito Savile, Earl of Liverpool, Governor of the Dominion of New Zealand, acting by and with the advice and consent of the Executive Council thereof, do hereby appoint you, the said

HENRY DOUGLAS MORPETH HASZARD,
THOMAS WILLIAM ADAMS,
SAMUEL ISAAC CLARKE,
LEONARD COCKAYNE,
FRANK YATES LETHBRIDGE, and
CHARLES PRIMROSE MURDOCH

to be a Commission for the purpose of inquiring by all lawful means into the condition of forestry in New Zealand, and for that purpose to inspect the forest lands of the said Dominion and the State nurseries and plantations, and to report—

(1.) Which of the existing forest lands it is desirable to permanently retain under forest covering for the purposes of soil-protection and prevention of denudation, water-conservation, prevention of floods, climatic, scenic, or any other national benefit.

(2.) Which of the forest-areas are not required for any of the purposes mentioned in (1), but are suitable for settlement, sawmilling, or other commercial purposes, indicating whether such areas should be utilized forthwith or rendered available at some future period.

(3.) The best method of dealing with the indigenous forests in the public interests generally.

(4.) Whether or not, in view of the large and increasing demand for white-pine timber in connection with the butter industry, the exportation thereof should be wholly or partially prohibited.

And with regard to afforestation operations—

(5.) The probable future demand for timber for commercial purposes within the Dominion of New Zealand.

(6.) The nature and kinds of timber likely to be so required.

(7.) How far the operations of existing State nurseries and plantations meet the probable demand.

(8.) To what extent such operations should be supplemented and expanded and in what localities should new nurseries and plantations (if any) be situated.

(9.) Whether the present operations of the State are being conducted on satisfactory and progressive lines. If not, to what extent and in what manner the present management and control should be altered.

(10.) Under what conditions should the State encourage and assist tree-planting by private individuals and local bodies; and, generally, any matters which, in your opinion, affect forest conditions and afforestation in the Dominion, or would tend to promote their development, including the necessity or expediency of any legislation in the premises.

For the purposes of your inquiry you are hereby authorized and empowered to have before you and examine all books, papers, documents, or writings you deem necessary, and examine on oath or otherwise, as allowed by law, all witnesses or other persons whom you think capable of affording you any information in the premises. The said Henry Douglas Morpeth Haszard shall be your Chairman, and you are hereby empowered and directed to conduct your inquiry in such manner, at such times, and with such adjournments as you think fit. And, using all diligence, you are hereby required to report to me under your hands the result of your inquiry, with any recommendations you think fit to make in the premises, on or before the thirtieth day of April, one thousand nine hundred and thirteen.

Given under the hand of His Excellency the Right Honourable Arthur William de Brito Savile, Earl of Liverpool, Governor and Commander-in-Chief in and over His Majesty's Dominion of New Zealand and its Dependencies; and issued under the seal of the said Dominion, at the Government House, at Wellington, this eleventh day of February, in the year of our Lord one thousand nine hundred and thirteen.

W. F. MASSEY,
Minister of Lands.

Approved in Executive Council.
J. F. ANDREWS,
Clerk of Executive Council.

EXTENDING TIME OF COMMISSION.

LIVERPOOL, Governor.

To all to whom these presents shall come, and to Henry Douglas Morpeth Haszard, Esq., F.R.G.S., Commissioner of Crown Lands and Chief Surveyor for the Westland Land District; Thomas William Adams, Esq., farmer, of Greendale, Canterbury; Samuel Isaac Clarke, Esq., builder, of Ponsonby, Auckland; Leonard Cockayne, Esq., F.R.S., F.L.S., Ph.D., of Christchurch; Frank Yates Lethbridge, Esq., farmer, Makino Road West, Feilding; and Charles Primrose Murdoch, Esq., woodware-manufacturer, of Auckland: Greeting.

WHEREAS by a Warrant dated the eleventh day of February, one thousand nine hundred and thirteen, and issued under my hand and the public seal of the Dominion, you were appointed a Commission to inquire into and report on the condition of forestry in New Zealand, and you were directed and required to report to me on or before the thirtieth day of April then next ensuing your proceedings and your opinion touching the matters mentioned therein:

And whereas it is expedient that the said period should be extended as hereinafter provided:

Now, therefore, I, Arthur William de Brito Savile, Earl of Liverpool, the Governor of the Dominion of New Zealand, in exercise of the powers conferred

by the Commissions of Inquiry Act, 1908, and of all other powers and authorities enabling me in that behalf, and acting by and with the advice and consent of the Executive Council of the said Dominion, do hereby declare and appoint that the time at or before which you shall present to me your report aforesaid is hereby extended to the thirty-first day of May, one thousand nine hundred and thirteen:

And with the like advice and consent, and further pursuance of the said power and authority, I do hereby confirm the said Commission, except as herein varied.

Given under the hand of His Excellency the Right Honourable Arthur William de Brito Savile, Earl of Liverpool, Governor and Commander-in-Chief in and over His Majesty's Dominion of New Zealand and its Dependencies; and issued under the Seal of the said Dominion, at the Government House, at Auckland, this twenty-ninth day of April, in the year of our Lord one thousand nine hundred and thirteen.

H. D. BELL,
For Minister of Lands.

Approved in Executive Council.

J. F. ANDREWS,
Clerk of Executive Council.

REPORT.

To His Excellency the Right Honourable Arthur De Brito Savile, Earl of Liverpool, Governor and Commander-in-Chief in and over His Majesty's Dominion of New Zealand and its Dependencies.

MAY IT PLEASE YOUR EXCELLENCY,—

We, the Commissioners appointed by Your Excellency on the 11th day of February, 1913, to inquire by all lawful means into the condition of forestry in New Zealand, and for that purpose to inspect the forest lands of the Dominion and the State nurseries and plantations, and to report on the several matters referred to in the Commission, a copy of which is attached hereto, have the honour to report as follows :—

We assembled at Wellington on the 26th February and held three meetings, at which our itinerary was arranged, and various matters discussed. The Hon. W. F. Massey, Prime Minister of the Dominion, was present at the opening of the first meeting, and briefly addresed us on the objects of the Commission. The Chairman, Mr. Hazzard, also delivered a short opening address.

Leaving Wellington on the evening of the 28th February, the Commission reached Invercargill on the 1st March, and held a public sitting there in the Government Buildings on the 3rd March. Since the subjects of our inquiry were of great public interest we decided to admit the public and the Press to all our sittings, excepting such as were held in committee, and to advertise beforehand the dates and place of such in the local newspapers. Whilst in Southland your Commission visited the Longwood Forest, the Waiau Forest, and the Waikawa Forest, viewing at the same time a considerable portion of the Southland Plain. A visit was also paid to the Bluff, and an inspection made of the Government timber-preserving works at Kew, where we examined various samples of timber treated by the Powellizing process. On the 6th March your Commission proceeded to Tapanui, making an inspection of the Government nursery the same day under the guidance of Mr. R. G. Robinson, Superintending Nurseryman for the South Island. The next day was spent, in company with Mr. Robinson, in examining the Dusky Hill plantations, and in paying a brief visit to the silver-beech forest in Whisky Gully, Blue Mountains. Leaving Tapanui on the 8th March we reached Dunedin the same evening. A public sitting was held in that city at the Land Office on the 11th March. While in Dunedin and neighbourhood your Commission visited Waitati, where, in the grounds of the Mental Hospital, under the guidance of Dr. Ross, the Superintendent, we examined a remarkable self-sown growth of an Australian gum (*Eucalyptus numerosa*). A visit was also made, in company with Mr. D. Tannock, to the plantations that are being planted in the Leith Valley by the Dunedin Corporation. In view of the use of timber for paper pulp, the paper-mill at Woodhaugh was also visited. On the 12th March your Commission journeyed to Ranfurly, on the Maniototo Plain, Central Otago, accompanied by Mr. R. G. Robinson, and inspected the nursery and the several plantations in that neighbourhood. Naseby was also visited, and the trees growing in that relatively cold climate noted. The next day we proceeded to Cromwell by rail, and had an opportunity of seeing some of the depleted area of Central Otago. On the 14th March, in order to further study the conditions for afforestation in the dry treeless districts of Central Otago and the Mackenzie Plains, your Commission proceeded to Lake Pukaki, *via* the Lindis Pass and Otarama. The following day we proceeded to Timaru by way of Lake Tekapo and Fairlie, examining *en route* certain plantations of the Mackenzie County Council. At Timaru your Commission divided into subcommittees, Messrs. Clarke and

Murdoch remaining in that city, and the other members proceeding to Christchurch, which was reached the same evening. On Monday, the 17th March, the Christchurch subcommittee visited a number of old plantations on the Canterbury Plains, including that of Mr. John Deans, at Homebush, where there is a vigorous growth of larch. The next day a public sitting was held in Christchurch at which all the members of your Commission were present. On the 19th March we travelled to Hanmer, and under the guidance of Mr. R. G. Robinson, Superintending Nurseryman for the South Island, visited the State nursery and a portion of the plantations. The next morning other parts of the plantations were visited and the prison camp inspected, and, in the evening, Christchurch was reached. On the 21st March the extensive plantations at Greendale of Mr. T. W. Adams, one of your Commissioners, were visited, and while there a deputation was received of settlers from Oxford regarding the reservation of a certain forest-area in that locality. On the 22nd March your Commission travelled to Hokitika, Westland, going through a portion of the Waimakariri National Park and the Otira Gorge. While in Westland we examined various types of forest, including the beautiful scenic reserve and other forest lands at Lake Kanieri. We also visited the sawmill of Messrs. Butler Bros., under the guidance of Mr. J. Marchant, and that of Messrs. Baxter Bros. The Town of Ross was the furthest point south that we reached in Westland. On the 25th March we held a public sitting at the Courthouse, Greymouth, examined various exotic trees growing in the town, and had the opportunity of seeing, at the factory of Mr. Charles Uddstrom, furniture in process of manufacture from one of the New Zealand beeches, probably silver-beech (*Fagus Menziesii*). Whether this determination be correct or the contrary, the above is the species milled in Southland, the principal locality where this timber is milled. The above timber appeared to your Commissioners to be well suited for furniture, and, as there is a very large supply, its export in quantity would be of great value to the Dominion. The evening of the same day we proceeded to Reefton, which town we left early the next morning *en route* for Nelson, *via* the Valley of the Buller. On the 27th March your Commission held a public sitting at the Council Chambers, Nelson, and the next day proceeded *via* the Rai Valley and Blenheim to Dumgree, returning to Blenheim the same evening. At Dumgree we saw the Government plantation, part of which was recently destroyed by fire. On the morning of the 29th March a public sitting was held in the Land Office, Blenheim, and in the afternoon part of your Commission visited an old plantation on the Hillersden Estate, Wairau, in the neighbourhood of Blenheim, and the remainder inspected the scenic reserve at Double Bay, Queen Charlotte Sound. The same evening your Commission left Picton for Wellington, where we arrived about 10 p.m. Three days, including Sunday, were spent in Wellington, during which time your Commission discussed various matters, and decided on the itinerary for the North Island. On the 2nd April your Commission journeyed to Napier. A public sitting was held in the Lands Office on the morning of the 3rd April, and in the afternoon one part of your Commission visited a proposed scenic reserve at Titiokura, and the remainder were most kindly shown over a portion of the district by the Hawke's Bay Builders' Association. On the 4th April your Commission divided into two subcommittees, Messrs. Haszard (Chairman) and Murdoch and Dr. Cockayne journeying to Lake Waikaremoana, *via* Wairoa, in order to inspect the forests near the lake; and Messrs. Adams, Clarke, and Lethbridge travelled to Waiotapu, *via* Tarawera and Taupo. The Waikaremoana party returned to Napier on the 5th April, and leaving that city on the 6th joined the other members of your Commission at Waiotapu the same evening. From Waiotapu the Government plantations were inspected under the guidance of Mr. H. A. Goudie, the Superintending Nurseryman for the North Island, and the prison camp of the Kaingaroa Plains was also visited. On the 8th April your Commission, under the same guidance, inspected the nursery at Whakarewarewa and certain of the plantations in its vicinity. On the 9th April your Commission again divided, Messrs. Clarke, Lethbridge,

and Murdoch proceeding to Tauranga, *via* Oropi, and the next day to Hamilton, *via* Waihi; while Messrs. Haszard (Chairman), Adams, and Dr. Cockayne went to Thames, where, in company with Mr. J. W. Hall, they inspected an interesting mixed plantation of exotic and indigenous trees planted by that gentleman forty years ago. This plantation is of special interest since an account of the rate of growth of the trees has been published in the "Transactions of the New Zealand Institute," Vol. 34, p. 386. The members of the two subcommittees of your Commission, with the exception of Dr. Cockayne, who had proceeded to Auckland by boat from Thames, reunited at Hamilton, and on the morning of the 10th April visited the Government experimental farm at Ruakura, and also an important plantation of Australian gums on the estate of Mr. R. Gillet, Kirikiriroa. The same evening the whole of your Commission reached Auckland. On the 12th April your Commission sat in committee at the Lands Office, Auckland. On the 14th April we journeyed to Dargaville, where on the day following a public sitting was held in the Courthouse. Mr. Adams and Dr. Cockayne did not attend the above sitting, since they went as a subcommittee on the same day to visit a proposed scenic reserve at Ruawai, near Naumai. On the 16th April your Commission divided into two subcommittees, Messrs. Haszard (Chairman), Clarke, Lethbridge, and Murdoch setting out for the Waipoua State Forest, and Mr. Adams and Dr. Cockayne journeying to Kawakawa, *via* Tangiteroria and Whangarei. The Waipoua party made an inspection of the forest the next day under the guidance of Mr. J. Maxwell, the caretaker, reaching Kohukohu, Hokianga, the same evening, to which township the remainder of your Commission journeyed the same day, *via* Ohaeawai. On the 18th April Messrs. Haszard (Chairman) and Lethbridge inspected the Omahuta Forest Reserve, and Messrs. Clarke and Murdoch that on Mount Raetea, to the north of Broadwood. On the 19th April your Commission travelled to Whangarei, *via* Ohaeawai and Kawakawa. On the 21st instant the Puhipuhi Forest Reserve was inspected by Messrs. Haszard (Chairman), Adams, Clarke, and Murdoch, in order to ascertain the results of the fire in the State plantations, and the value of the reserve for afforestation or settlement, as the case may be. On the 22nd April your Commission returned to Auckland. A sitting in committee was held in the Lands Office, Auckland, on the morning of the 23rd, and in the afternoon Messrs. Adams and Lethbridge and Dr. Cockayne visited the Three Kings' College, where they were shown by the Principal, the Rev. J. H. Simmonds, his important collection of Australian gums. The following day a public sitting was held in the Lands Office, Auckland, at which all the members of your Commission were present. On the 25th April your Commission left Auckland at noon, an inspection having been made in the course of the morning of the experimental butter-boxes referred to further on in our report. At Te Kuiti your Commission divided, Messrs. Haszard (Chairman) and Lethbridge, accompanied by the Secretary, Mr. E. Phillips Turner, proceeding to the Mokau River, in order to inspect the present and proposed scenic and climatic reserves, while the remaining members went on to Taumarunui. On the following day the Taumarunui party, under the guidance of Mr. H. Lundius, Crown Lands Ranger, proceeded down the Wanganui River, and paid careful attention to the scenic reserves and the banks of the river in general. On the 25th April the same party continued their journey down the Wanganui River, reaching New Plymouth the same evening. *En route* they called at Wanganui, and had an interview with the Chairman of the Wanganui River Trust, Mr. T. D. Cummins, and Mr. W. A. Veitch, M.P. The Mokau subcommittee, having made an examination of the banks of that river as far as the coal-mine, Pareware, joined the rest of your Commission at New Plymouth on the 25th April, and that day was occupied in a visit to the forest reserve on the Manganui River, near Inglewood, and to the Mount Egmont National Park. On the 30th April a public sitting was held at New Plymouth in the Municipal Council Chambers. On the 1st May your Commission left New Plymouth for Wellington, reaching that city the same evening.

As it was found impossible, owing to the extent of the country to be traversed, and also on account of numerous reserves that your Commission were requested to inspect, not included in our itinerary, we were reluctantly compelled to ask for an extension of time within which to present our report. This was sanctioned, and the period of your Commission was extended to the 31st May, inclusive.

On the 3rd May your Commission divided into three parts: Mr. Haszard (Chairman), Dr. Cockayne, and Mr. E. Phillips Turner (Secretary) remaining in Wellington, in order to draw up a provisional draft of the report. Messrs. Clarke, Lethbridge, and Murdoch proceeded to Auckland, and from that centre visited the kauri-gum reserves at Waitakerei and Swanson, and took informal evidence from residents in the district. On the 9th May the same subcommittee inspected the very interesting gum plantations of Mr. R. Reynolds, referred to in Appendix C. On the 9th May Mr. Haszard (Chairman) proceeded to Taumarunui in order to join the Auckland party, and with them examine certain forest lands and sawmills in the vicinity of the Main Trunk line. On the 10th instant the above subcommittee visited the sawmill at Mananui of Messrs. Ellis and Burnand, under the guidance of Mr. J. W. Ellis. An automatic dovetail-jointing machine was seen in operation. This constructs wide boards suitable for making butter-boxes out of narrow pieces of white-pine. This renders possible the utilization of what has hitherto been a waste product, and, should the machine come into general use, a considerable saving in the conversion of white-pine will be effected. Samples of the jointed wood were secured as an exhibit for your Commissioners. On the 12th May the subcommittee inspected in the morning the Government sawmill at Kakahi, as also the adjoining forest, and in the afternoon visited the forest at Owhango, reaching Ohakune the same evening. On the 12th May the subcommittee proceeded to Marton, where the next morning various plantations were visited, and in the afternoon the train was taken to Wellington. On the 3rd May Mr. T. W. Adams, who had been detailed to report on various matters in the South Island, and to visit the Government plantations at Conical Hills, which bad weather had prevented your Commission inspecting when at Tapanui, proceeded to Christchurch. On the 6th May Mr. Adams made inquiries regarding the conversion of *Pinus radiata* (generally known as *Pinus insignis*) in Canterbury. On the 7th May Mr. Adams proceeded from Greendale to Christchurch, and took photographs and measurements of poplars growing upon the banks of the River Avon. The next day Invercargill was reached, and on the 9th instant Mr. Adams proceeded to Queenstown, and on the following day inspected the plantations in the vicinity, and visited a certain Government reserve in order to ascertain its suitability for tree-planting. On the 12th May Mr. Adams proceeded to Tapanui, and the next day, in company with Mr. R. G. Robinson, Superintending Nurseryman for the South Island, inspected the Conical Hills plantation, and reached Waiwera the same evening. The next day Mr. Adams, under the guidance of Mr. J. Christie, inspected some gum plantations near Warepa, and in the afternoon proceeded to Dunedin. The next day Mr. Adams superintended the photographing of the natural plantation of gums at Waitati. On the 16th instant Mr. Adams proceeded to Greendale, *via* Norwood, and next day he procured photographs of houses built entirely of *Pinus radiata*. On the 19th May Mr. Adams proceeded to Wellington to join the other members of your Commission.

On the 20th instant your Commission assembled at the Parliamentary Buildings, Wellington, to draft their report. On the 22nd May your Commission divided into two subcommittees, one, consisting of Messrs. Haszard (Chairman) and Adams and Dr. Cockayne, remaining in Wellington in order to prepare a draft of the report; and the other, consisting of Messrs. Clarke, Lethbridge, and Murdoch, visited the forest reserve near Woodville, and reached Feilding the same evening, inspecting *en route* the Mangoira, the Mangawhararikl, and Rewa Forest Reserves. On the 24th May, in company with Mr. K. Dalrymple, the same subcommittee visited McKelvie's run on the

dunes south of the Rangitikei River, and Dalrymple's run on the north of the Rangitikei. On the 26th May Wanganui was visited in the morning, and Messrs. Veitch, M.P., Cummins, Macfarlane, and others on the River Trust, together with a deputation from the Scenery Preservation and Beautifying Society of Wanganui, made representations to the subcommittee regarding the conservation of the headwaters of the Wanganui. The subcommittee reached Wellington on the evening of the 26th. Since that date the full Commission has been engaged in the consideration of the final report.

The total distance travelled by your Commission was seven thousand miles.

As seen from the order of reference, the ten questions therein fall into two distinct categories, the one dealing with the existing natural forests of the Dominion, and the other with afforestation. It might be thought that these two phases of forestry should not be separated, and such would be the case in many other countries, but in New Zealand, as we explain at some length further on in this report, the natural forests belong, with perhaps one exception, to a class which cannot regenerate sufficiently quickly to allow them to be kept as permanent forests yielding a succession of crops.

Though each of the questions we are asked to answer is obviously of high importance, two matters stand out prominently — namely, that of climatic reserves and that of afforestation—since both concern not only the present but also the future prosperity of the Dominion. With regard to afforestation, the financial aspect is one of great moment, and in order to assure financial success the greatest economy must be practised, since the expenditure of an additional £1 per acre yearly would mean, at 4 per cent. compound interest, no less a sum at the end of fifty years than £152.

At first thought it might seem that the ground covered by your Commission in so brief a period as some ten weeks had been altogether too extensive, and that the forests and plantations visited could have received but a cursory examination at best. This might well have been the case but for the fact that various members of your Commission had been over much of the route previously, and in a more leisurely manner. Further, the members of your Commission generally have, in a private capacity, examined many other parts of the forest lands of the Dominion impossible to have been visited by your Commission in the allotted time, and that, moreover, they have had for many years a first-hand acquaintance with New Zealand forests in general, and with various private plantations. The above statement is illustrated by the appended map, which shows not only the route taken by your Commission, but also those parts visited previously by the members.

From the earliest days of settlement up to the present time there has been a great deal of tree-planting by private landowners and public bodies, whose activity in this direction is abundantly manifest throughout most of the settled parts of the Dominion. These plantations, indeed, are much greater than is generally supposed, since they total no less than 44,910 acres.*

Such plantations, great and small, are not only of importance for their commercial or climatic value, but they afford the most valuable testimony as to the trees suitable for afforestation, or other purposes, in different parts of the country. Also, they supply undeniable evidence as to the relation of the different species to the soil and the climate; the rate of growth of such species; the quality of their timber under different conditions and different ages; the results of planting at different distances; the effect of thinning; their liability to disease; and in many other matters of the highest importance with regard to forestry operations in the future. Regarding these private plantations very little has been published, notwithstanding they have so much of import to tell. The owner frequently is ignorant as to the names of his trees, and it is not infrequent that they have been supplied to him under wrong names. Quite early in our quest for information we recognized how important a full knowledge of the plantations of the Dominion as a whole would be; so, in order to make a commencement of a much-desired work, we invited, through the Press

* "New Zealand Official Year-book," 1912, p. 600, but deducting the 18,870 acres of State plantations.

and otherwise, owners of plantations to send information as to the names of their trees, their height and girth at 5 ft. from the ground, the nature of the soil in which they grew, and the altitude and climate of the locality.

We also visited certain of the plantations that lay along our route, and made special excursions to such in a few localities, but it is plain that much still remains to be done in this important field of research, and that an exhaustive knowledge of the plantations of New Zealand throughout is a matter of the highest importance to the State. What information we have collected on the above matters is shown in Appendix D.

We have held altogether twelve public sittings, at which we examined eighty-eight witnesses. In addition, we have had many informal conversations with settlers and others interested in one phase or another of the subjects under our consideration, and we have thereby elicited a considerable amount of valuable and suggestive information. One and all have been anxious to give us all the information and assistance that lay in their power; indeed, no trouble has seemed too great, and we have had reluctantly, owing to lack of time, to decline many invitations to visit plantations or pieces of natural forest. We have received many letters and contributions from different sources. For the whole of these we are most grateful, and we beg to accord our hearty thanks. We have also to thank sincerely several gentlemen who have placed their time, services, and knowledge at our disposal. We are expressly indebted to the Rev. Mr. Simmonds, of the Three Kings' College, Auckland, who has written the masterly letter on *Eucalypti* which appears in Appendix C; and Mr. R. Reynolds, of Trecarne, Waikato, who has given us such important evidence as to the remarkable durability of some of his *Eucalypti*, and sent us samples of the wood. It is hardly going too far to state that Mr. Reynolds's Australian gum may prove eventually almost the most important tree introduced into New Zealand. The evidence we have taken is appended. While carefully considering the facts therein recorded, and as far as we know neglecting nothing of importance brought before us, our conclusions are by no means based on such evidence alone. On the contrary, we have been guided in no small measure by our personal experience and observations.

In the compilation of our report we have sought to be as brief as possible, without neglecting any points of importance in an order of reference so extensive.

We have made every effort to carry out the important duties intrusted to us. The limited period allotted to us to undertake a task so great had led to our having had to travel early and late, and at the greatest speed. Nor would this have sufficed had it not been that we were favoured by almost invariably fine weather. Even as it was certain localities would have remained unvisited had we not divided at times into subcommittees, so that several forest-areas far apart could be inspected on the same day.

It is our pleasing duty to record that in all our recommendations there has been complete unanimity.

Passing now to the various questions on which we were instructed to inquire, and which fall naturally under the two leading heads of matters concerning the indigenous forests and those concerning afforestation, we beg to report as follows:—

PART I.—THE INDIGENOUS FORESTS.

1. As to the Existing Forest Lands, and which it is desirable to Permanently Retain under Forest Covering for the Purposes of Soil-protection and Prevention of Denudation, Water-conservation, Prevention of Floods, Climatic, Scenic, or other National Benefit.

The above question falls naturally into two sections—the one dealing with climatic and the other with scenic reserves. Since we have found it impossible to visit all the forest lands of the Dominion, or even to afford in certain cases adequate time for a thorough inspection of the areas visited, a good deal of reliance has had to be placed upon departmental reports, the evidence of depart-

mental officers or others, together with the knowledge previously obtained by various members of your Commission. Hence it follows that a general answer, so far as concerns climatic reserves, is alone possible, and that the areas suggested in Appendix A as suitable for such reserves must, in many instances, have their exact delimitations defined by the Department of Lands under the conditions laid down in our report.

(1.) *Climatic Reserves.*

For the purposes of this report, we define a "climatic reserve" in the terms of the question as one for the purposes of protection of soil, prevention of denudation, water-conservation, prevention of floods, and, in addition, shelter from winds. This latter function, not mentioned in the order of reference, is one of great moment in windswept localities, no matter the altitude, and obviously many scenic reserves have a strong climatic effect in this regard, and for that reason alone should be zealously preserved.

The value of having a forest covering of the watershed of rivers and at the sources of such and the smaller streams is now so well recognized that only a few extracts from the writings of leading authorities are needed here.

Professor I. Bowman writes dealing with the question of the evil effects of deforestation in the Southern Appalachian Mountains: "The rain beats directly upon the soil, the retarding influence of the ground litter and tree-root is withdrawn, and more rapid soil-removal occurs. When one of these evil effects have been allowed to take place mankind is deprived practically for thousands and even millions of years of the favourable conditions that preceded the epoch of destruction. In a hundred years man may achieve such baneful results as nature will compensate only during a geologic period of hundreds of thousands of years. Soil is a resource of priceless value. On resistant rocks its formation is exceedingly slow. Seventy thousand years is a very short time for the development of a soil-cover; for man it means a period so great that his mind can hardly appreciate it. The earth, as we find it to-day, must be treated with care if the human race is to have a fair distribution of its wealth in time. To the geologic mind there is something shocking in the thought that a single lumber merchant may in fifty years deprive the human race of soil that required ten thousand years to form."*

Professor Eug. Warming, of Copenhagen, writes as follows: "Every kind of covering formed by vegetation acts upon the physical relations in soil, and the denser, taller, and longer-lived the vegetation is, the more powerful is its action. Forest therefore acts most powerfully."†

Dr. B. E. Fernow states: "The conditions at the headwaters of each affluent must ultimately be reflected in the flow of the main river. The temporary retention of large amounts of water and eventual change into subterranean drainage which the well-kept forest-floor produces, the consequent lengthening of the time of flow, and especially the prevention of accumulation and carrying of soil and detritus which are deposited in the river and change its bed, would at least tend to alleviate the dangers from abnormal floods and reduce the number and height of regular floods." And again: "The well-kept forest-floor, better than even the close sod of a meadow, prevents erosion and abrasion of the soil and the washing of soil and detritus into brooks and rivers. . . . The best soil of the farms is often washed into rivers.‡

In relation to its area, few countries in the world are in more need of an adequate forest covering on their high lands than is New Zealand. The lofty mountain-ranges which traverse both Islands and the excessively broken nature of the land in many places, together with an average high rainfall, lead to the presence of innumerable streams, and offer ideal conditions for denudation.

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* "Physiography of the United States, and Principles of Soil in Relation to Forestry," 1911.

† "Oecology of Plants," 1909, p. 75.

‡ "Economics of Forestry," 1902, pp. 445, 446. See also appendix for article on "Erosion of Slopes in New Zealand," by C. A. Cotton, Lecturer in Geology, Victoria College.

In other words, the mountains and hills of New Zealand would, if not forest-clad, be a constant source of danger to the farm lands on which the prosperity of the Dominion so greatly depends.

From the above it follows that, in order to be efficacious, the climatic reserves of New Zealand must occupy a wide area. Originally, except where conditions of soil or climate were antagonistic, a tree-covering occupied the whole land, and extended to a height of between 3,000 ft. to 4,500 ft., more or less, according to latitude. This extensive forest has now been enormously reduced, and, indeed, rightly, in order to meet wants of settlement; nevertheless, there has been much unnecessary destruction, which has extended to the steep slopes of hill and mountain, and even to the upper altitudinal limits of the forest. Thus the headwaters of many streams are no longer surrounded by forest, and the general watersheds of the larger rivers are by no means so efficiently protected as was originally the case. The time has come, in our opinion, when these mountain forests, which in nearly every instance occupy comparatively worthless ground, and contain little, if any, milling-timber, should be zealously protected, nor, except under the most pressing of circumstances, should they be interfered with. Various Commissioners of Crown Lands, as seen in the evidence, are strongly and wisely in favour of materially extending the climatic reserves of their districts.

In Appendix A there is a list of such of the forest-areas that we specifically recommend for climatic reserves as are approximately defined. The following we also desire to be made climatic reserves, but the exact areas must be fixed by the Department of Lands :—

1. The sources of the principal rivers of Canterbury which rise in the Southern Alps. We call special attention to the Waimakariri National Park. The forest of this area has been gazetted forest reserve. This reservation we strongly recommend to be lifted, and the park made climatic reserve under the Act, as proposed in Part II.

2. The upper portion of the whole of the North Island dividing range, the exact limits to be fixed by the Department of Lands. The following principles have guided our choice in recommending the above areas: (1.) All forests situated above a certain altitude, which of necessity decreases considerably in proceeding from north to south, should be constituted climatic reserves. For example, a climatic reserve of this class on Mount Ruapehu might have its lowest limit at an altitude of 3,000 ft., while one on the Longwood Range, Southland, might descend to 1,000 ft., or even lower. (2.) Steep slopes on the lower hills, which cannot be effectively grassed, together with the sources of streams, should have their forest covering left intact. (3.) Forest on the banks of creeks, and on river-terraces, although at quite a low altitude, may be in some cases of considerable climatic importance, since, under certain circumstances, removal of forest from the banks means rapid undermining of these by the river.

At the present time the existing and proposed climatic reserves are, in many places, the haunts of numerous deer, wild cattle, or goats. We will leave the two latter classes of animals out of consideration for the present, since no one could claim that their presence within the forests was beneficial, and consider the deer alone. Should it be a fact that the presence of deer in great numbers is detrimental to the undergrowth of the forest, then it is clear that steps should be taken to either do away with them altogether or to restrict them to defined areas where they can do the minimum amount of damage. In order to ascertain what part the deer played in the economy of the upland forests, on the one hand, and what value they were to the community from the sporting aspect, on the other hand, we examined such witnesses in every centre as seemed likely to afford information of moment. Especially did we seek to get a clear expression of opinion from the side of the sportsman, and, with this end in view, took evidence from the chairman and secretary of various acclimatization societies; and, taking that evidence alone, we fail to see that deer are not harmful in a forest, or that the monetary gain to the country can in any way counterbalance the damage they must eventually do to the climatic reserves.

Taking the evidence of the non-sportsman, and considering the damage done by deer not only to the forests (see photo No. 1), but also to the plantations, orchards, and crops, our opinion as to their harmfulness is much strengthened. We therefore advise that measures be taken to restrict deer to limited areas, sufficient for sport, which may be proclaimed deer parks, where they can do the smallest possible damage.

The undergrowth of forest is of especial importance in preventing evaporation from the ground-surface, and thus assisting in conserving the water-supply. This function is recognized the world over, but in a New Zealand forest, where the undergrowth is usually very dense, its climatic effect reaches a maximum. Any factor, therefore, should be vigorously repressed which may lead to damage to such undergrowth. Deer, both red and fallow; cattle, tame or wild; and goats are of especial moment in this regard. So far as deer are concerned, these animals year by year are extending their range, so that the time is not far distant when, unless stringent measures are adopted, the whole of the Southern Alps in the South Island and the dividing range in the North Island will be overrun.

(2.) *Scenic Reserves.*

Under the term "scenic reserves" are included several distinct classes of reserve, which may be distinguished as follows :—

1. Reserves for preserving the scenery. The special character of the scenery of any country does not depend upon the surface features of the landscape, but upon the plant covering. For example, were the vegetation of the Otira Gorge to consist of European deciduous forest, and not of a mixed assembly of evergreen trees, shrubs, and ferns, most of them peculiar to New Zealand, the scenery, now famed throughout the world, would be altogether different, and its special charm and interest gone. So, too, the present Otira scenery differs in part from that of the Buller Gorge owing to the absence of New Zealand beech in the former and its predominance in the latter. The scenery of the Wanganui River has in many places between Wanganui and Pipiriki lost altogether its peculiar character and especial attraction since, instead of the original unique plant covering, innumerable European willows, in long lines, fringe its banks. The class of scenic reserve here dealt with is of especial moment along tourist routes, and the importance of maintaining the vegetation of such in its virgin condition should need no elaboration. Speaking of the vegetation of New Zealand as a whole, it must be remembered that out of its total of some 1,700 species of trees, shrubs, herbs, ferns and fern allies, more than three-fourths are found nowhere else in the world. Moreover, this vegetation, where unmolested by human occupation, is not artificial, as is that of Europe generally, where the forests have been planted or much modified by man, and even the mountain meadows changed by the grazing of domestic animals. The vegetation of New Zealand, where undisturbed, is truly primitive. It is indeed a piece of the primeval world just as planted by nature.

2. Reserves for the protection of historic places.

3. Reserves in the vicinity of hot springs.

4. Reserves for preserving examples of the vegetation, together with its accompanying birds and other animals.

Many of the foregoing reserves, as also those for climatic purposes, belong, in addition, to this class. They are, in fact, open-air museums where the unique plants and animals of New Zealand may remain unmolested for the benefit of future generations. Such otherwise would know only of the natural productions of their country from isolated specimens in gardens, dried plants in museums, descriptions in books, paintings, or photographs. Reserves of this character have been aptly termed "monuments of nature," and such have been created of late years in all parts of the civilized world, and legislation introduced to prevent their molestation. No one is opposed to the erection and maintenance of museums and picture-galleries at great cost, where all is inani-

mate; how much less then should the ground be begrudged for the maintenance of the living objects themselves in all their beauty amidst their natural surroundings.

5. Reserves, especially of forest, that may serve as resorts for picnics and for recreation.

Most of the reserves already mentioned serve, in part, the above purposes. What are here meant are rather pieces of forest near centres of population, and which need not, of necessity, be in their virgin condition. It is reserves of this class, by no means the most important, that are most generally associated with the term "scenic reserve" in the public mind.

An excellent account of the origin and development of the scenic-reserve movement is to be found in the report on scenery-preservation for the year 1906–7, pp. 1–3. Here some of the main facts are briefly stated. From its foundation the Department of Lands has aimed to conserve suitable areas of forest lands as State forests, public-recreation reserves, domains, thermal-spring reserves, areas of protection for water-supply, &c. Although under the numerous Land Acts power was given to reserve land for such purposes as the above, it was not until the Land Act of 1892 came into force that scenery-preservation was added to the object. Since the above date areas of specially attractive forest or land surrounding remarkable natural objects—*e.g.*, waterfalls, caves, and thermal springs—have been regularly set aside and excluded from sale.

In 1903 Sir Joseph Ward, then Minister in charge of the Tourist Department, brought down the Scenery Preservation Act. This provided for a Royal Commission to visit and report upon all areas possessing scenic or historic interest, or on which there were thermal springs, and submit recommendations for the acquisition of such as seemed desirable, whether Crown, freehold, or Native. For two years the Commission performed this work; but in order to provide simpler machinery an amending Act was passed terminating the Commission and substituting a small permanent Board of Government officials, consisting of the Surveyor-General, the head of the Tourist Department, and the Commissioner of Crown Lands for each land district, to investigate and report from time to time on all areas worthy of inspection. This body, known as the Scenery Preservation Board, acts as an advisory Board to the Government. By the Act of 1903 a special vote towards expenses of purchasing and dealing with lands selected for scenic reserves appears in the annual appropriations. In 1910 the Scenery Preservation Amendment Act became law; this added the Under-Secretary of the Native Department to the Board, and provided the power to take Native lands for scenic reserves. The Minister was also empowered to grant leases or licenses over open or cleared portions of scenic reserves for short periods not exceeding five years. The Governor may, in certain cases, revoke the reservation of land no longer suitable for scenic purposes, and dispose of the land as Crown land, but the price so obtained must be paid to the credit of the scenery-preservation vote. Finally, the whole of the reserves were made sanctuaries for the flora and fauna, so that no firearm may be discharged on a scenic reserve nor may any bird or game be killed thereon. In 1907 Mr. E. Phillips Turner was appointed Inspector of Scenic Reserves, a post which he still holds, and the duties of which he has fulfilled in an exceptionally able manner.

Regarding the Uplifting of Scenic Reserves.

From time to time requests are made to the Minister of Lands to uplift certain of the scenic reserves. The reasons given for so doing are for the most part that the land is suitable for farming purposes; that it harbours noxious weeds, which spread on to the neighbouring land; that it has been burnt more or less, and so no longer serves its purpose; that no one makes use of it for purposes of picnics; and, finally, that it is certain some day to be destroyed by fire.

It is rare to find a unanimous expression of opinion amongst those residing near a reserve as to whether it should be uplifted or the contrary, but generally a strong and possibly a biased plea is put forth on both sides of the question. In any case, it must not be forgotten that any scenic reserve is not merely constituted for the benefit of those in its immediate vicinity, but also for the people of New Zealand as a whole. For example, a reserve of virgin kauri forest is really of less moment for the neighbouring settlers than it is for those further to the south who have never seen a kauri-tree growing naturally.

The scenic reserves which have been set up at the instance of the Scenery Preservation Board have not been constituted such without a thorough examination as to their necessity. They are not proclaimed offhand; on the contrary, a considerable period must elapse between the suggestion of an area for reservation and its being finally gazetted. Further, in no few instances have they been created at the instigation of the settlers in the neighbourhood.

Another class of scenic reserve is, however, constituted in a manner different from the above. At present, and for some considerable time past, there has been a standing order that a Government surveyor, when cutting up forest land for settlement, must set aside at stated intervals small areas as scenic reserves. This procedure, though undoubtedly admirable in theory, is, unfortunately, not always a success in practice. The piece selected may occupy extremely good land; it may be in a position required for building-sites, roads, &c.; it may abut on the property of one quite unsympathetic as to scenery or preservation of plant and animals, and who would fain use the reserve as grazing-ground for his stock. Further, the wholesale and necessary burning of the newly settled forest-area makes it very difficult even for the most sympathetic to avoid letting his fires encroach on one or other of the small reserves. Once the fire enters the forest the trees are more exposed to wind, the danger from a fire is much increased, and on the now bare ground weeds can gain a foothold. A reserve such as described soon becomes worthless for its specific object and a menace to the adjoining farm lands. Happily not many cases such as the above have come under our notice.

With regard to the question of uplifting scenic reserves in the future, we are of opinion that no reserve should be uplifted without there being the strongest possible reason for so doing, and that in considering any special case the following points be taken into consideration: (1.) Is the reserve valuable from the scenic standpoint? (2.) Does it represent some special type of vegetation of which there are few or no examples in existing reserves? (3.) Does it mark some important historic spot? (4.) Does it afford a haven of refuge for some specially rare plant or animal? (5.) Has the agitation for its uplifting arisen from some one or more of the neighbouring settlers wanting the land for himself or themselves? (6.) Does it harbour noxious weeds, and, if so, does it contain more than the adjoining lands? (7.) Is its upkeep, owing to necessary eradication of such weeds, too great to warrant its retention? (8.) Has it been so much damaged by fire as to no longer fulfil its original object?

The reserves now set aside for scenery purposes number 518, which belong to the following distinct categories: (1.) Reserves gazetted under the Scenery Preservation Act and the Public Works Act up to the end of the year 1911–12, 262. Reserves of this class are inalienable, and are also sanctuaries for the fauna and flora. (2.) Reserves for scenery under the Land Act and the Public Reserves Act up to the end of the year 1906–7, 256.

There are also five national parks, viz.: The Tongariro, the Egmont, the Waimakariri, the Mount Cook, and the Otago Sounds. These parks, although of considerable extent, consist for the most part of extremely steep land, much of which is at a high altitude and altogether barren. There are also three islands set apart for the protection of the New Zealand birds, viz.: The Little Barrier Island, Kapiti Island, and Resolution Island. Finally, a considerable portion of Stewart Island has been set aside as a reserve for the fauna and flora, the whole of the area as it is at present being without any agricultural value.

Proposed New Scenic Reserves.

We recommend the following to be constituted scenic reserves :—

1. *The Poor Knights Islands.*—These islands contain a most interesting vegetation, one beautiful shrub, at any rate, being confined to them, and they are also the home of many birds now almost extinct on the mainland. The islands are absolutely unsuitable for settlement.

2. *Lake Waikaremoana.* — This proposed reservation is important both from its preserving the great beauty of the scenery and its helping to conserve the water-supply of the lake. We recommend that all the land from the water to the skyline be made a scenic reserve. We also consider it very necessary that a resident caretaker be appointed, and would suggest that the keeper of the boardinghouse near the lake be offered the post at a small retaining fee. It would be well that the caretaker should have the powers of a Crown Lands Ranger.

3. *Certain Lakes in the Rotorua Thermal District.*—The reserves here proposed are also important for climatic purposes. We recommend that early steps be taken to acquire from the Native owners all the forested land (about 11,000 acres) bordering the Lakes Rotoiti, Rotoehu, Rotoma, Okataina, Rotokawau, Tikitapu, and Rotokakahi, and that funds for the purpose be provided by opening for settlement an area (about 11,000 acres) of forest, bush, and scenic reserves that are not required in the Rotoiti and Rotoma Survey Districts, such settlement to be preceded by the milling of the timber. The specific areas referred to above are shown on the map on file 375, Head Office, Lands Department.

4. *The Wanganui River.*—Your Commissioners thoroughly recognize the importance of the scenery on the banks of this famous river as a valuable asset to the Dominion. The portion between Pipiriki and the house-boat is the finest part of the river, and it is most important that the vegetation of as large an area as possible be preserved in its virgin condition. We recommend that the Government acquire for preservation all steep banks of the Wanganui River not already reserved, and where the land is not suitable for settlement. The reservation to be from the water to the skyline.

5. *The Mokau River.*—The scenery of the Mokau River is very fine indeed, and it is imperative that as much as possible of the characteristic vegetation of its banks be reserved. We therefore recommend as follows : That the Government should acquire for preservation of the forest all the steep lands bordering on the Mokau River, and that the block of Crown land in Blocks V, IX, and XIII, Aria Survey District, be exchanged on an equitable basis for the land acquired along the river.

The Waipoua Kauri Forest.

The matter of milling the timber of the Waipoua Kauri Forest so that the land it occupies may be available for settlement has been specially brought before us. In order to ascertain the facts of the case, we took evidence in Dargaville from both those who wished and those who opposed the lifting of the reservation. We also visited the forest, devoting the greater part of two days to its examination. After carefully weighing the evidence on both sides of the question, and taking into consideration our own observations made during our present visit to the forest and previously, we recommend that the reservation on the Waipoua State Forest be removed subject to the following contions : (1.) That the timber be milled by the Crown for the people of New Zealand. (2.) That 200 acres of the most characteristic and healthy parts of the forest be reserved permanently. (3.) That the Warawara State Kauri Forest be also reserved permanently. (4.) That both the reserve of 200 acres of the Waipoua Kauri Forest and the whole of the Warawara Kauri Forest be established as national kauri parks for the benefit of the people of New Zealand by Act of Parliament.

Our reason for the above decisions are as follows : (1.) The area of the forest is altogether too large for a permanent reserve. (2.) If the whole forest

were reserved, much of the neighbouring land would be excluded from settlement. (3.) After milling, the land now occupied by forest will support a certain number of settlers. (4.) Although situated in almost the wettest district of the North Island during an abnormal dry season, the forest would be in danger of fire. (5.) The forest is a very ancient one, and the kauri-trees are not regenerating, so that as they die they are succeeded by taraire and other trees. (6.) The reserve of 200 acres, as suggested, and the Warawara Forest would supply admirable examples of kauri forest which would be a source of great attraction to visitors from abroad and to our own people. (7.) The Warawara State Forest is situated near the sea-coast to the north-west of Hokianga Harbour on broken hills having an altitude of some 1,600 ft. to 2,000 ft. The forest is extremely wet, and there is very little danger from fire. Owing to the position of the forest, and the rugged nature of the country, it would be difficult and expensive to remove the timber. We are of opinion that the forest is admirably suited for the purpose recommended above.

The Preservation of Scenic Reserves.

At the present time many of the scenic reserves are not as well cared for as they ought to be. They are frequently not fenced, and stock belonging to neighbouring settlers stray into them. In no few cases they are exposed to damage by fire. We therefore recommend that where possible the scenic reserves shall be fenced, and steps taken by planting shelter-belts, or otherwise, to preserve the forest, and that no stock shall be allowed to graze therein.

The provisions of the Scenery Preservation Act are stringent enough, but they are for the most part disregarded. As this is in many cases the result of ignorance of the law we recommend that notices *re* the reserves be placed not only in conspicuous places in the reserves themselves, but also in public places in the neighourhbod, such as post-offices, railway-stations, &c.

2. As to which of the Forest-areas are not required for Climatic and Scenic Reserves or any other National Benefit, but are Suitable for Settlement, Sawmilling, or other Commercial Purposes, with Indication as to Present or Future Utilization.

Except in the specific cases dealt with in Appendix B, we can only deal with the above matter in such a general manner as to give a lead in future transactions with forest-areas. It may be stated as a broad principle that no forest land, except it be required for the special purposes of a climatic or a scenic reserve and which is suitable for farm land, should be permitted to remain under forest if it can be occupied and resided upon in reasonably limited areas.* Should the area under consideration contain milling-timber the question will arise whether it be more profitable to mill before settlement or to fell, burn, and grass. Obviously the answer is purely one of finance, and each case must be dealt with on its merits, the main factors being the enhanced value of the timber if reserved for a stated period, its distance from the centre of demand, and the expense of the milling. Year by year timber formerly considered as far too distant from any market is being profitably milled. We strongly recommend, in consequence of the increasing scarcity of timber, that all land containing milling-timber shall have such converted prior to settlement.

The question with regard to the present or future utilization of the forest-areas as a whole would entail a most careful and detailed examination of all the forest land throughout the Dominion, a task quite impossible for us to have attempted. All that we can say is that the matter is, in the main, one of supply and demand, and each case as it arises should be judged on its merits, and with special regard to the financial aspect, and that the view of the proposed Advisory Forestry Board should in all cases be obtained and given effect to wherever possible.

* National parks and sanctuaries are not specifically mentioned, since they are really in the same category as scenic or climatic reserves.

We have examined a number of reserves so as to decide which should be retained or which should have their reservations removed. Our decisions regarding such lands are given in Appendix B.

3. As to the Best Method of dealing with the Indigenous Forests in the Public Interests generally.

(1.) *Classification of Forests.*

Up to the present there has been no economic classification of the New Zealand forest, although such would simplify matters when dealing with specific areas. We therefore suggest that the following classification or one on similar lines be adopted: (1.) Forest containing valuable milling-timber in a suitable position for profitable conversion and situated on land suitable for settlement. (2.) Forest containing valuable milling-timber which cannot be converted at a profit as yet, but growing on land suitable for settlement. (3.) Forest containing valuable milling-timber growing on land unsuitable for settlement. (4.) Forest containing insufficient or unsuitable milling-timber growing on land suitable for settlement. (5.) Forest containing insufficient or unsuitable timber growing on land unsuitable for settlement.

With regard to the above classification, in considering the value for timber and settlement respectively it is probable that certain factors in the future may lead to various modifications. Thus there may be a use for some timbers which are not, or are but little, converted at present—*e.g.*, tawa, taraire, and the various species of the New Zealand beech; various preservative treatments of timbers may come into use; certain species of trees may be found suitable for wood pulp or the making of wood-spirit, acetic acid, &c.

(2.) *Administration of the Milling Forest.*

With regard to the administration of the milling forest, the time has arrived when the remaining millable forest in the Dominion should be administered on one system, under the jurisdiction of the Land Boards, and the method that we would recommend is the one adopted in the Auckland Land District, where the trees are measured and the superficial contents computed before the timber is offered for sale either by auction or tender. By this system the sawmiller knows exactly what he is paying for, and he is induced to cut the bush out cleanly. The State also receives the best price for the timber. At present in some districts the timber is sold on a royalty basis on the output of the mill, in others the timber is sold on a rough estimate of the amount growing on a given block. This estimate, in some cases, is made by the surveyor who is employed and paid by the sawmiller. For obvious reasons this procedure appears to us to be a very objectionable practice. In other districts the jurisdiction is vested in the Warden, and the leasing of timber blocks treated as a mining privilege, although the royalties derived therefrom are territorial revenue.

It appears to us that what may have been good policy in days gone by, when gold-mining was the predominant industry and timber of little value, can hardly be considered adapted to present circumstances, when the rapid depletion of our forests is taken into account.

We would most strongly indorse the recommendation of the Royal Commission on the Timber and Timber-building Industries of 1909, that the dual control of the timber by the Warden should be terminated and the sole jurisdiction vested in the Land Boards for the following reasons:—

1. The Warden has no staff to supervise the efficient and economical working of the timber leases.

2. From the nature of his training he is not likely to be a man experienced in timber matters.

3. In treating a timber license as a mining privilege, and granting leases

for forty-two years, the land is often held for unreasonable periods and barred from settlement.

4. In some cases the Warden's Courts are held in small decayed mining townships where the Clerk of the Court may be the local constable; such constables are liable to frequent transfer, with the result that the collection of timber royalties has in some cases been allowed to get into arrears, and then, through millers becoming insolvent, large sums have been lost to the Crown. Instances of this have been brought under our notice.

5. Mr. J. S. Evans, S.M. and Warden for Nelson, in his evidence before your Commission, gave his opinion that the sawmilling industry could be better administered by the Commissioners of Crown Lands and the Land Boards.

The only argument that we have heard advanced against the change has been that the Warden's Court is held at more frequent intervals than the Land Board meetings, thus enabling millers to transact business with less delay; but this reason cannot be maintained when it is seen that in Auckland, the largest land district in the Dominion, and with some of the sawmills two hundred miles away from the city, the timber is administered by the Land Board with satisfaction to both the sawmillers and the public. Two interesting letters on this question received by your Commission from sawmillers in Westland are printed in Appendix C.

Among the advantages of having the jurisdiction under the Commissioners of Crown Lands and Land Boards the following may be noted: (1.) The Commissioner has the necessary staff to supervise the economical and efficient cutting of the bush. (2.) He can enforce conditions that the timber should be cut within a reasonable time and the way be prepared for settlement before the second growth and noxious weeds take possession of the ground.

We are of opinion that Regulation 105 of the regulations under the Mining Act, 1908, should be revoked, with the possible exception of the clause relating to the use of firewood for domestic purposes, and even this should only be allowed to be taken in places to be prescribed by the Commissioner. Immense damage has been done in the past to the Crown forest by the indiscriminate cutting of timber by the miners, and we fail to see any reason why this one industry should be subsidized at the expense of the State more than any other.

In regard to the payment of halves of timber royalties to local bodies, while we hold that the principle is sound in cases where the roads are used by the millers in carting their timber, still in some districts not 20 per cent. of the timber ever goes on the roads at all. The sawmillers make their own tramways to the railways, and thence it is sent direct to the ship's side. In these cases we consider an amendment of the law is required, and that the half-royalties should only be paid on timber which is conveyed by road. As the law at present stands some districts get large subsidies without any corresponding liabilities, and other districts get nothing.

As we are recommending further extensive planting, we consider that the revenue derived from the timber industry might with benefit be applied to the purpose of providing the necessary funds.

(3.) *The Beech Forest.*

There are very considerable areas of beech forest, both at high and low levels, which are at present but little used for their timber, though this is of considerable value for certain purposes, and will doubtless be more prized as the general timber-supply decreases. Further, these forests are the only ones amongst those indigenous to New Zealand which may regenerate rapidly enough to warrant their permanent retention. At present, as seen from evidence before your Commission, beech timber is steadily coming into use, especially silver-beech (*Fagus Menziesii*), which makes excellent furniture, for which purpose it is being increasingly used in Australia. So long ago as 1899, Mr. T. Kirk, in his admirable "Forest Flora," p. 176, wrote of this timber as excellent for the manufacture of ordinary furniture, and stated that, "When french-

polished it bears a considerable resemblance to plain mahogany." In order to thoroughly test the question as to the rapidity of regeneration in the various classes of beech forest, we recommend that the Government cause to be made at an early date an expert survey of the beech forest; such a survey would settle not only the question of profitable regeneration, but the state of the trees with regard to disease would be determined. This latter is a matter of much moment, since it is highly probable that much of the contradictory evidence regarding the durability of the timber has arisen through diseased trees having been converted. As a part of the proposed survey of the beech forest, the timber of the different species could be tested in several directions.

Regarding the popular names of the various species of New Zealand beech there is the greatest confusion. In the first place, the incorrect term "birch" is of almost universal application throughout the Dominion, and under this head are included not only the beeches proper (*Fagus**), but also the tawhero or kamahi (*Weinmannia racemosa*), the tawhiri (*Pittosporum tenuifolium*), the tipau (*Myrsine Urvillei*), and putaputawheta (*Carpodetus serratus*). This grouping together of absolutely different timbers under the one name "birch" is bad enough, but it is a small matter compared with the fact that each species of beech (*Fagus*) bears a different name in different districts. Thus *Fagus fusca* is known as "red-birch" in Wellington and as "black-birch" in Westland, in which district "red-birch" is the kamahi, while "black-birch" is *Fagus solandri* in Canterbury. So, too, *Fagus Menziesii*, the species esteemed for furniture, is "brown-birch" in Southland and "silver-birch" in Wellington, while it is called in some places "white-birch" and "red-birch." It is plain that such confusion of names must lead to endless mistakes in regard to the proper timber being supplied, and that much monetary loss might accrue thereby. We therefore consider that the Government should issue an illustrated pamphlet on the value of the different beech timbers in which definite names are applied to the different species. We propose that the misleading term "birch" be abandoned, and that the name "red-beech," "black-beech," and "silver-beech" be applied to *Fagus fusca*, *F. Solandri*, and *F. Menziesii* respectively. These names should be alone used in the publications, advertisements, and tenders of all Government departments.

4. As to whether or not, in view of the Large and Increasing Demand for White-pine Timber in Connection with the Butter Industry, the Exportation thereof should be wholly or partially prohibited.

In order to deal satisfactorily with the above important subject, the matter must be approached from several points of view, two of the most important being a consideration of the value of land for farming purposes on which the white-pine grows, and whether it be feasible to find another timber suitable for butter-boxes, and, we may add, cheese-crates, when the supply of the above timber is exhausted.

The white-pine, or kahikatea (*Podocarpus dacrydioides*), either forms pure forests of that tree alone on low-lying swampy ground so far as tall trees are concerned, or grows in much lesser quantity mixed here and there with the other trees of a New Zealand pine forest. In the pure white-pine forest the yield may occasionally exceed 80,000 superficial feet per acre, though it is generally less than half that amount. In the mixed forest the number of white-pine trees varies greatly, but the yield is almost invariably less than that of the rimu (*Dacrydium cupressinum*), with which it is associated.

As is well known, the soil of the white-pine swamps, when drained and the trees removed, forms the richest of agricultural land, which when grassed is of extreme value for dairy farms. The mixed forest, too, where the white-pine is a subordinate tree, is frequently situated on good agricultural land.

* We are using the generic name *Fagus* as it is the one in common use in New Zealand rather than the correct name *Nothofagus*.

It has earlier on been laid down in this report as a general principle that no forest land which is suitable for farm lands, except it is required for a scenic or climatic reserve, should be permitted to remain under forest if it can be occupied and resided upon in reasonably limited areas. Since no land is more suitable for occupation than that of the white-pine swamps, when drained, their value in this regard is a strong plea in favour of the removal of the trees forthwith. The matter as to a substitute for white-pine for butter-boxes is a somewhat difficult question, but it does not seem an insuperable difficulty. The use of white-pine for butter-boxes is confined to New Zealand and Australia, whereas in other butter-producing countries, such as Canada, Siberia, and Denmark, other timbers are made use of. It is true that Canadian and Siberian butter is of a lower grade than that of New Zealand, but this is due not to the superiority of white-pine in not tainting the butter, but rather that the butter itself is of inferior quality. The above view is supported by the fact that, although both Victorian and New Zealand butter is packed in white-pine boxes, the former brings a lower price in the English market than does the latter. As for the timbers used for the conveyance of butter in Siberia, Canada, and Denmark respectively, we have no evidence as to what is used in the first-named country, but in the two latter, according to Mr. Cuddie, they are spruce (*Picea alba*) and European beech (*Fagus sylvatica*). The use of beech timber for butter-boxes is interesting, as it suggests a new application for the New Zealand beeches.

In order to approach more closely the question of a substitute for white-pine, the characteristics of a first-class timber for butter-box purposes must be considered. These are: (1.) Non-liability to impart a taste or odour to the butter. This quality is lacking to some extent in all classes of wood, especially if not seasoned. It can be overcome in some cases by first paraffining the wood and, in addition, inserting two thicknesses of parchment paper, which course is recommended by the Dairy Division of the Agricultural Department, even in the case of white-pine. (2.) The wood should be in one piece, at least for the ends of the boxes. This, so far as the sides are concerned, is not essential, and jointed boxes of white-pine are being made use of at the present time. Should dovetailing be discountenanced, then, as the oblong box at present in vogue measures $14\frac{1}{2}$ in. by $11\frac{1}{2}$ in. by $10\frac{1}{4}$ in., trees less than $1\frac{1}{2}$ ft. in mean diameter would be unsuitable. (3.) A light timber is to be preferred, so that the box should not exceed $10\frac{1}{2}$ lb. or 11 lb. in weight. In this regard every additional pound must add to the cost of carriage to the railway, and were the boxes to be much increased in weight probably the freight for sea carriage would be increased. (4.) The wood should be light in colour, so that the brand will show well and the package be attractive in appearance. White-pine fulfils the above condition, though the wood is more or less yellowish-white. (5.) The wood should be easy to nail, and should hold the nails securely. As it is essential that all butter-box wood should be thoroughly seasoned, the danger of splitting where nailed must also be taken into account. The wood of seasoned *Pinus radiata* is especially good from this standpoint.

Up to the present white-pine has answered so admirably both for the packing of butter and cheese that there has been but little trial made of substitutes. There is information alone on this head regarding poplar, *Pinus radiata*, and tawa (*Beilschmiedia tawa*). Poplar, according to Mr. Cuddie, will probably be a satisfactory substitute. Both butter and cheese have been so packed, so far as non-tainting is concerned, with good results. The timber fufils all the other requisites of a butter-box.

Pinus radiata, according to an experiment conducted by Mr. M. Murphy, of Christchurch, some time ago, was used successfully for the packing of butter, the contents of the case being free from taint after being in the cool chamber, according to a letter he sent your Commissioners, "for the usual time occupied in transport to England" and "packed in the usual way." Tawa was largely used for the packing of butter in the earliest days of the industry, but at that time not nearly the same care was exercised as at present.

In order to gain additional knowledge regarding the suitability of timbers not used as yet for the packing of butter, we, early on in our Commission, with the co-operation of the Agricultural Department, the Leyland-O'Brien Timber Company of Auckland, and the Auckland Dairy Association, to all of whom we are much indebted, caused small boxes to be constructed, each with a capacity for 3 lb. of butter, from the following timbers: Tawa, taraire, poplar, and *Pinus radiata*. The interesting report of the Government Grader upon this experiment may be seen in the Appendix C. Suffice it here to say that the tests, so far as they went, were most encouraging, all the butter remaining in excellent condition and free from taint.

The quantity of *Pinus radiata* and poplar in New Zealand available for butter-boxes, &c., is extremely small, and it would be a considerable number of years before a reasonable supply were available if the greatly extended planting of these trees as recommended by us in Part II of this report be followed.

As for tawa, there is at present a good deal in certain of the indigenous forests of the North Island, but in many places it occupies land that will soon be taken up for settlement, where, as there is little other millable timber, it will be burned and not converted. Nor can tawa timber compete with white-pine under present conditions. How long the white-pine will last at the present rate of consumption we cannot say, since we possess no reliable data as to the area occupied by that tree. There are considerable forests in South Westland which it will not pay to convert for many years to come, owing to their distance from a seaport or railway. To sum up, the substitutes for white-pine must come from abroad until such time as our own plantations are available. We saw in Dunedin an imported butter-box made of Norway spruce (*Abies excelsa*), which seemed suitable and which is supplied at a lower cost than that of white-pine. We have also seen boxes made from wood pulp. Then there are the timbers used in Canada and Siberia for packing butter, which should answer equally well here, and which could be imported probably for many years to come.

Bearing all the above facts in mind, we are of opinion that a substitute for white-pine can be found, first of all in an imported article, and later in timber grown in New Zealand. The following matters may be briefly dealt with which concern our final decision:—

1. White-pine, at one time used as a building-timber in New Zealand, has fallen into disrepute through the action of the larva of a beetle, which brings about the so-called "dry-rot." Consequently the timber is now used solely in the Dominion for butter-boxes, cheese-crates, fruit-cases, and packing material generally. But in Australia the timber is used not for boxes only, but for other purposes; so that the whole of the contents of the log, the waste excluded, can be sold to the Commonwealth. Were such exportation to be forbidden the West Coast Timber Compnay shows that 60 per cent. of the log output would remain in the sawmiller's hands and the price of box-timber would be raised to such a price as to allow the above 60 per cent. to be rejected.

2. Were there to be a restriction on the export of white-pine, then the sawmiller would cease to convert the white-pine trees in his rimu forest, and they would remain only to be eventually burnt in the course of settlement.

3. By arrangement with Australia our white-pine timber is admitted free. We get much valuable hardwood timber from Australia, and were the exporting of our white-pine to be prohibited Australia might decline to let us import her hardwoods. After a careful consideration of all the points dealt with above, we recommend that there should be no restriction whatsoever imposed upon the exportation of white-pine. Further, in view of the great importance to the State of finding and providing a substitute for white-pine for the packing of butter, we consider it advisable that the Dairy Produce Division of the Agricultural Department should conduct an exhaustive series of experiments with regard to the capabilities of various timbers for butter-boxes, especially *Pinus radiata*, *P. Laricio*, the various kinds of poplar, Oregon pine (*Pseudotsuga Douglasii*), the various species of New Zealand beech, tawa, and taraire.

Regarding such experiments the following may be stated: (1.) Each experiment must be on a sufficient scale to preclude any experimental error. (2.) All timber must be properly seasoned. (3.) The ages of all the exotic timbers should be ascertained. (4.) Each set of experiments must be conducted with an exactly similar dairy-product. This also applies to the control of white-pine boxes. Grading must take place before packing and when unpacked. (5.) If *Pinus radiata* is a success that tree would naturally be recommended on account of its afforestation qualities as detailed in Part II of this report. There should be experiments with trees of that species of different ages, and also from timber seasoned both before and after milling, as well as from timber milled when green.

PART II.—AFFORESTATION.

1. As to the Probable Future Demand for Timber for Commercial Purposes in New Zealand.

The question here asked is one of extreme difficulty and complexity, and the answer could be little more than a guess, even were far more reliable statistics available than is at present the case. Before the subject can be approached with any degree of accuracy the following questions amongst others must be answered: (1.) What will be the increase in population of New Zealand at the end of certain definite periods? (2.) To what extent will the demand for timber increase or decrease in each timber-using trade and industry, including the demand for box timber? (3.) What will be the influence of substitutes for timber on the future demand?

When we turn to the latest issue of the "Statistics of the Dominion of New Zealand" there is nothing given as to the amount of timber used by different trades and industries. All that is available is the cost of materials, of which wood may be the principal or but a minor component, according to the special trade.

From the publication mentioned above the output of the sawmills may be fairly gauged, but so far as posts and rails are concerned their value alone is given, and an exact estimate of this into superficial feet is impossible. So, too, with regard to imports of timber; so far as laths and shingles, undressed logs, palings, and rails go, the number imported of each is the only data available. As for the amount of timber milled from plantations, and the quantity privately cut for posts and other purposes, there is no information of any kind.

Leaving any attempt at approximate exactitude out of consideration, we may reasonably consider that, although there will be a decrease in the use of certain timbers, judging from past and present experiences, there is certain, for a long time to come, judging as before from actual experience, to be an increase in other directions, and that at the very least we may assume that the gain will counterbalance the loss. Opinions have been expressed in evidence given before us that the future will see great strides in the matter of timber substitutes, and that we need not trouble as to our future timber-supply, nor make provision for the future demand. Such reasoning is not legitimate. In making an estimate as to future needs we cannot consider problematical inventions of timber substitutes nor undreamt-of discoveries. All we can do is to consider an extended use of such substitutes as at present exist, and base our conclusions thereon, while at the same time considering the increase of population, with its increasing demand for timber, based on the present consumption, and the probable progressive development of certain industries now on the increase and likely to so continue, such as the dairy and fruit industries, both of which require an ever-increasing supply of timber

We estimate the amount of timber consumed yearly in New Zealand at the present time as being 358,000,000 ft. As seen from what has gone before, there is no reason to assume that the amount consumed per head of the population will decrease. On the contrary, notwithstanding substitutes for timber, the *per capita* consumption in certain countries appears to be on the increase.

Assuming that the population of New Zealand will be doubled in thirty-five years, then, taking the present demand for timber as a basis, and multiplying by two, the probable future demand at that time will be 716,000,000 ft. This, as we have already pointed out, is little more than a guess, but it can quite well serve its purpose here, since when the more accurate statistics are available that we recommend to be procured another much more reliable estimate can be made. Before leaving the subject under consideration, we beg to suggest, in view of the great importance of possessing a more reliable estimate than we have given, that the Government cause exact statistics to be procured regarding the output of the sawmills of the Dominion, and also of that of the travelling sawmills, which even now convert a considerable amount of timber grown on private lands. Details should also be given as to the amount of each class of timber, together with exact quantity used in each trade and industry. Even then, with such statistics as the above available, after deducting the timber exported, the total would not be sufficient, since no account would be taken of the wood from private plantations, &c., used as fuel, fencing-posts, and other purposes.

2. As to Particulars *re* the Nature and Kinds of Timber likely to be required.

To answer this question at all fully a great deal of information would be required similar to that mentioned in the last section, but even more detailed, since not only would a knowledge be required of the class of timber used in each trade and industry, but particulars as to the sizes in vogue. Then there also comes in the estimated increase or decrease of any particular trade. Leaving the above out of consideration, there is no doubt but that the following classes of timber will be required in extremely large quantities: (1) Australian gums (*Eucalypti*) of various kinds, especially those yielding the most durable timber; (2) pines of various kinds for building-timber; (3) timber for the carriage of agricultural and other produce. Here *Pinus radiata* comes first, especially as it can be also used for a building-timber. Poplar timber also comes in here, and it is suitable for the manufacture of paper pulp.

3. As to how far the Operations of the Existing State Nurseries and Plantations meet the Probable Demand for Timber.

On the 31st March, 1912, the State plantations were 18,870 acres in extent. Taking the yields per acre as given by Maw,* since we have as yet no reliable New Zealand data, it appears that the final crop of the following timbers is, in Europe: Silver-fir (*Abies pectinata*), 72,600 superficial feet; Scotch pine (*Pinus sylvestris*), 41,400 superficial feet; Weymouth pine (*Pinus strobus*), 51,340 superficial feet; and larch (*Larix europæa*), 38,400 superficial feet. Since no estimate is made of thinnings in the above figures, and taking into account the greater size that the trees are expected to reach under New Zealand conditions, we have decided on 50,000 superficial feet as the estimated average yield per acre of the State plantations when converted. The total yield, then, of the 18,870 acres would be 943,500,000 ft., which, at the present rate of consumption, would last 2·6 years. At the present rate of planting—namely, 2,566 acres in 1911–12—the total yield, when converted, would be 128,300,000 ft., which, at the present rate of consumption, would last about four months. The determination of the amount to plant yearly in the future will be the duty of the proposed Advisory Forestry Board, who will have more accurate statistics on which to base their calculations. All we can say is that, taking into consideration the expected increase in the crop as more timbers of a high yield are planted, at least two and a half times the acreage of 1911–12 should be planted.

* "The Practice of Forestry," 1909, pp. 218–23.

4. As to what Extent the Operations of the State Plantations should be supplemented and expanded, and in what Locations New Nurseries and Plantations, if any, should be situated.

This question at once leads to the crucial point of the whole afforestation question—namely, the cost of production of the timber crop and the profit or loss thereon. In considering the financial aspect of afforestation it is essential that a strictly commercial basis should be adopted, in order to see whether any proposed plantation will result in a profit or loss to the State. In the first place, as the average cost of recent loans raised by the Government has come to about 4½ per cent., and as we have no means of knowing whether the rate will come down in the future, we have decided to adopt a 4½-per-cent. basis for our calculations.

Notwithstanding that all the leading authorities on forestry, such as Professors Schlich, Sommerville, and Maw, insist on the fact that compound interest on the initial cost of a plantation, and the annual rental value of ground used, should be charged till the timber is in a marketable condition, there still appears to be a good deal of misapprehension in the popular mind on the subject, some persons questioning the necessity of charging compound interest, or, in fact, any interest at all. Then, again, they argue that if the land upon which the plantations are situated belongs to the Government, no rental value should be allowed for. Perhaps, to make the position clear, it may be well to work out a supposititious case, thus: Suppose the Government had £100,000 either to lay out in establishing a plantation or to advance on loans at 4½ per cent.—if they adopted the latter course, and compounded the interest for forty years, they would at the end of that time have the sum of £581,636, and if the loan was for eighty years the sum would amount to £3,383,010, without any danger from fires or other risks incidental to forests. So it is clear that if money was put into a plantation it should produce timber at least equal in value to the above amounts at the end of the respective periods or the operations would entail a loss to the State.

Again, in regard to the rental value of the land: suppose the Government owned 10,000 acres of land worth £10 per acre, and had to decide whether to lay it out in plantations or to lease it for settlement purposes. If the latter course should be adopted, and the rental compounded as above for periods of forty and eighty years, the amounts would be £481,636 and £3,283,010 respectively; so that here again, unless the timber produced at the end of these periods equalled in value the amount shown in the first computation, plus the amount in this, the State would be a loser, irrespective of the indirect revenue from the tenants.

There is, moreover, another fact to be taken into account in estimating the final cost of the timber produced—namely, the annual upkeep or maintenance charges. On the data available this factor is very difficult to estimate. In the report of the Royal Commission on Coast Erosion and Afforestation in the United Kingdom, 1909, the sum of 4s. per acre per annum is set down for the purpose. We are of opinion, however, that owing to the extra cost of labour, and the difficulties in connection with the fire risks, and the eradication of bracken fern, the above figures would be much too low for this Dominion, and that at least 6s. should be allotted for the purpose stated.

Coming to the cost of the forestry operations already carried out by the Government, the departmental report on State afforestation for the year 1911–12, the latest available, gives the actual cost to date of State nurseries and plantations as £218,433 14s. 2d., to which must be added £30,698 16s. 4d., the value of labour performed by prisoners but not charged for by the Justice Department. No interest on the capital expended nor rental value of the land occupied has been allowed for, but probably if the present value of stock in hand, buildings, implements, and permanent improvements are taken into account they would balance the two latter items. The return shows 18,870 acres as having been planted, and dividing that into the sum arrived at as above gives the cost of each acre now under trees and its upkeep to date as £13 4s.

It is recognized, however, that a great deal of the earlier work done in the plantations was more or less of an experimental nature, and we are of opinion that the present cost of planting an acre, as estimated by Mr. R. G. Robinson—namely, £7 16s. 6d.—should be close to the mark, and we therefore take the round figure of £8 in basing our estimates. This compares favourably with the amount—£6 10s. per acre—given in the report of the Royal Commission on Afforestation in the United Kingdom, when the extra cost of labour is taken into account.

To show what financial result may be expected from the planting of trees that come to early maturity and produce large amounts of timber, such as *Pinus radiata*, poplar, and certain of the *Eucalypti*, in conjunction with land of low rental value, the following example is appended. From the evidence before us, we consider that at a moderate estimate an acre of *Pinus radiata* would produce 150,000 superficial feet of timber at the age of thirty-five years. Taking the value of the land at £2 per acre the figures would work out as follows :—

Expenditure.

	£
10,000 acres planted at £8 per acre at 4½ per cent. compound interest for thirty-five years ...	373,360
Rental value of land at £2 per acre at 4½ per cent. compound interest for thirty-five years ...	73,346
Annual maintenance charge of 6s. per acre at 4½ per cent. compound interest for thirty-five years	244,488
	£691,194 (approximate.)

Estimated Receipts.

	£
10,000 acres, yielding 150,000 ft. per acre, at 2s. per hundred	1,500,000
Deduct expenditure	691,194
	£908,806

If these results should be attained it would mean a profit above all expenses of nearly £91 per acre, and would allow the timber, after expenses of milling and freightage charges are met, to be retailed to the consumer at from 10s. to 11s. per hundred superficial feet.

In contrast to this, take an example of what would be the result in growing trees that take eighty years to mature, and cannot be expected to produce more than 70,000 superficial feet to the acre, in conjunction with land worth £10 per acre :—

	£
10,000 acres planted at £8 per acre at 4½ per cent. compound interest for eighty years ...	2,706,400
Annual rental value of 10,000 acres worth £10 per acre at 4½ per cent. compound interest for eighty years	3,283,010
Annual maintenance charged at 6s. per acre at 4½ per cent. compound interest for eighty years	2,186,671
	£8,178,081 (approximate.)

That is to say, each acre would require to produce nearly £818 worth of timber to square accounts, or, in other words, the standing timbers would have to be sold at about £1 3s. per hundred superficial feet, which is, of course, an impossible proposition. In the last example, even if the land was only worth £2 per acre, £555 worth of timber per acre would require to be pro-

duced to balance the expenditure. This latter case shows the utter absurdity of suggesting such a tree as the totara for afforestation purposes. (See photo No. 6.)

In these calculations no account is taken of the value of thinnings, as it is considered that for many years to come the cost of cutting would fully balance any receipts.

We are fully persuaded, however, that given cheap land, economical management, and the right kind of trees to plant, afforestation can be made a highly profitable investment for the State, apart from the secondary benefits of having a good supply of timber to meet the public demand and a possible amelioration of climatic conditions. We would recommend that in future, to keep the forestry operations on a sound commercial basis: (1.) That the Prisons Department should have a credit note for the value of all work done by prison labour. (2.) That 4½ per cent. interest should be debited annually to the cost of the previous year's operations. (3.) That the rental value of the land as assessed by the Government Valuation Department, also on a 4½-per-cent. basis, should be debited to the Forestry Account.

In considering the expansion of the afforestation operations of the State the length of time that the present timber-supply from the indigenous forests will last must be considered. According to evidence before us, the estimate of 33,060,883,437 superficial feet available in the indigenous forests in 1909 is at best a guess, and no one can truly say whether the amount be too much or too little. Our opinion is that it is not safe to conclude that there will be any supply of moment at the expiration of thirty years from the present time, and that unless more stringent methods are adopted to conserve the supply as far as possible the period of supply may be even shortened. From the above it is clear that sufficient provision must be made for the future if we are not to run the risk of a considerable deficiency in our supply of timber. The countries of the Old World are a striking object-lesson to us in regard to afforestation operations. It may be stated briefly that afforestation has been practised to a considerable extent in all civilized countries, and that where economy of method is closely followed it has proved a financial success. The thickly peopled countries of Europe do not begrudge the necessary areas for the work. Even in densely populated Belgium the forest area is 17·7 per cent. of the total area, or 0·2 acre per inhabitant. In Germany the area under forest is 34,989,675 acres. This forms 25·89 per cent. of the total land area and 0·62 acres *per capita*.*

Throughout the world timber is becoming both scarcer and more valuable. Quoting from the second Report on Afforestation of the British Royal Commission on Coast Erosion and Afforestation, p. 9, it is stated that Professor Schlich is of opinion that "Since the year 1894 a steady slow rise has taken place, which I estimate at something like 20 per cent." It is further stated in the same report, p. 11, that "Not only do the supplies of timber threaten to prove insufficient to meet the present demand, but it would also appear that the consumption per head of population in this and other countries shows a marked tendency to increase." And again: "Substitutes for timber—steel, concrete, patent compositions, &c.—there are in plenty, but in spite of these timber seems to be more a necessity of modern domestic and industrial conditions."

It may be urged that there is no reason for New Zealand to go in for a comprehensive system of tree-planting by the State since a supply can always be procured from abroad. But the above quotations show that there is but little reliance to be placed upon foreign supplies. Likewise the time may come when it is possible that many countries will forbid the export of their home-grown timber, and there is always the chance of the timber-supply being cut off in time of war. In short, if there is good reason for the countries of the Old World to plant commercial forests, there is far more need for an isolated land such as New Zealand to do so.

* Zon, R., "The Forest Resources of the World," Bulletin U.S. Department of Agriculture, 1910, p. 48.

Certain parts of New Zealand are treeless, or nearly so, especially Central Otago and the Mackenzie Plains. It would be of the greatest advantage to the State if such were afforested. The former district, owing to constant burning of the tussock and overstocking, including the ravages of rabbits, is virtually a desert below a certain altitude. Tree-planting here would be of the greatest benefit, and, even if carried on at a slight loss, the benefits would be great enough to sanction its adoption.

We are asked in what localities new nurseries and plantations should be established.

1. *As to Nurseries.*

Dealing first with the nurseries of the North Island, we are of opinion that the one at Whakarewarewa is quite adequate, so far as position goes, but that it will soon be too small. Since the pumice lands of the Hot Lakes District are so admirably adapted for afforestation, a large nursery in their vicinity will be required for many years. We recommend, then, that such suitable land as adjoins the nursery should be secured and reserved for nursery purposes, even if at present it be larger than required. So far as the price of the land goes, it must be emphasized that it is false economy to form a nursery for trees upon poor soil. The soil of the nursery should always be better than that of the plantations. Should our recommendations be given effect to, that there should be tree-planting on the dunes of western Wellington, then, as such planting would at first be experimental merely, the trees necessary could quite well be raised at Rotorua. If the gum-lands of the far North are to be afforested, then it might be necessary to have a second nursery in their vicinity; but the question is entirely one of relative cost of conveying the trees from Rotorua as against growing them on the spot, plus the additional expense of forming a new nursery with its necessary buildings.

There are at present three nurseries in the South Island—namely, those of Tapanui, Ranfurly, and Hanmer. It is evident that the expenses would be greatly reduced if there were one central nursery rather than these three. The South Island, too, is well supplied with railways, and it would be an easy matter to transport the young trees to almost any place suitable for afforestation operations. Tapanui, the most important of the present nurseries, possesses a soil difficult to work and by no means suitable for tree-raising; indeed, it speaks volumes for the skill in nursery-work of the Superintending Nurseryman, Mr. R. G. Robinson, that such good results are attained under such adverse conditions. As for Hanmer and Ranfurly, neither is specially suited for the work.

We recommend, then, that a central nursery be established for the South Island in South Canterbury, in the neighbourhood of Studholme Junction. The soil and climate are both ideal for the raising of nursery stock. The only drawback is the high price of land in that neighbourhood. But, as already explained, good soil is essential for the best nursery results, and it is quite legitimate in forestry operations to select the best of land for a nursery. The reasons for our selecting the above locality, and recommending a central nursery, are as follows: (1.) The good condition of soil and climate would enable nursery stock of a better quality to be raised, and the young trees would be suitable for transplanting at an earlier age. (2.) The position close to the Main Trunk line would facilitate delivery of stock to almost any part of the South Island suitable for afforestation. (3.) The expenses of one central nursery would be much less than that of a number of smaller nurseries far distant from one another. (4.) As we propose that the private planter and public bodies be supplied with trees at cost-price the nursery situated where suggested would be in a most convenient position to meet the demand. (5.) The proposed plantations on the Mackenzie Plains could be readily supplied.

2. *As to Plantations.*

During our travels through the Dominion we have paid special attention to the examination of areas not yet set aside which might be suitable for future afforestation. We recommend the following:—

1. An area in Central Otago contiguous to the railway-line and in the neighbourhood of Ophir, Alexandra, or Clyde. We can give no indication of the exact locality. This would have to be chosen with the greatest care, and certainly some experimental planting on a small scale be first of all undertaken. Central Otago is, according to evidence of Dr. Valintine, admirably suited for convalescent consumptives. These benefit much by light employment, such as tree-planting. But any such labour should only be paid for on the basis of the value done, since the afforestation operations cannot be burdened with the cost of charitable aid. If it be considered advisable to assist these patients further it should be done by means of a distinct fund.

2. One or more areas on the Mackenzie Plains. Afforestation here is almost as urgently demanded as in Central Otago, but the conditions for the growth of trees is more favourable. Here again the area to be planted will require the greatest care in selecting.

3. Ancient river-beds of Canterbury beyond the reach of the highest floods. The military reserve on the south bank of the Waimakariri at once suggests itself. Also, if the price be not more than £1 10s. per acre, some of the manuka-covered land between the Rivers Eyre and Waimakariri.

4. The manuka-covered land in the neighbourhood of Hawarden, Culverden Plain. This seems to us the most suitable, and it should be secured if the price is low enough. Already self-sown plants of *Pinus radiata* are growing amongst the scrub.

5. The slopes of Mount Isabel, Hanmer, near the present plantation. If this area be reserved it will be necessary to take in the summit of the mountain, otherwise it would be only taking the better land from the present run and leaving the worst.

6. Run No. 24, near mouth of Rangitikei, 6,360 acres in area, on the dunes of western Wellington, occupied by Mr. J. McKelvie. There are in New Zealand more than 300,000 acres of sand-dunes. A full account of them and their capabilities for tree-planting is given in a report by the Lands Department on the dune-areas of New Zealand. We thoroughly indorse the opinion of the author that the only effectual way to cope with dunes is by planting trees. We also believe that such planting may be a financial success, but, as the author of the above report points out, experiment is required first of all. If the vast dune-areas of the Dominion can be redeemed, and a part turned into profitable forest, the work would pay for its cost several times over, in that the dunes would be no longer a menace to the neighbouring farm lands.

7. An extension of the present areas on the volcanic plateau. A large area should be set aside not only to the north but also to the south of Lake Taupo. The ease in working the pumice lands, and the excellent manner in which trees of many kinds grow, mark out these lands as the most suitable of any in the Dominion for afforestation.

8. Several areas in the gum-lands of the Auckland Isthmus. Probably the neighbourhood of the Bay of Islands or Whangaroa would be very suitable. If the gum-lands can be cheaply afforested with the most valuable though less hardy Australian gums, land now comparatively worthless will be made most productive. But here also experiment is needed in the first place.

With regard to setting aside areas for future plantation we consider—(1.) That such areas should be styled "plantation reserves." (2.) That all such reserves should be made inalienable by Act of Parliament, but that prior to their being required for planting purposes they should be leased as grazing-lands.

5. As to whether the Present Operations of the State are being conducted on Satisfactory and Progressive Lines, and, if not, to what Extent and in what Manner the Present Management and Control should be altered.

In order to approach the above question, a brief history must be given of the afforestation operations of the State. The Forestry Branch of the Department of Lands and Survey was established in 1896. A few experiments had

been conducted on a small scale on the pumice lands of the Hot Lakes District in order to test their suitability for a number of varieties of trees. According to official reports* from Messrs. G. Mueller, then Commissioner of Crown Lands for Auckland Province, and R. H. Reaney, Road Surveyor, the above experiments were successful and pointed to the suitability of the vast pumice-area for afforestation. Although up to the year 1896 there had been abundant planting, both public and private, and though there were several enthusiatic tree-planters well versed in the requirements of their own districts, there was no one who could claim a thorough knowledge of the colony as a whole, with its manifold soil conditions and climates. Nor had the planting referred to above been carried on according to the requirements of modern European forestry. The Government, therefore, had a difficult problem to face, nor could it be solved forthwith without a good deal of experimental work. Even in those countries where forestry has been prosecuted on a most extensive scale for a long period there is still ample room for experiment.

Notwithstanding the above, a great deal of knowledge was self-evident from the plantations. It should not have been a hard matter to have learnt what trees were almost certain to thrive in any district, what species would ensure a short rotation, or what it would be risky to plant. Knowledge derived from European or American books and practice was of little moment, and suggestive only compared with the lessons to be learned from the existing plantations. Had these plantations been sufficiently studied the mistakes cited below would have been avoided and the State plantations to-day have been far more valuable.

In 1896 the late Mr. H. J. Matthews was appointed Chief Forester, under the Surveyor-General, who was head of the branch and responsible for its management. Yet, as pointed out in the Report on State Afforestation for 1910–11, the actual inauguration of the scheme was due to Mr. Matthews, who "had the sole technical control of the tree-planting operations" until his unexpected death in 1909. But not only had Mr. Matthews to busy himself with nursery and tree-planting operations, but he had to design the necessary buildings, lay out the various grounds, make roads, and carry on farming operations with the accompanying selection of stock. In short, he had to plan and direct the most extensive operations, involving the expenditure of large sums and the employment and management of many men. Obviously, much of his earlier work was of an experimental nature, and there were failures as well as successes. One part of Mr. Matthews's work, however, stands out conspicuously, and deserves unqualified praise. We refer to the nurseries and their management, which are a striking testimony to his ability and skill. Further, he early chose young men of promise as his assistants, who entered into their work with enthusiasm, so that by degrees there developed a capable staff trained in the technique of nursery and plantation work.

Among the first work was the establishment of nurseries at Tapanui and Eweburn, in the South Island, and at Whakarewarewa, in the North Island. Later on, other nurseries were formed at Hanmer, Kurow, and Starborough, in the South Island; and at Ruatangata, near Whangarei, in the North Island. In the neighbourhood of these nurseries, Kurow excepted, the various plantations have been established, now amounting in all to 18,870 acres containing about 44,000,000 trees. The above nurseries are all in operation excepting Starborough, Kurow, and Ruatangata, all of which were closed and planting operations stopped owing to the alleged unsuitability of the localities in question for afforestation.

The unfortunate death of Mr. Matthews in 1909 led to changes in management. The office of Chief Forester was allowed to lapse, and, instead, a separate officer was appointed to control the forestry operations of each Island respectively, under the title of Superintending Nurseryman, Mr. H. A. Goudie being appointed to the North and Mr. R. G. Robinson to the South Island.

* Report of the Department of Lands for 1896–97, pp. 110–11.

These officers, who reside at Rotorua and Tapanui respectively, supervise the several nurseries and plantations under their control, and are responsible for the raising and planting-out of the trees in each Island. Under them, in charge of each State plantation, is a forester. These various officials direct the work of each of the labourers and others employed in the tree-planting operations.

In regard to tree-planting operations, a certain amount has to be carried on at Rotorua, Waiotapu, and Hanmer by means of prison labour. Although the actual work done by the prisoners averages less than that by free labour, the value of the work to the community must not be judged alone on a monetary basis. There is no doubt, according to the evidence of Mr. G. C. B. Jordan, Under-Secretary for Justice, and others, that the employment of prisoners in tree-planting is distinctly of benefit to them, and quite likely to lead to their reformation. There is always work in the nurseries or plantations for such as really intend to reform, and it is not uncommon for a prisoner to become in this manner once more a useful member of society. We should be sorry to see a system abolished that is of so much value from its reformatory character.

The administration of the branch is controlled by the Under-Secretary for Lands, to whom the Superintending Nurserymen report, and from whom they may receive orders and directions.

The cost of afforestation is defrayed by the sale of timber in the State forests, supplemented by a contribution from the Consolidated Fund annually voted by Parliament.

The various plantations and other areas are as follows: North Island—Whakarewarewa, 9,024 acres; Waiotapu, 7,695 acres; Puhipuhi, 1,200 acres. South Island—Dusky Hill, 845 acres; Conical Hills, 3,672 acres; Naseby, 1,350 acres; Gimmerburn, 425 acres; Hanmer Springs, 2,668 acres; Dumgree, 881 acres.

In order further to understand the present position of State forestry in New Zealand, the policy and management of the operations from their inauguration must be dealt with. This requires a brief consideration of the following questions: (1.) Are the trees planted suitable for the localities in which they are planted? (2.) Are they the best kinds possible for the localities in question? (3.) Are the trees, even if suitable to the localities, always planted in the best position available? (4.) Has due attention been paid to the urgent necessity for growing trees that give a rapid rotation? (5.) Has sufficient attention been paid to growing every class of timber likely to be required in the future? (6.) Has sufficient provision been made against fire? (7.) Have the cheapest methods been adopted for establishing the plantations? (8.) Are the plantations situated in the best localities available? (9.) Are they in blocks of a sufficient size? (10.) Are they so arranged as to allow the future milling operations to be carried on in the most profitable manner? (11.) Have sufficient experiments been conducted? (12.) Have these experiments been carried on where they can be readily observed? (13.) Had the local plantations of settlers and public bodies been sufficiently investigated prior to the commencement of the forestry operations? (14.) Are the nurseries in the most suitable positions? (15.) Is the method of raising nursery stock conducted on sound lines? (16.) Is the method of procuring seeds satisfactory? (17.) Is there any plan in operation for educating the young men in the service? (18.) Is the management of the nurseries and plantations satisfactory at the present time?

The answer to a number of the above questions is directly applicable to the exact question in our order of reference—namely, "Whether the present operations of the State are being conducted on satisfactory and progressive lines"—for the present operations are in large measure similar to those of the past, in that many of the same trees are being planted, that the methods of planting and nursery-work are very similar, that the nurseries themselves are the same, that the fire-breaks are mostly those which have been in vogue for some time past, that the actual supreme control is the same, and so on.

As several of the above questions interlap, we shall not deal with them individually, but use them rather as the chief points of consideration in what follows.

If we take the list of trees standing in the State plantations as given in "Forestry in New Zealand," we find that up to 1909 the following had been the principal trees planted: Larch, 10,989,835 trees; Austrian pine, 3,769,431; Corsican pine, 3,756,325; various Australian gums, 3,464,589; *Catalpa speciosa*, 2,196,544; English oak, 2,041,621; Norway spruce, 1,242,723; ash, 583,925; totara, 546,500; sycamore, 525,247; bull pine, 291,145; Sitka spruce, 241,623; redwood, 186,641; *Robinia*, 161,800; American white-pine, 137,125; Australian blackwood, 140,335; Bishop pine, 132,025; Monterey pine (*Pinus radiata*), 110,161; alder, 77,918.

From the above it can be seen that larch has been planted in far greater quantity than any other tree, and since that date it has continued to be planted in considerable quantities. It is, however, very questionable whether larch should be used at all for afforestation purposes in New Zealand. Previous experience with this species in all parts of New Zealand, with but few exceptions, shows that, though it may grow well at first, its growth slackens, and it does not eventually form a timber-tree of much value. Nor is this all, for in Europe larch is subject to a most destructive disease, which, if it appears here, would cause enormous loss in the plantations, and possibly lead to their having to be renewed with some other tree, which, in view of the great area under larch, would be a financial disaster. Mr. Goudie showed us a piece of the wood affected with some disease which quite possibly is the larch canker. Further, in order to guard against the disease, the trees must have all their dead branches removed so as to allow free access into the plantations, so that an examination of the plantation in quest of diseased trees is possible. A trial clearing of an acre at Rotorua cost £3, and it would take another £1 to remove the debris. Should even the cost be considerably less than the above £4, the increased expense, at compound interest, would make the planting of larch quite out of the question from the financial aspect. Under the present management of Messrs. Goudie and Robinson the planting of larch still continues, but we are glad to see that it is much less than in the past in proportion to certain valuable pines, as the following figures show: 1909–10 and 1910–11—Larch planted, 5,096,000 trees; Corsican, heavy and bull pines, 8,903,810 trees.

Besides larch, other doubtful and even useless trees have been planted in the past, not in small quantities for experiment, but in large numbers to form permanent plantations. It may be easily understood that no tree should be used, however good it be, if there is a more valuable tree to take its place, and still less (in an operation where every economy must be exercised if a profit is to result) should trees be planted which will not grow rapidly enough, or which yield a worthless timber.

The following examples of certain trees useless for New Zealand afforestation may be cited with the number planted: *Catalpa speciosa*, 2,196,544; totara, 546,500; English birch, 252,710; Norway spruce, 1,242,723; English oak, 2,041,621; sycamore, 225,247; and alder, 77,918. Of the above, the worst case is that of the *Catalpa*, a tree interesting for a botanical collection but useless for afforestation. The planting of an acre or two might be justified, but it is hard to conceive why more than two millions were planted. Some of the trees cited above, although they give valuable timber, are of too slow a growth for profit, such as oak and totara; others, such as sycamore and alder, are comparatively worthless. The present management is growing fewer of these valueless trees, but even yet some are being reared in the nurseries, and the comparatively poor Norway spruce is much more in evidence than the far more valuable Oregon pine.

Planting the wrong trees, or faulty planting, has led in some cases to its being necessary to replant the area. This is now being done, and very wisely in our opinion, by Mr. Robinson at Conical Hills and elsewhere. Errors of this nature are just as costly to the State as destructive fires.

In some cases the trees, though suitable enough in all other respects, have been planted in the wrong position. Thus certain dry slopes at Conical Hills are planted with larch, but the Austrian pine would have been more suitable in the same plantation for such a position.

It has early on been made clear that if tree-planting for commercial purposes is to pay in New Zealand, where both interest and labour are higher than in Europe, trees which supply timber at an early age are essential. To this phase of the question very little attention has been given. And yet it is now well known that *Pinus radiata* will yield a really good second-class timber when from thirty to thirty-five years old, and that many Australian gums grow with the greatest rapidity and have an extraordinary yield. Had these trees been hardy in Europe generally, where afforestation is practised, they would long ago have been included as amongst the important timbers of the world. *Pinus radiata* is now being raised in small numbers in the State nurseries, but in, we consider, quite insufficient quantities.

With regard to the kind of timber required, there has been little attempt to meet the various demands for various classes of timber in the future. The durable wood for railway-sleepers, &c., might be supplied from the larch if the plantations succeed; and there is a certain amount of building-timbers being produced, but rapidly growing cheap timbers for carriage of agricultural produce have been and are being much neglected. It might pay quite well, for instance, to plant *Pinus radiata* much further apart than 4 ft., so as to produce fruit-case and rough-box timber in about twenty-years.

Regarding provision against fire, that is specially dealt with further on in section 10. Here we need only say we consider the present fire-breaks inadequate.

The tree-planting methods, both now and in the past, appear to be on good lines, and where the right trees have been used the plantations are thriving excellently. They are also—the Austrian pine stands excepted—remarkably free from disease.

Generally speaking, the individual plantations are of sufficient size, though it would have been better in some instances to have provided more land from the outset. This is a matter, however, which does not specially concern the present practical management of the planting operations.

Experiments are of the greatest importance, and obviously a good many have been carried out; indeed, much of the earlier planting was experimental. Unfortunately, many so-called experiments were on too large a scale, and can hardly, on that account, be deemed experiments, since their failure entailed considerable loss. A true experiment should be an experiment only, and should be on a comparatively small scale, and there should be no thought of direct profit. Also, planting experiments should be confined to stated places, where they can be watched carefully. As it is at present blocks of experimental planting, many of them far too large to be deemed to be experiments, occur here and there in the general plantations, which when they come to be milled will interfere seriously with the milling operations and entail unnecessary expense in the future.

We have already referred to the importance of an economic survey of the private plantations of New Zealand. Such a survey should have been a preliminary to afforestation operations. Had such been made it is inconceivable that some of the more striking mistakes we have pointed out could have occurred.

During the history of the Forestry Branch of the Lands Department three nurseries have been established and closed down because the localities where they were established were considered unsuitable. The most remarkable example is in the case of Kurow. Here, in 1905, 45 acres were selected which were described as having all the desirable advantages for an ideal nursery.* After about three years' work, and an expenditure of £3,070, some of which was not lost, as certain trees and plant were conveyed elsewhere, the nursery was closed down owing to the climate proving unsuitable. Such a case as this should never have occurred. Instead of erecting buildings and laying out a nursery on a large scale, a little experimental planting and seed-raising should

* Report of the Department of Lands, State Forests, 1905–6, p. 16.

have been made in advance, and the district properly tested as to the capabilities for afforestation before incurring a large expenditure.

We have earlier on in this report spoken in the highest terms of the nursery operations. The present Superintending Nurserymen are continuing to carry them on in an equally if not more creditable manner. The houses, implements, and stock are in the best condition possible. The only criticism we can offer is on the method of procuring seed; this is gone into fully in Part 10, and it is certainly a striking defect, but one which cannot be attributed to the Superintending Nurserymen.

To sum up our views as to the present operations of the State, and whether they are conducted on satisfactory and progressive lines, we consider that, as compared with the past, the management under the direction of the two Superintending Nurserymen, and they again under the Under-Secretary for Lands, is better than in the past, but that there is still room for improvement in the matters specially criticized above. Trees are still being planted which are not suitable; special methods for reducing the expense of establishing the plantations, such as sowing *in situ*, are not being tried; the fire-breaks are not adequate; there is not sufficient provision for educating the young men of the branch in forestry; the method of ordering and procuring seeds could be improved upon; too little attention is being paid to the establishment of quick-rotating crops of trees.

We know quite well the difficulties under which the Superintending Nurserymen have to carry on their very responsible duties. They are really responsible for the whole management — on them all depends — and yet they have no real power, as above them comes the head of the Department, who need not of necessity in the least be acquainted with forestry matters, or have much sympathy therewith. They have also a vast amount of departmental duties to perform, and, in addition to all else, attend to the training of their subordinates, and have to give advice *re* tree-planting to private individuals and public bodies. In short, their duties are multifarious. Further, they have been brought up in the system as it prevails, and it is hardly to be expected that they could make many radical changes in what they have been forced to practise for years, nor possibly would such changes have been tolerated. In Messrs. Robinson and Goudie the Department possesses two most valuable and zealous servants, who are full of enthusiasm in their work, and who are doing their best to make State afforestation in New Zealand a success.

With regard to the future, we consider that certain changes should be made. Two methods are available—namely, either the creation of a special Forestry Department, or the forestry to be, as at present, a branch of the Lands Department. There are valid arguments in favour of both propositions, but after careful consideration we consider that forestry matters should continue to be dealt with under a special branch of the Lands Department, because the branch as proposed below would deal not only with the plantations but with the indigenous forests. As the Lands Department already possesses in the Commissioners of Crown Lands and Crown Lands Rangers the necessary machinery, and men more or less skilled in the work, a great saving would be effected in comparison with setting up another Department with men new to many branches of the work and with a new and complicated machinery. Further, as the land on which the forestry operation would take place would be under the administration of the Lands Department, friction might arise between the two Departments. Nor do we think the magnitude of the operations as yet demand a new Department, but that such is rather a thing of the future.

We consider that the Under-Secretary for Lands has so many other duties to perform that it is quite impossible that he can afford the time necessary for proper supervision of the branch, or for the special studies that the control of a subject so technical as forestry entails. We therefore recommend—

1. That the directing control of the Forestry Branch of the Lands Department should be placed in the hands of an executive officer at an adequate salary, such officer to be of approved administrative and financial ability.

2. That the said officer should have associated with him an Advisory Board of experts in forestry and matters appertaining thereto.

3. That such Board shall consist of not less than four members, who are to be paid such fee as may be prescribed, and to be appointed by His Excellency the Governor.

4. That the Board shall be called together not less than once a quarter for the consideration of matters of policy and important details with regard to the State forestry operations. We also are of opinion that the present Superintending Nurserymen should, under the direction of the proposed Forestry Board, control the operations in the North and South Islands respectively, and that they shall receive remuneration adequate to the important duties they discharge.

Such a Board as composed above would be in a position to confer with the Superintending Nurseryman on many matters of importance. They would also be responsible for changes in method, &c. Forestry is not a science in itself, but is a compound of many sciences together, with a practical knowledge of nursery-work and tree-planting. It seems to us that a combination of men, expert in various branches of the subject, and each man with a grasp of the whole, would be far better equipped to direct the forestry operations of the country than would a young man brought out from Europe or America, who, however well he was acquainted with the forestry practice of his own country and with theoretical forestry, would be altogether ignorant of both New Zealand conditions for tree-planting and of the indigenous forests.

6. As to the Conditions under which the State should encourage and assist Tree-planting by Private Individuals and Local Bodies.

(1.) *Private Tree-planting.*

From the earliest days of settlement up to the present time there has been a good deal of private planting, so that plantations, large and small, are more or less in evidence in all the settled districts. No sooner is the indigenous forest felled and burned than the settler forthwith plants a few foreign trees round his homestead.

Tree-planting by the settler is usually undertaken for shelter purposes with the trees in one or more parallel lines at right angles to the prevailing wind. Sometimes the plantations are a chain or more in width, but, no matter how wide, the trees are nearly always planted so far apart that the lateral branches are not suppressed at an early age, and, in consequence, the timber is of very indifferent quality, through its being full of knots. It is this that has led to the timber of certain trees being considered valueless for building purposes—a quite mistaken conception.

Tree-planting by the settler is by no means universal. We were much struck, for instance, by the lack of shelter-belts on the windswept Southland Plain, where such would be of inestimable value not only to the farmer but to the whole district.

The reasons for private tree-planting are as follows: (1.) To afford shelter from wind, such shelter being beneficial not only for the stock and the crops, but it also protects the ground from loss of water, and favours the formation of the all-important humus. (2.) For providing firewood. (3.) For supplying fencing-material. (4.) For providing timber for rough buildings. (5.) For furnishing wood for handles, &c., for farm implements. (6.) As box-timber for packing purposes. (7.) For timber for sale for building purposes if the trees are planted under forest conditions. (8.) For purposes of beauty. (9.) For increasing the selling-value of the land through its making the farm more attractive

Private planting not only benefits the individual, but, if carried out on right lines, it is of considerable advantage to the State, not only in ameliorating the climate and adding to the beauty of the landscape and attractions of the neighbourhood, but in helping to increase the future timber-supply. In this latter regard it is specially important in that these private plantations are much less likely to be damaged by fire than are those of the State; also, as the plantations are in settled districts, the timber is growing just where it is wanted and the cost of carriage is saved.

Long ago the private planter was considered a public benefactor. The Planting Encouragement Act of 1871 provided that any person planting land of 1 acre in extent or over should be entitled to receive in respect of every acre of land so planted 2 acres of rural land of the waste lands of the Crown.

Bearing all the above statements in mind, and believing as we do that the private owner of land who plants trees of a suitable nature thereon under proper forest-conditions is benefiting not only himself but the Dominion, we recommend that the State should encourage tree-planting on the following lines: (1.) That the trees for such be supplied at cost-price by the State nurseries. (2.) That the planting be under Government advice. (3.) That planting by private individuals should be encouraged by the remission of taxes or otherwise on a certain percentage of the total area of an estate which has been planted to the satisfaction of the proposed Forestry Board.

2. *Planting by Public Bodies.*

A considerable amount of planting has already been done by local bodies. As for private planting, so here too the trees have almost invariably been planted too far apart. This is in some cases being remedied, and afforestation on more modern lines is now being carried on by the Dunedin City Council and certain of the County Councils. Afforestation by public bodies should certainly be encouraged to the utmost. They, too, should receive trees from the State nurseries at cost-price, and any proposed site for planting should be inspected by an official of the Forestry Branch, who should draw up a scheme.

7. As to other Matters which in our Opinion affect Forest-conditions or would tend to terminate their Development, including the Necessity or Expediency of any Legislation in the Premises.

(1.) *Matters concerning Afforestation.*

In our examination of the various State plantations the following matters especially attracted our notice as requiring alteration:—

1. *The Method of Fire-breaks.*

Nothing is of greater importance in a scheme of planting than an adequate protection against fire. Already in the brief period of New Zealand State afforestation destructive fires have occurred in the plantations at Conical Hills, Dumgree, and Puhipuhi. Where there are vast areas of bracken fern, tea-tree, or tussock, as in nearly all the areas where the tree-planting must take place, the chance of fire in a dry season is indeed great, and the methods of the European foresters, evolved under different conditions, do not meet the case.

At present the fire-breaks consist of ploughed belts 1 chain in width. These belts surround the plantations, and there are others traversing them from side to side. It has been the custom until recently to plough the breaks yearly, but the present practice, in part at any rate, is to lay them down in grass and keep it closely grazed by sheep. Young plantations are even in greater danger from fire than older ones, for the fern or grass closely fills the spaces between the trees for several years. Recently at Waiotapu the breaks have been constructed, according to the evidence of Mr. Goudie, so that a fire fanned by the prevailing wind should strike them obliquely and not at a right angle.

We consider the system of fire-breaks at present existing as altogether inadequate. The danger from fire is not merely from the flame running along the ground, but from that which is carried high in the air, together with sparks and burning material. When the furious winds of New Zealand are considered, the distance which sparks, &c., can travel is very great indeed. Even be the day calm, the fire itself, through heating the surrounding air, will cause a strong draught and consequent carriage of burning material. An adequate fire-break must not only stop a ground-fire, but must arrest all flying burning material. The most effective break of this kind would be a belt of some tall tree that would not catch fire. The wider such a belt, the greater the security. But it must be remembered that no belt or wall of any kind can make a plantation absolutely secure, since a fire may originate in its interior. As for the position of the belts, those on the summit of a ridge are the most efficacious, while those at the bottom of a gully are worthless. The position of belts obliquely to the prevailing wind, as now being adopted, is a change for the better.

Regarding the fire-breaks for the future, we recommend one or other of the species of poplar to be planted in belts. Such a belt on the outside of the plantation might be 2 chains in width, and outside this again a ploughed belt 1 chain wide.

Narrower belts of poplar can be formed inside the plantation and along the sides of roads. As the poplars grow, the ground beneath will gradually be covered with a layer of leaves, which, if dry, become a source of danger from ground-fires. We therefore recommend that experiments should be made with other fire-resisting trees and shrubs, especially such as can be established beneath the poplar. It might be possible to succeed with that great fire-resister the New Zealand fuchsia (*Fuchsia excorticata*) simply by sowing its seeds beneath the trees. The wineberry (*Aristotelia racemosa*), so easily raised from scattering seed, might also be tried. Another safeguard would be to cut down the outermost row of poplars, so that there would arise an outer belt of poplar-suckers.

It might seem at first thought that these belts as recommended would occupy altogether too great an area. Poplar timber is, however, of considerable value, as shown in the next paragraph, and the belts would serve a double purpose.

Coming, then, to the value of poplar timber, Maw writes* concerning the Black Italian poplar: "The wood is soft, white, and tough, and does not easily fracture. It is more nearly fireproof than any other timber, and for this reason is valuable for floor-boards." Clements states† that the cotton-wood (*P. deltoides*) is used for wood pulp, packing-boxes, or locally for timber. Pinchot,‡ referring to the last-named tree, writes that it is used for wood pulp, wagon-bodies, and boxwood material. Maw§ states that Black and Black Italian poplar if near a good market fetch 8d. to 1s. 3d. a cubic foot, but ordinarily 6d. to 9d. Elwes and Pritchard‖ state a certain stand of Black Italian poplar, which had been planted forty-eight years, realized £3 each standing when felled to clear the ground. They remark: "It seems certain that no other trees could be planted that would do so well in so short a time." As for Lombardy poplar, the evidence of Mr. Cuddie proves that its wood is satisfactory for butter-boxes. Also, we have in our exhibits a fine sample of the timber cut in Marlborough, together with a butter-box which seems well suited for its purpose.

It would probably be advantageous to plant the poplar fire-breaks in advance of the general planting of pines, &c. The effect of shelter on certain trees is remarkable. This may be well seen in the case of the Oregon pines planted inside a shelter-belt of *Pinus radiata* at the prison camp, Kaingaroa

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* "The Practice of Forestry," 1909, p. 367.
† "Minnesota Trees and Shrubs," 1912, p. 57.
‡ Silvical leaflet 25 of U.S. Department of Agriculture, 1908, p. 1.
§ *Loc. cit*, p. 328.
‖ "Experiments on Trees at Colesborne," Quart. Journ. of Forestry, vol. 6, p. 86, 1912.

Plains. Had shelter-belts been previously provided a certain stand of larch at the Dusky Hill Plantation would have grown much straighter than is now the case, and a considerable waste of timber have been saved.

2. *The Planting of Larch.*

We have already in Part II, section 5, given our reasons why we consider too much larch to have been planted. Here, without going into further details, we recommend that, in view of the reasons already given, we consider the planting of larch to be risky, and that it is advisable to cease planting that tree in the State plantations until further experience as to its behaviour is gained.

3. *Other Trees recommended for Planting.*

We specially recommend the following trees for extensive planting in the State plantations: Monterey pine (*Pinus radiata*), Corsican pine (*P. Laricio*), Heavy pine (*P. ponderosa*) Oregon pine (*Pseudotsuga Douglasii*), various varieties of poplar and such Australian gums as have been proved to be the best suited to the localities to be planted. Ash (*Fraxinus excelsior*) should be grown where suitable, but it is not a tree for general planting.

With regard to the poplars, these are to serve the double purpose of acting as fire-breaks and producing timber. As for the gums suitable, there are many trees thriving in various localities in New Zealand which are obviously suited to the local conditions, and from which seed can be readily procured. Seed collected in Australia is to be distrusted for the reasons given when dealing with the procuring of seeds in general. Besides the above-mentioned pines, it is desirable to grow some that would produce fine-grained timber suitable for the finest class of work. For this purpose the Weymouth pine (*Pinus strobus*) is to be highly recommended, since it is recognized as the most valuable pine of the eastern United States. Trial plantings of this tree are doing well at Rotorua, and should they continue to give promising indications as to the suitability of the tree, we consider that it should be planted in increasing numbers. We also recommend that a trial be made of *Pinus excelsa*, which is considered to yield the most valuable timber of any of the Himalayan pines. Seed of this tree can be procured at Queenstown, Homebush (Canterbury), and Greendale (Canterbury).

As it is probable that sand-dune planting will be a feature of the future, we suggest that, in addition to the all-important *Pinus radiata*, the Austrian pine (*P. austriaca*) and the Australian blackwood (*Acacia melanoxylon*) should be made use of. We would also point out the great value of the Norfolk Island pine as a tree for planting where there is full exposure to the sea-spray.

Regarding one or two of the above trees, a few explanatory notes seem necessary.

Monterey pine (*Pinus radiata*) is the tree which has been the most widely planted in New Zealand. It thrives in every variety of soil, from that of rich alluvial valleys to stony river-bed and sand-dune. It will also grow on the steepest of dry clay hillsides. Its rapidity of growth is truly remarkable, and no difficulty would be found in discovering examples from Te Aroha to Southland of trees that had grown on an average of 4 ft. per annum. As generally seen, the trees are growing either isolated or far distant from one another, so that the lateral branches are strongly developed and a timber full of knots is produced. But in many localities the trees, though not planted nearly closely enough, have developed long clean trunks, which upon being converted into boards and scantlings have yielded material that has been somewhat extensively used for farm buildings and in some cases for dwellings, especially in Canterbury. We have examined such structures in several places, and found the timber sound and in good condition, and the buildings quite suitable for the designed purpose. We have also a good deal of evidence regarding the value of *Pinus*

radiata timber for building purposes both from witnesses whom we have examined and from letters we have received, some of which appear as appendices.

Leaving the question of constructive timber altogether on one side, there is an enormously increasing demand for wood for box purposes, an increase due to the rapid development of the dairy and fruit industries. *Pinus radiata* is admirably suited for the purpose in question, and is now being used for fruit-cases, as also for soap and candle boxes. A deputation from the fruitgrowers at Whangarei urged us to recommend the extensive planting of *Pinus radiata* in the vicinity of that town. Several travelling sawmills are now annually employed in Canterbury during the winter months in converting *Pinus radiata* into building-timber, thus finding employment for men and machinery after the threshing season is concluded. As for the suitability of *Pinus radiata* for growing under forest-conditions, the small Government plantation of that tree at Waiotapu is a true object-lesson in the straight clean trunks of the trees, their evenness and rapidity of growth, and the general vitality of the plantation. Of all the trees in the State plantations, none can be grown so cheaply and readily as *Pinus radiata*, or can be planted out at so early an age. Had *P. radiata* been sufficiently hardy in Great Britain, or in central or northern Europe, or even had it been a common tree in its natural land, its claims to admission into forestry practice would have been recognized long ago. As it is, it is being used extensively for afforestation purposes in Australia, where it also grows with great rapidity. The value of a tree cannot be overestimated which can supply box timber at twenty years of age, and which can so much shorten an average rotation as to yield three crops of adult timber in 120 years or perhaps less under favourable circumstances. There is a never-failing supply of excellent seed of *P. radiata* to be produced in New Zealand, and it is quite probable that by means of selection an improved variety of the species may be established.

The Corsican pine (*Pinus Laricio*) is closely related to the Austrian pine (*Pinus austriaca*). It thrives remarkably well wherever it has been planted in the Dominion, and grows well in almost any soil and situation. Regarding the actual value of the timber, there is not a great deal of information available to us. Maw* states: "The timber is light, soft, resinous, and durable. It is very similar to that of Austrian pine, but is, when grown in this country, of greater technical quality, and possesses fewer knots. It is worth as much per foot as Scots pine." Kent writes†: For quality, quantity, general utility, and early maturity it may have equals but no superiors among the true pines. . . . Its wood, when matured and seasoned, is very resinous, elastic, and tough; very durable, long grained, and though a little coarse in texture is easily worked." As compared with Austrian pine, the advantages are with *P. Laricio*, in its somewhat more rapid growth, its much weaker development of lateral branches, and its immunity from attack by the aphis, from which the Austrian pine suffers so greatly in many of the Government plantations.

The Australian blackwood (*Acacia melanoxylon*) will grow rapidly on the driest sandhills. It is not hardy in every locality, but it tolerates the frost of the Rotorua district, according to the Forestry Report for 1910–11, p. 23. The timber is much prized in Australia, where it is used for furniture of the highest class and for ornamental woodwork indoors. According to Mueller,‡ it is "the best wood in Victoria for bending under steam; it does not warp or twist. Local experiments gave the strength in transverse strain of blackwood equal to *Eucalyptus* wood of middling strength, approaching that of the American white oak, and surpassing that of the kauri."

4. *On the Procuring of Seed.*

It is a matter of extreme importance that only seed of the highest grade should be used. Nor is it sufficient that the seed should be merely that of the species desired, but rather of the best variety of that species for forestry

* *Op. cit.*, p. 208.
† Veitch's "Manual of the Coniferae," 1900, p. 420.
‡ "Select Extra-tropical Plants," 1885, pp. 7–8.

purposes in any special locality. It has been abundantly proved of late years, through the researches of De Vries, Nilsen, and others, that many of the ordinary seed—samples of commerce—consist not of a number of uniform seeds each producing a similar individual, but that they are rather mixtures, and that there will be more or less non-uniformity, while some individuals will differ so much from the majority that they obviously belong to different races. Variation of the above character is so frequent in certain so-called species of *Eucalyptus* that it is impossible to get a uniform crop from commercial seed, nor will the seed supplied from a number of different localities produce similar individuals. So, too, with *Pinus radiata* is there a great distinction between plants raised from ordinary commercial seed. Remembering these facts, it becomes a matter of prime importance that seed of these variable species should be collected from some *one* tree, which has been proved to produce plants of the required character. The specific name is obviously of no moment in cases such as the above; *the important point is that the seed should come from the one tree*, and such seed might have some special designation such as "M.N." Thus *Eucalyptus* M.N. would always mean that the seed had been procured from the one special tree or its progeny, that tree having been proved of a higher value than the species in general to which it belongs. In the case of *Pinus Laricio* and *P. ponderosa* there are undoubtedly races of these superior for forestry purposes to the average of ordinary commercial seed. It is possible, too, that races for special localities may be procured by such selection, as described above—that, *e.g.*, a more hardy race may be discovered of one or other of the less-hardy gums so valuable for timber purposes. Selected seed of the above character we are calling "pedigree seed," and the original parent the "pedigree tree."

The present method of procuring seed is for the Superintending Nurserymen to draw up a list of what is required and the Head Office of the Lands Department to send the order to a local seedsman. It happens not infrequently that seed of certain of the species desired is not available at the time, and as it appears to be a fixed rule that a definite number of acres must be planted yearly, seed of other species not on the nurseryman's list is procured. This, in our opinion, is a remarkable course to take. It has happened more than once that trees not at all suitable for afforestation purposes have been raised for this reason—as, *e.g.*, *Pinus canariensis* at Tapanui, a tree not possibly hardy in that district. Another matter that we must refer to, and which has led to comparatively worthless trees being planted, is that pressure is sometimes brought to bear on those in authority by quite well-meaning persons, who, judging from examples of certain trees in their neghbourhood, or even from hearsay, are persuaded that such would be admirable for afforestation purposes. An idea such as the above is fallacious. The behaviour of a tree in one district is no certain criterion of its thriving elsewhere, and undoubtedly no tree should be used for afforestation until a full knowledge of its capabilities is ascertained.

Taking into account the matters discussed above, we recommend—

1. That seed, if not procurable from trees growing in the Dominion, should be procured direct from the best available foreign sources.

2. That, where possible, seed from selected pedigree trees should be collected in New Zealand by the Department. As an example of this latter case there are several trees of a form of the cider-gum (*Eucalyptus Gunnii*) growing on private property at Tapanui and plainly suited to the conditions of that locality. The finest of these trees could be selected as the pedigree tree, and from it alone seed be collected. So, too, with one tree or other in the important gum-plantation, preferably the one with rough bark, on the property of Mr. R. Reynolds, Cambridge, Waikato.* In this connection it gives us great pleasure to state that Mr. Reynolds has offered to allow the Lands Department to collect seed from these trees, and we thank him most sincerely for his generous offer.

* See Appendix C, and also remarks in the introduction.

3. That the Lands Department should procure the seed at an earlier date than hitherto, and not keep back the order until such time as the annual amount for afforestation is voted by Parliament.

4. That in the event of failure to obtain the amount of seed required, it is better not to sow at all than to sow substitutes of a less valuable character.

5. *Regarding Thinning of the Plantations.*

In modern forestry practice it is the invariable custom to plant the trees much closer together than they will be allowed to remain for the final crop. This close planting allows a canopy to be rapidly formed, so that the lateral branches, owing to lack of sufficient light, are suppressed and the trees develop straight trunks without branches. After a certain number of years, which differ for different trees, a considerable number of the trees are removed. This process is known as "thinning," and it is repeated at certain intervals.

This question of thinning is perhaps the most difficult and important problem that confronts the management of the State plantations at the present time. Were there a market for the early thinnings, as in Europe, where nearly all the refuse of the plantations can be used, then thinning could be practised without question, but here there is no sale for the large amount of immature timber that would be for disposal. We think, then, that though without doubt thinning has a most beneficial effect on those trees that remain, it is doubtful whether in New Zealand it is a payable proposition, and we are not sure that it might not be better not to thin at all and so allow the law of the survival of the fittest to operate. Which is the more payable plan time and experiment will alone show.

Regarding the plantations of the future, there is no doubt that as population increases there will be a market for all our thinnings, and that the ultimate value of the crop will be increased.

6. *Sowing* in situ.

The method of raising trees by sowing directly where the plantation is to stand is one well recognized in European practice. Thus Schlich devotes twenty-five pages to the subject,* detailing various methods. In New Zealand, too, many plantations of Australian gums have been raised from seed. But in the Government plantations, except for a few oaks and chestnuts, nothing of moment has been attempted. With regard to sowing *in situ*, certain early experiments were carried out by Mr. H. Matthews, but under very adverse circumstances, and it may have been their failure that led to sowing *in situ* being considered a valueless method. Mr. Goudie, too, more recently has conducted a few experiments which also ended in failure. The following observations have combined to convince us that every effort should be made to find out some cheap and effective method of raising plantations direct from seed. At Waitati, near Dunedin, some standing tea-tree scrub was burned a number of years ago. Growing in close proximity was an old tree of *Eucalyptus numerosa*, which bore an abundance of seed. This latter, blown by the wind, found a congenial seed-bed in the ashes left by the fire, and the young plants came up by hundreds, and, growing faster even than the aggressive tea-tree, rapidly formed a close thicket of gums, which now is a small wood (see photos Nos. 2 and 3). Survival of the fittest has gone on so that at the present time there are numerous young trees with trunks varying from 28 in. to 29 in. in diameter growing at suitable distances, and the smaller saplings, &c., are rapidly being suppressed. If gum-plantations can be raised in this manner, not only is an extremely cheap method of raising gums *in situ* available, but also a great deal of worthless land might be readily and rapidly

* "Manual of Forestry," vol. 2, pp. 151–76.

afforested, such as the Auckland gum-lands. On the tea-tree covered land in various places, especially in the Taupo district, *Pinus radiata* has come up freely from seed.

In the "Transactions of the New Zealand Institute," vol. 16, p. 383, A. T. Urquhart gives an account of how certain *Eucalypti* have spread over the gum-lands from seed.

We consider, then, that a series of experiments should be conducted forthwith in regard to sowing *in situ* on ground covered with tea-tree. We suggest a series of experiments such as the following: (1.) A patch of tea-tree to be burned standing, and seed of some hardy gum sown broadcast. (2.) The tea-tree to be felled and burned, and then the seed sown. (3.) Similar experiments to be made with *Pinus radiata* and other pines.

These experiments need only be on a quite small scale; less than an acre would suffice for each experiment. Land of various kinds should be tested, especially pumice soil, gum-land soil, and tussock slopes on hillsides. If these experiments are successful, then the future of forestry on a sound financial basis would be assured; and if they did not succeed, then the small cost of the experiments would be nothing in a large expenditure, and one would know the value of sowing *in situ* in New Zealand once and for all. It must be borne in mind that one success or one failure is no sound criterion as to ultimate success or failure.

7. Unsuitability of Indigenous Trees for Afforestation Purposes.

During our investigations we have been frequently urged to recommend the planting of one or other of the indigenous trees. There is, in fact, a general belief throughout New Zealand that the planting of certain kinds, especially the totara and puriri, would be commercially profitable. This idea is altogether erroneous. Without exception, the timber trees are of much slower growth than those used in forestry operations the world over. A full-grown totara may be five hundred years old or upwards. Photo No. 6 shows a cross-section of a totara log which was a seedling at the time of the discovery of America by Columbus. Even English oak, which we consider too slow for forestry purposes, will grow twice as fast as puriri when both are under the same conditions.

This comparatively slow growth of the trees, together with various other reasons that need not be detailed, place the forests of New Zealand in a different category from those of Europe and America, since it is quite out of the question to practise any method of forestry that depends upon their rapid regeneration.

8. Economic Survey of the Private Plantations of the Dominion.

Both in the introduction to this report and when dealing with the forestry operations of the State we have referred to the great amount of practical information that would be supplied by a searching examination of the private plantations of the Dominion, including those of the various local bodies. The matter needs no further elaboration. We therefore recommend that the Government causes an economic survey to be made of the various plantations throughout the Dominion.

9. Preparation of a Book on Forestry.

It has come before our notice, both from evidence and from informal conversations with settlers, that there is a considerable demand for information regarding the trees to plant in any district, the methods of planting, the time to plant, and so on. In 1905 the Government issued a small book on forestry by the late Mr. H. J. Matthews, which met a wide-felt want at the

time of its publication. This work is now much in need of revision, and in some places is misleading. We consider that it should be thoroughly revised and brought up to date. For such a revision the Superintending Nurserymen possess a great deal of unpublished data, the result of their practical experience, and this could be made use of. The proposed survey of the plantations would also be of the greatest value in regard to this work.

10. Education of Cadets and Others.

We do not propose to put forth any elaborate and expensive scheme with regard to educating the younger members of the forestry service. It is undoubtedly essential that every member of the service should have a fair knowledge of those sciences on which the practice of forestry depends. Already, in the Report of State Afforestation in New Zealand for 1910–11, it has been suggested that as the scope of operation widens it will be necessary to give to a few able and intelligent young men a practical training in the nurseries, combined with a scientific education at one or other of the New Zealand University Colleges. A man who seeks a foremost position as a forester must have, amongst other things, a fair knowledge of botany, entomology, chemistry, geology, surveying, and mathematics. Instruction in all these can be supplied by the New Zealand University. It seems feasible that young men engaged in the active work of the Forestry Branch of the Lands Department could be transferred for a time to Wellington, where, in the Head Office, they could be engaged in clerical work for their branch, and at the same time attend lectures and learn practical science in the laboratories of Victoria College. The Government Biologist and others could also be made use of to instruct such men. This is quite a humble scheme, but it might well be the forerunner of a thorough education in forestry. As the forestry-work is bound to increase there will be openings for highly trained men. At present talented students from time to time go, by aid of scholarships, to Europe for purposes of study. Such, if they were guaranteed employment for five years in the Forestry Branch at a commencing salary of £200 per annum, might be induced to study forestry in some of the great schools devoted to that subject in England and the Continent of Europe. It is plainly to be seen that such men would be of the greatest value to New Zealand, and it seems to us that our idea is worthy of consideration.

Before leaving this subject of education we must refer with pleasure to the work already being done on their own initiative in the way of educating the young men of the Department by Messrs. Goudie and Robinson. A full account is given of their methods in the Forestry Report for 1910–11.

11. Legislation required in order that Certain of the Recommendations in this Report may be carried out.

We recommend the following:—

1. That the Land Act be so amended as to include climatic reserves in addition to other reserves that can be made under the said Act, and that such reserves cannot be used for any other purposes than those indicated in our report except by Act of Parliament.

2. That a law be enacted making the Warawara Kauri Forest and the 200 acres of the Waipoua Forest, as defined in the body of our report, inalienable national kauri parks.

3. Whereas section 6 of the Scenery Preservation Amendment Act, 1910, absolutely prohibits the use of firearms in a scenic reserve, and as it may be expedient that firearms should be used to exterminate noxious animals that are destroying the vegetation therein, it appears desirable that some amendment of the Act should be made by which the Minister in charge of scenic reserves could grant under proper safeguard a permit for the destruction of such noxious animals.

12. Minor Recommendations.

We recommend the following:—

1. That an area of 927 acres 1 rood 34 perches in Block XI, Ohinemuri Survey District, Auckland, which has been temporarily reserved for water-conservation purposes should be permanently reserved and vested in the Waihi Borough Council as a source for the town water-supply.

2. That the chain reserve along the Pomahaka Stream bounding the Dusky Hill and Conical Hill Plantations should be closed, as at present strangers cannot be excluded from the ground, thus increasing the danger of fire. We may point out that it was from a fire lit by an angler that the last destructive fire originated in the Dusky Hill Plantation.

This concludes the report of your Commissioners.

In witness whereof we have hereunder set our hands and seals this thirty-first day of May, in the year one thousand nine hundred and thirteen.

H. D. M. Haszard, Chairman.
Thos. W. Adams.
Leonard Cockayne.
Samuel I. Clarke
Frank Y. Lethbridge.
Charles P. Murdoch.

E. Phillips Turner, Secretary.
31st May, 1913.

APPENDICES.

APPENDIX A.

Proposed Climatic Reserve as per Index-map.

Note.—In the accompanying schedule and map the areas of the proposed climatic reserves are necessarily very approximate, being situated in high rugged country it would be an expensive matter to define the boundaries upon the ground. However, this is not considered necessary at present: they can be sketched in near enough on the office maps of the respective land districts, and should settlement ever extend up to their boundaries they could then be defined by the Settlement Surveyor.

Land District.	Area.	Remarks.
	Acres.	
Southland ..	119,200	On the Takitimu and Longwood Range, for conservation of the streams that have their sources thereon.
Westland ..	534,600	For conservation of headwaters of various Westland rivers.
Nelson ..	947,000	,, ,, Nelson rivers.
Marlborough ..	88,350	,, ,, Marlborough rivers.
Wellington ..	93,820	For extension of Tongariro National Park and conservation of headwaters of the Wanganui River.

APPENDIX B.

SCHEDULE OF RESERVES REPORTED ON BY THE COMMISSION.

Land District.	Nature of Reserve.	Locality.	Name.	Area.	Recommendation.	Reasons.
Auckland ..	Kauri-gum reserve ..	Swanson ..	..	1,160	Reservation to be uplifted	Suitable for settlement and kauri-gum worked out.
,, ..	,, ..	,, ..	..	420	,,	,, ,,
,, ..	,, ..	The Wade ..	..	560	,,	,, ,,
,, ..	,, ..	Orewa ..	..	400	,,	,, ,,
,, ..	,, ..	Taupaki ..	..	100	,,	,, ,,
,, ..	,, ..	Okura ..	..	61	,,	,, ,,
,, ..	Forest reserve ..	Kamo ..	Kiripaka	1,369	No recommendation ..	No time to return for inspection.
,, ..	,, ..	Hokianga ..	Omahuta	3,000	Reservation to be uplifted	Part of Omahuta Reserve, on which forest is destroyed.
,, ..	,, ..	Broadwood ..	Raetea	10,843	Reservation to remain ..	Very steep hills at sources of streams.
,, ..	State forest ..	Hokianga ..	Waipoua	22.450	Reservation to be uplifted	Part of State forest required for settlement.
Taranaki ..	Forest reserve ..	Inglewood ..	Everett Road ..	166	,,	Land suitable for settlement.
Wellington ..	,, ..	Hunterville ..	Rewa	323	,,	,, forest burned.
,, ..	,, ..	Rangiwahia ..	Mangoira	1,650	,,	,, ,,
,, ..	,, ..	Mangaweka ..	Part Section 29, Block XI, Hautapu Survey District	550	,,	,, part of reserve.
,, ..	,, ..	Woodville ..	Woodville ..	2,110	,,	,,
Marlborough ..	Timber reserve ..	Onamalutu Survey District	Section 9, Block VIII Section 4, Block XII	232 76	,,	Bush destroyed.

A proposed scenic reserve near Owhango was inspected, and it was decided to recommend the opening for settlement of all the land (after the timber had been milled) except a strip of steep land along the Whakapapa River.

APPENDIX C.

SELECTED LETTERS ON MATTERS CONNECTED WITH THE INQUIRY OF THE COMMISSION.

No. 1.

TIMBER EUCALYPTS IN NEW ZEALAND.

[By Rev. J. H. SIMMONDS, Wesley Training College, Auckland.]

THE value of eucalyptus timber is so well known to our engineers, architects, wheelwrights, and farmers that there is no need to spend words in proving it here. We are simply in the position of having some of our vital industries dependent upon the forests of Australia; and any one who has travelled in that country with his mind advertent to the timber problem knows that the best we can hope for in looking to the original sources of supply is that we shall in the near future have to accept inferior grades of timber at indefinitely advancing prices. If we are to meet the situation in a permanently satisfactory manner it must be by establishing hardwood forests in our own country.

Of the eighty to ninety timber-yielding species of eucalyptus growing in Australia and Tasmania, it is certain that a considerable number can be successfully grown over a wide range in New Zealand. There are others that will probably be restricted to warm districts a little inland from our northern coasts. If some still remain that can never find a congenial home anywhere in this country, we can do without them. Our policy should be to use the experience already gained in planting extensively the best of those that have done well with us, while we persistently experiment, on a smaller scale and in various localities, with the most promising of the others.

The eucalypt most widely known in New Zealand is the blue-gum *(E. globulus)*. It grows quickly to a large size in many parts of both Islands. In some localities it has failed badly, but its range of healthy and vigorous life still entitles it to a place in the first rank of hardy exotics. Blue-gum saplings, like most other saplings, are soft and perishable; but the esteem in which the timber of this species is held in Tasmania and Victoria suggests that when our own mature trees are properly milled and seasoned they will yield a very valuable hardwood. For durability in contact with soil or water, Baron F. von Mueller gives the wood of *E. globulus* a medium position between the white-gums and the stringy-barks on the one hand and the red-gums and ironbarks on the other. For joists, studs, rafters, and heavy scantling in house-building he says it is one of the best. He further speaks approvingly of its use in ship-building, in carriage and implement manufacture, for telegraph-poles, for bridge-planking, and for railway-sleepers when the timber of *E. rostrata* was not available. In California, where eucalyptus-growing is being carried out systematically on a large scale, it is *E. globulus* that is most in favour for general planting, the opinion of experts there being that the timber is excellent for a wide range of purposes. Popular prejudice has had much to say against blue-gum, just as it has had much to say against *Pinus insignis;* but it seems certain now that these two familiar trees are both destined to hold an important place in our future forestry.

In various parts of the Dominion may be seen tall and stately eucalypts with the bark on upper stem and branches smooth and white and the flowers usually in threes. They are known to botanists under the specific name of *viminalis*. Some idea of their rate of growth and ultimate size will be gained when it is mentioned that a tree thirty-two years old was found by the writer to have a girth of 10 ft. 4 in. and a height of 100 ft. The timber of this eucalypt is not one of those with a reputation for great durability in contact with the ground, but from the account of it given in Mueller's "Eucalyptographia" it seems safe to infer that when sawn into boards and scantling for use in dry situations it will be found compact, durable, and not liable to warp. Visitors to Rotorua may see a splendid group of *E. viminalis* trees close to the railway-station. Older single specimens of a particularly beautiful strain may be seen in the grounds of Mr. R. C. Allen as the Thames train passes the Piako Station near Morrinsville. Mr. T. W. Adams could tell us that the species is equally at home in his forest plantations at Greendale, on the Canterbury Plains. Its celerity of growth, its hardiness in a wide range of situations, the great bulk of its timber yield, and its beauty entitle *E. viminalis* to favourable consideration and thorough trial.

In the Waikato there has been made an especially valuable discovery in eucalyptus-growing. Just thirty-eight years ago last spring the late Mr. John Reynolds, on the recommendation of an Australian bushman, imported several small parcels of eucalyptus-seeds from Sydney, and sowed them in rows on cultivated ground at "Trecarne," Cambridge. The scientific names of the several species were not known at the time, but have since been ascertained. The two that have made the

largest growth and are most valued by the proprietor, Mr. Richard Reynolds, are the stringy-bark (*E. eugenioides*) and a eucalypt now identified by Mr. J. H. Maiden, F.L.S., Government Botanist of New South Wales, as *E. Macarthuri*. It is this latter tree that here demands special description and report. It has its stem and larger branches covered with a rough but non-fibrous bark. Its buds, flowers, and fruits are small, and usually in sevens. The foliage is abundant, dark-green, and often drooping. In close plantations it develops a tall stem free from branches and of even thickness. Some of the trees at "Trecarne" have reached a girth of 8 ft. to 10 ft. and a height of 100 ft. The timber is sufficiently fissile to be easily split with maul and wedges. The heart-wood is of a pale-red colour, and from an early stage in the tree's life forms 75 per cent. of the whole bulk of the stem. Fencing-posts split out of this eucalypt fifteen to twenty years ago still have the heart-wood quite sound. From a thinly planted area of less than 3 acres there have already been taken 3,000 fencing-posts, 250 stock-yard rails, and 200 gate-posts, besides saplings and firewood; and the still standing trees will yield twice as many more. Had the whole area been planted with *E. Macarthuri* and the trees placed closer together, the crop would have been much heavier.

Mr. Richard Gillett, of "Peach Grove," Kirikiriroa, Hamilton, has two plantations of "gums," one dating from 1881 and the other from 1884. The seed was sown *in situ*, the sod having been previously turned where each tree was to grow. The seed in each case proved to be mixed; but it fortunately happened that the predominating species in both was *E. Macarthuri* as just described. An average tree in the older plantation has a girth of over 6 ft. and a height of 125 ft. Fencing-posts split out when the trees were only fourteen or fifteen years old still have the heart-wood quite sound. From the trees of this species in the younger plantation, which has an area of only ¼ acre, there have been taken out and sold 4,000 fencing-posts, ten piles 75 ft. long for bridge-construction, and some other large trees, the net receipts for which have amounted to £120; and it is estimated that the trees still standing will yield an equal product. From this experience Mr. Gillett infers that an acre of *E. Macarthuri* properly planted and grown would, when thirty years old, be worth £1,000 on the stumps, while long before that the thinnings would have paid working-expenses. Growing so rapidly, the timber of this eucalypt is liable to crack radially in drying. If by special care in felling and seasoning this one defect could be overcome, there seems to be no reason why these magnificent trees should not be converted into street-blocks, railway-sleepers, or girders and planking for bridges. Mr. Gillett would in future plant *E. Macarthuri* 6 ft. apart, and thin out as soon as the young trees are large enough to be useful. Other eucalypts represented by noble specimens in Mr. Gillett's grounds are *obliqua* and *viminalis*.

On the eastern railway reserve at Papakura there is a splendid little forest of eucalypts, consisting mainly of trees that are included by botanists in a specific group called *regnans*. These trees look like stringy-barks, but the persistent outer bark is only subfibrous, white the seed-cases are small. To realize the size and beauty of the trees it is necessary to leave the train and walk through the plantation, It is then seen that the stems are large enough for the sawmill. Some of them run up to a height of 50 ft. without a branch, and had they all been planted under forest conditions this would have been the case with the majority. Seven trees carefully measured for the writer by a friend give the following averages: Total height, 100 ft.; height to first branch, 37 ft.; girth, 8 ft. The age of the plantation is said to be twenty-nine years. Reports on the timber of *E. regnans* lead us to believe that if these trees were properly milled into boards and scantling the timber would, for house-building, be of excellent value. The species is very hardy, and is widely represented. The variety at Papakura is distinguished by Mr. Maiden as *fastigiata*, and is the best for cultivation.

So far as the writer is aware, the true stringy-barks have not been planted in large numbers in any one locality in New Zealand; but scattered about in various situations there are sufficient single trees and small plantations of *E. eugenioides* and *E. obliqua* to show that these valuable trees could be successfully grown over a wide range in the North Island, and probably also in milder districts of the South Island.

Mr. Robert Glasson, of Linwood, Drury, recently had some stringy-bark trees sawn up for the framework of a new house. In answer to inquiries, he now writes to say that the timber has given him entire satisfaction. It is interesting to further learn from his letter that the house is lined throughout and partly ceiled with *Pinus insignis* boards, some of which are 16 in. wide; and that, large though the pines were, the stringy-bark eucalypts planted about the same time had attained an almost equal size.

Of the red-gums *E. tereticornis* and of the ironbarks *E. sideroxylon* have both been noted in the Waikato and in Piako. Fair specimens of *sideroxylon* may also be seen on the western railway reserve at Papakura. On the Auckland isthmus *E. tereticornis* is hardy and fairly rapid in growth. About forty-five years ago the late Dr. Kinder had a number of eucalypts planted on his property in Arney Road, Remuera. Measurements of surviving trees recently taken are as follows:—

	Girth.	Height.	Condition.
Tereticornis	6 ft. 3 in.	85 ft.	Healthy and vigorous.
Longifolia	6 ft. 6 in.	90 ft.	,,
Punctata	6 ft.	80 ft.	,,
Eugenioides	7 ft.	100 ft.	,,

Tereticornis, *longifolia*, and *punctata* all yield valuable hardwoods durable in contact with the ground, while *eugenioides* is probably the best of the stringy-barks.

The writer has just had an opportunity to closely inspect the eucalyptus plantations of the Forestry Department at Whakarewarewa and Waiotapu. There are altogether 1,715 acres under

eucalypts, and the trees are everywhere healthy and in vigorous growth. The plantations are situated in an area where, in addition to cold winters, there are occasional severe frosts in summer. In commencing the cultivation of eucalypts under these conditions there was no option but to choose hardy species. Tender subtropical trees would have perished almost as fast as they were planted, or at the best would have struggled on as mere stunted shrubs. Hence the principal specific groups represented are those known as *amygdalina*, *coriacea*, *Risdoni* var. *elata*, *Muelleri*, *Gunnii*, *viminalis*, *obliqua*, *regnans*, *eugenioides*, and *sieberiana*. A few of these may serve only for shelter, firewood, and rough fencing; but the five or six last named are certainly valuable timber-trees that may be expected to grow to a large size. Quite possibly on the pumice land all of them will develop a degree of durability beyond that attained in their native habitat. The object-lesson as a whole is of immense value as showing what may be done with eucalypts in our colder inland districts, especially as the trees will soon yield an abundant supply of seed for distribution. The young forests of larch, pine, and eucalypt are already softening the climatic conditions, and thus preparing the way for species that have hitherto been unable to endure the winds and frosts. In judging timber values, we must remember that they are relative to circumstances. Thus, even in parts of Australia where more durable timbers are not obtainable and cannot be grown, the white-gums and stringy-barks come into demand and are gladly utilized.

In the grounds of Wesley Training College, on the Auckland isthmus, we have nearly forty species of eucalyptus under trial. They are distributed in small plantations, so that they may as far as possible be tested on different kinds of soil. Many of them are exposed to the full force of the prevailing south-west winds, and have consequently made less growth than would have been the case had they been effectively sheltered. The growth results to date for trees of twenty species are as follows:—

Name.	Number of Years from Planting.	Girth 4 ft. above Ground.	Height in Feet.
		Ft. in.	
Red-gums—			
Rostrata	9	3 2	42
Tereticornis	9	3 2	40
Ironbarks—			
Paniculata	15	3 0	43
Sideroxylon	15	2 9	40
Stringy-barks—			
Capitellata	15	3 0	40
Eugenioides	4	1 2	21
Obliqua	8	2 1	30
Macrorrhyncha	9	3 6	35
Miscellaneous—			
Macarthuri	9	4 0	50
Resinifera	9	1 11	40
Pilularis	7	1 10	30
Longifolia	7	1 4	27
Robusta	8	2 4	30
Globulus	35	8 0	80
Sieberiana	9	2 0	27
Viminalis	9	3 1	42
Gunnii	6	2 0	33
Amygdalina	8	2 6	35
Coriacea	9	2 6	40
Urnigera	6	1 8	25

Eighteen other species are represented by healthy specimens, but the plants are as yet not sufficiently advanced for detailed report. The complete list includes nearly all the most valued of the timber eucalypts; and the experiment as a whole is very encouraging, especially when it is remembered how many localities there are in the north more favourable for growing eucalypts than this isthmus.

To attain their best, eucalyptus trees must be closely planted in wide belts, so that they may have the benefit of mutual protection against winds and frosts, and so also that they may make long clean stems. The forest giants recorded in Australia and Tasmania have grown up in sheltered valleys or in the midst of other trees. We must heed the lessons of nature, and give our eucalypts congenial conditions. In all situations exposed either to cold alpine winds or to salt-sea breezes the plantation should have an outer screen of hardier species, or preferably of pines.

The initial difficulty in any attempt to grow eucalypts is to obtain a supply of seed from good parent trees and true to specific description. A eucalypt may be botanically true to type, and yet of an altogether inferior strain, as may often be seen in the case of *E. globulus*. In the Australian bush the seed-collector, even if he knows his business, is constantly tempted to gather from stunted, twisted, or spreading trees, simply because they are more accessible. He is also tempted to substitute one species for another. The city seed-dealer is himself deceived, and passes on the deception to his customers. It thus too often happens that the planter, after years of waiting, finds that his trees are quite different from what he expected, and more or less useless. The writer has himself several times been supplied by quite reputable seed-houses with parcels of seed that were either mixed or altogether wrongly named. If eucalyptus-growing is to be made a success in this country, it would seem imperative that some competent person shall visit Australia and Tasmania, and either collect the seeds

himself or arrange with trustworthy agents to do it under his explicit instructions. As far as practicable, supplies should be obtained from localities where the climatic conditions are similar to our own. To ensure reproduction of identical trees seed of *E. Macarthuri* must be obtained from the plantations of Messrs. Reynolds and Gillett. *E. globulus* and *E. obliqua* should be reintroduced from Tasmania.

Many of the eucalypts when allowed to do so will spread very rapidly by natural propagation. The seed germinates and grows freely even among grass or low scrub, and not infrequently young trees may be seen forcing their way through a heavy covering of bracken-fern. If, therefore, suitable seed could be obtained in sufficient quantity, it would seem quite possible to cover large areas with trees by broadcast sowing alone. *Globulus*, *Macarthuri*, *viminalis*, *regnans*, *obliqua*, and other rapid growers would all lend themselves to this method.

Of all timber-trees, the eucalypts, when of considerable size, are perhaps best able to survive a running fire. They may often be seen growing as if nothing had happened after the outer bark has been burnt off their stems. Even young trees when killed to the stump will shoot out and grow again. But of course it is better in every way to protect them from this worst menace to the work of the tree-planter. All large plantations should be surrounded and intersected by fire-breaks. Whether these shall be ploughed, closely grazed by sheep, or planted with umbrageous non-inflammable trees such as oaks is a question circumstances must determine. Methods and details must be left to the practical forester. What the country as a whole needs to take seriously is the necessity for quickly covering sufficient areas with the most valuable hardwood trees that our climatic conditions will permit us to grow.

No. 2.

Remarks on Erosion of Slopes in New Zealand.

[By C. A. Cotton.]

The most obvious difference between deforestation of slopes in the southern Appalachians and in New Zealand is that in New Zealand steep slopes are seldom or never cleared for cropping. Obviously, a growth of grass is of considerable value in checking erosion, especially "sheet-wash" erosion and erosion by parallel gullies. Where, however, land is required for pasture there is a tendency to clear slopes of much greater steepness than would be cleared for agricultural purposes. No doubt the slope on which it is safe to clear is much steeper, but there is a greater temptation to exceed the safe slope.

The slope of safety will probably be found to vary much more widely for grassed than for cultivated land, with varying geological conditions, for erosion of grassed slopes takes place usually by the method of small landslips. In this connection two widespread rock formations in New Zealand may be considered—namely, that facies of the older sedimentaries to which the name "Maitai" rocks is usually applied, and the bluish mudstones of the younger group commonly known as "papa."

In the Maitai rocks, as developed in the Wellington District, clastics of medium grain predominate. Where obtained fresh they are found to be well cemented, compact rocks, but there are innumerable intersecting joints which divide the rock into small fragments. Surface-water readily penetrates, and, large surfaces being exposed to attack, the rock is deeply weathered. On all but the steepest slopes, therefore, there is a thick covering of weathered material in the form of a stony or sandy clay, which is sufficiently porous to allow surface-water to pass readily through it. It is seldom, therefore, that the soil reaches that waterlogged condition which results in a landslip. Slips are rare on the hillsides in the immediate neighbourhood of Wellington, and although the bush has been cleared from all but the steepest slopes it has been replaced successfully by grass, and little destructive erosion has resulted.

On these rocks I have observed small changes in stream grades, which, in my opinion, are directly due to clearing, but none that I have noticed have had important economic results. They are shown by the formation of narrow V-shaped channels, owing to increased rapidity of run-off, upon the floors of gullies, the cross-sections of which show otherwise a broad U-shape. Caving along the banks of the new channels seems to be taking place only to a slight extent, and the damage is inconsiderable.

It would seem that on rocks of this type there is no difficulty in starting, after clearing, a good growth of grass, which is effective in checking erosion on slopes up to 30° at least. On slopes up to 40° or even steeper the grass seems to hold the soil fairly well unless the ground is overstocked.

There is danger of passing the safe limit of slope even on these rocks, however, especially in districts like the Rimutaka Ranges. Very steep slopes are being cleared in places along the eastern coast of Marlborough.

There is, of course, great danger in clearing slopes by way of experiment, for if the attempt to grass the cleared slope is unsuccessful, and the soil is lost by erosion, leaving a bare rock surface, reforestation is by no means easy.

Glenn points out that this danger is especially great on rocks which weather spheroidally. The spheroidal type of weathering is usually associated with certain types of igneous rocks, but in the Maitai clastic rocks it is not uncommon. The higher ridges, for example, in the neighbourhood of Wellington, mark the outcrops of strata of coarser-grained, more thoroughly cemented, less-jointed rock than that already described.

In this rock, which is strong enough to be used as road-metal, weathering of the spheroidal type occurs, and the surface is strewn with smooth rounded masses which in some respects resemble stream-worn boulders, but are really cores resulting from the spheroidal type of weathering.

The characters of the rocks usually called Maitai throughout New Zealand are by no means uniform, and no doubt the maximum slope on them which may be safely cleared varies from point to point.

On rocks of the "papa" type, on the other hand, slips are quite common. The subsoil and the underlying mudstone are impervious, and the surface is liable to become so thoroughly soaked that flow results, whole hillsides in some cases being affected.

A grass covering appears to afford no protection against erosion of this type. More protection appears to be afforded by forest; for slopes that were evidently stable when bush-clad have begun to flow after being cleared. The slopes of the valley of the Maungapakeha, on the road from Masterton to Tinui, may be cited as an example.

I have in mind also flowing hillsides of quite gentle slope bordering the Kaipara Harbour; the underlying rock, however, is there an argillaceous limestone.

It will probably be found to be a general rule that the average slope which it is safe to clear is much less steep on the younger (Cretaceous and Tertiary) rocks than is the average on the older (Maitai and other) rocks.

It should be stated that the foregoing remarks are not made as a result of special investigations of erosion on slopes, and that in making them I have had to rely entirely on mental impressions received while my attention was mainly devoted to facts of a different order. I can therefore make no claim to finality for the conclusions reached.

No. 3.

SIR,— The Dairy-produce Grader, Auckland, 23rd May, 1913.

As requested by your Commission, I now have much pleasure in reporting on the various samples of butter packed by the New Zealand Dairy Association (Limited), in boxes made from the following timbers: Taraire, kahikatea, *Pinus insignis*, and tawa.

The butter has been stored in the freezing-chamber at a temperature of 10° F. for a period of six weeks, and before being inspected it has been thoroughly defrosted.

On examination, we found the flavour in the various boxes to be as follows:—

Taraire.—One box paraffin-waxed and one without wax. No taint of wood could be found, and the butter had kept remarkably well. One thing I noticed was that this timber did not appear to take the nails too well, but in every other respect it seems suitable.

Kahikatea, Poplar, and Tawa.—Butter kept remarkably well, and no taint of wood.

Pinus Insignis.—The flavour of these two boxes (waxed and unwaxed) kept remarkably well, there being no taint of the wood.

I am of the opinion that any of these timbers would be most suitable to manufacture boxes for the export of butter; but with reference to the *Pinus insignis*, if used, would suggest that it be paraffin-waxed so as to eliminate any chance of taint, owing to the fact that some of our factories use a lighter parchment paper than others.

Some twenty-odd years ago, when the dairy industry was in its infancy and the only export trade was with Australia, the principal timber used was tawa and totara, and, having experience in the business in those days, I may state that the former wood used to give excellent results, there being no complaints whatsoever with regard to taints.

Another matter I would bring under your notice is that I was asked some three years ago to carry out an experiment with a specially prepared envelope manufactured of grease-proof paper. Butter was packed by the Cambridge Co-operative Dairy Company from one churning in envelopes of this make and placed in boxes made from the following timbers: Oregon pine, kauri, and *Pinus insignis*, and you will see by the enclosed copies of reports that the butter turned out free from taint.

At the present time I have not an envelope on hand, but, should you desire to see one, I believe that one could be borrowed from the patentee, Mr. E. Canavan Smith, of this city.

I trust that this experiment will be satisfactory to your Commission, and should you require any further information it will be my pleasure to supply same.

Kindly instruct me as to what I shall do with the samples of butter.

Yours, &c.,

A. A. THORNTON,

The Chairman, Forestry Commission, Wellington. Dairy-produce Grader.

No. 4.

DEAR SIR,— Mona Vale, Ma Waro, 22nd May, 1913.

Re establishing plantations on my property.

In 1907 there were 5,000 one-year-old prickly acacia trees planted 4 ft. apart, pit method, by day labour, at a total cost of £5 per thousand, also 2,000 oaks and 500 walnuts 6 t. apart, pit method, at £6 per thousand, all in grass land. These plantations were practically a failure, due partly to dry seasons, the tops dying back to the ground, and grass choking new growth from the root. The whole area planted with the above trees has since been replanted with *Pinus ponderosa*, with the exception of about an eighth of an acre, which I have kept with the object of observing whether the trees which are alive but making no progress will in time take a start when the grass runs out.

In 1909 I put in 3,000 *Pinus ponderosa* 6 ft. apart, notched method, in grass land. These trees made very little progress for two years, and then came away rapidly. In the same year 1,000 two-year-old Oregon pines and 1,000 larch the same age were planted, also 6 ft. apart, in tussock land, on a southern slope, all of which have done exceptionally well, making from 2 ft. to 3 ft. of growth per year. In the same year I put in 1,200 *Cupressus macrocarpa* in ploughed grass land. There was a large death-rate in these. Those that survived made but fair progress.

All this season's trees were planted 6 ft. apart, notch system, by Millichamp and Sons, of Ashburton; cost of trees with life guaranteed, £5 per 1,000.

I cannot give the cost of fencing, as much of ground planted was only waste corners, some requiring a good deal of fencing, whereas perhaps a larger area required less.

In 1910 the following trees were planted on tussock land: 9,000 larch, 4 ft. apart; 5,000 Oregon pine, 6 ft. apart; all three-year-old trees. The first year these trees only held their own, but made good growth the second year. One thousand one-year-old *Pinus insignis* on the same land did well from the first. These 15,000 trees were also planted by Millichamp and Sons, of Ashburton, by contract, at £3 10s. per 1,000, but with no guarantee. The above-mentioned trees form two separate plantations; in one there are three plots of cocksfoot grass, in all an area of about an acre. The plots were mostly planted with Oregon pine, as they were drier than the rest of the land. Well, hardly a tree lived. The same thing occurred in the cocksfoot plot of the other plantation. I might also mention that F. W. Smith, of Waratah, Albury, planted 8,000 similar trees the same year, and I noticed that hardly a tree grew where there was much grass, which I think is a strong indication that cocksfoot is detrimental to the growth of young trees.

Between the years 1884 and 1890 my father, A. B. Smith, planted 40 acres of mixed trees amidst one another. In 1894 we began to thin out the *insignis*, and have continued doing so up till now, no other fuel having been burned since 1897. I have also had 370,000 superficial feet of *insignis* building-timber cut for own use and settlers on Rosewill Settlement.

Of all the varieties of trees planted by A. B. Smith I notice the rate of growth of each has been as follows: *Pinus insignis*, *Macrocarpa*, Lombardy poplar, Oregon pine, larch, Norway spruce, and Corsican pine.

I have many hundred *Macrocarpa* fencing-posts in the ground. Some I removed after having been in fourteen years, and found the heart timber quite sound.

Yours, &c.,
A. M. Smith.
Per Tasman Smith.

The Chairman, Forestry Commission, Wellington.

No. 5.

Report of Subcommittee on Plantation near Cambridge, Waikato (Messrs. Lethbridge, Murdoch, and Clarke).

Left Hamilton Thursday, 8th May, by motor, at 9.30 a.m., at the invitation of R. Reynolds, Esq., owner of the "Trecarne" Estate, about two miles and a half from Cambridge, on the south bank of the River Waikato.

Weather rainy and cold.

Heartily welcomed by Mr. Reynolds, who explained that his plantation consisted almost entirely of eucalyptus trees, and at once invited us to inspect timbers from this plantation in actual use.

Exhibit No. 1.—Clothes'-line post, about 20 ft. high: Girth at 5 ft. above ground, 22 in.; age of tree when cut down, nineteen years; in use in present position, twenty years. Cut from the middle section of the tree, the bottom portion being used for another purpose. Thickness of sap, about 1¼ in. A hole was dug at the ground-line of this post, and the heart-wood was perfectly sound and solid. Only the sap had decayed below surface of ground.

Exhibit No. 2.—Yard-fence posts and rails: Age of trees when used, thirty years; posts in use, seven years; rails in use, seven years. Very little sap-wood on these posts and rails. The sap had decayed, the heart-wood was perfectly sound and good, and the amount of sap-wood was very small in proportion to the bulk of the several posts and rails. The rails were fixed feather edge uppermost, leaving the sap on the lower edge, and thus allowing the water to run off the sap-wood. Mr. Reynolds explained that his practice is to split both posts and rails to a size a little in excess of the common dimensions, to allow for the decay of sap-wood.

Exhibit No. 3.—A number of large fencing-posts which had lain on the ground unused for ten years. The sap had disappeared and the remaining heart-wood was very hard and dense.

Exhibit No. 4.—The plantation from which the foregoing materials had been procured. Dimensions, approximately: Length of plot, 180 yards; width, 67 yards. This is equal to about 2½ acres. During the past ten years there has been taken from this area 3,000 ordinary fencing-posts, 200 large posts (strainers), 250 fence-rails; all firewood used on the homestead and a large amount which has been given away to workmen and others. There still remain about 350 trees; some of these are of a slow-growing order, such as ironbark and red-gum, but all are of a useful size. Of the larger ones, a specimen measured 82 in. in girth, and was estimated to be 100 ft. in height (rough bark). No. 2 (smooth bark), 120 ft. high, 80 in. girth, thirty-five years old. Regrowth from stump after original tree had been cut down: No. 1—Height, 40 ft.; girth, 37 in.; age of regrowth, ten years. No. 2—Same age; had blown down from parent stump; length on ground, 54 ft.; girth (5 ft. from bottom end), 36 in. No. 3—Three leaders growing from one stump; two of these small main leaders about 60 ft. in height and 34 in. in girth.

Exhibit No. 5.—Stump of tree grown on outer edge of plantation: Girth outside the bark, 14 ft. 7 in.; girth inside the bark, 11 ft. 7 in. Seventy large fencing-posts were split from the butt-log of the tree felled from this stump. The seed of this tree, in common with others, was sown on the 8th October, 1874.

Exhibit No. 6.—Stringy-bark gate-post, cut from the top of a tree thirty years old. Girth at ground-line, 21 in. The sap-wood on this post is barely a quarter of an inch in thickness.

Reproduction.—This takes place by natural means. Mr. Reynolds remarks: "We have thousands of these young plants. Draw the trees from the ground, stow them in a wet sack, have the holes ready, and plant at once. With this method there are practically no losses."

Name of Tree.—Mr. Reynolds describes it as the Tasmanian messmate-gum. The botanical name (see Maiden's revised list) is *E. Macarthuri*. (Refer to Rev. Mr. Simmonds's letter.)

General Observations.—Mr. Reynolds describes this tree as being of two kinds—the rough bark and the white bark, there being no other apparent difference in the character or qualities of the two kinds, and is informed that this variety of gum tree is growing at the Government plantation at Waiotapu.

As to the value of such plantations, Mr. Reynolds said, "With the exception of the house plot, I have no area of land which is better occupied than that which is occupied by trees."

Speaking of a 10-acre block owned by a friend at Lichfield, which he had been asked to inspect, and which the owner did not appear to attach much value to except for purposes of shelter and supply of firewood, Mr. Reynolds said, "If I had that block I would not sell the trees for £50 an acre."

Questioned as to blue-gum (*Eucalyptus globulus*), Mr. Reynolds said he had at one time several thousands of these destroyed by frost, when they had reached a height of about 7 ft., and that he does not plant it now. As regards planting in fern land, it will pay to burn the fern, plough the land, lay it down in clover for two years, plough in the clover, and then plant the young trees. "Results will be as good in four years as in ten years if planted in unprepared fern land."

As to other trees for fencing, &c., he described an area of river-bank on steep ground of practically no value for other purposes, being a narrow strip the exact size of which was uncertain. This was planted with *Robinia* thirty-five years ago (known in Britain as Cobbett's acacia). This now contains timbers which had been valued at £600 for fencing purposes.

I only planted a few scores of plants some distance apart, the natural increase from the root (suckers) has produced the total, so the actual age of the total value of marketable timber would be at least ten years less. I do not think the total area of this irregular narrow strip would be more than 5 acres; it is a most valuable timber for fencing purposes, but compared (weight for age) against the *E. Macarthuri* it must take second place. The posts split out of the gum plantation were large. I value the fencing-posts at £5 per 100; rails, ditto, but the gate or straining posts were worth at least 7s. 6d. each.

No. 6.

Karere Tree-planting Camp for Consumptives.

Department of Public Health, Hospitals, and Charitable Aid,
Wellington, N.Z., 16th May, 1913.

SIR,—

I have the honour to forward herewith, as requested, details with regard to the capital and maintenance expenditure of the above camp for the years 1908–9, 1909–10, 1910–11:—

	Capital Expenditure.	£
1908–9.	Timber, cement, bricks, tents, closets, blankets, &c.	216
1909–10.	Timber, tents, cow-house, &c. ..	148
1910–11.	Duck for tents	15
		£479

Maintenance Expenditure.		£
Food, fuel, water, salaries, and wages ..		513
" " " " " ..		737
	£	
Chaff, cartage, and repairs	14	
Wages, manager and gardener	185	
Medical attendance, ten months	32	
	—	231
		£1,581

To the capital cost may be added another £50, representing £25 for prison labour, not charged for, and about £25 for stretchers, blankets, and odds and ends forwarded from the Cambridge Sanatorium.

The disparity shown with regard to the maintenance expenditure for the three years is due to the fact that during the first two years the camp was established the patients' food was paid for, and also the salaries of nurses. Early in 1910 it was decided to admit to the camp only convalescent patients who were capable of looking after themselves, and who would be able to work with some degree of continuity. Consequently, it was possible under these arrangements to dispense with the services of the nurses, and the patients were able to earn more than sufficient to pay for their food.

The above expenditure was for a camp for twelve patients. This was the average number of inmates during the three years the camp was in existence.

I have, &c.,

T. H. A. VALINTINE,
Chief Health Officer.

The Chairman, Forestry Commission, Wellington.

No. 7.

SIR,— Ruatapu, 9th May, 1913.

I have the honour of submitting the following report on the subjects under your consideration.

In relation to the existing forest lands which it is desirable to conserve for the purpose of soil-protection, preventing denudation, prevention of floods, and water-conservation, the bush adjoining rivers, especially at the mouths and on watersheds, should be reserved for the purpose of preventing erosion and floods, also for water-conservation and scenic purposes.

A remarkable instance of the necessity of protecting the forest growth at the sources of rivers is given by Mr. Elwood Meade, of the Irrigation Department, Victoria, in his paper read before the Science Congress, Melbourne, in January of this year. From his personal observation he told of an area of land in America watered by two rivers. The timber growing at the head of one of these rivers was sold for sawmilling purposes and removed. In a few years this river had practically disappeared, and the land previously irrigated by its waters became a desert subjected to floods after rain, whilst that portion of the area watered by the river from which the timber had not been removed suffered no damage nor alteration.

The loss of valuable land adjoining rivers owing to the banks not being protected by growth of trees is instanced in the river-beds of Canterbury, some of which are over a mile in width. Again, in the Manawatu district, Wellington, the rivers since the removal of the bush frequently change their course, and sweep away large areas of valuable land.

On the raupo flats, Kaipara district, adjoining the Wairoa River, no natural growth exists, and thousands of pounds have been spent, ineffectually so far, to prevent erosion.

The conservation of bush on watersheds is necessary to regulate the flow of the rainfall down the hillsides to the river-beds; the trees and vegetation regulating and holding back the water prevents floods.

Any bush lands suitable for agricultural or pastoral purposes should be quickly, but very economically, cleared of the bush by sawmilling, and the land put into profitable use. The available land for settlement is rapidly getting less and less, and with the demand existing attention should be paid to the heavy forest lands remaining.

In Westland it has too long been erroneously supposed that the land is unsuitable for agricultural and pastoral purposes. The land has been given over to the miner and sawmiller, without due consideration of the resultant work in relation to settlement. The disposal of land is largely in the hands of the Warden's Court, hedged round by the regulations of the Mining Act, with the sole view of utilizing the land or forests for the benefit of the miner and sawmiller. These latter frequently leave the areas in a condition practically unfit, unless a large expenditure is incurred, to bring them into profitable use for settlement.

The method of dealing with applications for timber in mining-areas is as follows: The Warden receives applications and passes them over to the Crown Lands Department for inspection of the area and report. This being obtained by the Crown Lands Ranger, the application, with report attached, is sent back to the Warden, who then deals with the matter. The Wardens have no supervision of the areas so granted, this duty falling on the officers of the Crown Lands Department, who periodically inspect and report on the work done by the millers. This dual control now in existence is cumbersome and unnecessary, and its abolition would benefit the two departments—the miller and the community in general. The Crown Lands Department, having the disposal of the land for settlement purposes after the miller has finished with it, should certainly control the disposal of areas for milling purposes. If this course is followed a systematic method of clearing the land by milling could be instituted.

Under the present system the haphazard granting of areas, owing to the millers picking out only the better portions of the bush and leaving the poorer, would be stopped. The timbered lands should be worked in a face, the land so cleared would be ready for settlement in compact areas, making the work of surveying and roading a cheaper and easier one than at present. It would also enable the County Council authorities to systematically road the district, and eventually save them large sums of money required under the present system to form and maintain roads which will in the future prove unnecessary.

A glance at the map showing the areas already worked and those now held for milling purposes shows the urgent necessity for a better system of granting cutting-rights.

In the report of the Timber Commission, 1909, after fully investigating the question of dealing with timber lands, the Commissioners reported that the system of dual control by the Warden and Crown Lands Department was not in the best interests of the community, and that the disposal of all timber should be in the hands of the Land Board alone.

The method of disposal of timber by granting millers stated areas is not the most profitable or economical from a national point of view. To get the best results, larger revenue for the Crown in the shape of royalty and railway freights, more employment for labour, and, of equal importance, better clearance of the land for settlement purposes, the present system should be altered.

In the Auckland and other districts the timber is accurately estimated on the log measurement of the standing tree. An area open for sawmilling purposes is offered at an upset value at per hundred feet royalty based on log measurement, and disposed of by tender, auction, or in some other suitable and necessary manner.

In the Westland District, on areas granted by the Warden's Court the quantity of growing timber is not measured or estimated by the Crown, the royalty being paid on the sawn output of the mill. The miller under this system is inclined to run through the bush, taking only the clean portion of the barrels, and leaving behind the knotty and faulty trees. Under the system of paying royalty on log measurement he must take all growing timber which has been estimated or measured, or lose the royalty he has paid thereon.

At the mill, also, the loss in conversion is not of so much importance to the miller paying royalty on sawn output; the main object, seemingly, is to get as much clean timber as possible without producing OB or lower grade. Millers frequently state that they get up to 80 per cent. clean timber from their mills. This percentage is only obtainable by systematical and intentional waste in the bush and mill, as can be easily seen by the inspection of worked areas of Crown lands, and by watching the operations of mills paying royalty on the sawn output.

On the occasion of the visit of your fellow-Commissioners to Ruatapu it was seen how the bush on the freehold was cleared down to trees 8 in. in diameter. Working the bush in this manner about 50 per cent. of clean timber and 50 per cent. of OB and second-class is produced. If all bush lands in Westland were worked in the same manner, more timber would be saved for use than can be grown by replanting. For settlement purposes alone it is absolutely necessary that all the millable timber should be removed by the miller. The climatic conditions are not conducive to good burns, the result being that the settler has to wait years for the timber left behind by the millers to rot before the full benefit of the land for grass-growing can be obtained.

Giving evidence before the Timber Commission in 1909 leading Greymouth sawmillers stated that unless steps were taken to prevent Oregon and other similar woods from competing with New Zealand timbers it meant that the millers would be forced to leave from 50 to 60 per cent. of the available standing timber in the bush to rot or burn. It must be presumed that these experienced gentlemen were speaking from practical knowledge, and that there has been, and is, at least this amount of waste going on since 1909.

A comparison of worked areas on Crown lands on the Coast with some of those in the North Island shows the necessity of stopping such a shameful waste of a valuable asset by at once bringing the disposal of timber under the system of sale on log measurement. If such a course were followed it is probable that at least 75 per cent. more timber would be produced per acre.

Government estimates of our remaining supplies of timber, which in this district are perfectly unreliable because no proper method of measurement or estimation has been used, give us from forty to sixty years of life, based on the present rate of increase in consumption. Taking the evidence before the Timber Commission of sawmillers, that they are leaving in the bush 50 to 60 per cent. of the standing timber, and accepting the loss in conversion at 30 per cent., the Crown is receiving royalty on only 27 or 33 per cent. of the standing measurement.

Taking the present annual output of timber from Westland at about 50,000,000 ft., the timber left behind to rot and burn, together with the unnecessary waste at the mills, would represent at least another 40,000,000 ft. to 50,000,000 ft. This represents a loss of thousands of pounds per annum, the amount of royalty received equalling about 2d. per hundred feet on the log measurement of standing timber. From the available returns on afforestation issued by the Forestry Department, as set forth in the annual returns and other published results, it is possible to plant foreign timbers to produce from 30,000 ft. to 40,000 ft. per acre in from forty to sixty years. In the Forestry report of 1909 Mr. H. A. Goudie, the Superintending Nurseryman for the North Island, estimates the value of the timber so grown, when it reaches maturity, at 12s. 6d. per hundred feet. Taking this valuation as correct, what will the sawn timber produced from these areas cost the consumer?

Accepting present costs and methods of production, the logs produce, say, 75 per cent. of timber: 12s. 6d. per hundred feet, less 25 per cent. loss equals a first cost of 16s. 8d.; milling, 6s.; average railage in Westland, 1s.; sea freights and Lyttelton charges to Christchurch, 5s.: total, £1 8s. 8d. This would put timber beyond the reach of the ordinary consumer, and under these circumstances it does not seem advisable to utilize for afforestation purposes in Westland any land that can profitably be used for agricultural or pastoral purposes.

With the area of available land for settlement yearly diminishing, is it wise to take large areas —and they must be large to be of use—when the same results—prolongation of timber-supplies—can be obtained by a more economical system in utilizing the native growth? The results of afforestation so far have proved very successful in acclimatizing and growing foreign woods. The departmental officers, however, recognize that the present annual grant is very inadequate to provide for the expansion of areas and maintenance of existing plantations.

If the evidence gathered by the Commission warrants the extension of the work of afforestation, the necessity of providing highly qualified and trained officers to carry out the work must receive attention. If the supply of timber for future generations is to be produced by afforestation, the present efforts must be largely increased. The amount of timber produced in New Zealand annually is, roughly, 420,000,000 ft., of which about 90,000,000 ft. is exported, leaving 330,000,000 ft. for home consumption. It will be seen that to provide for future requirements by afforestation it is necessary to plant at least 8,000 acres per year. This is four times the area now planted annually, so the necessity of training a large staff to attend to the extension of plantations is apparent.

In reference to the proposed export duty on white-pine, I am of the opinion that if this duty is imposed it will lead to a very great waste of the offcuts produced. The quantity of white-pine used in New Zealand, except for butter-boxes, is very small, and unless the millers can supply the Australian markets with the offcut sizes at a very low rate they will be unable to dispose of them at all. The butter-box sizes will be exported, duty or no duty, and the offcuts, representing about 33 to 40 per cent., will be practically wasted. Even at present rates the Siberian timber produced by cheap Asiatic labour is competing too successfully with our white-pine offcuts in Australia.

Summarized, my opinions on the questions before you are,—

1. For the purpose of soil-protection, water-conservation, and prevention of floods it is necessary to conserve or replant timber on river-banks, watersheds of rivers, and hillsides adjoining railways and roads.

2. In the districts subject to droughts, forest areas liable to be destroyed by fire should be utilized for sawmilling purposes as quickly as possible without waste.

3. Forests on land suitable for agricultural or pastoral purposes should also be sold for sawmilling purposes and the land put to profitable use.

In reference to 2 and 3, the methods of disposal of timber and granting of cutting-rights should be standardized throughout New Zealand. Methodical and economical systems of granting and working cutting-rights in forests under the control of the Crown Lands Department should be instituted.

4. The dual control of Warden's Court and Crown Lands Department over timber-areas should be abolished.

5. A reliable estimate of all standing milling-timber should be made before it is offered for sale.

6. Royalty should in all cases be based on the log measurement of standing trees, and strict and efficient supervision by officers of the Crown Lands Department of the proper working of timber-areas to prevent unnecessary waste.

7. The disposal of all lands cleared by millers for settlement purposes as soon as possible after surrender, so that the settler may take advantage of the tops, &c., felled by the miller for burning operations.

8. If evidence proves that it is possible to grow timber cheaply enough to supply local demands in the future, a vigorous extension of the afforestation works of the Forestry Branch should be started at once. The training of suitable officials to carry out the work necessary to get the best results should be undertaken, and in this connection it might be advisable to offer travelling scholarships to enable locally trained men to visit the countries where afforestation has proved a success. To induce good men to take up this branch of science, none but locally trained applicants should be considered in appointments to the afforestation branch of the Forestry Department.

9. In view of the lack of demand for this class of timber in New Zealand it is not advisable to impose an export duty on white-pine.

I have, &c.,

The Chairman, Forestry Commission, Wellington. D. Allman Marchant.

No. 8.

Dear Sir,— Cambridge, 18th May, 1913.

I have received your letter dated the 7th instant.

I regret that owing to my absence at Waihi I did not receive your letter until my return last night.

In reply to your question as to whether my statement as to the height, 200 ft., is reliable: my authority is Mr. John McCaw, then A.R.B. Manager.

Re length of clean barrel, I measured that myself—130 ft.—there being several trees lately fallen with the branches removed ready for crosscutting at the time Matamata was being valued for the Government.

I had a roving commission from Mr. Tole and was not subject to the Waste Lands Commissioner, whom I found it necessary to refuse to recognize, much to his indignation.

For the information of your Commission, I sowed the pine-seed, prepared the land, and planted the 40 acres of *maritima* myself, with one assistant; 2,000 a day was our day's work.

Re the *Pinus insignis*, 16,000, I used three ploughs, three planters; myself and a Native made the holes, and completed the job in two days and a half.

An 80-acre plantation completed with four ploughs and a corresponding lot of planters in four days.

I have a *Pinus insignis* tree growing in my grounds here 4 ft. through, 50 ft. without a branch, and 30 additional feet of knotty timber. Mr. Roache, engineer at Hororata Rapids, estimates it at 5,000 ft. of clean building-timber and 1,500 ft. of rough timber.

I enclose a strip of outside heart of *Pinus insignis* fifteen years old and fifteen years fallen; heart, 9 in. through.

Yours, &c.,

W. L. C. Williams.

No. 9.

Department of Agriculture, Industries, and Commerce,

Sir,— Wellington, 11th April, 1913.

With reference to your letter of the 1st instant, in which you ask to be advised of the result of an experiment which this Department carried out some time ago with a view to testing the suitability of poplar timber for the manufacture of butter-boxes, I have the honour to forward herewith, for your information, a memorandum of the 8th instant from the Director of the Dairy-produce Division of this Department, in which full particulars of the experiment are given.

I have, &c.,

The Chairman, Forestry Commission, Wellington. F. S. Pope, Secretary.

Tree, Nothopanax Colensoi, barked by Red Deer near Hanmer.

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Poplar Timber for Butter-boxes and Cheese-crates.

Department of Agriculture, Industries, and Commerce (Dairy-produce Division),
Wellington, 8th April, 1913.

YOUR memo. 13/438, of 3rd instant.

As the result of some correspondence which took place between Mr. H. M. Reader, of Havelock, and this office early in 1911, a large poplar tree was obtained in that district through Messrs. Robertson, timber-merchants.

This tree, which yielded 500 ft. of timber, was cut into suitable lengths and sizes, and forwarded to Wellington. After allowing some months for the timber to become thoroughly seasoned, six butter-boxes and six cheese-crates were made up by the Wellington Cooperage Company. In December of 1911 two of the boxes were filled with butter at the Konini Factory, the butter from two separate churnings being used. From each churning one poplar and one white-pine box were filled with butter.

After storing the produce for over two months the butter was examined for flavour, having previously been graded before being stored. At the first grading the flavours in all the boxes were similar. At the time of regrading the only noticeable difference in the flavour was that that of the butter near the sides of the poplar boxes was hardly as good as in the white-pine boxes. The difference, however, was very slight. Had the poplar boxes been first covered with paraffin-wax inside, it is probable that the flavour of the butter at the sides of the poplar boxes would have been as good as that in the white-pine boxes.

Poplar timber as compared with white-pine is whiter in colour, lighter in weight, and not so close in grain. In the boxes tested the nails did not hold so well as in the white-pine, but this little drawback could no doubt be easily overcome.

The timber made up into cheese-crates gave a satisfactory package, but it was not considered necessary to test the wood for holding cheese, as the crates are of an open nature and would not be at all likely to damage the cheese, provided the timber were thoroughly seasoned before being used.

No difficulty was experienced in working up this timber into boxes and crates. Of course, the cost in this particular case was rather high, but this could not be taken as any criterion under the circumstances.

D. CUDDIE,
Director of Dairy-produce Division.

The Secretary of Agriculture, Industries, and Commerce.

No. 10.

Department of Lands and Survey (State Forests Branch), Canterbury,
Hanmer Springs, 9th April, 1913.

SIR,—

I enclose herewith information *re* trees growing in this district, which I trust will be of some use to you.

The figures refer to the State plantations, trees growing at St. Helens homestead, and trees that were planted in the "Spa" grounds thirty years ago.

The photos enclosed herewith are of damage done by red deer to the native forests in close proximity to Hanmer, and not more than two miles from the township. The trees damaged are *Nothopanax Colensoi*, many hundreds of which have been stripped of bark to a height of 9 ft. from the ground, the trees being now dead or in a dying condition. Within a space of less than 20 yards square I counted no less than fifteen trees damaged in the manner described, and the whole of the bush of this variety of *Nothopanax* was more or less stripped of bark by the deer. The damage was done during the heavy snowfall last winter. Note the marks of the teeth on the trees; the trunks had the appearance of having been scraped with a knife.

Many larch were damaged in a like manner in the State plantations, and in one instance a *Pinus Laricio* was completely stripped of bark.

Four sets of antlers were picked up during the spring inside the plantation-area, and one deer was shot. There is no doubt that much damage will be done in the future by these animals unless means can be devised to keep them outside the planted area. Fencing of so large an area would be out of the question. Shooting would "meet the bill," I fancy, as, after being shot at and disturbed for a season or two on the Hanmer side of the range, the deer would probably give the locality a wide berth.

I have, &c.,
W. G. MORRISON,
Nurseryman in Charge, Hanmer Springs.

The Chairman, Forestry Commission, Wellington.

No. 11.

DEAR SIR,—

Leslie Hills, Culverden, 7th April, 1913.

In reply to your inquiry *re* forest-trees grown on Leslie Hills.

In 1860 my late father brought several kinds of trees from South Australia with him; amongst them were the blue-gum, oak, ash, sycamore, elm, walnut, wattle, and flowering or prickly acacia.

In 1893 I had sawn some 11,000 ft. of the blue-gum into 5–2½ and 6–6, for sheep-yards and rough sheds. About 5 per cent. of the posts have gone at the ground, but all the rest and the rails are as sound as the day they were sawn. Any sap on the timber, of course, rotted off.

In my opinion, this class of gum is one of the most valuable timber-trees to grow on a farm, as they are fast growers, and you can cut and come again. At twenty-five to thirty years of age they are fit to saw for fencing-posts and rough sheds. I am enclosing some leaves and seed-capsules.

Insignis.

Insignis was first planted here in 1871 or 1872, and in 1893 I had a few thousand feet sawn, the same time as I had the blue-gum, and used it in several sheds. This timber was used under cover, and now appears 25 per cent. harder than when first sawn; straight and very little cracked, and no dry rot. The *insignis* is a very useful tree for a farm, as at five years old it is quite safe to allow sheep into for shelter, and it cannot be beaten for a hedge if checked at the height you want. In a few years the lower spreading branches make a great shelter for stock, and if you give sheep which are affected with lung-worm a good supply of the branches it is a certain cure, as the affected sheep greedily eat the pine-needles.

Flowering or Prickly Acacia (Robinia).

This is also a most valuable timber; in my opinion, quite equal to totara, black-pine, or kowhai, and a fast grower from the suckers. I have a gate-post which had been in the ground for fourteen or fifteen years, and the bark was not even rotted off, and none of our bench saws would touch the timber. It has a grain very similar to the kowhai. I also enclose a few leaves of the acacia.

Yours, &c.,

The Chairman, Forestry Commission, Wellington. DUNCAN RUTHERFORD.

The following are some of the measurements and ages of trees grown at Leslie Hills:—

Blue-gums planted in 1860: Greatest girth, up to 13 ft. 10 in., 3 ft. from the ground.
Blue-gums planted in 1882, 4 ft. 8 in.
Insignis planted in 1871 or 1872, 10 ft. 5 in.
Insignis planted in 1882, 8 ft. 9 in.
Wattles planted in 1861, 9 ft. 3 in.
Wattles planted in 1882, 6 ft.
Walnuts planted in 1860, 8 ft. 5 in.
Walnuts planted in 1887, 4 ft. 6 in.
Ash planted in 1861, 4 ft. 4 in.
Elms planted in 1861, 7 ft. 2 in.
Oaks planted in 1872, 4 ft. 8 in.
Sycamores planted in 1872, 5 ft. 8 in.

Special Trees.

Blue-gum.

Girth at Ground.	Height.	Useful Timber.
10 ft.	137 ft.	72 ft.
11 ft.	152 ft.	76 ft.

Insignis.

8 ft.	132 ft.	102 ft.
9 ft. 6 in.	141 ft.	93 ft.

No. 12.

DEAR SIR,— Hokitika, 27th March, 1913.

In accordance with the general invitation issued by your Commission, requesting written evidence on matters affecting your order of reference, I respectfully beg to submit the enclosed statement regarding the administration of timber in this district. Our long experience since the year 1872 convinces us that dealing with the timber under the regulations under the Mining Act is unsatisfactory alike to those engaged in *bona fide* sawmilling and to the Crown.

I have endeavoured to set out in a concise form the relative merits of the regulations under the Mining Act and those under the Land Act. I remain, &c.,

CAMILLE M. MALFROY,
For J. C. Malfroy and Co.

H. D. M. Haszard, Esq., Chairman, Forestry Commission.

Timber under the Warden.

Security of Title.—A miller has no security, as his rights are open to be challenged at any time, owing to a legal technicality.

Finance.—The insecure title and no reliable asset outside plant seriously hampers necessary financing. The Warden has no power to grant the necessary time to lay the long main lines of tramway (generally of steel, and very expensive) which are now required, as the available bush lies considerable distance from established mills and Government railways.

Royalty. — The Crown has absolutely no security, as timber may be cut and sold, and the proceeds devoted to other purposes, before the Crown can even take legal proceedings for the recovery. In case of simultaneous working of Crown areas and freehold bush, the onus of proof of amount of royalty due to Crown rests wholly upon the Crown, whose Ranger has to be a detective.

Cutting Operations.—There is no incentive nor necessity for a miller to work and cut anything but the best and most accessible timber, as he only has to pay for what he actually takes and sells in marketable timber, regardless of waste resulting from careless milling and other causes.

Isolated Blocks of Timber.—As a miller can only hold one sawmill-area regardless of size he cannot obtain any right from the Warden to cut out small isolated blocks which are on his road to the sawmill-area, and these are therefore left, and will probably never be cut, and eventually be destroyed at loss to the Crown.

Administration.—Wardens, as a rule, are not well versed in matters relating to practical sawmilling, and deal with all applications on purely legal lines.

Timber under Land Act.

Security of Title.—A miller would have a secure title for whatever time the Land Board thought reasonable to allow for the cutting-out of an area.

Finance.—Security of title and the asset of standing bush bought for cash, being the property of the miller, provides a negotiable asset to finance on its prospective value after milling. Under the Land Act length of tramway can be considered when the time for cutting is being fixed by the Board.

Royalty.—Standing bush can be sold for cash, and millers would find no hardship to pay, as they would have the undoubted security to offer, if necessary, to finance. In cases of simultaneous cutting from Crown and freehold the Crown runs no risk of suffering loss, and therefore no objection would need to be offered to simultaneous cutting.

Cutting Operations.—Having had to pay for the whole of the timber as it stands assessed by the Crown's own officers, any timber that he leaves or wastes is his own loss, and naturally the bush will be thoroughly worked, and therefore the land will be more suitable for settlement.

Isolated Blocks of Timber.—The Land Board would have power to grant special licenses for areas up to 80 acres, and this would meet the difficulty at present encountered, and mean a decided increase in revenue to the Crown.

Administration.—A Commissioner, by virtue of his field experience, must be more competent to deal equitably with sawmillers, at the same time protecting the Crown and keeping the future settlement of the land in view; he also has officers specially trained to the work.

No. 13.

SIR,— Hobson Buildings, Auckland, 25th April, 1913.

I have the honour to bring the following matter under the notice of the Commission :—

I am aware that the evidence mainly sought for by your Commission is in regard to the conservation of existing forests and the cultivation and protection of plantations of timber-producing trees, but I would venture to suggest that the threatened early exhaustion of the sources of our locally produced timber might be partially averted by encouraging farmers and landholders generally throughout the Dominion to plant quick-growing timber-trees on such portions of their estates as are unsuitable for agricultural or pastoral purposes. Nearly every farmer has areas, smaller or larger, of this character, and the systematic planting of such areas would in some twenty years or so be of great assistance in supplying local timber wants and bring a useful revenue to the next generation and to the younger members of this.

The means to this end appear to me to be the issue of circulars from the Forestry Department to such persons as had the facilities for tree-planting in the manner indicated, the co-operation of the same Department in supplying suitable young trees at cost-price, and an arrangement with the Railway Department for the free carriage of the trees to *bona fide* planters.

Speaking as one who has visited every town and hamlet in Otago and Southland, as well as having travelled extensively through the rest of the Dominion, it is deplorable to see the hundreds of farms with not a tree on the property. The reason for this neglect is not so much the ignorance of the advantage of having trees on their estates, whether it be for shelter for their stock, or the enhancement of the attractiveness of their properties, or the ultimate direct gain of having timber-trees to sell, as the feeling that it is outside their main business of farming, and that they know very little about tree-growing, while the expense of purchasing trees and the cost of carriage to their farms would involve an outlay they in many cases could ill afford.

I would respectfully submit, Sir, that the Forestry Department would be doing a great public service were they to instruct farmers and others as to what class of trees could be profitably planted, how to plant and tend them, and facilitate their obtaining them at a reasonable cost.

I have, &c.,
R. MARIS CLARK.

The President, Forestry Commission, sitting in Auckland.

No. 14.

The Chairman of the Forestry Commission, Wellington.

I BEG to submit the following as a written statement for your Commission's consideration :—

Present Forests.

I am desirous of presenting my views upon the utilization and conservation of the existing New Zealand forests.

1. *Utilization.*—It is of far-reaching importance that the Government should demand a proper and economical utilization of the present natural forests. These forests represent a big convertible asset, and, from an economic point of view, waste in production and waste by fire should be guarded against as much as possible.

The waste of timber in the process of conversion is more pronounced where the millers pay royalty on the sawn measure and where royalties are low than where royalties are high and royalty is paid on the standing measure. On the west coast of the South Island the conditions at present are particularly favourable to negligent and wasteful methods both in bushworking and milling, the reason being the system of basing royalties on *the amount of timber carried by the railway* from the respective mills.

There are many reasons why this system of ascertaining the Governments interests in a forest should be discontinued.

In the first place, when it is desirous of acquiring milling-bush, an area up to 2,000 acres can be pegged out and secured under certain conditions by any one providing a nominal deposit and being the holder of a miner's right. This slipshod method has induced more or less "gridironing," and the acquisition of bush in some cases for speculative purposes. It also gives a milling access to any bush that may be served by road, and induces a class of millers that, from a bush-utilizing point of view, are undesirable. The reason of their undesirability is that as they are at the disadvantage of having to cart their output in some cases several miles to railway-sidings, and, as they have to compete with millers who have their mills served by railway-sidings, they have to make up an increased value of their produce by producing a better class of timber, and this is done by taking only the cream of the logs and leaving logs that will produce timber of a lower market value to rot in the bush.

Then, again, the railway quantities being the base for payment, there is no check on any local sales that may be made. I do not infer that millers so situated are guilty of trading on this chance of evasion, but it gives the officer whose duty it is to collect royalty no opportunity of ascertaining any leakage that may take place in this connection.

There is also the fact that mills of more or less a bogus character are put up not for commercial purposes, but for the purpose of complying with conditions of the Act, which enables the owners of such mills to hold additional areas which otherwise they would not be entitled to.

With bush so easily obtainable and with inadequate supervision much waste is induced, and there is no guarantee to the State that the areas so secured are worked with system and economy. An examination of the areas worked reveals the fact that millers invariably take the easiest timber to win, leaving the more difficult and isolated patches, which become valueless as soon as the tramways serving them are taken up or become unusable. Cases have been known where bushmen in working flat ground have left the edge of the forest in a series of curves, with the length of the hauling-rope as their radii. Gullies and awkward corners are left because if taken out would increase the log cost, and this is naturally avoided where keen competition exists.

Then, again, no royalty is collected on timber used in mill buildings, cottages, and tramways, and although a great proportion of this class of timber is unmarketable, owing mainly to trade customs, still the fact that it is used for the purposes indicated shows that it has some commercial value, and for which the State receives no benefit.

In sawing, again, there is no restriction as to what gauge of saw the miller shall use in converting a log into sawn timber, and as the wide boards are usually produced by the big circular or breaking-down saws which generally takes a kerf of $\frac{3}{8}$ in. (which in the case of 1 in. boards represents three-elevenths or between a quarter and one-third of the whole flitch), it is easy to understand that a big loss can take place in this manner. It should also be understood that it requires a less expert sawyer to manipulate a thick saw than a thin saw. Then there is the waste of timber by careless sawing. In some cases, where orders are only for the better-class timber, the whole of the inferior quality produced is consigned to the slab fire not because it has no commercial value, but because of the millers being harassed into supplying a class of timber too good for the purpose for which it may be required. Although it is not desirable for the proper utilization of forest, there would be less objection to the miller improving the quality of the timber by this method were the State to receive proper payment for it before the waste took place.

In Auckland the State has instituted a system that seems to give it full protection, for if any loss takes place in conversion of standing timber into sawn timber the miller purchasing the standing timber has to bear such loss.

I respectfully submit that, so far as the West Coast forests are concerned, it is expedient in the interests of all to institute different methods of disposing of the timber owned by the Crown. I think if your Commission adopted some such suggestions as the following, and these were acted upon, it would bring about an infinitely better method of dealing with the indigenous forests without unduly disturbing existing trade conditions :—

(1.) That all forest areas now in the hands of the Crown suitable for milling should be reserves for that purpose, except such areas as may be deemed advisable to retain for scenic, climatic, mining, or other purposes.

(2.) That, in respect to the West Coast forests, existing millers should have the opportunity of taking up such areas as they are now entitled to under the present Act.

(3.) That in future all timber should be sold by tender on the Government estimated quantities. The assessment to be arrived at in the same manner as is now in force in the Auckland Province.

(4.) That where mills are in such a position as to be the most advantageously situated for the working of any standing timber offered for sale the owners of such mills should have preference where tendering was equal or nearly so.

(5.) That suitable terms should be given millers for the payment of timber purchased.

(6.) That systematized instructions for ascertaining the estimate of quantities of timber offered for sale be given every Ranger whose duties are to deal with the assessment of standing timber, so as to produce uniformity in dealing with all Crown timber.

(7.) That the control of the whole of the standing timber in the hands of the Crown be placed under the Lands Department.

2. *Conservation.*—The idea of retaining our forests for distant future use is economically unsound. An ordinarily matured bush has no power to provide any material increase by way of growth, inasmuch as the natural growth is barely sufficient to compensate the natural decay. This must be so, otherwise the older the forests were the greater amount of timber they would contain, when it is well known that the old forests are represented by scattered "old man" trees which yield but small quantities of timber per acre. Nature having brought the forests to the highest point of utility, it is the duty of the community to utilize. Another reason why conversion and not conservation should be adopted is that a timber-tree as usually found in our native bushes yields no current revenue. For reasons already stated, the natural growth does not count, and, apart from this, our native trees are so slow in growth that as profitable timber-producers they are failures. If an area of sapling rimus of twenty years' growth were conserved for timber purposes, and the present value were £1 per acre, and in two hundred and thirty years, which would make the age of the tree two hundred and fifty years (which time is a reasonable one for a rimu to mature), it would have to be worth about £250 per hundred feet royalty, and this allows nothing for rates, taxes, supervision, and fire risks during this long period.

The fact that royalties on the West Coast are the same now as they were fifteen years ago alone proves that forest areas are not profitable for the Government to hold. If the 6d. per hundred the Government collected fifteen years ago has produced 5 per cent. compound interest in the meantime it would now be worth a little over 1s., or, in other words, they were receiving twice the royalty fifteen years ago that they are now. To meet this on a business basis it would seem that a fair assessment of the present value should be made, and this value should be loaded with 5 per cent. compound interest up to the time of disposal. It is only by some measure like this that the State can hold its extensive national asset on commercial and business lines.

It will be seen that the earning value of native bush is nil when considered from a sawmilling point of view, its only use being to provide raw material for conversion. The only time when the profit can be accrued is when the tree is converted into the commercial commodity of sawn timber, and this can be only done once, whether it is now or in a hundred years hence. Areas of land that are under native bush and are fertile and fit for good grass-growing are losing their time in sustaining a crop which is repayable only once, and whose value (which has taken a century or two to accumulate, under present conditions is only equal to about £2 10s. per acre for the timber grown upon it, unless an earning-power is given it by increasing the royalty equivalently to the cost of holding it. I do not for one moment advocate the wholesale destruction of these forest lands, because standing timber has a further national value beyond that of royalties levied, from the fact that its conversion maintains a vast industry of great economic value.

It would seem conversion without waste and reproduction with economy should be the keynote of New Zealand forestry.

Restriction on the Export of White-pine.

The restriction of the export of white-pine in order to retain it for our own use, and because it is a timber specially suited for butter-boxes, seems unreasonable when it is borne in mind that Australia and New Zealand contribute but a small amount of butter to the world's markets compared with those countries that do not use white-pine for a package. And, again, not half the quantity of white-pine exported goes into butter-boxes; the greater portion being used either for shelving, lining, flooring, or rough cases for fruit, rabbits, &c. To me it seems a good thing that we have an outside market for a timber which, with the exception of butter-boxes and cases, is considered a useless timber by New Zealand users. Further, I am inclined to think that sap rimu would do for butter-boxes as

well as white-pine, especially if treated with paraffin-wax, as is done in some cases with white-pine. Certainly the colour would be somewhat darker, but not so dark as an oak keg.

Might I suggest that your Commission recommends that a test of the suitability of rimu sap-wood for butter-boxes be made under Government supervision.

Ruatapu, 29th April, 1913. JOSEPH BUTLER.

No. 15.

SIR,— Waihi, 29th April, 1913.

I read with considerable interest the various paragraphs which appear in the *Herald re* your researches, and your remarks on same.

During the thirteen years in which I was manager of the Matamata Estate I dealt with various modes of planting forest-trees. The English method of digging holes I condemned from the first, and it was several years before the owner handed over the arboricultural production entirely to me, after which no planting was done except on land specially prepared by the plough, and from that time there was always success.

I have heard the present system adopted on the Government plantations is 3 ft. by 3 ft. and then thin out, which is expensive and unnecessary, especially in pine plantations.

I note from your remarks that you are in favour of planting large areas of *Pinus insignis*. Well, if the Commission come to no other conclusion, and the Forestry Department carry your recommendation out, you will have conferred an inestimable boon on the country.

A plantation of 16,000 *Pinus insignis* and 40,000 *Maritima*, and another plantation of 80 acres which were planted under my direction at Matamata (and which I recommended the Waste Lands Boards to reserve when I reported on the Matamata Estate for the Government), I am told has been ruthlessly destroyed. The majority of the *Pinus insignis* were 200 ft. high and 18 in. to 20 in. through and 150 ft. without a branch, and would now be forty years old. They were planted 9 ft. by 6 ft. apart, and I did not record a single miss in the plantation.

I have a *Pinus insignis* near my residence in Cambridge 50 ft. of clean barrel, 30 ft. small knotty barrel, and 4 ft. through. The clean timber is estimated by Mr. Roache, construction engineer of the Horahora Electrical Works, to be 5,000 ft. The tree is thirty years old, probably a year less. A tree planted at the same time, and cut down when it was thirteen years old, has now 10 in. of solid heart remaining either not affected or beneficially affected by the weather. Place the solid heart of a *Pinus insignis* in the ground as a gate-post and the solid heart of an oak of the same age in the ground, and the *Pinus insignis* post will be standing good and sound when the oak has gone to decay.

There are some trees of the Californian redwood varieties growing opposite Colonel Bloomfield's property on the slopes of Mount Eden you ought to see.

Mr. Richard Reynolds has also a variety of quick-growing gum producing imperishable timber. Every seed of both trees ought to be preserved for the benefit of the future of our country.

I remain, &c.,

The Chairman, Forestry Commission. W. L. C. WILLIAMS, Cambridge.

No. 16.

DEAR SIR,— Culverden, 29th April, 1913.

Mr. Wilson handed me your letter *re insignis* timber, and I will give you what information I can regarding it. I was in hopes that the Forestry Commission would have looked over my trees, as I believe it would have been worth their while.

We commenced planting *insignis* on a fairly large scale in 1873, and in 1904 a number of large ones were blown down. I got a sawmiller towards the end of 1905 to come up and saw these, and cut down some others, totalling 113,000 ft. I sold a quantity of timber from the mill at 9s. per hundred superficial feet, and charged 1s. 6d. extra for timber seasoned in the shed. In 1907 I got 60,000 ft. cut, selling most of it at 10s. 6d. In 1911 I got 132,000 ft. cut, selling at 12s. to 12s. 6d. The timber was planted in 1877.

I have to ask now from 12s. to 12s. 6d. for seasoned timber, but if purchasers would send orders to the mill it could be sold at 11s., as the cost of moving to shed, turning over, and drying in shed soon runs away with any profit. I had to pay 6s. 6d. per hundred for the mill, but if I got constant sale could afford to do it a little cheaper. I built stables and outhouses in 1905, and the timber is very satisfactory.

If I had to rebuild my own house I would use *insignis* for scantling, weatherboards, and flooring in preference to rimu, as I believe it to be immune from the borer.

Yours truly,

The Chairman, Forestry Commission. J. H. DAVISON.

No. 17.

DEAR SIR,— School, Barr Hill, 18th April, 1913.

I beg to acknowledge your communication of the 12th instant, and am glad if I in any way gave information of value.

In pursuance of your desire, I find on inquiry and personal observation that *Pinus insignis* has proved a thoroughly reliable and stable timber where a coat of oil or paint has been applied and the timber has been built clear of the ground. Mr. Wason's buildings, thirty-seven years of age, are quite

sound to-day in cases where paint has been used and the buildings are clear of the ground. Naturally there is always a shrinkage in this timber, as it is always fairly green and damp when used.

I have personally thoroughly overlooked these buildings, and only in cases where the plain boards have not had the favour of a little oil, and where the board-ends jut into the ground, have I found instability.

I also have overlooked two dwellinghouses in the vicinity, both seventeen years of age, and both almost totally *Pinus insignis*, and have found them to be quite as satisfactory (weatherproof, stable, and warm) as near-by houses of red-pine.

The best preserver of *Pinus insignis* has been found to be a coating of tar.

I am, &c.,

E. Phillips Turner, Esq., Secretary, Forestry Commission. RONALD OPIE.

No. 18.

DEAR SIR,— Barr Hill, 13th May, 1913.

In reply to yours of the 9th instant, I beg to assure you of my care and leniency in my estimating of the local *Pinus insignis* plantations. I have been to some trouble (a pleasure, believe me) to corroborate my former evidence, and find that I have been even too lenient.

In the district there are some 400 (not 200, as I placed it before, to be well on the safe side) acres of *Pinus insignis* forest; and an average yield per acre would be more than 190,000 superficial feet: Average barrel, 30 ft.; average diameter, 2 ft. to 2 ft. 6 in.; width of rows, 12 ft. or so; distance of each tree apart, 7 ft. to 9 ft.: fair average equals 200,000 superficial feet.

Plantations vary in size; but as an example of a fine, though not quite ideal one, I will mention that of Mr. McCartney. The plantation is 60 acres in area, and one which it would well reward a member of the Commission to visit. Some time ago half an acre of this area was felled and cut into timber, the royalty paid being £30. You may gauge the yield per acre from this; nevertheless, bearing in mind that the timber was cut by contract, this circumstance I find resulting in the loss of much timber quite capable of being made into useful material. I am, &c.

RONALD OPIE.

E. Phillips Turner, Esq., Secretary, Forestry Commission.

P.S.—I am not absolutely certain that the royalty paid on the ½ acre felled timber mentioned was £30. I have it from a fairly reliable person nevertheless.—R.O.

No. 19.

DEAR SIR,— Te Mata, Havelock North, 27th March, 1913.

I have received a letter from Mr. Phillips Turner asking a few questions about my eucalyptus plantations here, and I am pleased to give you my experience. The ground was ploughed about 6 in. deep from grass, harrowed twice, and chain-harrowed, and sown the end of August—4 oz. of seed was sown per acre. mixed with some dry soil; sown broadcast, using both hands and grasping with thumb and two fingers. Chain-harrowed after, and ought to have been rolled, but the land was too steep, and would have covered the seed too deeply. The seed was principally blue-gum with stringy bark, ironbark, peppermint, and other sorts. The seed was procured mostly off old blue-gum trees here and on neighbouring places where the varieties grow. The trees were begun to be thinned out when one- and two-year-olds for stakes for netting and for firewood; they grew at the rate of 7 ft. per annum for the first five years, and since have thickened in the trunk and have grown possibly 2 ft. per annum. The trees are now about 18 ft. apart in some plantations, and in others 10 ft. or 12 ft. The seed was in two plantations sown on gravelly terrace banks and in others on heavy clay land with a wet subsoil, and did best on the former soils. The altitude above the sea is 100 ft. Rainfall, from 20 in. to 40 in., the average being about 28 in.

I have used blue-gums for straining-posts and have found that when charred between wind and water (6 in. above and below ground) they outlasted totara strainers procured from the Dannevirke district—an inferior light-coloured totara. For fencing-material nothing can compare with *Robinia pseudo-acacia*, as they grow in every kind of soil from pure pumice to rich loan, and when 4 in. through will outlast totara. I have found *Acacia dealbata* and *decurrens* lasting as posts and strainers on light pumicey soils.

I raised some thousands of trees of *Catalpa speciosa* (which have a great name in the United States), and found that our spring frosts in Hawke's Bay kept them from becoming any use. They sprouted or came into leaf very early in September, and a hard frost would cut them back, and if they tried to bud again in November the same thing would happen, and they have proved useless.

For growing timber (in time) my *Pinus austriaca* and *Laricio* will prove the most valuable, I think.

Yours, &c.,

The Chairman, Forestry Commission, Wellington. B. CHAMBERS.

No. 20.

DEAR SIR,— Kanieri, 26th March, 1913.

I notice that you are inviting sawmillers to give reasons why the export of white-pine should not be stopped.

As you are aware, the land from which the white-pine at Benjamin and Mulcock's mill, Kokatahi Road, is cut off is taken up by other parties for grazing-runs, and consequently if the timber is not

milled it will be felled and burned, and in such case could be of no use to any one; whereas if it is milled and exported it will bring money into the Dominion, and give employment to a considerable number of men, and also produce revenue to the Government through royalties and railage. These are the reasons why I consider the timber ought to be allowed to be exported from mills situated like this one.

As for other mills on the Coast that are cutting white-pine, most of them get some white-pine mixed with the red-pine, and if the white had to be left in the bush and only the red taken it would never pay to again go back just for the scattered white-pine.

In most places the milled-bush land is taken up for grazing-runs, and in such case the fire is set to the tops and scrub, and consequently the white-pine that was left would also be destroyed. In many places, again, it would not pay to work the red-pine unless the white could also be taken.

By the above-mentioned facts you will notice that if the milling and exporting of white-pine is interfered with it will mean that a lot of it will be destroyed and never used for any good purpose whatever, and the income to the country from its exportation would be stopped, and hundreds would be thrown out of employment.

I am, &c.,

A. E. Hackell,

Manager for Benjamin and Mulcock.

H. D. M. Haszard, Esq., Chairman, Forestry Commission, Wellington.

No. 21.

Dear Sirs,— Tapanui, 14th March, 1913.

Re yours 10th instant: Deer of all classes do damage to the bush, eating especially the broad-leaf and all succulent plants, besides horning and rubbing young trees to their destruction. Deer and cattle injure bush and destroy young trees wholesale, and therefore should be put out on the back-blocks away from civilization as far as possible or confined to areas that are enclosed with deer-proof fences.

Fencing-timber is becoming very scarce and dear, and horned animals should be kept out of bush areas as far as possible. Fires are, however, more destructive than deer, and fire wardens are needed in New Zealand on same footing as those in America.

Yours, &c.,

The Forestry Commission, Christchurch. W. Quinn.

No. 22.

Dear Sir,— Charteris Bay, 4th April, 1913.

In regard to your inquiries about *Pinus insignis*, my plantations are, on an average, 18 ft. apart. The main average of years is thirty-four; distance apart, roughly 18 ft.; height, about 100 ft.; diameter, 2 ft. The diameter is approximate, some are nearly or quite 3 ft. I have sawn a lot of them for my own use, and have sawn the backings for neighbours for fruit-cases at a cost to them of 4½d. per 30 lb. case. This price has been payable for refuse timber.

With regard to squared timber, I have used it for all purposes—gate-posts, sheep-netting stakes, weatherboards, &c.

I will take gate-posts first: They were squared 8 by 8. Eight holes (inch) were bored horizontally 6 in. apart and 6 in. deep. The posts were laid on the ground, and these holes filled with tar. They were kept filled with tar from day to day till no more tar was absorbed. Then I turned up pegs, just fitting the inch holes, and drove the pegs home. This had the effect of squeezing the tar through to the outside of the posts. I have had these posts in the ground nine years, and apparently they are as good to-day as when put in. The tops were hand painted to keep the weather out.

The sheep stakes were stood upright in tar for two weeks. Under separate cover I am sending you samples of one that has been two years in the ground. I am not sure yet whether they do not get a bit brittle under this treatment, but I think they will last for ever. They absorb so much tar that they become nearly as heavy as hardwood. It is possible that they might make indestructible railway-sleepers if steeped in tar, provided they would carry the weight.

For either boards and scantlings they make beautiful timber if painted or tarred, but they absorb a lot of oil if paint is used. If oil is dropped on an inch board in a few hours it will be showing through on the low side of the board.

Pinus insignis is, as your Commission knows, a wood full of resin when cut down. This all dries out, but evidently the channels the resin ran out of are ducts to let tar or oil run in. As you also know, it is absolutely worthless unless treated in some form, except for timber where no weather reaches it.

In my idea it is a coming timber. It will grow quickly, almost anywhere; it is good shelter; it is a striking tree; and it lends itself to the soaking-in of preservatives more than any timber I know. It looks well in inside work when planed and oiled.

I am sorry I had to write this account in a great hurry, or I might have written more on the subject.

One other item I may mention. In 1895 I planted a totara in a specially good bit of ground; it is now 21 ft. high; it was 18 in. when planted.

Had I known that information was voluntary, when your Commission sat I would have attended at Christchurch.

Any more information that I have I shall be happy to supply if required.

Yours, &c.,

The Chairman, Forestry Commission. Orton Bradley.

No. 23.

DEAR SIR,— County Council Office, Mackenzie, Cheviot, 27th March, 1913.

In reply to your letter of the 19th instant, *re* plantation cut for milling purposes at Cheviot, I have to state,—

The plantation consisted of some 36 acres, comprising a narrow strip of good heavy land with a creek running through same. Planted some forty years ago. Trees were put in about 10 ft. apart, and have been thinned from time to time. The average size of trees cut, 2 ft. to 4 ft. diameter at the stump; height, up to 110 ft. Output, 600,000 superficial feet of milling-timber and some 600 cords of firewood.

The timber sold readily at 13s. per 100 superficial feet, and has been used for general building purposes (houses, woolsheds, stables, &c.). Firewood produced 15s. to 20s. per cord.

The majority of the trees were *Pinus insignis*. There were a few *muricata*, and these proved the better timber, but were considerably the smaller.

Experience has proved that the trees were planted too far apart, and this, together with the thinning, caused limbs which produced knots. Where the trees were planted thickest the best timber was obtained. I consider 4 ft. to 6 ft. apart would be sufficient.

The trees in the forty years had reached their limit of usefulness, and were going back if anything, some of the large trees being inclined to be soft. Under similar conditions thirty to thirty-five years would be sufficient to allow a plantation to grow before cutting to mill.

I have examined the timber in woolsheds and stables after being in position for three to four years, and could observe very little shrinkage, although it had been put in practically green from the log. I notice the timber absorbs a great deal of oil in painting.

The sawmiller, who is also a builder of long experience, considers the timber, when kept off the ground and painted, to be equal to rimu for general building purposes. He pays royalty of 1s. 6d. per 100 superficial feet and 5s. per cord on firewood.

Trusting the above will be of some slight service to you.

I am, &c.,
W. M. COTTRELL,
County Clerk.

The Chairman, Forestry Commission, Wellington.

No. 24.

DEAR SIR,— 450 Armagh Street East, 17th March, 1913.

I am very sorry that I cannot lay my hands on the notes I made some years ago regarding the use of *Pinus insignis* timber for butter-boxes. However, the following are the particulars. Mr. T. W. Adams, who is a member of your Commission, is familiar with the facts, although he may not be able to go into details.

I have always been impressed with *Pinus insignis* as a tree which will ultimately prove of great commercial value to the Dominion. It is admirably adapted to the climate and soils of Canterbury, in fairly good land producing timber of commercial value in thirty or forty years.

Believing that the timber of this tree would be found suitable for butter-boxes, I resolved to put it to the test. I accordingly asked Mr. Wason (of Lower Rakaia) to have a box made of this timber the same size as those in common use for the packing of butter. Mr. Wason did as I requested, selecting timber from a *Pinus insignis* which had been blown down three years previously. I kept the box in my office for a couple of months, and then sent it to the Central Dairy Company, Addington, where experiments were about to be tried with different timbers. Mr. Ellis, the then secretary, somewhat demurred at packing butter in a box made of such timber; however, after some persuasion and a guarantee against loss, it was packed in the usual way, and placed with the others in the cool chamber, where they remained for the usual time occupied in transport to England. I was present at the opening (by experts) and the testing, and had the satisfaction of hearing my box pronounced to be of excellent quality, quite equal to the best. *Pinus insignis* takes a beautiful polish.

No doubt you are aware that Mr. Giles, of Parnassus, uses a large quantity of this timber for farm and other buildings. It is said that it does not shrink nearly so much as the ordinary timber in use for house-building.

Yours, &c.,
M. MURPHY.

Mr. P. Turner, Secretary, Forest Commission, Warner's Hotel.

No. 25.

The Members of the Forestry Commission. Greymouth, 25th March, 1913.

WE respectfully beg to bring under your notice these few facts that seriously interest the sawmillers of this district, and ask you to give them your favourable consideration.

We notice that in the course of your itinerary through the Dominion the matter of placing an export duty on white-pine has been brought before you, with the idea of preventing altogether, or at least seriously limiting, the export of this timber. We would point out in the first instance that until very recently this timber was practically valueless, owing to the very limited demand for it in New Zealand, due to the ravages of the borer and the very short life of the timber in this damp climate. Latterly a demand for a small quantity for butter-boxes has arisen, but this requires only 12 in. and 14 in. boards, of which the average white-pine bush does not produce 40 per cent. to meet the severe classification to which this class of timber is subjected, no board being accepted unless absolutely free from all defects. The production of these butter-boards thus leaves 60 per cent., or more than half the log output, on the sawmiller's hands, for which no market exists in New Zealand, or, if it does,

we have not heard of it. From this you will see that if the sale of white-pine were restricted to New Zealand, as it would be if an export duty were imposed, the price of butter-box timber would have to be raised to such a price as would permit of the offcuts—the 60 per cent. referred to—being destroyed.

By reciprocal arrangement with Australia, New Zealand gets red and white pine into the Commonwealth on a preferential tariff, and we are able so to dispose of the whole white-pine output as to permit the dairy industry to get its boxes at a fair rate. The State gets its royalty, and labour is employed to an extent that would be impossible were this duty imposed. An export duty on pine-logs was imposed with the avowed intention of securing to our own workers all the employment possible, and an export duty on sawn timber would more than nullify any advantage so given.

There is the further fact to be considered that most of the white-pine on the West Coast grows in company with other timbers—matai, rimu, &c. If these other timbers are taken out, and the white-pine left until New Zealand wants it, we respectfully submit that it will be totally lost to the State. Fire is certain to destroy the trees sooner or later, and a few months after they are dead they are useless for any commercial purpose. The result would be, on the one hand, loss of royalty, railage, and taxable value to the State, and loss of employment to the mill hands; on the other hand, a very large rise in the selling-price of red-pine would have to take place to compensate for the increased cost of production, caused by having to go over a very much larger area to get the same quantity of timber.

In the few places where white-pine grows alone it will usually be found to be rich river-flat. These are the most desirable areas for farming, and in view of the fact that such a small proportion of the available white-pine can be used in New Zealand our remarks apply even more forcibly here.

As men who have struggled for years and are still struggling to establish the timber industry on such a basis as will enable us to handle the forests to the very best advantage of the State, our workmen, and ourselves, we desire to make the strongest protest against any such ruinous proposal as this suggested export duty would certainly be.

There is a further matter which we would respectfully bring before you—viz., the desirability of urging on our Railway authorities the value of birch as a railway-sleeper. When the Midland Railway was laid fifteen years ago it was laid entirely with this class of timber, and some of the sleepers still remain. At present the Department pays 3s. 6d. each for silver-pine sleepers, and we understand 4s. 3d. to 4s. 6d. for hardwood. Now, sleepers of birch (*Fagus fusca*) can be obtained in large quantities at 2s. 6d. each alongside the railway-line. This would be a saving in first cost of, say, 2s. per sleeper as compared with the hardwood, and as money at 5 per cent. doubles itself in fifteen years, this 2s. saving would provide a second sleeper inside the Australian cost and also pay for placing it in the line.

Even if the Department decided to creosote birch sleepers, which can be done under 1s. each, there would be a big saving by using the birch. Another most important point is that the use of birch sleepers, even if it were maintained that there was no direct saving, would keep the whole cost of the sleeper in the Dominion, and employ a considerable amount of labour. At the same time, a timber that is among the strongest commercial timbers we have, but which has hitherto been virtually neglected and is now being largely destroyed, would be brought into its proper use, and its value as a national asset conserved.

The method of dealing with birch to-day is to take out the red and white pine and to leave the birch to its fate, which is generally fire, and we are positive it can be turned to much better account. Even if it were used on wharf-deckings and such works, instead of the Australian hardwoods, which have lately furnished many instances of their short lives, a great saving would be effected both from national and strictly commercial standpoints.

As regards afforestation, we venture to suggest that the Government be recommended to establish on the West Coast trial plantations in order to ascertain what foreign quick-growing timbers are suitable for the climate. Nothing has been done in this direction by private persons or local bodies, as is the case in other parts, and the climatic conditions render the experience of other districts unreliable. There are areas of open country where plantations could be tried to begin with, and small blocks should also be tried in country from which milling-timbers have recently been taken.

We respectfully commend the above suggestions to your favourable consideration.

For the West Coast Timber Trading Company (Limited),

J. W. Caldwell, Secretary.
E. W. Boyd, Director.

No. 26.

Gentlemen,— Lyceum Hall, Greymouth, 25th March, 1913.

Seeing you are taking evidence in Greymouth on the question of reafforestation, whilst being in favour of having the forest of the Dominion replanted as the timber is cut down so as to ensure a supply of timber in the future, I would like to bring under your notice the question of the export duty on white-pine, as suggested by the farmers of the Dominion.

I would respectfully point out to the Commissioners the injustice such a tax would impose on the wharf labourers in this and other parts of the Dominion. The export of the white-pine from this part to Australia gives a considerable amount of employment to a large number of men, and the loss to the men would be fully 25 per cent. of their earnings if a duty was put on the exportation of white-pine, making prohibitive the sale of the timber in Australia.

Trusting you will give this your earnest consideration when dealing with your report, which I presume you will lay before the Government. I remain, &c.,

James Goodall,
Secretary.

The Chairman and members of the Forestry Commission.

No. 27.

Note on the Grass-grubs found in the State Nurseries.

[By A. H. Cockayne, Biologist, Department of Agriculture.]

Up to the present time, with certain isolated exceptions chiefly of a non-parasitic nature, such as frost and fires, the main pathological troubles that have had to be contended against in the State afforestation-work have been incurred during the nursery part of the operations.

The most serious of these has been the really considerable loss that has occurred through the ravages of a group of beetles belonging to the endemic genus *Odontria*, which in the larval condition is popularly referred to as the grass-grub.

During the past season it has been stated that in the Rotorua Nursery alone three-quarters of a million larch seedlings and two-year-old plants have been destroyed. This is in itself sufficient to demand the thorough control of these insects in the nursery beds; but there is another and more serious aspect than the mere killing of the plants, and that is the increased price per thousand of the surviving ones will seriously affect the final cost of the mature lumber, especially if the trees are employed for the production of large timber and the rotation of the crop is at all extended.

In forest-tree pathology the most serious losses often occur during the nursery operations, as in most cases the effects are epidemic in their nature, and a total loss of the affected individuals takes place. In growing and standing timber the effects of disease, although apparently more serious from a monetary point of view, can generally be checked by the adoption of methods that mean the elimination of the centres of infection. In the case of trees that are not of marketable size the removal of diseased ones, although an expensive operation, often has but little injurious effect on the ultimate yield, as the number employed per acre presupposes the elimination of a large percentage of those originally planted. With regard to marketable-sized trees, the evil effects of plant-diseases can be often largely obviated by the disposal of the timber before the disease secures too strong a hold, thus tending to remove the centres of infection and at the same time securing some appreciable return from the affected individuals.

It can thus be seen that the guarding of the nursery beds against insect and fungus invasion becomes an essential feature in the nursery work, and the recent effects of the various species of "grass-grubs" indicates clearly the urgent necessity for their suppression, even if the cost may be quite considerable.

For some time I was under the impression that the species responsible for the trouble was the ordinary grass grub, *Odontria zealandica*, but recent researches show that the one attacking the North Island nurseries is the newly described *Odontria puncticollis*. This insect is fully described and figured in the March number of the *Agricultural Journal*. In the South Island, so far as my observations go, I am inclined to think that *Odontria striata* is the main cause of damage. Great care has been taken by the nurserymen in charge to sow only on apparently clean land, and that the infection has in nearly every instance taken place through egg-laying occurring in the beds after the seed has germinated and the seed-frames removed.

At Rotorua larch has been mainly attacked, and *Pinus Laricio* has apparently escaped damage, but in the South Island such is not the case; but one must remember that in each locality it is a different species that is the causative agent. The larvæ completely eat through the roots, and plants that are attacked quickly succumb, being apparently unable to develop fresh roots sufficiently quickly to replace those that are destroyed.

It is, of course, impossible to give any definite information on the line of action that should be adopted until such time as the full life-history of all the species that are responsible for the damage has been worked out. However, it can safely be asserted that if egg-laying can be prohibited on the nursery beds during the summer following the sowing of the seed the effects of the grass-grub can be kept down to a minimum. So far as the nursery beds are concerned, this does not appear to be at all impracticable, provided the times and duration of egg-laying are accurately known. With regard to *Odontria puncticollis*, the main flights appear to take place during February and March, and the same is apparently true of *Odontria striata*, while with *O. zealandica* it is in November and December that the majority of the female beetles are on the wing. It has been proposed to make the present seed-frames beetle-proof, and keep them covered over the beds until any danger of egg-laying is over. Mr. Goudie has suggested certain modifications on the way that the scrim is at present used on the frames which would enable it to be removed during the daytime and replaced every evening without any undue expenditure of labour. In this way the injurious effects of keeping the young plants covered over during a portion of the summer will be avoided.

It is a very significant fact that so far as our present knowledge goes the ordinary grass-grub, *Odontria zealandica*, rarely causes any appreciable damage in the State nurseries. I am confident that this is due to the fact of the seed-frames being kept normally on the beds until after the main egg-laying of that species is completed. Of course, *O. zealandica* has at times been found in considerable numbers in the nursery beds, but the present seed-frames are by no means insect-proof, although they could easily be made so.

Soil fumigation and spraying may also play an important part in the control of the subterranean insects affecting the nursery beds, and experiments are proposed to be carried out in these directions. However, so soon as there are full particulars as to the exact times that the egg-laying of the various species takes place I am sure that the screening of the beds during these crucial portions of the year will provide an efficient and practical means of control.

I would here like to express my obligation to Mr. Goudie and Mr. Robinson for the really excellent notes they have provided me regarding various phases of the life-histories of the species that they have had under observation.

APPENDIX D.

Schedule of Measurements of Trees growing in New Zealand Plantations.

Name of Tree.	Age.	Girth at 5 ft. from Ground	Approximate Height in Feet.	Locality.	Distance from Sea.	Height above Sea-level	Quality of Soil.	Whether Grown in an Exposed or Sheltered Situation.	Measured by	Remarks.
	Years.				Miles.	Ft.				
Eucalyptus numerosa	..	28¼ in.	..	Waitati	½	100	Clay	Sheltered	Phillips Turner	On margin of clump of self sown trees.
,,	..	20½ in.	..	,,	½	100	,,	,,	,,	
,,	..	9½ in.	..	,,	½	100	,,	,,	,,	In middle of same clump.
,,	..	26 in.	..	,,	½	100	,,	,,	,,	
European larch	..	9½ in.	15	Gimmerburn	40	..	..	,,	,,	Interior of plantation.
,,	..	8½ in.	14	,,	..	1,200	..	,,	,,	..
,,	15	24 in.	30	Te Kapo	48	2,500	Small gravel from schist	,,	,,	Interior of plantation.
,,	15	19½ in.	25	,,	48	..				
Pinus radiata	15	43½ in.	..	,,	48	2,500	Ditto	,,	,,	,,
,, austriaca	15	23½ in.	..	,,	48	2,500	,,	,,	,,	,,
Pinus Murrayana	25	46 in.	50	Greendale	30	400	Good	,,	,,	Interior of belt.
Pseudotsuga Douglasii	30	57 in.	70	,,	30	400	,,	,,	,,	..
Pinus radiata	40	11 ft. 6 in.	123	,,	30	400	,,	,,	T. W. Adams	Exterior of plantation.
Eucalyptus viminalis	17	26 in.	60	Rotorua	50	1,000	Pumiceous	,,	Phillips Turner	Interior of plantation.
,,	17	41 in.	60	,,	50	1,000	,,	,,	,,	Exterior of plantation.
Robinia pseudo-acacia	20	39 in.	30	Whangarei	10	40	Alluvial	,,	,,	..
Cupressus macrocarpa	..	8 ft. 8 in.	70	Auckland	½	20	,,	,,	T. W. Adams	..
,,	..	7 ft. 8 in.	70	,,	½	20	,,	,,	,,	..
Eucalyptus globulus	56	12 ft. 11 in.	60	Parawanui	6	20	Sandy loam	Exposed position	C. Murdoch	..
,,	45	12 ft. 10 in.	58	,,	6	20	,,	,,	,,	..
Robinia pseudo-acacia	..	2 ft. 4 in.	40	,,	6	20	,,	,,	,,	..
Pinus radiata	..	7 ft. 8 in.	150	Pickwick Plantation, near Wanganui	8	250	,,	,,	,,	..
,, ponderosa	..	10 ft. 6 in.	..	St. John's Hill, Wanganui	5	230	,,	..	,,	Could only see the stump of the tree, having been felled some years.
Cupressus sempervirens	..	3 ft. 6 in.	45	,,	5	230	,,	,,	,,	
,,	..	2 ft.	45	,,	5	230	,,	,,	,,	
Eucalyptus Macarthuri	35	6 ft. 10 in.	100	Trecarne, Cambridge	50	230	Good soil	..	S. I. Clark	..
,,	35	6 ft. 8 in.	100	,, ,,	50	280	,,	,,	,,	..
,,	39	14 ft. 7 in.	..	,, ,,	50	280	,,	..	,,	..
Araucaria excelsa	..	11 ft. 8 in.	125	Tauranga	¼	30	Modified pumice	,,	,,	..
,, Bidwilli	about 60	6 ft. 3 in.	60	,,	¼	30	,,	,,	,,	..
,, Elm	,, 60	2 ft. 6 in.	60	,,	¼	30	,,	,,	,,	..
,, ,,	.. 70	10 ft. 2 in.	80	,,	¼	30	,,	,,	,,	..
Populus tremula	..	17 ft. 7 in.	80	,,	100 yds	14	,,	,,	,,	Supposed to be the largest in New Zealand.
Black walnut	..	5 ft. 7 in.	..	,,	100 yds	14	,,	,,	,,	..
Eucalyptus globulus	45	7 ft. 6 in.	115	Hillersden Estate, Marlborough	15	..	Good soil	,,	H. D. M. Haszard	..
,,	45	9 ft. 9 in.	115	Ditto	15	..	,,	,,	,,	..
,,	45	9 ft.	115	,,	15	..	,,	,,	,,	..
,,	45	5 ft.	115	,,	15	..	,,	,,	,,	..
Pinus radiata	30	9 ft.	90	Queenstown	..	1,100	Mica schist gravel	Sheltered	T. W. Adams	..
Larix europæa	25	4 ft. 9 in.	45	,,	..	1,100	Ditto	,,	,,	..
Poplar	30	8 ft. 6 in.	70	,,	..	1,100	,,	,,	,,	..
Pinus radiata	30	11 ft. 2 in.	100	Ruakura	25	141	Good	Rather exposed	Phillips Turner	..
Eucalyptus Macarthuri	30	9 ft. 10 in.	90	,,	..	..	,,	,,	..	..
,,	27	9 ft. 10 in.	123	,,	..	..	,,	..	..	..

Agathis australis		37 ft. 3 in.		Puhipuhi							Dead tree.
Gleditschia triacanthos		8 ft. 7 in.	50	Hokianga			Good	Rather exposed			
Ulmus montana		8 ft. 6 in.	50	Pakaraka			"	Exposed	Phillips Turner		
Wellingtonia gigantea	40	12 ft. 1 in.	80	Queenstown			Fair	Rather exposed	T. W. Adams		
Eucalyptus globulus	9	3 ft. 6 in.	50	"			"	"	"		These trees looked very healthy, and were well grown.
"		11 ft. 7 in.	85	"			"	"	"		
Eucalyptus viminalis		9 ft. 3 in.		"			"	"	"		
Eucalyptus globulus		16 ft. 3 in.	80	Warepa			Good	Sheltered	"		Tree not very high.
"		6 ft.	150	Fendalton, Christchurch			Very good		Phillips Turner		Humphrey's Plantation. Very fine trees, the finest seen.
"		5 ft. 11 in.	150	" "			"	"	"		
"		4 ft. 4 in.	150	" "			"	"	"		Isclated, branchy.
"		11 ft.	90	" "			"	"	"		
Larix europæa	40	3 ft. 5 in.		Bangor			Good	Formerly exposed	"		Bangor trees of poor quality.
"	40	2 ft. 11 in.		"			"	"	"		
Populus canescens	40	2 ft. 11 in.		Homebush			Very good	Sheltered	"		
"		1 ft. 10 in.		"			"		"		
"		1 ft. 4 in.		"			"		"		The smaller trees from suckers.
"	40	6 ft. 5 in.		"			"		30 ft. clear hole		
Pseudotsuga Douglasii	40	4 ft. 6 in.	80	"					"		
Larix europæa	40	4 ft. 6 in.	80	"					"		Trees the finest seen by us of larch.
"	40	3 ft. 10 in.	80	"					"		
Pinus ponderosa	40	6 ft. 8 in.	100	"					"		
Cupressus macrocarpa	23	7 ft. 8 in.		Cambridge					S. I. Clarke		
Eucalyptus	38	6 ft. 10 in.	120	"							These are fine specimens.
"	38	6 ft. 8 in.	120	"							
Cupressus macrocarpa	24	6 ft. 6 in.		Tauranga				Modified pumice			
Populus fastigiata (Lombardy poplar)	40	9 ft. 5 in.	80	Christchurch	7	15	Good	Fairly sheltered	T. W. Adams		
Ditto	40	11 ft. 1 in.	80	"	7	15	"	"	"		Planted for ornament. Six measured in succession out of nineteen trees in the line.
"	40	10 ft. 1 in.	80	"	7	15	"	"	"		
"	40	11 ft. 4 in.	80	"	7	15	"	"	"		
"	40	10 ft. 5 in.	80	"	7	15	"	"	"		
"	40	11 ft. 11 in.	80	"	7	15	"	"	"		
Eucalyptus hæmastoma	14	2 ft. 4 in.	45	Whakarewarewa	50	1,000	Pumice	Exposed	"		These are planted as experimental trees, and are good object-lessons.
Eucalyptus Gunnii	14	3 ft. 2 in.	55	"	50	1,000	"	"	"		
Eucalyptus corymbosa	14	3 ft. 7 in.	55	"	50	1,000	"	"	"		
Eucalyptus gigantea	14	2 ft. 11 in.	55	"	50	1,000	"	"	"		
Wellingtonia gigantea	14	10 ft. 3 in.	65	"	50	1,000	"	"			
Larix europæa	12	1 ft. 9 in.	30	"	50	1,000	"	"			
"	12	2 ft. 1 in.	32	"	50	1,000	"	"			
Agathis australis	20	1 ft. 10 in.	35	Te Aroha	20	1,000	"	"			
Pinus radiata	30	7 ft. 2 in.	125	"	20	1,000	"	"			
Wellingtonia gigantea	40	6 ft. 3 in.	75	Thames				Sheltered	These trees planted by Mr. Hall serve perhaps as no others in New Zealand to illustrate the rate of growth of some exotic trees in comparison with our own native forest-trees.		
Agathis australis	40	2 ft. 4 in.	60	"				"			
"	40	1 ft. 9 in.	45	"				"			
Dacrydium cupressinum	40	2 ft. 3 in.	45	"				"			
Libocedrus Bidwillii	40	1 ft. 11 in.	30	"				"			
Podocarpus totara	40	2 ft. 9 in.	33	"				"			
"	40	3 ft. 4 in.	40	"				"			
Retinospora obtusa	40	2 ft. 6 in.	25	"				"			
Cupressus torulosa	40	5 ft. 7 in	40	"				"			Tree dying.
Podocarpus spicatus	40	1 ft. 1 in.	20	"				"			
Phyllocladus trichomanoides	40	1 ft. 9 in.	20	"				"			
Podocarpus ferrugineus	40	1 ft. 3 in.	25	"				"			
Fraxinus excelsior	40	3 ft. 5 in.	45	"				"			
Quercus robur	40	6 ft. 11 in.	53	"				"			Favourable situation.
Podocarpus dacrydioides	50	2 ft.	40	"							

MINUTES OF PROCEEDINGS.

WELLINGTON, WEDNESDAY, 26TH FEBRUARY, 1913.

THE first meeting of the Forestry Commission was held at the Legislative Council at 3 o'clock p.m.

Present: Henry Douglas Morpeth Haszard, F.R.G.S., Commissioner of Crown Lands and Chief Surveyor of the Westland Land District; Thomas William Adams, farmer, of Greendale, Canterbury; Samuel Isaac Clarke, builder, Ponsonby, Auckland; Leonard Cockayne, F.R.S., F.L.S., Ph.D., of Christchurch; Frank Yates Lethbridge, farmer, Makino Road West, Feilding; and Charles Primrose Murdoch, woodware manufacturer, Auckland.

The Secretary read the Royal Commission.

The Prime Minister attended and addressed the Commissioners on the subject-matter of the Commission.

On the motion of the Chairman, a vote of thanks was tended the Prime Minister for his address.

The Chairman then reviewed the questions outlined in the Commission, and Mr. Clarke also addressed the Commission on the subject generally.

It was resolved that the Commission visit the South Island first, leaving Wellington the night of Friday, the 28th, and proceeding to Invercargill.

It was also resolved that only in exceptional cases should oral evidence be taken, and that any association or person desiring to tender evidence should be requested to put it in writing, when it would receive the careful consideration of the Commission; all such communications to be sent to the Commission, care of the District Survey Office in each centre.

It was further resolved that the official reporter be authorized to give a *résumé* to the Press Association of the proceedings of the Commission for publication.

The Commission adjourned at 4.45 p.m.

WELLINGTON, THURSDAY, 27TH FEBRUARY, 1913.

The Commission met at 10 a.m., at the Legislative Council Committee room, at 2 o'clock.

All the members were present.

The minutes of the previous meeting were read and confirmed.

An interesting letter was read from Mr. A. Bathgate, of Dunedin, concerning afforestation.

A letter was read from Messrs. Humphreys Bros., with regard to bush being milled before Crown land is opened for settlement.

A letter from the Under-Secretary for Crown Lands was read, with reference to the abandonment of the Dumgree Plantation, and the Nurseryman's report thereon.

The Commission were engaged till the evening in further fixing the itinerary.

The Commission met again at 7.30 p.m., and continued and finished the itinerary scheme.

The Commission adjourned at 9.30 p.m.

WELLINGTON, FRIDAY, 28TH FEBRUARY, 1913.

The Commission met again at the Legislative Council, at 10.30 a.m., and finally approved the itinerary as drawn up.

All the members were present.

The minutes of the previous meeting were read and confirmed.

The Commission adjourned at 1 p.m.

INVERCARGILL, MONDAY, 3RD MARCH, 1913.

The Commission met at the Government Buildings, Invercargill, at 10 a.m.

Present: All the members of the Commission.

The Commission adjourned to visit the powellizing works for the treatment of railway-sleepers at Kew, and were shown over the works, and had the process explained to them by the manager.

The Commission met again at 2 p.m.

William Mosley Andrews and John Walker, representing the Southland Builders' Association, attended and gave evidence.

Gordon H. M. McClure, Commissioner of Crown Lands for the Southland Land District, and James Collins, Crown Lands Ranger and Timber Expert for the Lands Department, were also examined.

In re Bluff Hill proposed scenic reserve: The Commisioner of Crown Lands was examined as to the state of this matter, and it was resolved that the question was one to be dealt with by the Scenery Preservation Board, and that the Commission proceed no further with the matter.

The Commission adjourned at 5.30 p.m., after having resolved that the Press be admitted to public sittings.

TAPANUI, FRIDAY, 7TH MARCH, 1913.

The Commission met at 7 p.m., having on 6th March inspected the Government nursery at Tapanui, under the guidance of Mr. Robinson, the Nurseryman in Charge.

All the members were present.

The minutes of the previous meeting were read and confirmed.

A letter was read from the Queenstown Borough Council with regard to afforestation in that district.

It was resolved to thank the Councillors for their letter, and express regret that owing to shortness of time the Commission should not visit the town.

A letter from the Winton Borough Council was read asking the Commission to move in the matter of a reserve on the north-west boundary of the town.

Resolved, That the Council be informed that the matter is outside the scope of the Commission, as land referred to is private land.

A letter from the Prime Minister, enclosing a letter from Mr. J. W. Ellis, of Hamilton, *re* white-pine industry and afforestation generally, was read.

It was resolved to recommend for reservation and climatic purposes Black Gully and all the forest clumps on steep slopes of the range to the east of Tapanui; details of boundaries to be left till an examination could be made of the maps at Dunedin.

In connection with the above resolution, it was further agreed that the country referred to be used as an experimental site for the purpose of planting exotic trees therein, seeing that it lay so near to the State nurseries.

The Commission adjourned at 8 p.m.

DUNEDIN, MONDAY, 10TH MARCH, 1913.

The Commission met at the District Lands Office at 10 a.m.

All the members were present.

The minutes of the previous meeting were read and confirmed.

Mr. Statham, M.P., attended and asked that the land along the Tahakopa River, in Block XIII, Rimu Survey District, should be reserved for scenery-preservation purposes.

It was resolved, on the motion of the Chairman, That Mr. G. H. Stewart, of Tapanui, and other prominent farmers be asked to furnish their views in writing on the question of the damage done to plantations by the imported deer.

The Commission adjourned at 12 noon.

DUNEDIN, TUESDAY, 11TH MARCH, 1913.

The Commission met at 10 o'clock a.m.

All the Commissioners were present.

The minutes of the previous meeting were read and confirmed.

Mr. A. S. Malcolm, M.P., wrote asking the Commission to visit Catlin's River district, and inspect certain gum-plantations growing there.

It was decided that, owing to pressure of time, the Commission could not visit there, but would be glad to receive all particulars, photographs, &c., of the trees from the settlers interested.

A letter was read from the Prime Minister, enclosing one from Mr. Seddon, M.P., on the subject of the timber industry, &c., in Westland.

The Chief Health Officer wrote intimating his willingness to address the Commission on the question of planting trees as an occupation for outdoor consumptive patients.

It was resolved to hear the Chief Health Officer's evidence in Wellington.

It was resolved to ask the Mayor of Dunedin to allow the Superintendent of City Reserves to furnish the Commission with data as to the cost of tree-planting in the Corporation reserve.

Mr. G. M. Thomson, M.P., intimated that he was forwarding a statement of his views on afforestation to the Commission.

A telegram was received from Mr. Statham, M.P., suggesting the reservation of the banks of the Waipori Stream. It was decided that the matter was one for the Scenery Preservation Board.

The following witnesses gave evidence:—

A. Bathgate, Dunedin.

William Campbell, assistant Corporation gardener, Dunedin.

G. W. Macintosh, president of the Acclimatization Society.
A. Cowie, secretary of the society.
Gabriel Hodges and James Knox, representing the Otago Builders' Association.
E. H. Wilmot, Commissioner of Crown Lands.
E. O'Neill, Crown Lands Ranger.
J. R. Scott, secretary, Otago Dairy Association.
A. S. Ross, Dairy Instructor and Butter Grader.
The Commission adjourned at 4 p.m.

FAIRLIE, SATURDAY, 15TH MARCH, 1913.

The Commission held a sitting here at noon, having journeyed from Dunedin *via* Ranfurly, Cromwell, and the Mackenzie Plains. On the 12th and 13th March they inspected the Naseby and Gimmerburn Plantations and the Ranfurly Nursery. At Fairlie on the above date the evidence of Mr. R. L. Banks, engineer to the Mackenzie County Council, was taken regarding the county's plantations.

The Commission then proceeded to Christchurch.

CHRISTCHURCH, TUESDAY, 18TH MARCH, 1913.

The Commission met at 9.30 a.m., at the Lands Office.
All the Commisioners were present.
The minutes of the previous meeting were read and confirmed.
Letters were read from Mr. M. Murphy on afforestation and the value of *Pinus radiata*.
The following witnesses attended, and gave evidence:—
Edward Herring, retired farmer, Papanui.
Richard P. Grady, of A. M. Grady and Co.
J. C. Helmore.
H. G. Ell, M.P.
John H. Maynard.
Dr. Morton Anderson.
Professor Charles Chilton, D.Sc.
Robert Nairn, nurseryman.
W. B. Buckhurst, Crown Lands Ranger.
H. S. Price, Chief Draughtsman, Canterbury Land District.
John Dryden Hall, farmer, Hororata.
The Commission adjourned at 4.30 p.m.

On the 19th and 20th March the Commission inspected the State nursery and plantations at Hanmer.

HOKITIKA, MONDAY, 24TH MARCH, 1913.

The Commission met at the Lands Office at 7.30 p.m.

Letters were read from Hon. F. M. B. Fisher, *re* scenic reservation at Ruawai, Kaipara; A. N. Harrop, on growth of native trees; J. G. Wilson, *re* the planting of sand-dunes; H. E. Pacey, of the National Dairy Association, Auckland; and W. B. Leyland, regarding butter-box tests.

The Commission adjourned at 8.30 p.m.

GREYMOUTH, TUESDAY, 25TH MARCH, 1913.

The Commission met at the Courthouse at 10 a.m.
All the Commissioners were present.
The minutes of the previous meeting were read and confirmed.

Messrs. G. H. Boyd and J. W. Caldwell, director and secretary of the West Coast Sawmillers' Association, attended and handed in a statement dealing with the export of white-pine and the use of red-beech as a timber for sleepers.

The Commission adjourned at 11 o'clock a.m., and proceeded to Reefton, examining *en route* Mr. A. Whitehorn, Crown Lands Ranger for the South Nelson District.

NELSON, THURSDAY, 27TH MARCH, 1913.

The Commission met at the Municipal Chamber at 10 a.m.
All the members were present.
The minutes of the previous meeting were read and confirmed.
A letter was received from the Greymouth Wharf Labourers' Industrial Union of Workers regarding the prohibition of the export of white-pine.
The following witnesses attended and gave evidence:—
John Pollock, chairman, Acclimatization Society.
F. A. Thompson, Commissioner of Crown Lands, Nelson.
James S. Evans, Stipendiary Magistrate and Warden.
Frederick G. Gibbs, M.A.
R. E. Harris, Crown Lands Ranger.
The Commission adjourned at 1 p.m.

BLENHEIM, SATURDAY, 29TH MARCH, 1913.

The Commission met at the Crown Lands Office at 10 a.m., having the previous day inspected the Dumgree Plantation.
All the members were present.
The minutes of the previous meeting were read and confirmed.
The following witnesses attended, and gave evidence:—
W. H. Skinner, Commissioner of Crown Lands, Marlborough.
H. F. Hursthouse, Crown Lands Ranger.
William Masefield.
John Fawcett.
The Commission adjourned at 11.15 a.m.

WELLINGTON, MONDAY, 31ST MARCH, 1913.

The Commission met at the Government Buildings at 10 a.m.
Present: All the Commissioners.
The minutes of the previous meeting were read and confirmed.
Letters were received from Messrs. G. M. Thomson, M.P., B. Chambers, the South Canterbury Builders' Association, the Mackenzie County Council, Ashburton County Council, and James Collins (Crown Lands Ranger, Invercargill), regarding afforestation matters.
The itinerary for the North Island was decided on.
The Commission adjourned at 5 p.m.

NAPIER, THURSDAY, 3RD APRIL, 1913.

The Commission met at the Lands Office at 10 a.m.
Present: All the members.
The minutes of the previous meeting were confirmed.
Letters were received from Messrs. A. E. Hackle and Camille Malfroy regarding forestry questions.
The following witnesses were then examined:—
Robert Thomas Sadd, Commissioner of Crown Lands, Hawke's Bay.
Henry Martin Smith, Crown Lands Ranger.
John Griffin, president, Napier Builders' Union.
Mr. Ward, member of Napier Builders' Union.
The Commission adjourned at 12.45 p.m.

AUCKLAND, SATURDAY, 12TH APRIL, 1913.

The Commission met at the Lands Office at 11 o'clock.
The minutes of the previous meeting were read and confirmed.
The Chairman reported that a subcommittee had, on the 4th April, visited the forest reserve at Lake Waikaremoana; that on the 7th April the full Commission had inspected the State nurseries and plantations at Waiotapu and Waipa; and that on the 8th April an inspection was made of the State nurseries at Whakarewarewa.
It was resolved to apply to the Government for a month's extension of the Commission.

DARGAVILLE, TUESDAY, 15TH APRIL, 1913.

The Commission met at the Courthouse at 10 a.m.

The minutes of the previous meeting were read and confirmed.

Letters were received from E. Hardcastle, regarding destruction of the forest by deer; and from the Prime Minister, forwarding a communication from Mr. Ell, M.P., on the subject of scenic reservations.

The following witnesses attended, and gave evidence:—

Francis J. Dargaville.
William T. Hunt.
Peter Brown.
John H. McCarroll.
Edwin Harding.
Wolsley Allen.
James Maxwell, caretaker of the Waipoua Forest.

The Commission adjourned at 4 p.m.

AUCKLAND, WEDNESDAY, 23RD APRIL, 1913.

The Commission met at the Government Buildings at 10 a.m.

All the members were present.

The minutes of the previous meeting were read and confirmed.

The Chairman reported that on 16th April the Commission had journeyed to the Waipoua Forest, and on that date and the 17th April had proceeded right through the forest reserve. He mentioned that on the 21st April the Puhipuhi Forest had been inspected, and that during the Commission's stay at Whangarei Mr. Lionel Hamlon had interviewed the members on behalf of the Whangarei Fruitgrowers' Association, urging the advisability of State planting to meet the future requirements of the fruit industry.

The Commission adjourned at 12 noon.

AUCKLAND, THURSDAY, 24TH APRIL, 1913.

The Commission met at 10 a.m., all the members being present.

The minutes of the previous meeting were read and confirmed.

The following witnesses gave evidence:—

David Goldie, timber-merchant.

William Arthur Cumming, architect, the president of the Auckland branch, New Zealand Institute of Architects.

William B. Leyland, timber-merchant.
David Hay, nurseryman.
August Charles Koch, District Engineer, New Zealand Railways.
Henry Paul Kavanagh, retired Civil servant.
Robert Craig Pollock, Government timber-measurer.
Edward Bartley, architect.
James Trounson, sawmiller.
Dr. McGill, District Health Officer.
Alexander McColl, timber-merchant.
William Johns, member of Auckland Land Board.
Harry M. Skeet, Commissioner of Crown Lands, Auckland.

The Commission adjourned at 5 p.m.

On the 26th April a subcommittee, consisting of Messrs. Haszard (Chairman) and Lethbridge, journeyed *via* Mahoenui to Mokau, and thence to New Plymouth.

The same day the other members of the Commission proceeded *via* Taumarunui to Pipiriki.

Both parties inspected proposed reservations along the banks of the Mokau and Wanganui Rivers respectively.

The Commission arrived at New Plymouth on 28th April.

NEW PLYMOUTH, WEDNESDAY, 30TH APRIL, 1913.

The Commission met at the Borough Council Chamber at 10 a.m., all members being present.

The minutes of the previous meeting were read and confirmed.

A deputation consisting of Messrs. W. A. Collis and R. C. Hughes (representing the Egmont National Park Board) attended and gave evidence.

The following witnesses were also examined :—
T. C. List, chairman of Taranaki Expansion League.
Clement W. Govett, solicitor.
George H. Bullard, Commissioner of Crown Lands for Taranaki.
John Johnston, Dairy-produce Grader.
H. J. Okey, M.P.
Charles Ahier, timber-merchant.
The Commission adjourned at 2.45 p.m., and next day proceeded to Wellington.

WELLINGTON, FRIDAY, 2ND MAY, 1913.

The Commission met at Parliament Buildings at 2 p.m.
The minutes of the previous meeting were read and confirmed.
Letters were received from Messrs. W. A. Banks, Medbury; J. H. Hudson, Hoteo; T. Thompson, Westport; T. Harle, Oxford; and J. Butler, Ruatapu, on the subject of the inquiry.
The Commission proceeded to consider the drafting of the report.

WELLINGTON, SATURDAY, 3RD MAY, 1913.

The Commission met at 10 a.m.
Mr. Adams was authorized to return to the South Island, and to report on Conical Hills Plantation, which the Commission had been unable to visit on account of bad weather.
Messrs. Murdoch, Clarke, and Lethbridge were appointed a subcommittee to inspect and report on the reserves at Swanson, Henderson, Wade, and Okura.
The Chairman, Dr. Cockayne, and the Secretary were authorized to proceed with the preparation of the draft report.

WELLINGTON, THURSDAY, 15TH MAY, 1913.

The Commission met at 10 a.m., all the members excepting Mr. Adams being present.
The minutes of the previous meeting were read and confirmed.
A letter was received from the Under-Secretary for Lands enclosing the Governor's Warrant extending the Commission to the 31st May.
Letters were also read from several other persons concerning matters being inquired into by the Commission.
Kenneth W. Dalrymple, farmer, Rangitikei, attended and gave evidence.
The Commission adjourned at 3.15 p.m.

WELLINGTON, FRIDAY, 16TH MAY, 1913.

The Commission met at 10 a.m., all the members being present except Mr. Adams.
The minutes of the previous meeting were read and confirmed.
Mr. John MacPherson handed in a written statement of his views on value of shelter and other plantations.
The following witnesses were sworn, and gave evidence :—
William Henry Bennett, representing the executive of the New Zealand Federation of Builders.
Professor H. B. Kirk, professor of biology at Victoria College.
Dr. Valintine, Inspector-General of Hospitals.
A Hamilton, F.R.G.S., Director of the Dominion Museum.
Dr. A. K. Newman, M.P.
H. A. Goudie, Superintending Nurseryman for the North Island.
George G. Schwartz, president of the Wellington branch of the New Zealand Institute of Architects.
David Cuddie, Director of the Dairy-produce Division of the Department of Agriculture.
Winnard M. Singleton, Assistant Director of Dairy-produce Division of the Department of Agriculture.
The Commission adjourned at 4.45 p.m.

WELLINGTON, MONDAY, 19TH MAY, 1913.

The Commission met at 10 a.m.
All the members were present excepting Mr. Adams.
The minutes of the previous meeting were read and confirmed.
It was resolved that, as it was difficult to discriminate as to its relative value, the whole of the evidence, as reported, be printed.
The following persons attended, and gave evidence :—

G. C. B. Jordan, Under-Secretary for Justice.
Dr. Frank Hay, Inspector-General of Mental Hospitals.
James Burnett, Chief Engineer, Government Railways.
W. H. Field, solicitor.
C. A. Cotton, lecturer on geology at Victoria College.
L. O. Tripp, president of the Wellington Acclimatization Society.
G. P. Newton, Assistant Under-Secretary, Internal Affairs.

The Commission then considered and accepted various parts of the draft report, and adjourned at 5.30 p.m.

WELLINGTON, WEDNESDAY, 21ST MAY, 1913.

The Commission met at 10 a.m.
All the members were present.
The minutes of the previous meeting were read and confirmed.
The subcommittees that had been appointed to pay special visits to certain localities presented their reports.
Messrs. Lethbridge, Clarke, and Murdoch were appointed a subcommittee to visit the sand-dune areas on the west coast, near the Rangitikei River; and also to proceed to Wanganui, to have a further interview with the local residents as to forest-preservation on the banks of the Wanganui River.
The Commission adjourned at 5.30 p.m.

WELLINGTON, TUESDAY, 27TH MAY, 1913.

The Commission met at 2.30 p.m., all the members being present.
The minutes of the previous meeting were read and confirmed.
The subcommittee reported on its visit to Wanganui and the sand-dunes on the west coast.
The Commission further considered its report, and adjourned at 5 p.m.

WELLINGTON, FRIDAY, 30TH MAY, 1913.

The Commission met at 9 o'clock, all the members being present.
The minutes of the previous meeting were read and confirmed.
It was resolved, in regard to the request made at Greendale by a deputation of settlers of Oxford, Canterbury, That certain extensions of the present reserves in that district should be made; that the matter was one that could be best dealt with by the Canterbury Land Board.
As regards scenery reserves, it was resolved as follows: Whereas section 6 of the Scenery Preservation Amendment Act, 1910, prohibits the use of firearms in a scenic reserve, and as it may be expedient that firearms should be used to exterminate noxious animals that destroy the vegetation therein, it is desirable that some amendment of the Act should be made by which the Minister in charge of scenic reserves could grant under proper safeguards a permit for the destruction of such noxious animals.
On the motion of Mr. Adams, seconded by Mr. Clarke, it was resolved, That Dr. Cockayne should accompany the Chairman in presenting the report to the Prime Minister for transmission to His Excellency the Governor.
It was resolved, That the Chairman be authorized to sign the minutes of the last meeting.
On the motion of the Chairman, seconded by Mr. Murdoch, a cordial vote of thanks was passed to all State officials and private persons who had so willingly afforded their assistance during the inquiry of the Commission.
On the motion of Mr. Lethbridge, seconded by Mr. Murdoch, a very cordial vote of thanks was passed to the Chairman for his able and zealous conduct of the business of the Commission.
On the motion of Mr. Lethbridge, seconded by Mr. Adams, a very cordial vote of thanks was passed to Dr. Cockayne for so readily placing his literary abilities and technical knowledge at the disposal of the Commission, and for the untiring energy he had devoted to the work.
On the motion of the Chairman, seconded by Mr. Lethbridge, a vote of thanks was passed to the Minister in charge of the buildings for his kindness in allowing the Commission the use of the rooms.
It was resolved, That a cordial vote of thanks be passed to the Secretary, Mr. Phillips Turner, for his zealous and able conduct of his heavy duties.
It was resolved, That a cordial vote of thanks be passed to Mr. W. H. Russell for his ability in the conduct of his duties as official reporter.
The Commission finished its final sitting at 12 noon.

MINUTES OF EVIDENCE.

INVERCARGILL, MONDAY, 3RD MARCH, 1913.

WILLIAM MOSELEY ANDREWS sworn and examined. (No. 1.)

1. *The Chairman.*] What do you wish to state?—I represent, with Mr. Walker, the building trades and Builders' Association of the Southland District, and desire to place before you our views on the matter the Commission is inquiring into. The question of afforestation in this district is going to be a serious one if not grappled with at once, inasmuch as our forests are being rapidly depleted, and as no provision is being made for replanting it follows that timber fit for building purposes will soon be non-existent. We think that the Government should, in the first place, remove the duty on imported timbers, especially Oregon pine, which would, in our opinion, help to preserve the local timbers to a large extent, as they are more suitable for certain work than our own. We also think that the present wholesale slaughter by the mills is uncalled for, and that something should be done by inspection so that more care can be exercised in regard to the cutting thereof. Also, something might be done on these lines: sawmillers, after they have cut out an area, should plant a certain number of trees in place thereof in selected places. Trees could be supplied by the Government at a nominal cost. Arrangements might also be made to form a tree-planting society in various centres, Government to supply trees to this society free of charge. We would further urge the Government to use every endeavour to push on the tree-planting on the lines they are doing in the north, by planting suitable trees which would in, say, from forty-four to fifty years, be fit to use. We have heard of samples of timber from imported trees, grown in New Zealand, that have been fit to use in less than the above time. There are large areas in Southland that are not suitable for farming which could be planted—viz., all the eastern slopes of the Longwoods around Otautau, &c., which, lying to the sun and protected from the westerly gales, would grow trees to perfection. Another area is lying along the hills fronting the Hedgehope River. This country, being well watered and interspersed with many gullies, and of easy access, would make an ideal plantation. In conclusion, we hope that the Commission will use their best endeavours to promote a system of tree-planting throughout the whole of New Zealand.

2. Can you give us an idea of the areas you consider suitable for planting?—Only approximately. I allude to the Hedgehope district. The gullies there are suitable for agriculture, but the growth at present is merely scrub. The abandoned mining area lying to the south and facing north to the Hedgehope River would be suitable.

3. Do you know of any plantations that have reached a stage fit for milling?—No. I have seen *macrocarpa* used for window-sashes, but I cannot speak as to its lasting capabilities.

4. Are there any trees of that kind over forty years old in this district?—Yes, some distance from Invercargill.

5. *Mr. Murdoch.*] What do you mean by "wholesale slaughter by the mills"?—I mentioned the sawmillers, but I should also have included mining operations. As a miner I have seen the trees indiscriminately cut down and left to be burnt in dry weather. They were 5 ft. in diameter. The sawmillers are not doing that now; but still there is room for better methods of selection of the trees for cutting. The smaller trees should be left for timber, whether in mining or sawmilling areas, and then in time they would come into use. I think the methods of inspection of milling-areas should be improved.

6. *Mr. Lethbridge.*] But these people are cutting their own bush?—Yes, but a special safeguarding clause should be inserted in the lease when the area is granted.

7. You think timber-trees ought to be planted in such areas?—Yes.

8. *Dr. Cockayne.*] Have you seen any foreign trees which have been planted in old bush which has been partially cut?—I have seen some imported trees so planted. The *macrocarpa* will grow splendidly in any bush. On the Orepuki Diggings areas of scrub were cut, the big trees left, and the land was sown in grass.

9. Would such an area if cleared entirely of native timber grow grass?—Yes.

10. *Mr. Clarke.*] Your idea is that planting should take place in this district in order to ensure in the future a permanent supply of timber?—Yes.

11. What about the financial point of view? Has there not been a considerable increase in the cost of timber as the result of sawmilling being removed to a farther distance afield?—There has been a considerable rise, as much as three times. It is not accounted for by the increase in the cost of labour, as sawmillers fourteen years ago were getting almost the same wages as now.

12. *Mr. Adams.*] Do you know the present state of the sashes you referred to made from *macrocarpa?*—No. They were made twelve years ago.

13. *The Chairman.*] How much do you pay on the railway per 100 ft. from Bluff to Invercargill?—Rate and a half on imported timber. The price of Oregon has risen 7s. 6d. a hundred feet in Southland during the last three months.

JOHN WALKER sworn and examined. (No. 2.)

1. *The Chairman.*] Do you also wish to make a statement?—I am a builder, but have had only a limited experience in sawmilling. We only got twelve years ago half what is being got for timber now.

2. *Mr. Clarke.*] What is the reason for the difference? Has there been a large increase of cost at the stump?—Millers have to go farther back for it now, and into rougher country. Wages are not much different, but the millers are making better profits now.

3. You agree with the builders that further plantations should be established within a reasonable distance of the places where the timber is needed?—Yes. There are a lot of abandoned mining-areas near Otautau that should be planted.

4. What height do the hills run there?—From 300 ft. to 400 ft.

5. *Mr. Lethbridge.*] Whom do the abandoned areas belong to?—I think to the Government.

6. *Mr. Murdoch.*] Have you made recent observations of the cutting of the timber, the getting it out of the bush, and the alleged slaughtering that is said to be going on?—No.

GORDON HURRELL MORELAND MCCLURE sworn and examined. (No. 3.)

1. *The Chairman.*] You are Commissioner of Crown Lands and Chief Surveyor for the Southland District?—Yes. I have been here twelve months last December.

2. You have the administration of the timber industry under the Land Regulations?—Yes.

3. Do you find those regulations work generally satisfactorily?—I suppose they work satisfactorily, but I do not quite understand your question. Do you want my opinion as to whether the Timber Regulations should be improved or not?

4. Yes?—I have not gone into that question. When I came here the usual thing was to estimate the timber, and I found that the quantity of timber some mills were supposed to be cutting was farcical—one panned out at 355 ft. a day; so I recommended the Head Office to alter the system of reckoning to the actual output, and every miller, barring two or three, is against the change, which seems a strong argument that they were not paying for the timber they were previously cutting. The improved system applies to the new areas taken up.

5. How was the timber estimated previously?—By the Ranger and the surveyor who surveyed the area. The way they estimated the value of timber was absurd—much too approximate, in my opinion.

6. What is the process in Southland if a miller wants 200 or 400 acres of rough bush?—He can only get 200 acres.

7. Does the Department here insist on a survey?—In every case, practically. Those surveys are done by private surveyors, instructed by the Department.

8. How are the figures of the sawmiller checked as to his output?—He has to put in a sworn statement; but we have not commenced the new system yet.

9. Have you ever had complaints from the sawmillers that the Ranger had overestimated the timber?—No; their stock argument is that they did not appoint the valuers. They also wished to know why they had to pay for second-class timber. I replied that everything off the saw had to be paid for.

10. Under the old system if a Ranger made a mistake and estimated a bush at 3,000 ft. to the acre, and it turned out to be 20,000 ft., the miller would get the benefit?—Yes.

11. But if the trees were counted, branded, and measured, there would be no danger of the Crown losing revenue in that way?—No.

12. What royalty do the millers pay here on red-pine?—Sixpence per 100 ft.

13. It has been represented to the Minister that certain scenic and other reserves have become breeding-grounds for noxious weeds and rabbits: have you such complaints in this district?—No. One settler complained about a small reserve I have made since I came here, near Orepuki.

14. On what ground?—He wanted the land for farming, I think. Rabbits are all through Southland, and unless you net the country you cannot keep them out.

15. Have you heard complaints about opossums doing damage to native trees?—No, the office file will give what information there is. There was a consensus of opinion that for these animals there should be an open season.

16. Can you suggest any suitable areas of Crown lands that could be planted?—Not offhand. Up near Kingston there is a lot of inferior country that is available for the purpose, but there is nothing to the east.

17. *Mr. Adams.*] What do you think of the eastern slopes of the Longwood Range for the purpose?—That is nearly all sold. As soon as you mill the virgin bush the weeds follow, and it is impossible to cope with them. The only thing to do is to cut such country up for settlement. As soon as you mill the bush here it is valueless as a bush.

18. And the soil where you refer to is decent?—Fairly good.

19. *Mr. Clarke.*] It has been suggested that areas near Otautau and Orepuki and Hedgehope, abandoned mining claims, would be suitable for tree-planting: is that your opinion?—No such areas are available at Otautau and Orepuki. The Hedgehope country is poor, cold, indifferent country—the worst in Southland. Land there has been offered to the Land Purchase Board for £2 10s. per acre. The ground wants lime. Country which has been so treated has been resold at £10 an acre.

20. *The Chairman.*] Do the settlers here experience any difficulty respecting the second growth on their clearings?—Most of the clearings have been made along the coast, and there is probably no better land in Southland than round the coast. It is now in grass paddocks.

21. With regard to the National Park, I suppose that is pretty wild country?—Yes.

22. Have you been on it?—Years ago. Some portions of it may be good land.

23. Have you been on Stewart Island?—Not for a long time. It is all forest. I do not think that Stewart Island is suitable for settlement, and there is no demand there for settlement land. Mr. Arthur Traill, on behalf of the settlers, has requested me to go to Stewart Island and inspect the scenic reserves with a view to the uplifting of some of the reservations.

24. I have here a copy of a schedule of quantities of timber available sent from here to the Head Office. Have those figures been prepared by Mr. Collins, the Ranger?—He probably checked them. They would be compiled from the various reports and office records.

25. When these schedules were sent to Wellington was there any qualifying statement attached?—I do not know. I would like to see my covering letter. The figures were really approximate.

26. Have you had any practical experience in valuing timber-areas?—No.

27. *Dr. Cockayne.*] As far as Southland is concerned there is really no information of any value as to when the timber will all be felled?—We know only about certain areas; but that return is only an approximation.

28. *Mr. Clarke.*] Is it not just as likely that the quantity is overestimated as underestimated?—Yes. I think that return is taken from one of the forestry returns, from which the quantity since milled has been deducted.

29. *Mr. Adams.*] Is the variety of trees here the same as on the West Coast?—I think so, but there are much better trees in Westland than here. The people here cut everything, because of the manufacturing that is done.

30. *Mr. Clarke.*] Are there any places along our route in Southland it would be desirable to see with a view to afforestation?—No, unless you go into the Longwoods. The really good land has all been let. I purpose reserving a wooded hill at the back of Otautau for scenic-reserve and water purposes.

31. *Dr. Cockayne.*] What has been done with the top of the Longwood Range?—It has been reserved for climatic purposes.

32. *Mr. Clarke.*] Where is the nearest point you could recommend an area for planting timber for building purposes in this district?—There would be no difficulty in getting land to plant if you had the suitable timber-trees. No land district is so much under agriculture as Southland, but it has too much rain, and therefore we do not want any more bush. There is plenty of land here that is available that is better than the Hanmer land.

33. *Mr. Lethbridge.*] Have you any scenic reserves that are not required that could be drawn upon for settlement?—I do not think so. Until land becomes too valuable to hold as scenic reserves it should remain in its present category.

JAMES COLLINS sworn and examined. (No. 4.)

1. *The Chairman.*] You are the Crown Lands Ranger and Timber Expert, Southland, for the Lands Department?—Yes.

2. You have had considerable experience in estimating the value of Crown and other bush lands?—Yes.

3. Is it confined to this district?—I have been in other districts in the North Island and Otago. I have been in this district since I was twenty, but have been eight years in the Government service. Prior to eight years ago I was sawmilling.

4. Were these tables regarding timber-areas in Southland which have been sent from the local office to Wellington compiled under your supervision?—No, but I think I was consulted over some of them.

5. Who would have compiled them?—I think they have been compiled chiefly from my reports.

6. Probably they are all compiled from your reports?—Most likely. I have not seen these before, though. The chief part consists of only rough estimates, because they relate to places where nobody has been. All the country west of the Waiau is practically unsurveyed.

7. Are the estimates within 50 per cent. of being right?—I would not say that. They are all underestimated.

8. What has been the system in leasing timber-areas to the millers?—A sawmiller took up an area of about 200 acres, which would be surveyed; and there would be other reserves—say, about three others of 200 acres each, or 800 in all.

9. How did he pay for it?—On an estimate given by the Crown on the area as surveyed.

10. Did you prepare the estimates of the amount of timber in these blocks?—No; they were chiefly calculated by the surveyor who surveyed the land. I have also done some.

11. What was your method?—To get the height of the tree, the diameter, and the average; and then the method of calculation as to the quantity of sawn timber that would come out of that tree was to square two-thirds of the diameter, and multiply that by the length. The result would be practically the same as that arrived at by the method adopted by the surveyors here.

12. What was the smallest tree you would consider a milling-tree when measuring the bush?—We measure generally any tree which will not be less than a foot in diameter at the butt.

13. How long has that been in vogue?—Since 1886.

14. What would be considered a good average milling-bush here?—10,000 ft. per acre at the present time.

14A. What is the highest figure you have got off an acre in this district?—Close on to 40,000 ft., in the case of the Seaward Bush in the early days.

15. Taking Forest Hill on this list here: it gives an area of 4,000 acres, and 12,000,000 superficial feet of rimu, 4,000,000 of kahikatea, 1,000,000 of matai, 1,600,000 of miro, 400,000 of totara, making 19,000,000 in all. Has that area been accurately measured?—No, it is just approximate.

16. How did you arrive at the quantities of timber in each?—It is just a rough estimate only. There would not be double the quantity in it. It is only a guess from what I have seen of the bush alongside.

17. Have you been in the National Park?—Very little, and not far into it.

18. So that the classification there again must be purely a guess?—Yes, and a very rough guess. I am sure there will be more timber there than we have estimated.

19. That only works out to 200 ft. an acre?—Yes.

20. Do you know the Mokoreta Block?—Yes.

21. Is that all bush—15,000 acres?—No; there is a good deal of scrub. About 2,000 acres would be milling-bush.

22. What would it run to the acre?—About 3,000 ft.

23. Then the figures given in this schedule, 392,000 ft., are quite wrong?—That has been copied from some old return made out before I joined the Department, and never checked since.

24. Have you been to Stewart Island?—Yes; it is very poor milling country. There are three mills there, milling from 3,000 ft. to 4,000 ft. to the acre, chiefly red-pine and miro; very little kahikatea, and no matai.

25. Is there much birch?—There is very little, if any.

26. What is the number of mills in operation in Southland?—About sixty.

27. What is the average number of hands employed?—About eighteen.

28. Is there much export of timber out of New Zealand from here now?—Not much.

29. Do you consider the regulations under the Land Act a satisfactory mode of dealing with the timber?—Yes.

30. When the trees are measured and counted are they branded?—No, because we do not measure everything.

31. What proportion of trees in a 200-acre block would you measure?—Probably 7 or 8 acres. We might take half a chain all the way round where we would measure the timber accurately, and then multiply the whole area by it.

32. Would a bush of that sort be fairly even throughout the whole block?—In nineteen cases out of twenty that would give a very fair average.

33. In the method you use for getting the average per acre do you make any allowance for waste?—No; that method accounts for the whole quantity with the exception of totara. If it is a very bad sample of totara we sometimes deduct 10 or 15 per cent. The same with birch, which is very faulty.

34. *Mr. Murdoch.*] Do you allow for the bark?—No, the only allowance we make is the one-third of the diameter, which makes up for all waste.

35. *The Chairman.*] At what height from the ground would you measure the butt diameter?—2 ft. 6 in. The average of that tree would be 9 in. or 10 in. If it measured 10 in. it would be picked for milling and the tree would be measured up.

36. Is there any check when they do cut it?—The butt is there, and you can check it.

37. Do the sawmillers hold the reserves for excessive periods, or do they work them continuously?—They have held them much longer than they should in some instances. Under the old Act of 1885 and the State Forests Act there was no limit, and consequently the New Zealand Pine Company and several others who took up bush at that time hold it still, practically.

38. There is no provision for making them cut it?—It is all provided for now, and the millers here have come under this new regulation. They must have it cut out in twenty-one years now.

39. *Dr. Cockayne.*] I see in this list the term "tawai" is used: what is meant?—Birch.

40. Do you include one species of tree, or more, in that term?—We only include the one species of birch. There are four or five.

41. Do you include all the four or five as "birch"?—Yes, but only red-birch and brown-birch are milled.

42. Is kamahi milled in Southland?—No.

43. It is not included in this schedule, and yet it forms a large proportion of certain forests?—Quite right.

44. Both the *Fagus Menziesii* and the *Fagus fusca* are fit to be valued for milling purposes?—Yes.

45. What is miro sold for?—It is classified as red-pine and sold as such.

46. Do you know pokaka?—Yes.

46A. Is that milled?—I have seen it cut for a tramway.

47. What do they sell it as?—I have never known it sold as a timber.

48. *Mr. Murdoch.*] You think the figures given in this return are not very reliable as to the quantity of timber available in Southland?—I think it is all underestimated.

49. *Mr. Clarke.*] You have probably taken care that it should be underestimated?—Yes.

50. Why?—When a man is asked for an estimate, and it is a rough one, it is much safer to underestimate than to overestimate.

51. Practically, Stewart Island cannot be taken into account as a milling-bush?—There are mills working there now, and will be for some time.

52. *Dr. Cockayne.*] Could a mill be profitably established in the neighbourhood of Port William?—Yes.

53. And in the bush at the head of the Freshwater River going to Mason's Bay?—Not at present, because it is too far away.

54. Do you know the silver-pine?—Yes, in the wood, but not in the tree.

55. Do you know the pine called "yellow-pine" in Westland: in Stewart Island I think they call it "bog-pine"?—Yes.

56. It is mostly very small, although it is an extremely durable wood?—Yes.

57. It is not big enough to cut for railway-sleepers?—No.

58. *The Chairman.*] Where the kahikatea has been cut and milled, is the land then found to be good agricultural land?—Yes, some of the best in the district when drained. It is not swamp land, but just wet land, and the soil is good when drained.

59. If land containing kahikatea bush were locked up indefinitely it would tend to bar the development of the dairying industry?—I should think so.

60. *Mr. Murdoch.*] Do you know of any other wood in this locality which would be suitable for butter-boxes when artificially treated?—No, but I think this brown-birch would be worth trying.

61. *Dr. Cockayne.*] Why should you not not try the *Fagus fusca* as well?—We have not any within easy distance. The nearest is at Five Rivers and Burwood.

DUNEDIN, TUESDAY, 11TH MARCH, 1913.

ALEXANDER BATHGATE sworn and examined. (No. 5.)

1. *The Chairman.*] We were very pleased to receive your letter, Mr. Bathgate, on this question, and shall be glad to hear any further remarks you wish to offer?—I wrote that letter in order to interest you on the question of afforestation in Central Otago. A little has been done at Ranfurly and Naseby, but operations should be prosecuted more vigorously in that district, as the country in the Molyneux Valley, from Alexandra up to Lake Hawea, is eminently suitable for fruitgrowing, and afforestation will still further improve it. Supplemented by irrigation, its future will be beyond question. A large part of that area could be cultivated by the dry-culture methods adopted in some of the States of America, and the Dunedin Expansion League has urged the appointment of an expert on this matter. Whenever the lease of one of the grazing-runs falls in it should be divided into smaller areas and dealt with on the methods I suggest, afforestation reserves being made in connection therewith. There is no other land in the district available for afforestation; and in the future there will be a great demand in the district for timber for fruit-boxes. The first planting in this district was on low land at Naseby, but I would like to see, in the Molyneux Valley especially, a reserve half-way up the mountain-sides for planting purposes. I think the larch would grow to a very considerable elevation, and pines. Severe frosts occur in that district. As to water-conservation, in that dry country it is necessary to preserve the water-supply for irrigation requirements, and under afforestation operations the flow of the river would be augmented. The Manuherikia River never runs dry, but many of the streams do in summer. It is not necessary that timber for fruit-cases should be of first-class quality. *Pinus radiata* might be planted, as it is quick growing, and would make excellent timber for the purpose. The poplar also does well there, and I suggest that this tree should be planted where the country has been subjected to dredging operations. Thirty years ago some land forming part of the High School endowments at South Taieri were placed on the market, and the plan showed afforestation reserves, but nothing has been done there in that direction. Afforestation would prove beneficial to the valley by providing breakwinds.

2. What is the area?—32 acres, 55 acres, 49 acres, and 22 acres. But they are only 5 chains in width, and it is a pity they were not much wider.

3. Would not small areas like that be better dealt with by the local bodies?—Probably it would be better. As to afforestation for national purposes, undoubtedly the country near Hawera in the North Island should be planted, and a broad belt along the sea-coast would prove a great shelter, and enhance the value of the land. Jutland is a case in point where such plantations have been made with much advantage. The local bodies hitherto have not been very much encouraged to plant trees; there is difficulty in getting the trees from the Government at present. Afforestation operations should not be dependent on a yearly vote of Parliament, but should be based on a system that would not be likely to be curtailed should a financial stringency arise, or change of Government take place. When the Department has trees available for planting, local bodies and settlers might be notified of that fact by advertisement—the price should be a low one—and I feel sure the opportunity would be largely availed of. I am strongly of opinion that the Government should appoint a forestry expert, and in saying that I am not reflecting on the men in charge of the nurseries, who are capable men. I know two of them, Mr. Goudie and Mr. Roberts, but I do not think they claim to be all-round forestry experts. The Indian Government appoint men at £1,000 a year as experts in forestry, and others skilled in chemistry, botany, and the nature of soils.

4. Have you any knowledge as to the destruction said to be done to the native forests and plantations by the imported deer?—No, excepting that there is no doubt that when they become numerous the deer do a great deal of damage to the forests. The same remark applies to the rabbits, that are doing much damage to the undergrowth, practically eating it out, especially at Tapanui.

5. In afforesting Central Otago would it not be necessary to erect rabbit-proof fences to protect the plantations?—I am afraid it would be until the trees grew up. After a time the fencing could be moved to another block.

6. *Mr. Adams.*] Do you think an expert from Home would be able to introduce any fresh methods of any value to us here?—Quite possibly he might, as many trees of value have never been tried here. There are trees in Uganda growing on hills that might be suitable to this country; they are comparatively new to science. An expert in soil chemistry would probably be able to tell us at once that it would be useless to plant certain trees in certain soils.

7. *Dr. Cockayne.*] What time would an expert who was regulating the whole business of forestry have to analyse soils?—He would be the controlling head, but there would be chemists attached, say, to the Lands Department, who would report to the head of the Forestry Division, who would then appraise the value of the analyses and apply it to practical use. I know a little of the training these men undergo at Oxford, where they have specialists in all these departments.

8. You mean that a trained scientific man should be at the head of affairs, and not a gardener?—Quite so. I do not suggest bringing a man from outside if we could get one in the Dominion with the necessary qualifications.

9. Do you think it a fair thing, after large areas of land have been planted for future forests, and some of the present forest country has been set aside as national parks and climatic reserves, that it should be allowed to be filled with deer for the benefit of sport, when there are so many other areas where the deer would do no harm?—I think it is a mistake to allow the deer to roam at will all over the country.

10. *Mr. Adams.*] Would you be in favour of remitting rates and taxes in the case of any private person planting not less than 5 acres of land?—I would be strongly in favour of doing so. At present, if a man plants his land he is afraid the value will be raised and he will have to pay more taxation.

11. You wish the State to conduct the operations and private individuals to assist?—That is my view.

12. *Mr. Clarke*] Would it not be necessary that the whole matter should be under the control of the Government, in order to ensure a national supply, seeing that the time element is so important?—Perhaps so.

13. Would the proposal as to private individuals assisting lead to anything like a national supply that could be depended on?—No.

14. *Mr. Murdoch.*] Do you think that the Government in giving trees to settlers ought to exercise some supervision over the planting, and afterwards?—I do not propose that the trees should be given, but the cost should be kept as low as possible—to near cost price. A settler would never stand the Government stepping in, after he had bought the trees, and telling him he must not touch them.

15. Then it would be no use his planting them?—If he paid a low price for the trees I do not think the Government has any right to say what he should do with them in the future.

WILLIAM CAMPBELL sworn and examined. (No. 6.)

1. *The Chairman.*] Do you wish to make a statement to the Commission?—Yes. I am the assistant forester at the Corporation nursery, Dunedin, and I propose to deal with the question of the benefits of forestry from an agricultural point of view. There are tracts of land that should be planted to assist moisture, keeping in view the fact that New Zealand is largely composed of hills and valleys. I have observed that various districts in Otago are falling back in respect to milk-production through the land being laid bare. This country is destined to be the Denmark of the Southern Hemisphere for dairy produce; but various districts I have visited where dairying is carried on give indications that a heavy loss annually occurs through the want of shelter. The Peninsula, Dunedin; a large part of the coast land between Port Chalmers and Oamaru; large tracts of land on both sides of the railway between Gore and Morton Mains, and away to the western district, are cases in point. In these places shelter is very necessary, but we have not got it. Thus we have exposure, which affects the cow by inducing consumption, red-water, mammitis; loss of butter-fat, through want of food and water, follows. All this arises through the want of shelter.

2. Are the lands you refer to Crown or private lands?—Private.

3. Have you any suggestion to make as to how they should be afforested?—The high lands should be planted by private individuals.

4. How would you ensure that they should plant them?—By legislation.

4A. Do you think the State should assist the settler in any way in the matter?—Yes, by finding the trees.

5. What about the fencing?—I would protect the plantations with wire netting.

6. Who should pay for it?—I would ask the Government to assist, assuming an expert reported that planting in the locality was necessary.

7. *Dr. Cockayne.*] Do you consider that changes of climate have come about since the destruction of the forests?—There has been a huge loss of moisture in various parts.

8. Have you any accurate records bearing on the matter, or is your opinion based largely on a general idea derived from your knowledge of this district?—My opinion is derived from information gained through having gone through the districts mentioned.

9. Then it is a general idea rather than a scientific fact?—Yes, but I think it is also scientifically correct.

10. Have you kept exact records of rainfalls?—No.

11. Or the effect of rainfall on the forests?—I have not.

12. *Mr. Adams.*] What do you think of the suggestion to exempt the private owner from rates and taxes as an inducement to him to plant?—I quite agree with that.

13. Would you not prefer that proposal to the idea of compelling him to plant?—Where expert knowledge is brought to bear it should predominate, and if necessary pressure should be exerted to effect these improvements. My evidence, however, bears only on the value of shelter for dairy stock.

GORMAN WILLIAM MCINTOSH and ALEXANDER COWIE sworn and examined. (No. 7.)

1. *The Chairman.*] I understand that you gentlemen represent the Otago Acclimatization Society?—[*Mr. McIntosh*] Yes, I am the president, and Mr. Cowie the secretary.

2. It has been represented to us, Mr. McIntosh, that the unrestricted roaming of the deer through the national forests may prove detrimental to the trees, and we would like to gather the opinion of the society as to the value of the deer to the country, &c. Do you consider the untrammelled wandering of the deer all over the country beneficial to the State?—No. There are parts where they do no damage and give very good sport, and thereby attract visitors to the country. Money is spent with benefit to the district concerned, but to allow the deer to roam without restriction throughout the country would be very detrimental.

3. Do you consider that certain well-defined areas for deer-parks would meet the requirements of sportsmen?—Yes.

4. In what manner would you restrict the deer to those areas?—The only way is to shoot them off and keep the numbers down.

5. It is stated that some herds are spreading throughout the Alps, and unless some steps are taken they might soon occupy the whole of that territory. They are also invading settlements and the State nursery at Tapanui?—The latter are isolated instances. In New Zealand there is a tremendous lot of country that is fit for nothing else but deer. Where the animals now are is very rough, broken country, with no sheep on it in many cases. The red deer are high up on the snow-line, and that country is fit for nothing else. The fallow deer are at Tapanui, in the Blue Mountains, and in that district we are told they are a nuisance to settlers. The matter was referred to our society, and we are in communication with the Minister of Internal Affairs, and we have agreed that those settlers whose lands are affected should have the right, with their families, to kill the deer all the year round in order to keep them down. But some of those settlers have got at a very nominal rate country which would be better utilized as deer-parks. At other places on the mountains deer have invaded the settlements, but the settlers do not mind, as they can get game nearly all the time, and they take advantage of it. Something should be done to keep the deer out of the Government nursery, as they damage the young plants.

6. *Mr. Murdoch.*] The red deer are doing the damage at Dusky Hill plantation. I understand you are referring to fallow deer?—The fallow deer are reported to be more mischievous. We have suggested that settlers should use the bird-scarifiers which have proved so successful in other places to keep the animals out. The cartridges can be set to explode at any interval required. They have been very effective at Roxburgh amongst the fruit-trees. The settlers in the deer districts do not think much of them, but we propose to send the Rangers up with two of the machines to let the settlers see the effect.

7. *The Chairman.*] It is stated that the deer eat the young growth out, and perhaps in course of time may exterminate the climatic reserves. Have you any opinion to offer in that connection?—I suppose the cattle that run there would do the same. I have been told that the deer on the Blue Mountains have done good in keeping down the Canadian thistle.

8. *Mr. Lethbridge.*] If you give the settler the right to shoot at any time he will welcome the deer, and our forests might be ruined?—I have not heard that they were doing damage in the Tapanui Nursery, but we have been informed that they were working down towards there. They will have to be shot out of that.

9. *Dr. Cockayne.*] Deer have quite recently been placed in the vast forest at the headwaters of the Waimakariri River in the hope that in time they will help to form one continuous herd throughout the northern portion of the Southern Alps. Do you think it reasonable that any risk of damage should be run in the case of that forest, which is of very great importance to the Dominion, for the sake of sport?—I do not think those deer would really be a serious menace to our national forests, and it would take them a long time to spread through that range. In the Hawea district there is a very large herd that wants shooting out. They never leave that part of the country, with the result that the district has become overstocked, and the animals have deteriorated. We have arranged to shoot them out by contract. We have shot out five hundred head of deer this season.

10. Tourists go to Mount Cook to see the beautiful mountain-flowers, and if there were large herds of chamois there those plants would be wiped out. Which do you think it is the best for the country to keep?—It is a matter of taste. The botanist would prefer the ranunculus, and the sportsman the chamois. There is very little danger of the chamois becoming so numerous as to do much harm. A short time ago only one was seen on Mount Cook, and that was supposed to be the last. No others have been seen.

Mr. Cowie: At the head of Lake Wanaka there are large patches of the *Ranunculus Lyallii.*

11. *Dr. Cockayne.*] Is there not a danger of these plants being destroyed, Mr. Cowie, by these animals in those places where the Government caters for tourists, and where consequently they should be preserved?—The mountains where there are large patches are often the places where the deer are most plentiful: they do not touch them. It is above sheep level.

12. *Mr. Clarke.*] Were the five hundred head of deer shot for the purpose of preventing damage to the country, or to prevent the deterioration of the herd, Mr. McIntosh?—To maintain the standard of the herd. We have been told by visiting sportsmen that we have here the finest type of red deer in the world, and the finest herd, and so we wish to keep up our reputation by thinning the animals out.

13. Would that be considered sufficient by the settler who may be suffering damage from the incursions of the deer?—In that part of the country they do not do any damage to the settlers. They are in the wilds of the country, where there are no sheep even. At Morven Hills there are no complaints at all from the settlers.

14. *Mr. Murdoch.*] Do you consider those areas where there are no sheep even suitable for tree-planting?—I do not think so, on account of the snow and frosts.

15. In those districts where the deer are getting too numerous, and are damaging the farms and the State plantations, you consider it advisable that they should be shot off?—I do.

16. Would not that solution of the matter be enough for the settler?—They do not think so, but some even want to go in for poisoning.

17. *The Chairman.*] If they got permission to shoot them at any time when they trespassed on the farms might not they go into the mountains and shoot them?—We know they are shooting them all the time. We are anxious to acclimatize animals, birds, plants, or trees, and it is not to our interest to try and force anything detrimental on a settler, or that he is opposed to. We are anxious to meet him.

GABRIEL HODGES, President, and JAMES KNOX, Secretary, Otago Builders' Association, sworn and examined. (Nos. 8 and 9.)

1. *The Chairman.*] I understand that you wish to make a statement to the Commission, Mr. Knox?—Yes. The executive of the Dunedin Builders' Association are convinced that afforestation is urgently required, and of vital importance to the prosperity of the Dominion. It is a well-known fact that the forests of both North and Middle Islands are being depleted at a rapid rate, and comparatively little afforestation is taking place. We are also of opinion that it is a matter of the utmost importance that the reafforestation of the lands should be carried on in a more vigorous manner than has obtained in the past; also that special consideration should be given to timbers suitable for building and other constructive purposes. Further, that large areas of land suitable for afforestation can be planted in this Island without in any way encroaching on land suitable for agricultural purposes.

2. Has your society gone into the question of what timbers they consider should be planted?—The pines we think would do—Corsican and yellow.

3. Has the *Pinus insignis* been used for building purposes in Dunedin?—It has been used for scantlings and weatherboards; also for joinery-work.

4. *Mr. Lethbridge.*] From trees grown in New Zealand?—From the imported timber.

5. *The Chairman.*] I refer to the locally grown timber?—I do not know of any *insignis* which has been cut down here and turned into timber.

6. Has the association considered the length of time the timbers they advocate should be planted would take to grow?—It would be a matter of from thirty to forty years.

7. What timber would be available after that time for sawmilling?—I have not gone into that question, but I suppose the Corsican pine would be ready in that time.

8. In the event of thinning-out taking place, what could the smaller trunks be used for?—For farm use, such as fencing; but not for posts.

9. Is any birch or beech used in the local market here?—No; we do not care for it. It has been tried; you can always buy it at 2s. less than any other timber, which indicates there is something wrong about it for building purposes. It warps and twists badly.

10. There are several kinds of these birches or beeches: which ones have you tried?—We call it here the red-birch. It is used for making chairs and furniture.

11. Does it warp if it is properly seasoned?—It requires a lot of watching.

12. Does it make good furniture if properly seasoned?—Yes, when properly seasoned it is a good timber for furniture. We are using it extensively now for that purpose, but outside that I do not think any one in Dunedin is using it. It is obtained from Southland.

13. *Dr. Cockayne.*] Have you had any from any other district?—Not that I know of.

14. Would it surprise you to know the red-birch does not grow in Southland?—It would surprise me.

15. *Mr. Clarke.*] Would you be less surprised if you were informed that the various kinds of birch are called all sorts of names in different districts?—No.

16. Assuming it is called "red-birch" here, is it fair to assume it would be called "red-birch" where you got it from?—Yes.

17. Do you consider you are responsible for the name?—No.

18. You are only concerned as builders with the value of the timber for your purpose?—Yes.

19. Would you consider it advisable to re-forest with that tree in preference to introducing foreign trees of proved value?—I would introduce the foreign trees, because the birches are useless.

20. Are the prices of timber still going up?—Yes.

21. Are there any lands near here, or within reasonable distance of this market, that could be planted?—The land at the back of the Flagstaff might be planted, and about Seacliff. It is handy to the railway and the city.

22. If timber is planted by the Government for commercial purposes you would not expect them to spend £500 in producing £400 worth of timber?—No.

23. Would not the proposition from a commercial point of view depend largely on the price you get the land at?—The Lands Department would be the best people to decide where the land should be selected.

24. *Dr. Cockayne.*] Do you think it right that a sawmiller should sell you yellow-birch, a comparatively worthless timber, under the name of "red-birch," which is a fairly good timber?—The difference would not be understood by the man who was buying the timber.

25. *Mr. Adams.*] Do you know the difference between the different birches?—We have only the one we call the red-birch on the market here.

26. *Dr. Cockayne.*] When you get a consignment of totally different timber under the name of "red-birch" from Nelson, or the North Island, what do you call it?—We would call it "beech" here.

27. *Mr. Murdoch.*] Supposing you get it from the mills seasoned, will it twist or warp again?—It must be watched and turned.

ERNEST HERBERT WILMOT sworn and examined. (No. 10.)

1. *The Chairman.*] Have you been long acquainted with this district, Mr. Wilmot?—I am the Commissioner of Crown Lands here, and have held that position for about four years, but I have been generally acquainted with Otago for close on forty years.

2. What areas in this district do you consider suitable for afforestation purposes—land that is fairly cheap?—The Superintendent of the nursery at Tapanui has spoken to me several times about this matter, and I have consulted the Ranger also; but we have found it very difficult to find any areas in Otago that are suitable, and that we could recommend.

3. I understand there are large areas of Crown land in Otago Central?—Yes, large areas held under pastoral lease.

4. Are there resumption clauses in the leases, or would you require to wait until the end of the lease before the lands would be available?—Most of those runs are held under Class A, and not resumable in the ordinary way; but, of course, you can resume under other clauses of the Act.

5. I suppose the leases expire at different times?—Yes.

6. Are there any expiring shortly?—We looked through the leases expiring up to 1918 not long ago, and we would not select any lands from those that seemed very suitable. If you go in for cheap land you will often find that only parts of it are suitable for tree-planting, which tells very badly against the value of the plantations.

7. Do you consider that Otago is well supplied with scenic and climatic reserves?—I think so, as regards purely scenic reserves.

8. As regards scenic reserves, it has been stated that settlers complain that in some districts these reserves are becoming breeding-grounds for noxious weeds and animals, and in other cases the land they occupied was suitable for agriculture and thus they were blocking settlement?—I do not think that applies much to Otago.

9. Have any such complaints reached you?—I do not think it applies to this district.

10. *Mr. Adams.*] Are any of the runs falling in before 1918?—They come in every year. A fairly large run, the Galloway, comes in in 1916.

11. *The Chairman.*] I have just received a telegram from Mr. Statham, M.P., suggesting that the bush in the Waipori Reserve should be preserved. Do you know anything about that matter?—I think there is a large reserve there already.

12. The timber question does not bulk very largely in your district, I think?—All there is is down by the Catlin's and at the Rankleburn, and also on the west coast at Martin's Bay, which is not exploited yet.

13. *Dr. Cockayne.*] Does the timber at Wanaka come into your district?—Just a little at Makarora Valley, which is partly in our district, the other part being in Canterbury.

14. *The Chairman.*] Does the Ranger value the timber when a miller applies for an area?—Up to the present most of the timber has been paid for as cut, on the returns from the mill.

15. How are these returns verified?—The books are open for the Ranger's inspection at any time, and at Catlin's most of it comes out by rail.

16. Does the miller have to make any statutory declaration as to the amount of timber he cuts?—We have never required it of him that I know of.

17. Is any of the timber bought on a royalty basis as it stands?—I started that system as soon as I came here. It is a most satisfactory system.

18. How is that timber estimated?—It is valued by the surveyor who makes the survey, excepting in the case of small patches, when the Ranger will value it.

19. Is the surveyor an officer of the Department, or a private surveyor?—A private one employed by the miller, and paid by him.

20. Is there not a danger in that case of the surveyor being biased in favour of the miller who employs and pays him?—I do not think so. We would not allow a man to act who we did not consider was fairly competent and a straight man. In Southland, where I had considerable experience in both Departments, the millers had great confidence in the surveyors employed there. I have not had much experience in Otago of the matter, not more than two areas having been surveyed since I came here.

21. *Mr. Lethbridge.*] You would not accept his statement if you had no confidence in the surveyor?—No. If the miller wished to appoint a man I had no confidence in, knowing he knew nothing about the value of timber, I would suggest he should get another man.

22. *The Chairman.*] Do you not think it would be preferable to have the timber estimated by an officer of the Department?—Where there is a large quantity of timber in a district like Southland, or your own district, I think so.

23. Is not even a competent man when employed by a private person likely to have an unconscious bias?—He will not overestimate.

24. In regard to the quantities of timber shown in the 1909 return, have you much confidence in those figures?—Necessarily they are only approximate.

25. Have you had any actual experience in measuring and estimating timber?—No, not while I was District Surveyor.

26. *Mr. Adams.*] Do you think the estimates are under or over the mark?—I should say they were underestimated. If we estimated 5,000 ft. in a bush we would write it down to 4,000 ft.

27. *Dr. Cockayne.*] We had an estimate of so-many million feet of timber in connection with a certain kind of tree which it was stated grew at Stewart Island but which does not exist there at all. How would you account for that mistake?—It might be considered to be there, and so it would be entered accordingly.

28. *The Chairman.*] Then these figures are useless because they are only guesswork?—They are not too reliable.

EDWARD O'NEILL sworn and examined. (No. 11.)

1. *The Chairman.*] You are the Crown Lands Ranger for Otago?—Yes. I have been sixteen years in the Government service. Formerly I was a farmer. I have had no experience in sawmilling.

2. What is the method followed when a miller wishes to obtain an area for milling?—He makes application in the usual way, and is instructed to mark off his area in such a way that it can be easily picked out. In the last case the Commissioner insisted on a proper survey being made by the applicant, and the survey was made by a surveyor and not by an officer of the Department.

3. Is that the only case in which a proper survey has been made?—Yes. Most of our bush land has already been surveyed for settlement purposes, and the boundaries are accepted.

4. In this case who makes the estimate of the timber on the land?—I have done so so far.

5. What is your method?—By taking a line through the section guided by prismatic compass, half a chain each side of my track. I estimate each tree within that given area. Perhaps 5 per cent. of the area is estimated, and the rest is averaged on that basis.

6. Then the figures in the 1909 return as to the quantities of timber in the Otago Land District have not been arrived at in the way you state, by measuring off?—Not all through. A lot of that country has not been surveyed.

7. So that any estimate of timber in that place must be only approximate?—Yes.

8. What method do you adopt to get the superficial contents of a tree?—Get the circumference; deduct one-quarter to make a square log; then make your calculation, and take off 33 per cent. In my opinion there is not too much taken off.

9. What is that 33 per cent. supposed to cover?—Only bark and saw-cuts.

10. How do you arrive at the height of a tree?—I take a 10 ft. stick, and try to get my eye into it; but we never measure the trees by getting up them.

11. Do you ever use the Abney level?—No.

12. What is the greatest amount of red-pine which has come off an acre within your knowledge?—The highest for mixed timber was 18,000 ft.

13. How many sawmills are in operation here?—Eleven, employing an average of ten hands each.

14. Can you suggest any improvements regarding the Timber Regulations under the Land Act?—No. The royalty might be increased from 6d., and I think that is low.

15. Are the sawmillers satisfied with the regulations?—They have never made any complaint.

16. Has it come under your notice that scenic reserves have been made in unsuitable places, or where the land is valuable for settlement? We have had complaints from the settlers, but there is no ground for them. Quite recently there was a complaint from Catlin's asking that two reserves should be cut up for settlement, but I feel satisfied that it was the opossum-hunting that induced those people to make the application. Since the restrictions have been removed from the opossums there has been a big run on them by hunters, who are making a lot of money catching those animals.

17. Do you think the opossums are doing damage to the native bush?—I believe so.

18. Have you seen them damaging the trees?—No, but many men have come to the conclusion that they are destroying some of the younger bush-plants. I have reported on the matter recently.

19. Do you know whether the deer are coming down from the highlands and interfering with the farms?—Yes, they are. I have had to go into that matter, and have reported about it, especially with regard to the Rankleburn Forest.

20. Is there any other place where the same trouble has occurred?—No. They have been coming down on to the pastoral country at Morven Hills, but I do not think the damage there is very noticeable.

21. *Dr. Cockayne.*] Do they damage the ground crops on the Hawea Flat?—I have never heard any complaints about that place.

22. *The Chairman.*] I suppose it would be a very expensive matter to fence against the deer?—Yes. I made an estimate of a fence which ran into £700.

23. *Dr. Cockayne.*] Do you know of any deer-country which is not sheep-country?—No. The deer always come down to the lowest possible country in the winter.

24. Do you find that they are not confined to the open country, but stray into the forests?—They live in the forests, but come down to feed in the lower country.

25. *Mr. Clarke.*] Do you not think it would be very much better to estimate exactly each sawmill area as it was applied for instead of going on the rule-of-thumb business you have described?—To do so would be very costly. A man would not do more than 2 acres a day, and in a block of 800 acres it would prove a heavy matter.

26. Would not the accurate results that would be obtained more than pay for the labour?—They might, but I would not like to offer an opinion on the subject, because I do not know how long it would take to estimate a given area.

27. *The Chairman.*] How long does it take you to arrive at the contents of a 200-acre block on the method you describe?—About three days.

28. *Dr. Cockayne.*] Have you ever heard the name "brown-birch" used in Otago?—No.

29. Or "white-birch"?—Yes.

30. Or "black-birch"?—Yes.

31. Or "red-birch"?—Yes.

32. Or "silver-birch"?—Yes.

33. Any other name relating to "birch"?—No.

34. *Mr. Lethbridge.*] Are there any Maori reserves in your district near any forest?—Yes, in one place there is a considerable Native reserve, all bush.

35. Good timber?—About the average. There is a lot of kamahi.

35A. *Dr. Cockayne.*] Is kamahi milled at all here?—No; but it is used for mining-props.

36. Have you ever heard it called "birch"?—Yes, by the settlers about the mills.

JOHN ROBERTSON SCOTT sworn and examined. (No. 12.)

1. *The Chairman.*] Is there any statement you would like to make, Mr. Scott?—I am the secretary of the South Island Dairy Association, and as to the question of some other timber taking the place of white-pine for butter-boxes, I may say that years ago we tried white-birch out of the Waipori Forest, at Henley, and we made a fairly good case; but the wood proved brittle and very unsuitable. There is no timber as suitable as white-pine for cheese and butter boxes.

2. Locally is the white-pine used as cut, or do you paraffin the boxes?—They paraffin the boxes and line them with parchment paper to prevent the acid getting out of the wood.

3. In your opinion are there any other New Zealand timbers which, if so treated, would be suitable for butter-boxes?—I am afraid not. In our experiments we have found nothing else suitable.

4. From whom could we get the result of those experiments?—Mr. Cuddie, the Dairy Commissioner, might be the best man to go to. In Australia the butter-boxes are made almost exclusively of white-pine. The Canadian Commissioner in his report compliments New Zealand on its butter-boxes as landed in London, and says they are superior to the Canadian ones.

5. At what price are the white-pine boxes supplied here?—They cost about 1s. 8½d., and at one time we used to give 1s. for them.

6. Have you seen the imported boxes Mr. Moritzen is trying to put on the market now?—No, but I do not think any resinous timber would be any good for butter.

7. *Mr. Lethbridge.*] What are you going to do when the white-pine runs out?—That is the trouble. Year after year we have passed resolutions at our meetings, without effect, asking the Government to put an export duty on white-pine; but while we can get it we do not grudge the increased cost. With the drain on us from Australia the problem is becoming very serious indeed. The cost of the boxes has risen steadily, a portion of the increase being due to labour. But a jump in four years from 1s. to 1s. 8½d. is not wholly due to labour; in fact, the labouring-man is not getting it.

8. *The Chairman.*] Are you acquainted with the class of land the kahikatea timber grows on?—Yes; it is very good land indeed, but if neglected grows weeds very quickly.

9. If cultivated, would not that land produce a large quantity of butter-fat?—It is fine dairying country, all that Catlin's land.

10. Would it pay the Government to leave that land in kahikatea for a number of years, or turn it into cultivated land yielding butter-fat?—I think it would pay better to leave it in kahikatea timber.

11. You advocate the prohibition of the export of kahikatea?—Yes.

12. Would it not pay the country better to cultivate the land when the rents derived would return a greater revenue than keeping it in timber?—I admit all you say, but my trouble is, what are we going to do for timber in a few years' time?

13. *Mr. Lethbridge.*] What does Canada do?—They have plenty of timber, but their boxes are not as good as ours, and they have no export trade now.

14. *Dr. Cockayne.*] Has not Siberia?—Yes, but their butter has but a short distance to go compared with ours.

15. *Mr. Murdoch.*] Have you ever tried tawa?—No. I do not think it grows down here.

16. No, it only grows in the North Island, and I think it is the only substitute you could get here?—If so, I suggest that the Commission should get some boxes made and try it.

17. I suppose you are aware that in the working-up of the white-pine we only utilize 50 per cent. of it for butter-boxes?—I am aware of that.

18. Would it not be possible to use the off-cuts of this timber for butter-boxes?—You must have a uniform size.

19. Yes, but would it matter so long as you got the boxes how many boards they were composed of?—It would not make any difference, provided the joining was good, and you had the parchment lining and used the paraffin. That is only my opinion. I am not an expert.

ALEXANDER CHARLES ROSS sworn and examined. (No. 13.)

1. *The Chairman.*] What is your position?—I am the Dairy Instructor and Grader, and have been here three years and three months, having been transferred from Taranaki, where I was two years in the Government service. Prior to that for seven years I was manager of a dairy factory.

2. Did you ever try any experiments with other timber than white-pine for butter-boxes?—Some years ago, in Southland, when I was managing secretary of a factory, some cheese-crates were sent down from Dunedin. They were not made of white-pine, but a kind of birch. They proved unsuitable, being too brittle.

3. Is it necessary to paraffin timber for cheese-crates?—No, as long as it is strong and pliable.

4. Do you know the tawa?—No.

5. Have you seen the imported boxes Mr. Moritzen has here?—I was shown a sample last night, but they seemed to have a resinous smell, and I do not think they will suit. They may.

6. Do you know anything about the Canadian system of packing butter?—No; Mr. Singleton, who has been in Canada, can tell you about it.

7. Is much land in Otago devoted to dairying and cheesemaking?—It is an increasing industry, especially in Catlin's district.

8. *Dr. Cockayne.*] How long would it be before the resin would taint the butter?—Before it had been packed two weeks.

9. Supposing we had no kahikatea in New Zealand, could birch be used for butter-boxes?—I could not say. As long as the timber does not taint the butter I see no objection to it.

10. *Mr. Murdoch.*] As to the present waste of white-pine, would it matter if the cases were made of different sizes of timber?—If we had a "white" box it might not matter. The tops and bottoms would have to be in one piece, but perhaps two pieces would do at the sides if they were properly fastened. We can use a lot of the timber that is at present rejected for the local trade, reserving the best for the export trade.

11. *Mr. Lethbridge.*] Do you think they get more knocking about on the sea voyage than in the railway-trucks here?—No. Once on the boat they get very little knocking about. The worst handling is out of the trucks into the steamer.

FAIRLIE, SATURDAY, 15TH MARCH, 1913

ROBERT LINDSAY BANKS sworn and examined. (No. 14.)

1. *The Chairman.*] What are you, Mr. Banks?—I am the engineer to the Mackenzie County Council, and my headquarters are at Fairlie.

2. Has your Council done much tree-planting?—Yes. Some of the trees in our plantations, which you would see as you came along, were planted in 1882, but they were not planted close enough to lose the side branches, having been planted from 9 ft. to 10 ft. apart. A lot of the planting done by the County Council in the old days has been practically lost through the mixed planting.

3. *Mr. Adams.*] I suppose you planted *Pinus insignis* with the others?—Yes, and they choked them; the *Pinus* growing so quickly crowed the others out.

4. With that exception the others have kept pace with one another?—Yes.

5. *Mr. Clarke.*] What was the effect of planting *Pinus Laricio?*—We did not spend any money on them. We found it the easiest to plant *Pinus pinaster.*

6. *The Chairman.*] What is the age of the larches at Lake Tekapo?—About fifteen years. We started planting there in 1893, but I do not think any survived.

7. *Dr. Cockayné.*] Have any been cut down by frosts?—No, but we lost a lot of *insignis* down here. That lake never freezes; it is always above 32°.

8. *Mr. Lethbridge.*] How many do you plant a year?—We spend about £100 a year in planting, and get the work done for £6 a thousand, including the trees. There is no guarantee. With a guarantee the cost would be about £10.

9. *The Chairman.*] How many do you plant to the acre at £6 per thousand?—8 ft. apart they would run 680 to the acre, but we have been planting them closer, and now they run from 1,000 to 1,500 to the acre. We have planted out 100,000 3 ft. apart.

10. Do the nurserymen plant them out for £6?—Yes, and the cost of the fencing is outside that. We pay £1 a chain for rabbit-proof fencing. The County Council asked the Government some years ago to take over the planting of this county, and do the work on a bigger scale, because it is a treeless district, but we did not succeed.

11. *Mr. Adams.*] Have you some good reserves?—Yes, there were a lot set aside for planting purposes in Mr. Baker's time as Commissioner, and we get rents from them, which are spent in further planting.

12. *The Chairman.*] What terms are those reserves leased for?—I think, by the year.

13. *Mr. Adams.*] What is the quality of the land?—The best to be got there, the reserves being picked out on account of the land.

14. *Mr. Lethbridge.*] Is there any Crown land adjacent to those reserves?—They are Crown lands held on lease.

15. *Dr. Cockayne.*] Are they on the flat?—Some are on the flat, and some on the low-lying hills.

CHRISTCHURCH, TUESDAY, 18TH MARCH, 1913.

EDWARD HERRING sworn and examined. (No. 15.)

1. *The Chairman.*] Do you wish to make a statement?—I am a retired farmer, and have been thirty-one years in Canterbury, and I was a member for many years of the Ashburton County Council. I have had much experience in tree-planting, and have met with success. I planted *insignis* principally, also *ponderosa* and *Douglasii*. I planted 9 ft. apart, the outer row being *Pinus insignis*, and then a row of deciduous trees. The *insignis* did very well, but the latter badly. The soil was shingly. The locality was Alford Forest, Ashburton County. The rainfall was 79·6, on an average. I strongly advocated the planting of larch, but the Chairman of the County Council opposed it on the ground that the rainfall was deficient. Finally the plantation was made of larch, and a few months ago I was informed the trees had grown to a height of 40 ft. They are thirty years old.

2. Did planting the trees 9 ft. apart ensure their growing up without putting out side branches?—The branches died away as the trees grew, and I do not think the stems became knotted. The effect of the plantations has been to improve the plains by restraining the floods, and also to improve the stock by providing them with much-needed shelter. The cutting-out of the Alford Forest was a crime, as the trees were no good for timber

3. *Dr. Cockayne.*] Did you plant the trees on the level or the slopes?—On level land between the two rivers, in strips 1 chain wide.

4. How do you know they were free from knots?—Because the boughs died off.

5. What was the capital value of this land at the time you planted it?—About £3 an acre, and it is now worth £5.

6. *Mr. Murdoch.*] Because of the plantation?—Partly. Without shelter-belts it would be worth 50 per cent. less. There is very great benefit to the sheep on account of the shelter.

7. *Dr. Cockayne.*] Have you seen *Pinus insignis* used for building purposes?—No. A storm did no damage to the *insignis*, but cut the deciduous trees down.

8. Is there any accurate information as to the effect the cutting-down of Alford Forest has had on the streams and river?—No, but many ravines have been made by rain-storms since the bush was cleared.

9. *Mr. Lethbridge.*] Have you calculated the cost of making your plantations?—I did, but my books have been destroyed.

10. Did you raise the trees from seed?—I purchased them from a nursery at a very low price. My wool was the finest a certain buyer bought, and I attribute its quality to the shelter the sheep got from these plantations.

RICHARD D. GRADY sworn and examined. (No. 16.)

1. *Witness*, a member of the firm of A. M. Grady and Co., attended and submitted samples of brushes made from the fibre of the *Cordyline* (cabbage-tree). He stated that the articles were made by hand, but he was unable to disclose the process. They were not on the market, but he wished the Government to take up the process for the benefit of the inmates confined in different public institutions. A dairy brush for the use of farmers could be sold for 2s. 6d., and a clothes-brush for 3s. They were very durable articles. The fibre made excellent cordage, comparing well with manila. Sixty per cent. of the bulk sample of the leaf could be placed on the market. The process of preparing the fibre he would not indicate. For upholsterers it was an excellent material. He had not taken out a patent because he wanted the Government to take it up. The prepared fibre would stand the rain.

JOSEPH CORNISH HELMORE sworn and examined. (No. 17.)

1. *The Chairman.*] I understand you have had some experience in tree-planting?—Yes. Some years ago, at Sherwood, I planted four shelter-plantations half a mile long and about 1½ chains wide, one being entirely of oak. I sowed the acorns *in situ*, scattering them broadcast, and ploughed them in. The result was most successful, a fine oak forest growing up. The age of the trees would now be fifteen years. There is a foot of soil before you come to the shingle. If I did the work over again I would not sow the acorns broadcast, but in rows about 1½ yards apart. I also planted some bark-wattle, but they were cut down every year by frost; eventually they grew into good trees. I had other shelters of pines; but I recommend for the Canterbury Plains the *Cedar deodara* and the *atlantica*.

2. Would you recommend the planting of oaks for commercial purposes?—Certainly.

3. *Mr. Adams.*] What about the difficulty of getting sufficient seeds of the *atlantica*?—I planted the plants.

4. *Dr. Cockayne.*] Have you noticed how in the North Park if it were not for the grazing there would be in a few years an oak forest?—Of course there would be; also sycamores. I found the gums no good at all. They grew into bare poles—wretched-looking things—and took too long to grow. The frosts cut them down, and they want good soil.

5. *Mr. Clarke.*] Did you plant the blue-gum?—Yes, at Sherwood, between Rakaia and Methven. The spruce did not do.

6. *Mr. Adams.*] Did you try larch?—Yes; they did very well; also the prickly acacia, which is valuable for posts.

7. *Mr. Clarke.*] Did the frost interfere with the growth of the gums?—It checked it.

HENRY GEORGE ELL, M.P., sworn and examined. (No. 18.)

1. *The Chairman.*] I understand you wish to tender some evidence in regard to afforestation matters?—Yes. With regard to the great use timber is put for local purposes, I might say I was informed by one manufacturer yesterday that he required at least 300,000 ft. per annum of native timbers. Another informed me that his firm's requirements for timber for casing was about 500,000 ft. per annum. One manager of a factory in Nelson informed me he wanted 500,000 ft. per annum, and another said he required from 250,000 ft. to 300,000 ft. per annum. As to the existing forests and how long they will last, you have that information, but I wish to emphasize the need for more tree-planting throughout this Dominion. The present policy of the Department of limiting their operations to certain districts is entirely wrong. In Taranaki there are no State forests beyond the natural ones, which are being rapidly cut out; there are none in Hawke's Bay, Wellington, or Canterbury. Hanmer is beyond Canterbury. In Marlborough there are none. At Dumgree some planting is going on. The mistake, in my judgment, in connection with the present policy is that the Canterbury people, for instance, will have to bear the cost of the transit of the timber from Hanmer. To get that timber out economically it will be necessary to run a railway into the plantation; otherwise the cost of haulage would make the timber too dear for profitable use. If the people of the districts I have mentioned have not timber-supplies handy they will certainly suffer. There should be State forests in every provincial district, and there is plenty of poor land available for the purpose.

2. *Mr. Murdoch.*] Could you indicate where the localities are?—There is plenty in the immediate neighbourhood of Wellington—precipitous, hilly, broken country. I could not say whether it is Crown land or private. The Government are planting on very poor land in other places.

3. *The Chairman.*] But it is not of a precipitous nature?—I am not in a position to discuss that phase of the question. The timbermen find it profitable to cut timber in precipitous country, and go to a great expense in doing so. I would not advise planting in country where there is only a soil-depth of from 6 in. to 18 in., but where there is plenty of soil even on precipitous country the trees will grow.

4. *Mr. Adams.*] What do you think of the proposal to plant the reserve held by the Waimakariri Protective Board?—That country is suitable, and ought to be planted, being so near a large industrial centre. In Taranaki in a few years' time thousands of farmers will have to go far afield to get even their posts or firewood.

5. *Mr. Lethbridge.*] They can grow timber for posts?—I know that, but they are not doing so, unfortunately.

6. *The Charman.*] Would you advocate that the settlers should be offered special encouragement to plant shelter-belts?—Yes; provided the right kinds of trees were planted on the advice of a Government expert, I would exempt them from some taxation.

7. *Mr. Clarke.*] Do you think that would be a wise policy in view of the fact that another man might buy the settler out and cut the plantation down?—I see your contention.

8. Would it not be better to allow the settler to purchase the trees at cost price for his own purposes, but, as far as timber-producing for commercial purposes is concerned, to keep the matter under State control, and in large areas rather than in small shelter-belts?—I desire to see both systems adopted. Of course, before the State would allow exemption in regard to land-tax or local rates, certain covenants should be provided that the trees should be allowed to grow to maturity.

9. *Dr. Cockayne.*] The land would be sold subject to the plantation remaining intact?—Yes.

10. *The Chairman.*] Have you heard of any damage being done to the native forests by wandering herds of deer?—I have protested on more than one occasion against the deer being allowed to roam freely all over the country. They should be restricted to certain areas.

11. *Dr. Cockayne.*] Do you think such an area as the Waimakariri National Park should be used as a deer-park?—I do not. The national interest should not be sacrificed to one particular sport.

12. *The Chairman.*] Are there any other matters you wish to mention?—With regard to the question of encouraging on scientific lines the planting of trees, I consider that the planting in Canterbury, excepting in the case of Mr. Adams, a member of this Commission, has been carried on on haphazard lines, with nobody to instruct the farmers as to the best kinds of trees to plant, or to direct the operations of the local bodies.

13. Has not Mr. Robinson, the Superintending Nurseryman, been available?—Yes; but that is not sufficient. When the Hon. Mr. McNab was in office I suggested that in every land district an expert forester should be associated with its staff, to advise the local bodies and farmers, and the agricultural and pastoral associations, on tree-planting, and so help to create a stronger public opinion thereon. Many of the Road Boards and County Councils have waste river-bed lands under their control, and waste lands on roadsides, and expert advice would lead to the planting of such land.

14. *Dr. Cockayne.*] Are you aware that throughout the Empire, with the exception of India, scientific forestry is almost a new science, and it would be a most difficult matter to obtain a number of men with the necessary attainments? Do you think, therefore, one of the recommendations of this Commission should be in the direction of the training of young men as scientific foresters?—I do.

15. Do you think that as we have good University colleges we could train these men in our own country?—I do, and the system should be established without delay.

16. *Mr. Murdoch.*] Your last suggestion, as to placing competent foresters in each land district, appeals to me—it is badly wanted—but until the highly trained men referred to are available, do you not think we have men in the Dominion now who are sufficiently competent to carry

on the work?—The man occupying this position should have an office, say, here, with instructive leaflets available, and authority to go before a Road Board or a County Council, or other local body, that has under its control waste lands, and he should endeavour to induce them to plant those areas. Such an officer would earn his salary many times over.

17. *Dr. Cockayne.*] I am not making any reflection on the officers here now in suggesting the appointment of highly trained scientific men—they are most excellent men—I am not reflecting on certain men who may be in New Zealand and who would probably be suitable for this work; but if forestry is to be put on right lines a great number of men may be required, and they are not here?—I think trained scientific men are very necessary. A mere planter of trees is not sufficient. He should have a knowledge of soils, the qualities of trees, their habits, and the age necessary before they can produce marketable timber.

18. *Mr. Lethbridge.*] Would not that be a matter of experience and of experiment largely?—Yes.

19. *Mr. Clarke.*] Do you not think our officers here could, with a scientifically trained man to assist in the way you suggest, do what was required without the necessity of having all these men referred to with university qualifications?—The man you speak of is merely a skilled labourer, and can be got by the hundred in this country. You want to go beyond that.

20. You would not appoint him to control men?—No. The latter would form part of the staff of a forestry officer in charge of a district.

21. *Mr. Adams.*] Has not Mr. Robinson taken considerable pains to train some men?—Yes, in the art of planting only. But I do think it is essential that for a man to be a successful forester he must undergo a certain amount of scientific training.

22. *Dr. Cockayne.*] One timber we could find out all particulars about is *Pinus radiata*, because we have it here old enough; but would not work of that kind require a very distinct scientific training?—Yes; a man must have scientific training and instruction.

23. *Mr. Lethbridge.*] Are you aware that one-half the royalty on timber in certain parts of New Zealand goes to the local body?—Yes.

24. Seeing we are short of funds for forestry, do you not think that a moiety of that one-half royalty should go to the Forestry Department instead of all to the local body?—I do. The millers rarely use the main roads, but draw their timber from the forests to the nearest railway-line without touching the roads. It is not a justifiable concession to the local bodies, and the money should go to encourage forestry. I wish to put in a parliamentary paper—C.-1c, 1907—dealing with the forestry operations of the Government. I wish to call attention to the serious statement in this return, that at the outside the oldest trees in the Government plantations are not fourteen years old, and that they could not come into use until nearly sixty years from now. I do not think the country is doing its duty, or has done it for years past, in this matter.

24A. *Dr. Cockayne.*] A lot of private planting has been done ever since the "fifties" in all parts of New Zealand, and forms an object-lesson as to the effect of tree-planting on soil and climate; but about these trees we know very little. Would it not be for the benefit of the public, and of future forestry, if a proper scientific and economic survey were made of these plantations from north to south?—It would be very useful, because it would enable the Government to see the extent private planting has gone in the direction of supplying future requirements. But if you drew on the whole area planted it would be but a fleabite as compared with the needs of the country in the matter of timber. As to the effect of denudation of our hill-lands, that can be seen in the case of the precipitous lands in the North Island, which is subject to heavier downpours than we have here, and where the ridges of the hills have been washed bare down to the rock. Later on the land will become poorer and poorer, while the low country will be subject to disastrous floods. Even the covering soil on some of our Christchurch hills is being washed away and deposited on the flats. It is very necessary that the forest covering should be preserved on all the ridges in precipitous country, or what has been left of it. It is not necessary to leave the timber-trees—they can be removed; but the scrub ought to be preserved.

25. *Mr. Clarke.*] What do you think should be done with such a reserve as the Waipoua Forest, in the North Island, which is a valuable kauri forest?—It should be preserved because of its unique character as a kauri forest, and we should not look only at the commercial interest—the sentimental side of life should be considered. Therefore, that forest should be preserved as a national reserve.

26. *Mr. Murdoch.*] It is difficult to save a kauri forest from fire, and if it is decided to remove the restriction on this forest do you not think the Government should cut it up themselves?—I do, but I hope the milling will be done with greater care than at Kakahi Government sawmill, where there is as much waste as in any private milling-area. This brings me to the question of greater supervision being required over the milling of timber. I have seen trees felled 5 ft. and 6 ft. from the ground; in all milling-areas there should be Rangers on the spot to supervise the felling of trees.

27. *The Chairman.*] Do you not think the time has arrived when more accurate methods should be applied to the measuring of timber?—All our timber should be very accurately measured, and the milling supervised by a Government officer, to stop the waste going on. In some places the millers pay for the timber off the saw, and that is an incentive to waste. Likewise all forests should be managed under one authority, and not, as at present, under a divided one in some cases—the Lands Department and the Warden.

28. *Mr. Murdoch.*] Do you think the Forestry Department should stand by itself instead of forming a branch of the Lands Department?—I do.

29. *Dr. Cockayne.*] In the event of its being kept under the Lands Department, do you think a Board of practical and scientific men to advise would be better than the present method of leaving the matter in the hands of the Under-Secretary entirely?—I am decidedly of that opinion, because you might have an excellent Under-Secretary with no experience as a forester.

30. A combined Board would possess more knowledge than one man?—Yes. I believe the Board would not only have greater powers of administration, and therefore be more efficient, but it would stimulate public interest in this question. From inquiries I have made in the butter-factories I think the time has arrived when we should conserve the white-pine forests for the needs of the butter industry.

31. *The Chairman.*] You are probably aware that land where kahikatea grows is of a rich nature, suitable for dairying. If locked up for milling-timber the State might lose considerably in rentals more than it would get by way of royalty on the timber. Which would be the best course—to throw it open for settlement and take the rents, or keep it in timber and take the royalty?—I am not looking at the royalty or the rental, but at the known needs of an industry that requires this timber for butter-boxes.

32. Other countries, such as Canada and Siberia, utilize other timbers, paraffining the wood?—I assume the dairy people here cannot get other timber equally as good and cheap as the white-pine. If they can do so my suggestion falls to the ground. We shall not be able to draw supplies from America, as their forests are being depleted. Oregon pine is going up in price, and we only get the second class. It is estimated that in twenty to twenty-five years the yellow-pine forests will be cut out. Russia commenced planting two hundred and fifty years ago, and is now reaping the benefit.

33. *Dr. Cockayne.*] Do you think it advisable to grow timber at an apparent loss rather than not at all?—Yes.

34. *The Chairman.*] Have you any views as to the scenic reserves?—I am sorry to see what is going on now. Sale plans have passed through my hands recently covering thousands of acres of heavily timbered land, and not an acre has been set aside as a reserve.

35. *Mr. Lethbridge.*] Can you point the places out?—I can submit some of the plans relating to Hawke's Bay, Auckland, and Southland.

36. Is it not possible there might be large scenic reserves in the neighbourhood of these blocks?—There is nothing to indicate them on the plans.

37. *Dr. Cockayne.*] You look on these reserves as natural museums as well?—I do.

38. Where all types of trees, plants, and insect life indigenous to our native forests should be preserved as samples?—Yes. I would also make reserves showing the character of all the plants and soils associated with the various forests, and containing specimens of the different native forest-trees. In Taranaki and in other parts the settlers have applied to the Government to buy some little scrap of forest that has escaped the settlers' fire.

39. *Mr. Lethbridge.*] Do you not think these small reserves are very often a nursery for noxious weeds and rabbits?—I have seen blackberry on poor land and in open country.

40. I mean small areas?—I do not regard from 20 to 25 acres as a small reserve; it is big enough to be worth looking after. I have heard of cattle being turned into a scenic reserve.

41. *Dr. Cockayne.*] Where there was a rare plant such as the Chatham Island lily, would you stipulate that such places should be fenced off and declared sacred?—I would. I advocate the setting-aside of reserves for the preservation of the animal and bird life of this country. The time will come when people will not smile at these proposals, but a truly national sentiment in regard to them will be evoked.

42. *The Chairman.*] Do you know anything of the lasting properties of beech?—I saw a house at Otarama built of that wood. It was between twenty-five and thirty years old, and the timber was sound.

JOHN HENRY MAYNARD sworn and examined. (No. 19.)

1. *The Chairman.*] What is your position?—I am the secretary of the Canterbury Builders and Contractors' Association. A committee of our association was appointed to consider the matter and submit to you any suggestions bearing on your inquiry. The following was resolved: Seeing that the Commission is constituted of such capable men, and that Dr. Cockayne and Mr. Adams are especially well conversant with all the conditions bearing on the subject as far as Canterbury is concerned, and knowing also that the builders' representative, Mr. Clarke, is one of the best authorities in the country as to the most suitable timbers to grow for building purposes, we have every confidence that the questions at issue are in good hands, and we are content to leave them there. I believe the suggestion emanated from this association that a Commission of this kind should be appointed, as we are of opinion something should be done in the direction of the inquiry at once.

2. You derive your supply of timber chiefly from Westland?—Yes

3. Do you import any birch or beech?—Very little is used here. It is used in the country, and in the past I have used black-birch from Oxford and Alford Forests for building. It is used for bridges. *Pinus insignis* is used for farm buildings, and a quantity is cut at Barewood now. It is not fit for ordinary building purposes.

4. *Dr. Cockayne.*] Have you only known of black-birch?—I have known of red-birch, which is found on the West Coast.

5. Have you heard of white or silver birch?—Yes, but they are not reckoned good enough for building purposes.

6. *Mr. Adams.*] What has been the main objection to birch in Canterbury?—You must use it straight from the mill. That means using it in its green state, consequently there is considerable shrinkage. Buildings I erected twenty years ago in Ashburton of black-birch are in a good state of preservation now.

7. *Dr. Cockayne.*] With a shortage of timber in New Zealand I suppose black-birch would be better than nothing?—Considerably.

8. Do you think it right that forests of that timber should be burnt?—Decidedly not.

9. Would a proper examination of our birch forests be useful to the country?—I think it would be very useful. There is probably a prejudice more than anything else against the black-birch.

10. *Mr. Murdoch.*] Does not all the birch timber shrink or warp?—To some extent. If you put sufficient lead into the paint the weatherboards will stand well. Twenty years ago I built a cottage for Mr. C. J. Harper, and it is still in a good state of preservation.

11. You could not stock it?—Not for weatherboards, but for scantlings.

MORTON ANDERSON, M.D., sworn and examined. (No. 20.)

1. *The Chairman.*] You are vice-president of the Acclimatization Society of North Canterbury?—Yes.

2. It has been represented to the Commission that the unrestricted roaming of the deer through the national parks may prove detrimental to the trees. Does your society think they should be restricted to certain areas in order to prevent such damage?—They cannot do any harm up the Rakaia Gorge. They form a great attraction to tourists, who belong to a money-spending class.

3. Do you know what amount is spent in deer-stalking licenses?—Our herd has not brought in a great deal yet, as it was only started in 1897, and I estimate their numbers at about 550. They are spread over many thousands of acres far back from any agricultural country.

4. It has been represented that they are eating out in some places the flora in the native forests, exposing the bush to danger from fire. Has that phase of the question occurred to you?—They are not doing any harm to the bush in the Rakaia. I was up there once deer-stalking, and noticed they were rubbing their antlers on the trees and on the wild-irishmen growing in the river-bed. The latter were dying on account of being practically ring-barked. Some of the forest trees were marked with something like a blaze in one part, but it did not go round the tree. I do not think it would have any serious effect.

5. *Dr. Cockayne.*] It is essential that at the headwaters of the Waimakariri the forest should be preserved, in order to protect the plains from floods. I heard that deer had been turned into this national park in order to allow them to mingle with the Rakaia herd and other herds, so as to have one vast herd of deer right through the north of the Island and along the eastern slopes of the Southern Alps. Do you think it right there should be any risk of that forest being destroyed by these animals?—It would not be right, but I do not see how they are going to introduce the element of danger. Deer-stalkers do not start bush-fires.

6. I am referring to the danger to the forests from the deer themselves?—They certainly make tracks in the forest, but they do not clear out the undergrowth.

7. Do you think the deer should be confined to specific areas, to be known as deer-parks, for sporting purposes, and declared vermin outside those parks?—They would roam into the forest all the same.

8. I take exception to the deer that have been turned out in the River Poulter district. May there not be danger to that forest in time when those deer multiply?—I have not sufficient experience of the subject to say definitely one way or another, but as far as my own observation went at the Mathias and the Rakaia I could not see that they were doing any damage to the bush.

9. *The Chairman.*] Perhaps your society will discuss the matter and forward their observations to the Commission?—We might do that. No complaints have reached me as yet.

CHARLES CHILTON, M.D., D.Sc., sworn and examined. (No. 21.)

1. *The Chairman.*] You are a professor at Canterbury College, and have travelled considerably in New Zealand, and must have noticed the universal destruction of forest. Do you consider that in all cases this is justifiable?—I have noticed that our forests are disappearing, and as one interested in botany I have been horrified at the rapidity with which the bush is going. This has been particularly noticeable up the Main Trunk line between Wellington and Auckland within the last four years. At Lake Wakatipu a lot of the bush along the head of the lake has disappeared within recent years.

2. In what cases do you consider that removal of forest is contrary to the interests of the Dominion?—That is very difficult to answer. In certain cases the forest must go—where land is valuable—but other cases should be seriously considered before the bush is cut down. I should be inclined to be conservative in regard to keeping the forest intact unless some definite gain is to be obtained by its removal. We have to bear in mind the increased cost of modern forestry operations.

3. *Mr. Lethbridge.*] Are there any particular spots you would like preserved?—All places which are essential to climatic conditions, and forests on the mountains and at the headwaters of the rivers, in order to conserve the water-supply. A proper survey would have to be made of the right kinds of areas that should be preserved, and then I presume an Act of Parliament would be required to finally deal with them and reserve them.

4. *Mr. Adams.*] In your opinion does the forest affect the rainfall?—It is a much-disputed question, and the general conclusion is that the actual rainfall cannot be increased by the forests,

but that the retaining power of the land is largely increased by the bush covering, which acts like a sponge and prevents the water running away too rapidly. You have a constant supply instead of an intermittent one.

5. *The Chairman.*] Can you give any specific examples of where permanent climatic reserves should be made?—One is already reserved—the Waimakariri National Park—and it should be made a reserve also as far as the forest is concerned. Canterbury College is a botanical resort, and one of its greatest assets in this connection is that park. Its proximity to the College makes it invaluable to students, and we should look to the needs of both present and future students. Another forest that should be preserved is at the headwaters of the Rakaia. It is a mixed bush of manuka, totara, and other trees, and is fairly accessible.

6. Apart from the value of scenic reserves for aesthetic purposes, what do you consider their importance from the standpoint of education?—They are extremely important from the point of view of pure botany. There is nothing like the variety in the European and English woods there is in New Zealand, which offers enormous advantages in that respect. If forestry in New Zealand is to be placed on a scientific basis the forests must be retained for demonstration purposes.

7. Do you consider that areas other than forest—*e.g.*, swamps, dunes, alpine meadows, &c.—should be made into scenic reserves for educational purposes?—Yes, it would be extremely desirable to have areas of that kind bearing on the general question of forestry; they are places of extreme interest botanically. In comparison to the Yorkshire moors, some of our swamps are far more interesting fields of research, and they bear on the general question of the science of forestry. It may also happen that if the natural flora is preserved in this manner you might thereby be able to gain a proper knowledge of some tree which at present we have not a full knowledge of, and which may become extinct before science has discovered all its uses. Not only do the trees become extinct, but we ought to know something about the matter from the point of view of zoology, and so preserve many types of animals and insects that would otherwise become extinct also. Of course, as it is a great many of the smaller animals have become almost extinct from the want of the application of this science.

8. Do you consider that men admitted into the Forestry Department should have a special scientific training?—I certainly think so; that is the general tendency in all industries, and in the science of agriculture, medicine, and other subjects. In medicine and agriculture through actual experience a great deal of valuable knowledge has been obtained, whereas forestry is a new subject.

9. What branches of science should they be fairly conversant with?—Forestry is not a science in itself, but the application of various sciences to a particular purpose, and it is necessary to have an acquaintance with the fundamental sciences that affect work of that kind. At Edinburgh University the students have to study botany, zoology, physics (including meteorology), chemistry, organic chemistry, mathematics, and entomology, and the different applications of all these subjects to forestry.

10. *Dr. Cockayne.*] Where in Edinburgh do they get their practical knowledge?—A certain amount is obtained by visiting the private estates. They have no public forests there. But it is actually stated in the University regulations that in connection with the essential part of the practical work students are recommended to go to Germany, as there are no State Forests they can use in the British Islands. That is also recommended at the Oxford School of Forestry; or they should go to France.

11. *The Chairman.*] What is the present position in New Zealand for obtaining such a training as you might consider desirable?—The fundamental sciences are all being taught in our University colleges. We have the Agricultural College at Lincoln, and the experimental stations of the Agricultural Department.

12. Would it be practicable for the New Zealand University to give a diploma in forestry of a grade somewhat lower than that for B.Sc.?—Yes. I am doubtful about the legal position, as to whether we can give that diploma without an Act of Parliament. We could issue a degree of Bachelor in Forestry under the present charter, and not make the regulations up to the standard of the present B.A. But the different University colleges have power to give a diploma themselves.

13. *Dr. Cockayne.*] Could the men in the lower grades of a forestry department be given a diploma in agriculture after two years' study?—It would be quite possible for the colleges to issue such a diploma, just as they do in connection with engineering and mining.

14. And such men could take their practical work at the present State nurseries?—Yes.

15. *The Chairman.*] What remuneration would you consider sufficient at the commencement for a young man who is entering the forest service, in view of the fact that the Transvaal Government is sending cadets to the Forestry School at Oxford under the condition that they enter the forest service at £200 a year, with annual increments?—£200 would not be too much for the full course such as you have at Edinburgh. If they do not want such a long training you might start them lower; the initial salary does not matter so much as long as there is some certainty of its increasing afterwards.

16. Would a forest laboratory be a valuable adjunct to the Forestry Department?—You might have one situated in a forest, where botanical research could be carried on. It would be not only useful but absolutely essential if forestry is to be put on a proper basis. The Chemical Department in Wellington could be utilized for some of the work, and the Geological Department for other aspects of it. There should also be a laboratory in the forest itself, as the experimental raising of trees under different conditions would have to be done in a forest, as it could not be done in a city like Wellington.

ROBERT NAIRN sworn and examined. (No. 22.)

1. *The Chairman.*] You are a nurseryman?—Yes, a member of the firm of Nairn and Sons.

2. Do you grow trees on a large scale for forestry purposes?—Yes, of many different kinds.

3. What is the average time from the planting in the nursery until the trees are ready to send out?—From two to four years; pines about two years, and the deciduous trees from three to four years.

4. At what price per thousand does the nursery sell forest-trees?—By making a speciality of pines and forest trees generally we could beat the man engaged in general nursery work. They would be grown on cheaper land admitting of horse-labour. Under these circumstances it is a profitable industry. I can supply you with a price-list of our forest-trees.

5. From the building point of view, what timber do you consider most profitable to grow?—Many mistakes have been made in the past as to the character of the trees that should be planted, and now we are limiting the industry to trees that can be grown successfully for commercial purposes. *Laricio, insignis, ponderosa, Douglasii* can be grown under favourable conditions; the larch in valleys and in places where there is plenty of moisture.

6. What age would some be you have planted out?—Twenty years.

6A. At what distance apart?—Too far, according to present forestry ideas.

7. What about the gums?—More of the gums should be grown on the plains and on land which is of little value. In California, which has a climate similar to ours, they grow gums with great success.

8. What do you think of the poplar as a timber for certain purposes?—None of the authorities are favourable to its being used as a timber. I advocate the planting of *mnolifera* and *tremula*. The latter furnishes the soil with food, and forms first-class shelter.

9. *Mr. Lethbridge.*] What authorities did you look up as to the poplar?—Bailey, an American authority; and Nicholson.

10. What about its utility for paper-pulp?—They did not say anything about that.

11. *Mr. Murdoch.*] As a shelter-plant it is very good?—Nothing better. I advocate poplar *pyramidalis* for shelter for orchards.

12. *The Chairman.*] Would a belt of poplars 1 chain wide be an effective fire-break?—Yes, because it does not catch fire easily.

13. *Dr. Cockayne.*] Are you acquainted with Maw's work on forestry?—No.

14. He writes as follows regarding the black Italian poplar: "The timber is white, soft, and tough, and does not easily fracture. It is more nearly fireproof than any other timber, and for this reason should be often used for floor-boards." Do you think that wood would do for butter-boxes?—It should do very well, being cheaply grown, and light, and of a suitable colour.

15. Do you think a 4-chain belt around a pine forest would make that forest virtually fireproof?—I think it would.

16. As regards the propagation of poplar, would it be cheaper to raise a thousand *Pinus Laricio* or a thousand poplars?—A thousand poplars, easily.

17. Would you grow the cuttings in the nursery?—Yes, packed quite close together. It may be necessary to strike them in the nursery first. They grow much quicker than *Laricio*. No preparation is needed for the planting of poplars. They are very much the cheapest; but the advantage of putting them in the nursery is that they would be prepared ready to put in their proper place straight away, and you can work amongst them better.

18. *Mr. Adams.*] Would not one difficulty be getting sufficient cuttings?—After the second year you could get as many cuttings as you wanted.

19. *The Chairman.*] Has your firm undertaken the planting of large areas by contract or otherwise?—I do not do that kind of work. It is limited to two firms in Ashburton, where land is very much cheaper than here.

20. That is a large factor in forestry operations, on account of the mounting-up of the compound interest in connection with the rental value. Have you gone into that aspect of the question?—It would not be possible to carry on such operations on a large scale close to a city excepting on poor land.

21. *Dr. Cockayne.*] Does it make any difference if you grow trees on good soil on the low lands for subsequent planting-out in other places, or on the actual spot where they are to finally remain?—It does not make much difference if your plants are well prepared. If you have a soil suitable for lifting purposes—soil with a dash of clay in it—the plants transplant better. It depends on the soil and not so much on the locality, and how they have been raised.

22. Is it now almost useless to grow *Cupressus macrocarpa?*—Not at all. Many are still grown, and very successfully, reaching to very large size. I have seen some diseased, but when grown from healthy seeds they grow up strong and well.

WILLIAM BLYTH BUCKHURST sworn and examined. (No. 23.)

1. *The Chairman.*] You are the Crown Lands Ranger for North Canterbury?—Yes. I have been here six years, and have a good acquaintance with the northern district.

2. Do you visit the scenic reserves occasionally?—Yes.

3. Have you heard any complaints about them becoming breeding-grounds for noxious weeds?—Yes, but not as a rule; only one or two instances. One was at Four Peaks, but it is not in my district.

4. Were the complaints justified?—Quite possibly they might be. Rabbits and weeds accumulating on the edges of these reserves might become a nuisance unless closely watched.

5. Have any of the reserves complained of ever been vested in a local body?—In some case, like the Selwyn Plantation Board, they have been. They are vested in a Domain Board; but, as a rule, the Lands Department supervise them.

6. Has anything come under your notice as to damage done by deer in State forests, or to settlements?—Not in North Canterbury. They are at the headwaters of the Rakaia, but are not doing any harm.

7. *Dr. Cockayne.*] What about Marlborough?—I heard complaints there from settlers on the north bank of the Wairau that the deer come down and eat the turnips and worry the domestic stock.

8. Do you consider they are detrimental to the forests and the young growth?—They are likely to bark the trees, and where the forest has been destroyed and is growing again, if deer are allowed to roam through the bush they would destroy the growth; but in old standing bush I do not think they do much harm, or more harm than cattle.

9. They would tend to check regeneration?—Decidedly.

10. *The Chairman.*] I understand you have done a good deal of estimating and measuring of timber?—Yes, in the North Island, and I was in the timber trade for some years. To estimate growing timber requires considerable experience.

11. Could any reliance be placed on an estimate of growing timbers comprised in a district of many miles extent, such estimate being made at a few days' notice?—Very little, unless the man were a keen observer. As a rule such estimates are not to be relied on.

12. *Dr. Cockayne.*] Could a man stand on a hill and look at the bush below him and tell the quantity of matai and miro there was in it?—No. When asked to report on the timbers in certain areas I found it hopeless to expect to be able to do it accurately, and so I simply reported what I thought would be an estimate of 1 acre, and then reckoned the whole area from that.

13. *The Chairman.*] It might happen under some estimates that when the bush was taken out there would only be in it half the timber estimated, or two or three times as much?—Quite so; because a lot of the timber included in the estimate might be absolutely worthless.

14. *Dr. Cockayne.*] What would you call the birch at Oxford?—Black—*Solandri*.

15. What do they call it in Wellington?—I have never heard it referred to there. Not much grows there.

16. How far north does it grow?—In Auckland, but it is very rare. I have seen it on Tutumohe Range.

17. Do you know *fusca?*—Only as "brown-birch"; in Marlborough chiefly.

18. Do you know *Menziesii?*—The "red-birch."

19. Where is it called that?—In Marlborough.

20. Have you ever seen any *fusca* in Canterbury?—There may be a little at Glynnwye, but you would have to search to find it.

21. Have you had any experience of *fusca* as a timber?—Only watching the mills cut it. It is used in Marlborough for rough building, but it twists a lot unless seasoned before cutting.

22. Have you had any experience with black-birch?—Yes, but that also is liable to twist, while the tannic acid is very hard on the saws. It is suitable for bridge-building, but not for houses.

23. Have you had any experience with *Menziesii?*—Only when I had it seasoned for making furniture. It takes a very nice polish.

24. *Mr. Murdoch.*] What formula did you use in measuring up round timber?—I used Hopper's generally. We would square one-fourth of the girth, take the length, and then the cubic contents. Multiply by 12 to get the superficial contents. Here timber is sold off the saw.

HENRY GAUNT PRICE sworn and examined. (No. 24.)

1. *The Chairman.*] In the absence of the Commisioner you have charge of the Lands Office here?—Yes.

2. Have any complaints been received from the settlers that some of the scenic reserves have been set apart in unsuitable places, and have become breeding-grounds for noxious weeds, &c.?—I do not remember any particular case of that kind. A sum of money is voted every year for the destruction of weeds, and when a Ranger reports that noxious weeds are spreading they are destroyed. I do not think your question applies to the scenery reserves here. In a treeless place like Canterbury, where we have forests we should preserve them. We should not deforest here.

3. Have you had any experience with deer here?—No. I was in Hawke's Bay, and there are deer at Lake Waikaremoana; but I never heard they had any bad effect on the forest.

4. Before coming here you had many years' experience in bush country as a surveyor?—Yes, principally in Hawke's Bay and Poverty Bay.

5. Is there any tawa timber there?—A considerable amount. It has not been used for sawmilling purposes, and I never heard of its being regarded as good building-timber. It is not lasting, but would do for butter-boxes.

6. *Dr. Cockayne.*] What does the forest at Motu consist of?—Pines—rimu, kahikatea, miro. There is not much beech in it. You will find that timber on the high ranges.

JOHN DRYDEN HALL sworn and examined. (No. 25.)

1. *The Chairman.*] What are you, Mr. Hall?—A farmer, residing at Hororata. I wish to call the attention of the Commission to a plantation reserve, No. 1763, in the Selwyn Survey District, on the Dunsandel–Hororata Road, on which there is now growing a dense growth of silver-wattles which have spread to the adjoining lands and are causing considerable damage to them. If the Commissioners were to see how useless this reserve is, and were to ascertain how expensive it will be to clear it and to plant it with desirable trees, I think they would be able to form some conclusion as to the undesirability of planting silver-wattles elsewhere. I own the adjoining land, and have cleared the wattles that had spread to it. The Plantation Board at my request dug a ditch, 4 by 3, to prevent the spread of the plants, and it has been successful. The plantation harbours rabbits, and in the present state is of no use to the district.

2. Do you consider the silver-wattle a noxious weed?—That is a strong term. It may be useful for some purpose, but in the interests of the farming community it is a bad plant to grow. I would like to get a remedy that would destroy it. The plantation consists of 100 acres, and I would pay 5s. rental an acre for the land cleared, but now it is useless.

3. Have you any other point to advance?—I suggest that all Crown leases should contain a covenant binding the tenant to plant in certain places if considered necessary suitable trees or seeds to be supplied by the Government. You can get at the Crown tenant and compel him to do certain things which are for his ultimate benefit.

4. What about future leases of the same property?—If the matter were put before the Crown tenant in the same way as it would be put before any ordinary farmer, and he were convinced of the benefit he would derive from the shelter—I speak as a farmer—he would spend a small sum not only in planting, but in taking care of the trees afterwards. Canterbury is conspicuous for absence of method in devising shelter plantations for the protection of stock. The plantations made by the Selwyn County Council are of great benefit, no doubt, to the whole district, but they would have acted very much better if they had been cut into L shapes, with little clumps and corners, rather than have been arranged in big strips.

5. *Dr. Cockayne.*] Would you advocate the planting of public roads?—The difficulty there is that if you plant the south-west side you shelter the stock but shade the road.

6. If you used deciduous trees you would not shade the road?—There are deciduous trees in the Riccarton Bush, and they form a case in support of what I say.

7. Have you tried *Salex salmonii*, a quick-growing willow?—No.

8. *The Chairman.*] Is there any other point?—One more: that information should be imparted to persons proposing to plant trees as to whether or not such trees will harbour birds. The diffidence that exists on the part of the Canterbury farmer to making plantations is the fear that they will prove a harbour for birds that will decimate his crops. I do not think he is justified in that conclusion, but it leads to a lack of energy in respect to tree-planting which is not creditable or desirable. My father planted many acres, and where they were of large size—the County Council plantations are 10 chains wide—they proved a great harbour for birds; but later on when he planted four rows deep in L shape there was no serious trouble with the birds.

9. They were purely for shelter purposes?—Yes.

10. You are interested in the dairy industry?—Yes.

11. And plantations would assist that by affording shelter to the stock?—Yes. I think the plantations of Mr. Bealey's were some of the first of deciduous trees in Canterbury. They consist of oaks, ash, elms, willows; but the inclination of the present-day farmer is to get the trees out and put grass in.

12. Do you know if any experiments have been made in this district with a view to testing other timber than white-pine as to its use for butter-boxes?—We get our timber from Southland for cheese-crates. We use the white-pine. I think the National Dairy Association stipulate that that timber must be used.

13. The tainting difficulty would not come in in the case of cheese-crates as it does in the case of butter-boxes?—No. Cheese does not absorb nearly as readily as butter. The cheese industry is much more likely to expand than the butter, as it does not require cool storage, like butter. I think it is quite possible that other timbers might be used almost entirely for cheese-crates.

RICHARD GEORGE ROBINSON sworn and examined. (No. 26.)

1. *The Chairman.*] You are the Chief Nurseryman for the South Island under the Lands Department?—Yes.

2. At what do you estimate the cost of planting an acre with forest trees at 4 ft. apart, including the raising of the trees?—In computing cost of and the anticipated returns from our afforestation labours a vast amount of speculative matter requires to be presented. The following information will serve to show at a glance the actual average expenditure per acre now incurred in raising trees and establishing a plantation. No provision is made for the initial value of the land or buildings, and the fencing item is based on the assumption that an area of about 1,000 acres is being afforested:—Nursery work: Initial expenses in formation of nursery, 1s. 3d.; tree-seed cost, 2s. 9d.; seed-sowing, 5d.; tending one- and two-year-old seedlings, 11d.; lifting and lining-out seedlings, 2s. 2d.; tending lined-out seedlings, 3s. 8d.; lifting and bundling for plantations, 3s. 6d.; transport of trees, 5d.; tools, implements, repairs, &c., 3d.; general maintenance work, 1s. 9d.; supervision, 6d.: cost of raising 1,000 trees for plan-

tation, 17s. 7d. Fencing, 3s. 2d.; rabbiting and clearing, 5s. 6d.; pitting for tree-planting, 12s. 6d.; tree-planting and distribution of trees, 13s. 9d.; formation of roads and fire-breaks, 1s. 3d.; tools, implements, repairs, &c., 1s. 3d.; supervision, 2s. 3d.: cost of planting and upkeep of 1,000 trees, £1 19s. 8d. Total raising and establishing cost, £2 17s. 3d. In the Rotorua State Nursery, where growth is more vigorous, it is possible to satisfactorily move a large number of two-year-old trees direct from seed-beds to the plantation, and this somewhat reduces the cost of production of certain trees to below the sum it costs in the South Island. As about 2,722 trees are usually planted over an acre of ground, it will thus be seen that the total estimated expenditure connected with the creation of an acre of plantation will approximately reach £8 4s. 2d., although the cost varies annually, being influenced by labour and climatic conditions.

3. What are your opinions regarding the employment of prison labour in connection with afforestation operations?—Prison labour is specially desirable for afforestation work (1) when large areas of land are being operated upon, (2) when the ground-surface is easily prepared, (3) in localities where extremes in temperature or persistent rainfalls are not general.

4. What do you estimate the annual value of each prisoner's work?—At Hanmer Springs each prisoner during the past twelve months has been credited with having performed labour representing a value of £73 4s. 1d., or an increase of £4 7s. 8d. per man on the preceding year.

5. What number of prisoners were at the Hanmer Springs camp during the past twelve months, and what is the total value of the work performed by them?—The average number of prisoners actually employed was 15·46, and the average number in camp was 24·2. The total value of work performed during the year was £1,134 13s. 3d., as against £992 14s. 1d. in the previous year. Virtually there were eight men allocated to the looking-after of the camp. Fifteen men are practically working full time the whole year, and these figures show that the labour of 15·46 prisoners is equal to that performed by ten free workers. So that a free worker is worth one-third more than a prisoner.

6. You say that £73 is the value of a prisoner's work: does that sum include the supervision by the warders?—No. We arrive at the value in this way: we know that a free worker can dig 1,000 pits at 12s. 6d. a thousand, and if a prisoner makes 1,000 pits he also is credited with the same amount of liability for making that number, 12s. 6d.; so that the warders are not reckoned, but merely the amount of work that is performed.

7. What do you consider is the most economical method of conducting the work—by prison or free labour?—Undoubtedly the employment of prison labour at tree-planting is satisfactory as far as the Forestry Branch of the Lands Department is concerned, but it must be remembered that the expenditure attached to the providing of board, accommodation, and clothing of inmates of prison camps is borne entirely by the Justice Department, whose hearty co-operation with the Lands Department has been instrumental in making such a success of the undertaking. In my opinion evidence from the Justice Department bearing on the actual camp maintenance-work, and necessary supervision by warders and Gaoler in charge, would require to be considered before it would be possible to state definitely if tree-planting by prison labour is the most economical method of conducting State afforestation generally. All statistics in connection with the work performed by prison labour could be submitted in the course of a few days, when the preparation of the annual statements of expenditure incurred, &c., will be completed. But the reformative value to the inmates of the tree-planting camps should not be overlooked when discussing the merits of prison labour.

8. What are your opinions regarding the distribution of trees to public institutions, local bodies, and private individuals?—If the distribution of trees from nurseries is undertaken without having made special provision for the same, the season's State tree-planting scheme is seriously interfered with. Many countries adopt a policy of distributing trees gratis to public bodies, but insist upon regulations governing the planting and subsequent maintenance-work being adhered to. Such plantations would undoubtedly be an asset to the Dominion. In my opinion much benefit would accrue if domains and public institutions were liberally assisted by the State in the matter of donations of trees, but planting conditions would require to be drawn up, otherwise indiscreet association of varieties and otherwise faulty planting methods would eventuate. Supplying trees to private individuals is another matter, and if private nurserymen are in the position to supply hardy stock at a reasonable rate to purchasers I see no reason why the State should enter into competition with them. It is, however, purely a matter of policy, but if the distribution of trees to domains, hospitals, schools, and other Government institutions were decided upon, such tree-raising would require to be distinct from the State's own afforestation work, and a special amount authorized annually for the purpose. If we were called on suddenly to supply large quantities of forest-trees to private people or public institutions it would interfere with our scheme of afforestation, and the quantity of land to be prepared the year before the scheme is put in force. When the matter is arranged I estimate the number of trees that would be ready for distribution at the proper time. A certain number of men are employed, and the required pits are dug three or four months in advance. So that if we were called upon at any time to distribute a large number of trees to public bodies it would mean that there would be a certain number of pits left over from that year, which under certain conditions would be valueless next year. There would therefore be an actual waste of the cost of making the pits.

9. Is it part of your duty to tender advice to public bodies in regard to tree-planting when they request you to do so?—Yes, every effort is made to assist public bodies by tendering solicited information, but, owing to pressure of departmental duties, rarely is it possible to do so to the desired extent. Collections of timbers, seeds, destructive insects, &c., are gradually being acquired, and in this way it is possible to transmit a great deal of information very accurately.

10. Would you advocate that the Government should print a small book dealing with the subject of tree-planting for the use of public bodies, specifying the trees which would do best and the proper methods of planting?—I think the suggestion is a good one. I also think that such a book was prepared by Mr. Matthews, and was ordered to be printed. We have gained considerable experience since that publication, and it could now be brought up to date, with chapters on the scientific aspect of the matter as well as on the practical side. With full illustrations it would prove a very valuable aid indeed.

11. Would you briefly allude to the varieties of trees you are now planting in the South Island, and state under what conditions they are used to advantage?—After sixteen years' experience the Department is in possession of valuable facts relating to the character of trees being operated upon in the various districts. This knowledge, blended with the demonstrations of enthusiastic private planters, and the literary efforts of eminent forestry experts, enables the work of the State to be carried on in the most modern way. Several years of experimenting revealed the undesirability of adhering in New Zealand to ideas expressed by Continental authorities, but such work also disclosed certain possibilities, and we are now confining our efforts in the South Island principally to the growing of the following trees, although some fifty varieties are included in the established plantations: *Pinus Laricio* (Corsican pine), *Pinus ponderosa* (yellow-pine), *Pinus Benthamiana* (Bentham's pine), *Pinus strobus* (Weymouth pine), *Pinus austriaca* (Austrian pine), *Pinus radiata* (remarkable pine), *Pinus muricata* (Bishop pine), *Pseudo-tsuga taxifolia* (Oregon pine), *Picea excelsa* (Norway spruce), *Picea sitchensis* (Sitka spruce), *Fraxinus excelsior* (English ash), *Fraxinus americana* (American ash), *Larix europœa* (European larch), *Larix leptolepis* (Japanese larch), *Quercus pedunculata* (English oak), *Juglans regia* (walnut), *Sequoia sempervirens* (redwood), *Thuja plicata* (white-cedar), *Alnus glutinosa* (alder), *Betula alba* (English birch), *Populus* (various), *Salix* (various). Briefly explained, the sheltered gullies, where generally greater humidity and fertility of soil is in evidence, are reserved for such trees as ash, Oregon pine, oak, walnut, &c.; on the fertile flats, ash, Oregon pine, Norway spruce, Sitka spruce, *Pinus ponderosa*. Hillsides having an inclination to a southerly aspect are planted with Japanese and European larch, but the Department is now greatly reducing the output of the European species. Partially exposed country, either level or hillside, is planted with *Pinus Laricio* and *Pinus austriaca;* and upon a surface of a rocky nature *P. ponderosa* or *P. Benthamiana* is used with success. These two latter-mentioned pines are also allotted the most exposed positions, and are undoubtedly the most useful trees for any situation or condition. Shelter-breaks are formed of *P. radiata*, *P. muricata*, *Populus fastigiata*, and English birch according to the suitability of each variety to the prevailing condition. Where much surface moisture is prevalent alder, poplars, and willows are introduced successfully.

12. I suppose you are still conducting certain experiments in connection with trees?—Yes; further experimental work is still in progress, and any practical idea bearing on the efficacy either in working-systems or suitable trees for certain localities I am ever ready to investigate. Preparations are being made this season to create an arboretum at each tree-raising station in the South Island, so that the character and progress of as many varieties of tree as possible will be watched and reported upon from time to time.

13. Have you any difficulty in securing suitable labour for tree-planting work?—Usually, No. The rate of wages paid in New Zealand, 8s. per day of eight hours, is apparently a sufficient inducement to suitable men. Much of the pitting and tree-planting work is performed by contract, and employees so engaged are able to earn up to 8s. 6d. and 9s. a day.

14. Does the State provide accommodation for the employees?—Yes, each plantation employee is provided with sleeping-accommodation in the form of a hut, tent, or part room of a house within the forest reserve.

15. Do the employees receive any other allowance?—Yes, firewood or coal is provided gratis.

16. Have you any regulations in force in connection with employees smoking in the plantations?—Yes. Regulations were issued to each officer in charge of a plantation to the effect that no wax matches must be brought into the plantation by any employee. The men are allowed to smoke, and are given "smoke-ohs" in the morning and afternoon. But I have found it almost impossible to prevent men from smoking if they so desire. The substitution of wooden matches for wax matches relieves the difficulty to some extent.

17. Is there any specified time for smoking?—No. They are allowed to have a few minutes off in the morning and afternoon.

18. When the men are working are they under the supervision of a foreman?—Yes, there is always a foreman in charge.

19. And he would make it his business to keep his eye on these men during the smoking period, and to see that no matches are likely to be thrown about so as to be a danger?—That is so.

20. *Mr. Murdoch.*] Can you indicate six trees you would preferably plant now which are fast growers, and would be likely to turn out the best building-timber?—*Pinus Laricio* or the Corsican pine, *Pinus ponderosa* (it will grow under almost any condition), Oregon pine, *Fraxinus excelsior*, Japanese larch, *Pinus radiata*.

21. What do you think of the *radiata?*—It would be an excellent rough timber. We have in Tapanui Nursery alone over 100,000 to be planted out next year. It would be possible to plant it a little farther apart than 4 ft., and I am arranging to plant it 6 ft. apart. I regret to say, speaking generally, that the present season has been most unfavourable for tree-planting, the worst since the start of the Tapanui Nursery; nevertheless there will be an output of trees that will compare favourably with previous years. The output will be about a million and a half.

22. *The Chairman.*] What are the wages paid to employees?—The foreman gets 9s. 6d. a day, and is a salaried officer. Other men are paid from 8s. to 8s. 6d. a day. The clerk is a salaried officer.

23. *Dr. Cockayne.*] Do you keep a record of the cost of planting out the trees?—Yes, to the halfpenny. Until quite recently I had to do the whole of the work myself, but now I have the assistance of a clerk.

24. Had you orders from the Department to do the work yourself, or did you do so of your own accord?—It was a recognized thing that I had to look after everything until the new departure.

25. Are you the general adviser on all matters of forestry for this Island?—Yes; the Domain Boards first communicate with the Head Office, and then their letters are sent to me to report on.

26. Have you anything to do with the instruction classes?—The work of education falls on me in connection with students in forestry.

27. *Mr. Adams.*] Is there anybody who could take the matter up if you were not doing it?—I do not know.

28. *The Chairman.*] What other duties have you?—I also look after the stores for the South Island, involving a sum of £7,000.

29. In the returns showing the cost of the nurseries for the year 1912 is any allowance made by way of interest on the money invested, or the rental value of the land?—No, that has not been kept. The amount shown is the actual cost.

30. *Dr. Cockayne.*] The Department has never taken into consideration the question of the compound interest?—Never. I have included any areas the Government have had to purchase; but the areas we have operated on in the South Island have been Crown land, and no allowance has been made in that case for compound interest.

31. Have you had any experience in this Island in regard to sowing *in situ?*—Yes, at Dusky Hill and Conical Hills, and the result has been a failure.

32. Have you ever tried burning the manuka scrub, and sowing on the same ground the seeds of eucalypti *in situ?*—Not in the South Island, but in my private experience I have been successful.

33. Have you seen the eucalypti on the Canterbury Plains which have been sown and raised *in situ?*—Yes, and I have charge of a number of those places.

34. What sowing *in situ* have you tried at Dusky Hill and the prison plantations?—The experiment we conducted under almost ideal conditions was the sowing of acorns. We were careful in selecting only the most vigorous seeds, and under ideal conditions the result was satisfactory.

35. Have you tried sowing any pines *in situ?*—I do not think they would be successful.

36. Are you aware that in a certain class of soil in New Zealand pines are coming up spontaneously?—In this country if you sowed *in situ* such trees as pines the leaders would be so interfered with that they probably would not get through at all; they are exceedingly delicate.

37. *The Chariman.*] Have you any suggestion to make as to the kind of country afforestation operations should be carried on in?—If we get any rougher ground than we are operating on at present we might as well stop planting.

38. *Dr. Cockayne.*] What kind of ground do they afforest in Germany?—Similar ground to ours, but they do not get the extremes of temperature we have here. An even temperature is a very important factor in successful tree-raising.

39. *Mr. Murdoch.*] Do you consider it best to have a central nursery for the South Island, or several scattered about in different places?—We have already established our nurseries, but when we started the system it would have been very much better to have had one big central nursery in the South Island. The trees sent down here from Dumgree have turned out very successful. It is quite possible for trees to be sent from anywhere in the South Island to Otago Central with success.

40. Then it would be advantageous to keep this central nursery here at Tapanui?—Tapanui is not a good place for a central nursery, the heavy soil being very much against it; and in bad weather the men have to be found work at other occupations, which makes our tree-planting unprofitable.

41. Where would you suggest for a central nursery?—I would not like to say unless an inspection of the areas could be made. Somewhere in the Timaru district might do.

42. *Mr. Adams.*] At Willowbridge, Studholme Junction?—Yes.

43. What became of the oaks planted at Hanmer some time ago?—They did very well; also the ash. The latter started a quick growth, but afterwards they went back. With the exception of the Dusky Hill plantation oak-growing has not been a success.

44. *Mr. Murdoch.*] Could a piece of poor country where the bush has been pretty well killed out, but where some may still be growing, be successfully planted with foreign trees?—Yes, in the case of any reserves which are pretty well worked out I think a system of underplanting could be successfully accomplished.

45. I refer to comparatively open milling-forests where the *Pinus insignis* has grown rapidly, exceeding everything. Have you seen such a case?—It is quite possible. It would grow very rapidly if sheltered.

46. *The Chairman.*] If a central nursery were established the cost of supplying trees to different parts of the Island would be cheaper than to establish nurseries at several places where separate staffs would have to be maintained?—Decidedly so.

47. And if you could double, or quadruple, your output the cost would be proportionately lessened?—Quite correct.

48. *Dr. Cockayne.*] From the data you have could it be definitely ascertained whether or not it would pay to abandon the present nurseries?—It would take a year to decide, and would require a series of experiments. No nursery should be started unless there is a large area of plantable land in the vicinity, and a nursery should not be isolated. I do not think the Government should attempt to afforest any area under 1,000 acres. There should not be only one plantation in its vicinity. I may say that the *Pinus Laricio* crop has been a failure this season all over the world, and it is our principal crop here.

GREYMOUTH, TUESDAY, 25TH MARCH, 1913.

Mr. G. H. BOYD and Mr. EDMUND STRATFORD sworn and examined. (Nos. 27 and 28.)

1. *The Chairman.*] What association do you represent?—The Westland Timber-millers' Association, Westland. We have held a meeting, and decided to place our views on the subject before the Commission in writing. There is nothing we wish to add now. The white-pine question is the main one from the millers' point of view.

2. Have you any remarks or suggestions to make, Mr. Boyd, regarding the question of the administration of the Timber Regulations, as to whether the system could be improved?—As far as the supervision of the cutting is concerned?

3. Yes, and the administration generally, especially with respect to the dual control of the Commissioner of Crown Lands and the Warden?—We have not taken that point into consideration particularly. As you know, dual control is always difficult. Personally, I think it would be better if the matter were put under one control. But here we work under the mining laws also, and I do not really see how you are going to get away from the present system as far as this district is concerned.

4. It can be got away from. There are mining laws in force in the Auckland District, and there is no difficulty experienced there. Perhaps your association would like to go into the matter and forward the Commission an expression of opinion on the subject in writing?—I am quite sure our association would rather work under the Land Board, but we can go into the matter more fully and forward our views in writing.

5. It would strengthen the case if you could give specific instances of the way in which the control is at present conflicting, and where it entails loss both to the miller and the Crown?—I do not think we would have any difficulty about doing that.

6. Have you anything to add?—I do not think so. The waterside workers intend, I think, to address the Commission in writing, and to protest against any duty being imposed on silver-pine, as it would affect their earning-powers.

7. *Mr. Clarke.*] In your written statement you might include a suggestion as to what timbers the Sawmillers' Association consider would be suitable for their trade when our own timbers have been worked out; because we must assume, although you are sawmillers now, your successors will be timber-dealers in the future. Will you consider that?—We have gone into that point, but the information at our disposal on the subject was very limited. No experimental planting has taken place on the West Coast, and we think the Commission might look into the matter and arrange that some steps should be taken to provide for future timber-supplies in this district. We have here large plateaux that are absolutely bare, and that is where the silver-pine grows; it is a hardy wood. Possibly ground that would grow such timber would also grow some of the Australian hard woods. We have no frosts on the Coast.

8. *Dr. Cockayne.*] I think the *pakihi* land could be afforested, and it would be the best way to deal with it: what do you think?—Yes, it might do. There is a lot of land on the West Coast that can never be suitable for agriculture, and to plant it would be the best way to deal with it. But there are a lot of areas here that are not *pakihi* land.

9. *The Chairman.*] We have to consider the question of the compound interest on the value of the land mounting up all the time, and so swelling the initial cost that it might be found at the end, say, of a hundred years that it is costing £500 to produce £100 worth of timber. Have you considered that aspect?—Well, all the hard wood is going up in price in Australia all the time, and as far as cheap land is concerned you cannot get cheaper land than *pakihi*, because it is absolutely valueless.

NELSON, THURSDAY, 27TH MARCH, 1913.

JOHN POLLOCK sworn and examined. (No. 29.)

1. *The Chairman.*] During our investigations it has been suggested by some witnesses that the unrestricted roaming of deer through the climatic reserves will tend to the destruction of the young trees, and stop the regeneration of the forests. Are you prepared to give any evidence on the point?—I understand the deer do clear out the underscrub, and young trees in some cases, and everything within their reach.

2. What is your official position?—I presume I am here as chairman of the council of the acclimatization society. I have been all my life in this district, and spent some years in the field as a cadet surveyor.

3. Has it come under your notice that the deer are doing damage to the forests?—I do not think they are barking the trees, but they are certainly eating out all the underscrub and young trees.

4. Are they doing any damage to the settlers' orchards?—We have had complaints from settlers on the Moutere Hills, but, as far as we can ascertain, there is only one very small herd there of a dozen red deer; and the population is very small.

5. Are the deer generally distributed throughout the ranges here?—Yes, they are, pretty well, in this province.

6. Does your society allow the settlers to shoot the deer indiscriminately where they interfere with settlements?—We have no power to so allow them. The settlers can apply to the Minister of Internal Affairs for a permit. We received these complaints before the opening of the deer-stalking season, and we deferred dealing with them until the season closed, when probably the nuisance will have been abated by the season's shooting—the months of March and April.

7. Do you think it would be wise to have certain restricted areas set aside as deer-parks, treating all deer found outside those areas as a pest and destroying them?—It would be safe to treat them as a pest if found in areas set aside for forest conservation, water-supply purposes, or catchment-areas; but it would be rather a drastic step to specify a few small areas as deer-parks, and make them vermin in the rest of a very large district.

8. Are they multiplying rapidly?—Yes, and spreading well. A few years ago there were no deer at the head of the Wangapeka, the Buller, and at Karamea: now they are all over that country.

9. Have you any idea as to the number of deer in the district?—No; a great area of our district is not even used by deer-stalkers.

10. *Dr. Cockayne.*] You spoke about small areas for deer-parks, but I do not think that is the idea of the Commission. In Canterbury deer have been turned out in certain parts. There is the Rakaia herd, and those interested in the sport think it would be a good thing if this herd could mix with the Nelson herd, and form one continuous herd throughout the whole northern part of the Southern Alps. This Canterbury herd has been placed in the Waimakariri National Park, on which that part of the country depends so much in connection with flood-prevention. Do you think it is reasonable that such large continuous areas should be turned into a deer-park, a large part of which is a climatic reserve?—It seems a question of climatic reserves as against the deer. I do not see how you can confine the deer to one part. You must let them roam or else clear out the whole lot.

11. Could you not provide that in certain areas it would be legal to shoot them, and in others—which would be deer-parks—it would be illegal to do so?—I should be very much opposed to such a provision, because that would be fatal to the conservation of deer, and to the society deriving any revenue from sportsmen for the improvement of the herds. If you had free country to shoot in men would not take out any licenses, but would shoot in that free country.

12. How many English tourists take out licenses to shoot deer in the Nelson area?—Not many; I do not think we average four or five a year. We are hardly in the line of tourists here.

13. Does the sport bring people here from other parts of New Zealand?—Yes, but it is a matter of only six weeks or two months at the most.

14. *Mr. Murdoch.*] Can you suggest a solution of the difficulty?—It is a difficult matter, the only alternative being extermination if the animals are doing the damage alleged. If they roam through the whole forest and are damaging the underscrub—they do not affect the forest-trees—of course, the question of the trees as against the deer comes in, and the latter would have to go. But the question is whether they are eating the underscrub, and doing such serious damage to the bush.

15. *The Chairman.*] There is the further question of whether, if the underscrub is eaten out, it would not render these forests more liable to the danger of fire?—I presume it would, but the underscrub, being green, is hard to burn.

16. Would not the destruction of the undergrowth render the land liable to the growth of noxious weeds?—Yes.

JAMES SIM EVANS sworn and examined. (No. 30.)

1. *The Chairman.*] I understand you are the Stipendiary Magistrate and Warden for the Nelson District?—Yes. I travel about this district, and if there is anything that comes in the way of my duties that I can give you information upon I shall be pleased to do so.

2. The question of the dual control of the timber industry in the mining districts is being considered by the Commission. I do not know if the provision in force in the Westland Land District as to the timber in a mining-area being administered by the Warden applies here also?—Yes, in the mining district.

3. Is the dual control a satisfactory method, in your opinion, of dealing with the timber?—I have never had any application in this district for a timber license, and I have been here nearly four years. I practised as a lawyer in Riverton, where there is a good deal of timber, and I have had experience in regard to making application for timber licenses; but I think that the Warden should have the control of the granting of timber strictly for mining purposes, but not for sawmilling purposes. I know that many mining-areas are taken up by grants from the Warden and are used for ordinary sawmilling purposes, and not for mining. In that case the matter should be under the control of the Commissioner.

4. The Warden having no Rangers or officers he can use to exercise the proper control over the sawmillers?—No. The Warden's license should be strictly confined to timber-cutting for mining-props, &c.

5. Have you had opportunities of noting if the deer are doing any damage to the forests?—I know the Tapanui country and the Blue Mountains, and I know what deer are like down there. I do not think you can confine them to a particular area.

6. *Dr. Cockayne.*] Could you limit them to the Tapanui Mountains with one of the Umbrella Mountains?—No.

7. *Mr. Adams.*] Do you think they will become so numerous as to be a source of danger to the native flora and forests?—I do not think so, or any more than the wild cattle used to be, or the wild pigs, in parts of Southland.

8. *Dr. Cockayne.*] But they were exterminated by the settlers?—Yes, for their hides.

9. *Mr. Murdoch.*] Is there not a danger of the deer clearing out the young trees so that the forest will never regenerate?—I dare say there is a positive danger in that respect, but I do not know whether they are attacking the bark like the rabbits.

10. *Mr. Adams.*] Do you know anything about the scenic reserves in this district?—I have travelled between here and Collingwood, and very much regretted to see the way in which the beautiful bush there has been slashed about and burnt. It ought to be preserved on each side of the road. The land there can never be cultivated, being very stony, and only fit for grazing cattle, or sheep perhaps. There is still some bush left, and it is a very fine bit of scenery. The same remark applies to the Buller Gorge, which in some places is fast becoming a mass of blackened stumps. Some of the land there is lease in perpetuity, but a good deal is freehold. It is not high-priced land, being steep and rocky. There is a large hill of marble there. The outcrop is a mile in width, and runs for miles across the mountains, and the land is fit for nothing but to run a few sheep on. In 100 acres you would only get 10 acres of grass.

11. *Mr. Clarke.*] Have you issued no timber licenses for four years?—None that I can remember.

12. Does that mean there has been no mining-work carried on during that time?—Oh, no; but the mines that are working are established mines, having their timber-cutting licenses before I came here. There are one or two mills working at Collingwood, nominally mining mills, but I think they send out timber. The ordinary miner is entitled to cut timber on Crown lands for his own purpose, and the old-established companies have their rights along with their mining-rights.

13. Do their mining-rights give them the right to cut timber and sell it for market purposes?—Nominally, they do not; but in practice they do that.

14. Are they within their rights in selling it?—I think so. I do not think there would be anything to restrict them, or any ground for forfeiture. Stricter regulations might be drawn up if the Warden is to have the right to grant timber in that way. The Mining Regulations were primarily drawn up to deal with mining-timber only, but in practice I know they do sell.

14A. Practically speaking, then, they are abusing their rights by taking advantage of a technicality?—I would not say they have abused their rights, or that their rights would be liable to forfeiture for selling the timber for other than mining purposes.

15. Should the regulations be made stricter for the purpose of allowing miners to have timber for their own purposes, or for other purposes?—Only for mining purposes, which was the original intention.

16. Would it not be possible for a man to apply for a timber-cutting license under these conditions when he had no hope of obtaining any good mining result?—He could nominally apply for it for mining purposes, and could cut and sell timber, although there was no possibility of starting a mine.

17. Is not that evasion?—I am not prepared to commit myself at present to saying whether a man who does that is committing a breach or not; but the matter requires looking into.

18. Then the matter should not be under a dual control?—I am quite satisfied about that; but I do think that timber for mining purposes should be under the control of the Warden, because all the mining ought to be under his supervision.

19. *The Chairman.*] Is there any other matter you wish to allude to?—There is a question as to the granting of rights outside a mining district that may come within your province. My opinion is that the Warden should have the right to grant all rights, either for mining for gold or timber rights, whether inside or outside the mining district; but with regard to mining-rights applied for outside the mining district, no grant should be made by the Warden until he receives a report from the Commissioner of Crown Lands. I am quite sure this system would be satisfactory to the Commissioners, who do not like dealing with mining-rights, and it is within the province of the Warden. But the Commissioner's interests would be sufficiently safeguarded if no grants were made outside the mining district, either for timber-cutting or mining, without first getting a report from the Commissioner.

20. Would it not be better to say that the question of timber shall be left in the hands of the Lands Department, the miller not to be allowed to cut timber without the license being endorsed by yourself?—I would have no objection to that; but, seeing that the Warden is solely concerned with mining, it might be better to consider that question from a mining point of view. I have known Commissioners of Crown Lands who have been rather antagonistic to mining, and I do not blame them, as I have seen fine Crown lands washed away by mining operations.

21. There is a provision in the law at present that certain areas in mining districts should be set aside as Warden's areas, the administration of the timber being left in the hands of the Commissioner of Crown Lands. That is the case in the Auckland District. If this provision were in force in Nelson and Westland would it meet the case?—Yes, anything of that sort. I do not quite agree with taking the control of large areas of timber, particularly in sawmilling country, out of the hands of the Commissioner. If there is a restricted area of timber and there is a large mining industry, it is advisable that the Warden should have power to recommend a reservation for mining purposes, the one industry fostering the other.

22. You are probably aware of the provision in the Mining Act enabling a holder of a miner's right to peg out a tent-site, 24 by 48, without any reference to the Warden or Commissioner. Men sometimes take out one of these miner's rights and squat on Crown lands while they possibly have not any connection at all with mining?—Yes, a man can do that.

23. Do you not think at this stage in the history of mining such a right is no longer required giving a man the opportunity of occupying Crown land without any reference to Warden or Commissioner?—There are difficulties about the matter. I think it should be stopped except for *bona fide* mining. You could get over it that way, or by making registration compulsory, not charging any fee perhaps. Under the present circumstances a man can get a grant of an acre of land and can hold it for forty-two years, for 5s. a year, with a right of renewal.

24. *Mr. Clarke.*] Without any prospect of getting gold?—It does not matter whether he is mining or not; as long as he is in a mining district he can get it. In the early days it was necessary to grant a certain amount of freedom, but now that the mining industry is on a more settled basis these rights should be limited to mining only.

FREDERICK AUGUSTUS THOMPSON sworn and examined. (No. 31.)

1. *The Chairman.*] You are Commissioner of Crown Lands and Chief Surveyor for the Nelson Land District?—Yes. I have been here as Commissioner about nine months, but I have spent fourteen years in the district altogether. I left it many years ago, and was engaged in survey-work in the Oamaru district and in the Grey Valley, returning here as Commissioner a few months ago.

2. Have you had any recent complaints that the scenic reserves are becoming breeding-grounds for noxious weeds, and are blocking land-settlement?—Yes, a good many complaints to that effect, but they were from people who were interested in acquiring the land. It became a common expression to say that if a man wanted a piece of a scenic reserve it was infested with blackberries.

3. You think that in the majority of cases these complaints were not justified?—They were not from a public point of view. Possibly there were a good many weeds on them. In some cases portions of the scenic reserves have been burnt, become denuded of timber, and then full of rubbish and weeds.

4. Are there any specific cases where you can recommend the Commission to uplift the reserve and throw the land open for settlement?—Not to any great extent. The main cases are where such reserves have been made without due consideration—land that would be better adapted for a homestead-site, and which has without proper care been declared a scenic reserve.

5. I understand that in certain cases you have already had the reservation uplifted?—I have in several cases recommended that the reservation should be uplifted, and the Scenery Board has gone into the matter.

6. Do you think the present method of first getting the recommendation of the Land Board and then referring the matter to the Scenery Preservation Board is quite ample in regard to safeguarding the same?—Yes, it would be ample. In all cases we get full reports from the Ranger or surveyor. It is very desirable that there should not be power to uplift them too drastically. The present process seems the best, as it does not allow anything to be done hurriedly and without proper consideration. The Land Board has first to pass the resolution that it is desirable to lift the reservation with the idea of utilizing the land for a homestead-site.

7. Are there any places in this district you can recommend to be set aside as climatic reserves for water-conservation purposes?—Yes; I will indicate them on a map I will forward shortly.

8. Do you consider the present method of administering the timber under a dual control is satisfactory?—No, for this reason: in the first place the sawmilling business is really distinct from mining, and, as far as the records are concerned, we have to do the work twice over. One office looks after the granting of the titles, and is supposed to record them, while the other office has to collect the revenue. In fact, one office is a receiving office and the other is a collecting one. It would be better if the collecting office and receiving office were combined.

9. Do you consider that if the matter were administered under the regulations of the Land Act, 1908, it would be a much better system?—If they were carried out in their entirety they would meet the case.

10. Do you consider the time has now arrived when timber disposed of on Crown lands should be measured correctly before it is offered for sale?—Where land is disposed of by public tender the timber thereon should be specified and measured up. A proper estimate should be made tree by tree.

11. Do you think that would tend to prevent waste?—I think so. There is a tendency to waste timber and to work it out in a slovenly manner, and it would be better if each party knew within a reasonable time what they were buying.

12. Do you consider the estimates of the timber on Crown lands which have been published by the Department at various times, especially in the Report on Forestry for 1909, at all reliable?—No. I do not think they are more than merely a shot at the quantity.

13. In the case of country which has never been explored they must be simply a guess?—Practically. A practical man going through the bush would have a good knowledge of the quantity, but I do not think this work has been done with anything like accuracy.

14. You do not think a man standing on a hilltop overlooking miles of country would be able to estimate how much rimu, kahikatea, and miro would be in that bush?—Not if he did it that way. In some cases the estimates may have been based on more careful averages.

15. But in a district where there are thousands of acres practically unexplored?—You could not do it anything like near the mark.

16. *Mr. Clarke.*] If it is a rough shot would it not be just as likely to be overestimated as to be underestimated?—The chances are about equal.

17. You would not suggest that although not approximately correct they are absolutely unreliable?—I have not any certain information on the matter. I have generally found they might give you a good idea as to what sort of bush you might have in a place, but not a very close estimate if worked out block by block.

18. *Mr. Adams.*] Some witnesses thought it was very much of an underestimate. What is your opinion?—I have not gone into it.

19. Would it be more likely to be underestimated than overestimated?—It is impossible for me to answer that question.

20. *Mr. Murdoch.*] Do you think those estimates give even an approximate idea of the timber in any district?—A careful man would be able to work it out as an estimate only if he went through the country carefully. It would be no use my saying whether the estimates referred to are right or wrong. I can only say from the premises that it was just a rough shot.

21. *Dr. Cockayne.*] Referring to the so-called "beech," which consists of a number of different species; have you any estimate of these species, as to how many of them are available in connection with any particular timber, or are they all lumped together as one "beech" only?—As far as I know they are all lumped, and no distinction is made.

22. Therefore the figures are of no value as to the commercial possibilities of our forests in that respect?—They would not be of much use.

23. *The Chairman.*] You have had a certain experience of the Westland Land District?—Yes, two years and a half.

24. Would you say that the amount of timber in that district for commercial use greatly exceeded what there is in this district?—I do not know very much about the southern part of Westland, but I think there must be a good deal more timber there than here.

25. In the 1909 return I was rather struck with the statement that the quantity in Nelson was approximately as 4 to 5 as against Westland. Do you think that is correct?—I think there must be more timber in Westland.

FREDERICK GILES GIBBS sworn and examined. (No. 32.)

1. *The Chairman.*] You are a Master of Arts and connected with Nelson College?—Yes. I have resided in this district since 1876.

2. Have you any remarks to make as to the matter we are inquiring into?—I have rambled through the forests practically all round this bay, and on the west coast to a certain extent, in the neighbourhood of Karamea, and on the high ranges round Blind Bay, and I am pretty familiar with the country for a distance back from the seaboard.

3. Is that forest-clad land?—Yes, up to an elevation of a little over 4,000 ft. The bush consists of the various species of beech.

4. Have you specially observed the result of forest-destruction as regards the denudation of the soil?—Yes. Denudation has been very apparent in many places. Where the steeper hillsides have been denuded of forest, within a few years afterwards a great deal of the soil has gradually slipped from the hillsides and left the country comparatively bare.

5. Has it had any effect on the streams that used to flow from those areas?—I cannot say that I have noticed a diminution in the streams, and without measurements it would be difficult to give any definite statement on the subject.

6. Are you acquainted with any scenic reserves?—Yes.

7. Generally speaking, are they in good order and free from weeds?—Most of the scenic resorts are well covered with bush, so that the blackberry and other weeds have gained very little hold.

8. Are there any forests in this district you can recommend as reservations for the preservation of the natural vegetation?—Yes; for some time past a number of us have been making efforts to secure the reservation of a block of 1,200 acres which is wedged in between two other reserves, but which if cut out would constitute a great source of danger from fire. Both lie at the back of the range behind Nelson, to the eastern side, but a difficulty has occurred owing to the land being included in the national-endowment lands. There seems to be some legal difficulty over the matter, but we have represented it to Wellington several times.

9. *Mr. Thompson* (Commissioner of Crown Lands): May I say, Mr. Chairman, that the piece referred to is national-endowment land, but under the amending Land Act of 1912 there is power to exchange it, and we are going to exchange it for 1,200 acres in the new block we are opening up That will meet the case. It is desirable to make it a reserve, and I have recommended accordingly.

10. *The Chairman.*] Do you wish to add anything, Mr. Gibbs?—Yesterday I mentioned to Mr. Thompson another matter he immediately fell in with: that the reserves made at Lakes Rotoiti and Rotoroa should be extended to take in their watersheds, to save the danger from fire. We have brought under the notice of the Minister the necessity of making a reserve of the upper part of the Cobb Valley, one of the tributaries of the Takaka Valley. It is one of the most beautiful valleys around Nelson, and should certainly be preserved. A small piece of freehold in the bottom of the valley might be left undisturbed, as it serves to assist to keep open the tracks to the forest. I also suggest the Kiwi Valley, a branch of the Wangapeka, should be reserved.

11. During your rambles did you notice that the deer were doing any harm to the forest?—It is the opinion of many in Nelson that the deer are becoming numerous, and that they are doing a great deal of harm and threatening the bush with extermination. Personally, I think their fears are often exaggerated, because, although the deer must, of course, do damage and eat a great deal of vegetation, during the thirty years I have been wandering about I cannot say, excepting perhaps in a few localities, that I have noticed very much difference with regard to the thickness of the bush. There are some places where deer are plentiful, and where the forest is becoming more park-like and free from undergrowth. If they become much more numerous no doubt that position would extend. At present I do not think the deer are plentiful enough in the district to threaten the bush seriously with extermination, although I know that experts in bush matters hold the contrary opinion.

12. Have you noticed whether, in addition to eating the young shrubs, they also eat the bark of the trees?—They have been very destructive in many orchards about Nelson. Last year I saw an orchard at Moutere where two or three deer had done a lot of damage to about 500 trees, up one row and down another. That was an orchard many acres in extent.

13. And it is practically impossible for orchardists to fence against them?—Yes, without going to considerable expense.

14. If the deer were allowed to become very much more numerous, would there be still greater danger of the young flora being eaten, and so exposing the forest to the risk of fire?—Yes, if they became much more numerous. They would also change the composition of the forest, and would extinguish certain species before they eat others.

15. *Dr. Cockayne.*] As to the high mountain-tops, in Canterbury they are used for sheep-grazing: are the tops of the high western mountains in Nelson also used for sheep-grazing?—Yes; on the ranges between Takaka and Collingwood there are a number of sheep depastured—above the bush-line—and they do very well indeed there. I do not think sheep are depastured to the westward of the Takaka Valley. Cattle are turned out on the Goodin Downs and on the Mount Arthur plateau.

16. In the beech forests did you notice whether the trees are diseased or healthy?—They seem to differ very much according to the locality. On our eastern ranges it is the general experience that the birch forests are very greatly diseased. It is difficult to find sound birch-trees of any size. Last week my attention was called to the fact that down the Buller nearly all the birch-trees felled recently in the McGowan Valley are perfectly sound. A surveyor told me that the birch on the high elevations was all perfectly sound, whereas on the eastern range of Nelson the contrary is the rule.

17. In view of the fact that certain species are likely to be of proved commercial value in the future, do you think an economic and scientific examination of the beech forests with regard to their regenerating-powers should be undertaken?—That would seem to be obvious, and would be of very great importance.

RICHARD EDWARD HARRIS sworn and examined. (No. 33.)

1. *The Chairman.*] What are you?—Crown Lands Ranger for the Nelson District.

2. Is it part of your duty to overlook the timber-areas?—Yes.

3. Is the timber administered by the Warden or the Commissioner of Crown Lands?—Some by the Warden and some by the Commissioner.

4. How many mills are there in operation?—Twenty-three or twenty-four.

5. How many of them come under the jurisdiction of the Commissioner of Crown Lands?—Two.

6. When a miller wishes to acquire an area of land for milling, how does he proceed?—He generally gives me instructions to measure the timber on it.

7. Is the area surveyed first?—Yes. They have been all old sections in State forests in years gone by.

8. Have you any difficulty in picking out those old boundaries?—No.

9. What is your method for measuring timber?—I generally measure the circumference of a tree, and get the height as nearly as possible, and then work out the contents by the formula. I use the Hopper's measurement.

10. Does the miller pay on the estimated quantity?—Yes.

11. Is it sold by auction or public tender?—By auction generally.

12. Do you find the millers are satisfied with the Department's estimates?—They are well satisfied so far, and there have been no complaints.

13. Do you consider that a more satisfactory method of dealing with timber than allowing a sawmiller to go through the bush and pay on the output that comes from his mill of the actual sound timber?—Oh, yes! We get all the revenue, and they get all the timber out of the bush. There is no waste.

14. In regard to the areas which come under the Warden: what method is adopted there?—The applicant erects his sawmill, cuts the timber out and ships it away and sells it. There is no one to supervise it.

15. Do they pay royalty?—I could not tell you, as I have nothing to do with it. The Receiver of Gold Revenue collects the revenue.

16. When he collects the revenue does he hand it over to the Receiver of Land Revenue?—I do not know anything about it, as we have no instructions to check these matters at all.

17. Has the Receiver of Gold Revenue any method of checking the amounts?—None at all.

18. He has no Ranger?—No.

19. Therefore the millers can do what they like without any check?—There is no check on them, and they can do what they like.

20. Do you find that the bush on the scenic reserves is fairly well preserved, or is it becoming infested with noxious weeds?—No. The only damage to the reserves is from fire, as the adjoining owners of land light fires, which spread to the reserves. All down the Buller people go along and put a match into the bush and burn acres of it, and do the same thing over again next year further on.

21. Can you suggest any means by which this can be prevented?—No. We have got the Engineer of Roads to instruct the surfacemen to keep a lookout for these people.

22. Has any case of the kind been sheeted home and proceedings instituted for damage?—Yes, one—between Westport and Inangahua Junction. It occurred eight or nine years ago. The guilty party was fined £3.

23. Do you find the deer becoming very numerous in this district?—Yes.

24. Will they be a menace to the orchards if allowed to go on increasing?—No doubt they will be.

25. Are they doing any damage to the native bush?—They have eaten the underscrub.

26. Have you noticed whether they are ring-barking the trees?—Certain classes of trees they do—the "five-finger" and karaka.

27. *Dr. Cockayne.*] Is the Buller Gorge reserved as a national park?—Part of it.

28. Are there notices put up explaining that no fires are permitted?—There were some put up on two or three different occasions, but all were pulled down.

29. Are there any notices there now?—Not that I am aware of. The last one was pulled down six weeks ago.

30. Would it be any use putting up notices now about burning, &c., in different places other than in the actual parks themselves? It would be a very good idea. Also as to shooting the protected birds.

31. *Mr. Murdoch.*] When a miller obtains an area for cutting, do you measure all the milling-timber on that block?—Yes, from 12 in. up.

32. You do not go lower?—Not below that, what we call millable timber. All the millable trees are marked and branded.

ALFRED JOHN WHITEHORN sworn and examined. (No. 34.)

1. *The Chairman.*] What is your position?—Government Ranger for the Nelson Land District. My district goes down nearly as far as the Inangahua district, from Reefton to Berlin, and as far as the mouth of the Maruia. I have been a Ranger since November, 1911, and prior to that date I was a chainman on the Government Survey staff and the Geological Survey. I have also had several years' experience as a farmer. I am the general inspector of the leaseholds and timber-cutting. I look after the sawmill and coal-outputs, the cutting of sleepers, &c.

2. What is the system here when a miller applies for an area of land?—The matter has never come before me, all the mills having been granted areas before my time.

3. What check is exercised over the output of timber to see the Crown receives its proper amount of royalty?—I go through their books and get the waybills from them.

4. Are the books kept well?—Apparently they are correct as far as I can see. Taking the big mills, I have never seen the butts of their books; they come to me as a lump sum. I inspect the books of Parata's mill.

5. Can you check their returns?—Only from the railway.

6. When do the millers supply these returns?—They make their payments every six months. I have sent in one return—last December—for the mills since being in Reefton. There are no mills cutting on Crown lands.

7. Supposing the miller has the right to cut off freehold land, and there is an area of Crown land in the vicinity on which he also has the right to cut, is there any method of checking what comes off the freehold, and also what comes off the Crown land?—That is the difficulty. My predecessor asked the Warden to stipulate that the miller should cut off only one area at a time.

8. Have you had any practice in the actual measurement of standing timber?—I can do it, but I have not had much experience.

9. How do you get the superficial contents?—I work on a formula I have in the office.

10. Do you think it would be advisable in all cases when inspecting the miller's books to also check by the railway measurement?—I would like a further check, and it would be better after seeing the miller's butts to also go through the railway-carriage notes.

11. Do you consider the dual control by the Warden and the Commissioner of Lands satisfactory?—I do not.

12. What would you suggest in its place?—To have one control only. The Warden might have to adjudicate on a case he had already acted on.

13. When a miller applies to a Warden for a timber-area does the latter refer it to the Commissioner to ascertain whether it is Crown land and open for milling?—Not as far as I know. One man has applied for a 50-acre block, and I have written to the Commissioner asking whether it was open for sawmilling purposes.

14. Are you supplied with maps showing what is Crown land and what land has been alienated?—We are supplied with the ordinary lithographs. They are hardly up to date, but I can tell from them which is Crown land. The boundaries might only be pencilled in and the actual survey not marked on the map.

15. What is the procedure as to the cutting of sleepers?—Most of the sleeper-cutters already have their twelve months' licenses, and only one man has got one since I have been at Reefton. He got it through the Warden's Court.

16. Does it apply to any specified area?—No. The fee is 5s., and it is a license to cut anywhere. It is issued under the regulations of the Land Act.

17. Then the Warden does not work under those regulations?—Yes, the Grey Warden, because he signed the license I referred to. The holder lives at Inangahua Junction.

18. After the man has got this rover's license does he pay royalty on the sleepers?—Yes, and it is collected when he brings them in. It amounts to 3d. per sleeper.

19. Supposing a sleeper-cutter came in with a quantity of sleepers to sell to the Railway Department, do they make him produce his license?—They are supposed to, according to the regulations.

20. What is your opinion with regard to the wisdom of allowing sleeper-cutters to roam all over the country cutting sleepers?—The policy does not work well in the interests of the Government, and there should be a better method adopted. I have no control over the cutting now. They might be given a license to cut in particular localities.

21. Have you formed an opinion as to the quantity of timber in your part of the district?—No. Any estimate I might form would be only approximate. I believe a return was sent in twelve months ago of the milling-timber, but it would be a very rough guess.

22. Who made it?—The previous Ranger at Westport.

23. What class of timber is general in your district?—Rimu. Very little kahikatea. There is birch also, and very small patches of totara.

24. Are not the birches milled out in that district?—Parata's have a standing order for birch, but other mills do not cut it.

25. Is there much timber used in connection with the mines?—Yes. It is cut by contract with the mine-owners, and no royalty is paid on it as far as I know.

26. Is the timber used by the mines sawn before it is used by them?—It is taken in the rough state. A return comes in for what is sawn, and the royalty is paid on that quantity.

27. *Mr. Murdoch.*] Do you think the dual control between the Warden and the Commissioner is a good one?—No, for the reasons I have stated.

28. *Dr. Cockayne.*] Do you know the yellow-pine?—The white-pine is called "yellow-pine" in some places. I have not seen in my district any yellow-pine.

29. *The Chairman.*] Supposing the men with roving licenses to cut sleepers were to cut posts and supply them to private individuals, is there any check to ensure the payment of the royalty?—A lot of posts have been supplied to the Public Works Department by private individuals, and they were cut without license. That has been the cause of my trip down the line to-day.

30. *Mr. Clarke.*] Then they can use their license for a double purpose, and you cannot detect them?—That is so. They should only be allowed to cut in defined and stated localities.

31. And perhaps large quantities may be sold to private individuals?—No doubt it is being done. There are thousands of posts about the roads on which I do not think royalty has been collected. I spoke to one man on the subject who got some off Crown land, and he quoted a clause in the Land Act permitting him to do it.

32. *Mr. Lethbridge.*] Have you any scenic reserves in your part of the district?—Little ones. There is one place at the Junction that should be reserved, but a lot of the existing ones are valueless. One place between the Junction and Three-channel Flat should be reserved.

33. Why are those you refer to no good?—They are spoilt from the scenic point of view, because the bush has been burnt off.

34. *Mr. Clarke.*] Are not they likely to regenerate themselves?—Not unless you plant the trees. If there is a good flat already burnt it is better to put it in grass than back into bush.

35. Do you attach no value to the scenic part of the matter?—Yes, when the scenery is there, and the beautiful native bush.

36. *Mr. Murdoch.*] Are the deer doing any damage to the native bush there?—I saw one head on the Inangahua recently, but I have had no complaints from the settlers. Up north I believe the farmers want to get rid of them. I have seen much damage done by them to the native forests in Nelson District.

37. Would they do much damage to the native forests if they were there in thousands?—No doubt they would. I have seen the undergrowth destroyed, the marks of their teeth on the scrub, and the trees half torn out of the ground and stripped. Once the deer have destroyed the scrub I have never seen it grow again, so that there would be little chance of the forest regenerating.

38. Are many goats here?—I have not seen many wild ones. There are some in the Maruia, but there are not many in the Nelson end.

BLENHEIM, SATURDAY, 29TH MARCH, 1913

WILLIAM HENRY SKINNER sworn and examined. (No. 35.)

1. *The Chairman.*] You are the Commissioner of Crown Lands and Chief Surveyor for the District of Marlborough?—Yes.

2. It has been represented to the Commission that in some districts the scenery reserves have been laid off in unsuitable places, that the timber has been destroyed, the reserves are becoming a breeding-ground for noxious weeds, and are also blocking settlement. Are there any places in this district to which that remark applies?—Not, generally speaking. The remarks may apply in a minor degree. There are only one or two small areas, as mentioned in our conversation this morning.

3. As to the one or two you mentioned, you will be able to forward a schedule later on showing the position and the reasons why they should be uplifted?—Yes.

4. In regard to climatic reserves: I notice your district has been fairly well attended to in that respect, but it would appear that in certain cases the advantages might be further extended?—I think so, especially in the Pelorus Valley and along the mountain backbone running south-west towards Tophouse.

5. It is not land that would be at all suitable for settlement?—Quite unsuitable—poor, rugged, barren country. A block in the upper part of Wakamarina Valley, adjoining the country in question and easy of access, has been open for selection for over two years, but no one appears willing to take it up. The timber on it is of little or no commercial value, consisting mainly of birch—no milling-timber in the ordinary sense.

6. In dealing with timber here what method is in vogue? Is it under the regulations of the Land Act, 1908?—Yes, that is on a royalty basis pure and simple. We have had no auctions here so far.

7. Do you not think the time has arrived now, in the interests of the Crown, that where an area is granted to a miller the timber should be carefully measured, the individual tres branded, and either put up to auction or tender with the upset price of the present royalty?—Certainly. That would be preferable to our present system, which is not, generally speaking, in the best interests of the Crown. There has been a great deal of waste in the past.

8. You think if a miller has to pay for every stick that the land will be much better cleaned up—which is, of course, to the interests of the Crown. You will be aware that that system has been in vogue in Auckland for a considerable time?—Yes. That is, in my opinion, the better system, and if any further timber-areas are dealt with in this district it will be by tender or auction as mentioned. Unfortunately there is very little timber left now to deal with.

9. In regard to the timber, you have no trouble with dual control in this respect?—No trouble at all. We administer the whole lot here.

10. Referring to these climatic reserves, I understand the deer are fairly numerous in this district?—Yes, they are fairly numerous in the Pelorus, and the Rai, and the upper portion of the Wairau Valley.

11. Do they live chiefly in the bush?—Mainly in the bush. Mr. Hursthouse will give fuller evidence than I can. We have had numerous complaints from the smaller settlers that they come out of the bush and damage the crops.

12. If they live in the bush they live on the herbage there?—Yes.

13. Do you not consider that with the large number of deer eating out the undergrowth in these climatic reserves it will tend to open the bush to the light and wind, dry up the moisture to a considerable extent, and thus pave the way for destruction by fires?—Yes, I think so, especially in our drier valleys. I have no evidence that I could put before you of any great damage done so far by the deer, but this must eventuate if the numbers increase. It must have a damaging effect as time goes on.

14. In your opinion the herds are increasing in number?—Yes.

15. Then, in regard to lands for afforestation, are there any lands in this district that you could recommend for plantation purposes? Of course, you will understand that for afforestation we can only deal with cheap lands that are not fit for settlement purposes, and of only small rental value?—I should say that very little Crown land of a suitable character is at present available for this purpose. As already stated, there is a block on the Altimarlock Run —pastoral lease—Awatere Valley, which I think would be suitable, and which would be available in five or six years on expiration of lease. This land is eight or ten miles up the Awatere from the Dumgree plantation, which you visited yesterday.

16. What is the nature of that land—broken land or paddock land?—Sloping land, broken as it rises in altitude. There is nothing left quite like that which you saw at Dumgree yesterday. On North Bank Settlement, Wairau Valley, there is good land for this purpose, but this is land for settlement and would require to be resumed.

17. Anything fit for land for settlement we could not look at, because the compound interest over long periods of years would swamp it. Do you know of any, Mr. Hursthouse?—Why not plant the waste lands in and along the Wairau River bed. There must be some thousand acres available there in different localities.

18. We find that to economically plant it can only be done in large areas. The administration of small areas—the necessary buildings and fencing—would make the cost excessive. If there are a thousand acres, would it be in one block?—Not in one block.

19. What are the private plantations here like, Mr. Skinner?—With regard to tree-cultivation on a large scale I would refer you to the plantations on the Hillersden Estate, Upper Wairau. Those plantations are doing remarkably well. Shelter-belts a mile and a mile and a half long and two or three chains wide have been successfully established, and go to show that dry country such as this is—both as to soil and atmosphere—will grow trees.

20. Do you not consider that it would pay the settlers in this district to do a great deal more than they are doing at present in the way of shelter-belts?—Most certainly. One great drawback has been the fact that if the settler improves his holding by planting his taxation is increased. Under the liberal terms of the Vogel-Atkinson scheme a great impetus was given to tree-planting, and if such were in operation now it would have a good effect.

21. It was suggested in Dunedin that land under plantation should be exempted from taxation. Do you agree with that suggestion?—I suggested such action before the Scenery Preservation Society in Taranaki some years ago. There is no doubt, however, that the tenants on the land for settlements in Flaxbourne, Starborough, Blind River, &c., are alive to the benefits of tree-planting. They cannot farm to advantage without it. The Wairau Valley was so wind-swept years ago that they could not grow grain. They can grow corn now, thanks mainly to the Hillersden plantations and others lower down the valley.

22. Do you think it would be a good thing if the Government had an expert forester to advise the people in regard to the kind of timber they should plant in these shelter-belts, with the idea that in the future they would provide a certain amount of timber for industrial purposes, butter-boxes, &c.?—I think that is an excellent idea. The trees could be supplied from the Crown nurseries at a most reasonable price. Often in these shelter-belts trees are put in of no use whatever for commercial purposes. The expert forester could advise those desirous of planting as to the most suitable trees.

23. *Mr. Adams.*] Have you noticed what particular trees the deer attack in those reserves?—Not the birches or the large trees, but the smaller luscious growth—the houhou and the broadleaf, and the karamu, and those plants or shrubs which constitute the undergrowth of the forest.

24. That seems to be the main consideration, whether they are trees of milling-timber or undershrubs?—Mostly shrubs.

25. You think they will not injure the forest-trees very much?—Of course, when the trees are very small they are nibbled off, but it is mainly the shrubs they are eating out now.

26. What is your opinion, Mr. Hursthouse?—The forest-trees perish with the rest.

27. *The Chairman.*] Is there not a danger, Mr. Skinner, that when the underscrub is devoured the sun gets in and dries up the leaves, and renders the forest liable to fire?—I am

not defending deer, but can hardly think they are so numerous as to be a serious menace to the bush. We had the same trouble in the Egmont National Park with the cattle. All sorts of remedies were suggested, unlicensed shooting amongst others, but now that settlement has advanced to the margin of the reserve the evil is curing itself. There, however, the forest recovers itself much more rapidly than in a dry district such as this, and the danger from fire need not be considered there.

28. Do you know how the estimates of timber in the report of 1909 were arrived at?—They were done by Mr. Stephenson Smith, the late Chief Surveyor, and Mr. Frank Ward, the late Crown Lands Ranger.

29. Is Mr. Ward here now?—He has retired from the service, and is in Nelson. Mr. Smith is here. The estimate of 1909, as regards private lands, I think was very much overestimated.

JOHN FAWCETT sworn and examined. (No. 36.)

1. *The Chairman.*] What is your position?—I am a builder and contractor.

2. Do you wish to make any statement or give any evidence in connection with our order of reference from the builders' point of view?—I am not quite prepared to make a statement at the present time. I would like to see other builders first and find out where they are getting their timber from. I think you have got the data as to the amount of available milling-timber in this district.

3. Have you a builders' association in this district?—No.

4. If the builders generally could arrange a meeting and reduce to writing the evidence they wish to put before the Commission, and forward the same to us later on, it would meet the case?—I think so. It is the only way to get valid evidence.

5. Where do you get your chief supply of timber from now?—From the Pelorus Valley. I have been getting some from the West Coast.

6. Through Picton?—No, round the coast and up the river—mostly rimu from the West Coast, and matai, rimu, and totara from the Sounds; but I think the timber in the Sounds is pretty well cut out. Our main supply is from the Rai Valley at present.

7. Do the builders here use the birches or beech-tree at all?—They use the birch if they can get it, but black-birch is very scarce, and brown-birch is not much to be had. Builders do not care about cutting it. If builders can get it they think it a satisfactory timber to use. Black-birch for piles and stringers is very difficult to get here, and builders have to fall back on ironbark and jarrah.

8. Are any of these timbers used for cabinetmaking purposes here?—None of the birches. Down in Greymouth there is some very excellent furniture being made from what they call the "red-birch": we call it "brown."

9. We find that red, brown, black, and white may refer to the same timber, and what they call "red" in one place may be "brown" birch in another: what is your opinion?—In the Onamalutu I used to get a good supply of red-birch, and it was so red it would take an expert to tell the difference between red-birch and totara.

10. Is there any *Pinus insignis* used here to your knowledge?—I have noticed a few trees milled, but it is only used for dray-bottoms. It seems to be light and tough for that purpose, but not suitable for the building trade. I bought some of those trees where you saw the row of poplar-stumps last night, and I built one or two sheds, and where kept off the ground—off the damp—that timber is as sound as possible, but I am using it mainly for fruit-boxes.

11. That is important evidence, because the poplar is a quick-growing tree. Do you consider it would be suitable for butter-boxes?—Certainly. There is no smell. It also makes very pretty furniture. Some of the boards I cut were about 14 in. wide. I made for a man a little clothes-box, oiled it, and it looked like birdseye-maple.

12. Is it an easily worked timber from the builders' point of view?—It is very soft, but very tough; no difficulty in nailing; does not split easily—good from that point of view—equal to if not better than white-pine.

13. Do you know the age of the poplar-trees in the avenue you mentioned when they were milled?—Yes, I can tell you to the year, because the man I made the box for—an old identity of Blenheim—asked me, when I was using some of the planks in connection with Levin and Co.'s new office, "What is that you are using, Fawcett? Is it poplar from that avenue of Mr. Neville's? I remember those being planted when they were the size of my finger. They were planted for a pig-fence about thirty-three years ago." I measured the trees felled on the ground, and they averaged about 97 ft. long.

14. And what was the mean girth, about?—The diameter would be about 2 ft., giving about 6 ft. of girth.

15. Would that be a butt measurement?—Yes.

16. And what measurement about 90 ft. up?—It would not be more than 20 in. girth from 90 ft., and 4 in. in diameter.

17. Four inches, you say, over 90 ft. That is useful evidence, as we are endeavouring to get the ratio of the growth of trees of various kinds?—I think it is a good average: thirty-three years old, and 6 ft. of a girth at the butt.

18. Is it fairly good land where they grew—shingle bottom?—No, river-bed silt; the very best soil. I think the poplar would grow on shingly soil. Whether it would be at the same rate of growth I do not know, because it is a tree the roots of which will find water, and it seems to grow quick and well enough. I had half a mind to send a few boards to the Government to see if they could not make use of them.

19. Have you any of the timber in stock now? Would you mind supplying the Commission with a small sample—say, a butter-box?—My timber is not quite wide enough. I have used all the wide stuff—6 by 1½ and 8 by 1½.

20. It need not necessarily be a butter-box. Could we have a cigar-box?—I would do that with pleasure.

21. *Mr. Adams.*] You say the black-birch is suitable for stringers, bridges, posts, &c. Can you suggest why the Australian timber is cutting it out?—It is a very valuable timber, and I am sure if it were put on the market it would be preferable to the Australian timber. I would use it myself, because I know it is a good timber. People will give you 7s. for a black-birch strainer at the present time, 7 ft. long and about 9 in. diameter.

22. How do you account for the Australian wood cutting it out in the way it is doing, according to your evidence?—Because the Australian timber has been placed on the market, and the black-birch has been left to rot here in the bush. Perhaps you get a nice fine tree with a 30 ft. barrel. You cut off a length of the 30 ft. at a bend, and the 7 ft. below is as hollow as a drum right through. I have seen it myself in the bush that way. It is a timber that takes a lot out of the soil. It is very heavy, and people will not take the trouble to place it on the market. If there were the same energy in placing black-birch on the market as there is over other timber I am sure it would hold its own against any timber from Australia.

23. How do you account for the fact that the other is placed more cheaply on the market? Evidently the Australian timber is hard to cut. In your experience is it quite as hard to cut as ours?—When you cut a tree of this Australian timber down you notice very little waste. In black-birch you cannot cut it without waste. You cannot rely on it: that is really the point. There are some beautiful black-birch trees in Karamea. In Marlborough they are not to be had, except on the high ranges, and it will not pay to get it.

HAROLD FRANKLIN HURSTHOUSE sworn and examined. (No. 37.)

1. *The Chairman.*] What is your position?—Crown Lands Ranger for Marlborough. I have been stationed in this district sixteen months, and prior to that in Nelson, at Westport, and also in North Auckland in the kauri forests. I have had six or seven years' experience as a Crown Lands Ranger, and I have also been Timber Ranger.

2. Were you a timber-measurer in the Auckland District, and did you work out the contents when putting the timber up for sale?—Yes.

3. In your opinion is the Auckland system a more satisfactory one for dealing with the timber than just selling it on a rough estimate, as obtains in some other districts?—Yes, I think so, particularly as regards the kauri timber. In fact, for timber generally I think that is a better method from the Crown's point of view.

4. The bush is worked in a thorough manner, and there is not so much waste?—I do not think there is so much waste. The majority of the sawmillers clean their bushes up in a practical manner. Of course, some waste more than others.

5. My experience has been in some districts the miller will run a tram through, and some trees nice and straight he will take, but others a little off the line in a gully he will pass over and push on to his next reserve, and so on. Those trees are apt to be left, and a fire runs through them?—That is so; but the matter rests with the Ranger. Before he can pass on his first area must be cleaned up to the Ranger's satisfaction.

6. Is not the tendency to run through, particularly if there are orders being filled for white-pine?—Theoretically the Ranger has power to make them clean up; but in cases where there is dual control it is a difficult matter, and with the shortness of timber I am of the opinion that if all the timber were measured it would be the more satisfactory way. Also, there is now many a sum of royalty that is not collected.

7. Do you think a man standing on a hill and looking over miles of country can form any reliable estimate of the amount of timber in a bush without thoroughly going through it and examining it carefully?—I am satisfied it is impossible to give anything like an estimate. Any estimate given in that manner is not worth the paper it is written on.

8. Have you noticed any deer in this district?—I have noticed signs of a great number, but very rarely see them.

9. They are shy, I suppose?—Very shy; but they appear to come out on the green clearings as soon as it is dark.

10. In the daytime they are mostly in the bush?—That I doubt. I do not think they go far in the bush, but keep along the edges in the cleared country.

11. What signs of them have you seen?—The bush being eaten and tramped. The tops of all the spurs in my district are more or less like a cowyard, the main ranges particularly. Everything is trampled out. I have often looked for signs of what they eat, because I had my doubts as to what they did eat. The major portion of this country has not much undergrowth. In the birch bush particularly you can see for 10 or 15 chains ahead of you nothing but a few young birch-trees and a fern I call the puhi.

12. Did you notice any shrubs in particular eaten?—Only the bush called the karamu; but I noticed the mosses eaten along the edges, and certain kinds of fern.

13. Have you noticed any of the larger trees barked by deer?—No; but I have seen them barked by goats, many of them.

14. How can you tell it is done by goats and not by deer?—I have seen the goats at it. They seem to bark anything.

15. Are the goats numerous in this district?—No, excepting in certain localities. They are wild goats: that is the trouble. In the forests where the goats are at all thick there is practically no undergrowth—the whole is eaten out—and the forest does not improve.

16. You think the goats had better be killed?—Yes.

17. What is your opinion, Mr. Skinner?—They are thick in places. In one portion of the district beyond where we were yesterday a Mr. Boyd has already killed five hundred goats. He said he could get no feed for his stock.

18. You recommend shooting them, Mr. Hursthouse?—I think the damage done by deer, goats, and cattle could be stopped by the rifle at any time.

19. It seems to be a question whether it would not pay the State, in view of the few sportsmen who are in the district or who come here from abroad, to keep our climatic reserves intact, rather than allow the deer to spread and damage them irretrievably?—Of course, I am not of the opinion that the deer are hurting our climatic reserves.

20. If they make tracks through the bush and eat the underscrub it will have a drying effect on the bush, rendering it more likely to be destroyed by fire?—Yes.

21. Do you not consider it would be a good plan to have certain parts of the country set apart as deer-parks or sanctuaries, and outside those places let the deer be shot at any time?—That seems a good plan. I have had cases mentioned to me of deer coming into crops and making a racecourse of them—not eating the crops. That was in the North Bank Settlement. They put in the night galloping round; not much of the crop left in the morning.

22. Have you had any instances under your notice of deer goring the draught horses?—Yes, in the Westport district and at Reefton—one case at each place.

23. Have you heard of any such cases, Mr. Skinner?—We had a complaint from Mr. Anderson, who had a fine draught horse killed in this district.

24. *Mr. Adams.*] What timbers in marking trees would you consider milling timbers, Mr. Hursthouse?—Rimu, matai, white-pine, totara. I have occasionally marked a miro where exceptionally good. Unless a tree contained 250 ft. I would not mark miro. The reason I would mark it is because probably he would take it whether I marked it or not.

WILLIAM NORRIS MASEFIELD sworn and examined. (No. 38.)

1. *The Chairman.*] Where do you live?—I am a sheep-farmer, living in Pelorus Sound. I have lived in the district about twenty years.

2. Are the deer fairly numerous where you live?—Not on my place, but quite near there are a number of red deer. They live chiefly in the bush, where they live on the leaves of the small trees. They also come out on the edge of the faces and feed on the grass.

3. Are they increasing?—Not very much. I have been deer-stalking for eight years, and have not noticed there are many more than there used to be. I have had more experience in the Wairau deer-stalking than down there.

4. Have you heard any complaints from the settlers of the deer damaging or destroying their fruit-trees and crops, or frightening or goring their horses?—I have heard once or twice—not locally, but more from the North Island—that they had to be shot off a bit, being too many; but they are not thick enough to have to do that here. I heard a farmer say a stag came among his cattle, but the big steers got hold of him and drove him away.

5. Will they not damage the climatic reserves and render them liable to fire?—I noticed at the "World's End," at Tennyson Inlet, on the Nelson boundary, they had got at the young trees, but in the Wairau there is just the birch, and they do no harm to the bush. They attack the small trees that do not grow large. They do not touch the pines, tawa, or pukatea.

6. Not even in their young state?—I have not noticed that. They eat one shiny-leaved tree that has a soft bark, but I do not know the name.

7. We have had evidence that the deer are doing much damage to orchards, one witness in Nelson complaining that five hundred trees had been so destroyed?—In my district the settlers would soon settle them if they got into an orchard; but they are not thick enough there.

8. Do you not think if certain areas of bush country were set aside as deer-parks—where they could be shot at certain seasons—and outside those areas they could be shot at any time, the sportsman's case would be met?—Yes. I suppose that would thin them out in the parts where you do not want them.

9. The president of the acclimatization society in Dunedin gave evidence and seemed prepared to fall in with that view. If treated in that way the interests of sportsmen and tourists might be conserved, and stop this damage being done to private individuals' properties?—They have destroyed a lot of crops, but not near us. They are not thick enough there and cannot get to us, as our property is on a narrow peninsula, and the water stops them.

10. *Mr. Adams.*] Do you know of many sportsmen coming from outside New Zealand to the district you know of best?—I do not think there are many. Some come to the Wairau deer-stalking, but I think most go to Otago and Wairarapa.

11. How many do you think have been here?—I only know of a few of my own friends.

12. Then the amount brought into the country by way of the licenses is of no great value?—I understand that you assess the damage done by the deer at a greater value than the income that may be brought into the country by encouraging sportsmen to come here. In my opinion, however, they do not do any great damage.

NAPIER, THURSDAY, 3RD APRIL, 1913.

ROBERT THOMAS SADD sworn and examined. (No. 39.)

1. *The Chairman.*] You are the Commissioner of Crown Lands and Chief Surveyor for the District of Hawke's Bay?—Yes.

2. This is not a very extensive timber district?—No; most of the timber lies a long distance back, some thirty to thirty-five miles.

3. Is there any sawmilling in operation at present?—There are five mills at work, partly on private and partly on Crown land: one at Norsewood, with about twelve months' cutting supply; Anderson and Sons', eight miles from Dannevirke, with about two years' cutting on Crown lands. At Puketitiri there are two mills cutting on private land, with about eight or nine years' cutting, chiefly rimu, thirty-five miles from here by traction-engine, but in winter timber-wagons only are used—a two days' trip. Bull Bros. have a mill at Tepuhuhi, on private land, with five or six years' cutting. There is another small mill near the same place. The Ranger, Mr. Brooks, has reported on the timber-areas, and I will forward a copy of his report. As to the area at Matawai and Motu, there have been efforts made to get it thrown open for settlement. The milling-timber is worth from £10 to £12 an acre, but it is deemed advisable to withhold the area until the railway gets closer. The rimu there is supposed to be some of the finest ever seen.

4. Is there any danger from fire if left in its present state?—It has escaped the recent fires when all the country was on fire, so that there seems to be no risk.

5. *Mr. Adams.*] Is there any estimate as to how long the present supply will last at the present rate of milling?—No; it might last ten years, but it would depend on the demand. It could be cut out in five years.

6. *Dr. Cockayne.*] Do you know the beeches by their scientific name?—I think the one referred to in the report is what they call "brown-birch."

7. *The Chairman.*] Has the *Pinus insignis* been used in this district for building?—A great deal is grown on the runs, but I do not know of any which has been cut up and sold for building; or gums either.

8. Are there any large private plantations in the Hawke's Bay Land District?—I think there are none over 50 acres. There are shelter-belts at Hastings, some of which would be thirty years old; but, of course, I am only a recent arrival here.

9. *Mr. Murdoch.*] There seem to be some decent trees on the Park at Hastings. Do you know their age?—They would probably be forty years old.

10. *The Chairman.*] Do you consider it advisable that the land on the northern shore of Lake Waikaremoana should be acquired and reserved for scenery purposes?—I do. It is a very important matter. It is Native land, and is situated in the Auckland Land District. If the forest there is not shortly acquired it will be destroyed along the face of the lake, the value of the lake will be affected, and the forest-area we have reserved on the other side of the lake will also be rendered worthless. Only recently another 100 acres has been burnt. The lake is looked on as a most important source for the development of electrical energy.

11. *Mr. Lethbridge.*] Do you think that taking the forest off the hills will diminish the rainfall?—Tremendously. Taking the south-west wind in the Nelson District, that wind becomes a dry wind after it passes the Hope Saddle.

12. *The Chairman.*] Is the caretaker at Lake Waikaremoana a Government employee?—He leases the place and boats from the Government, and is the Ranger for the trout-fishing.

13. Do you think he should be appointed Ranger for the scenery as well?—I certainly think so, and have recommended accordingly. He should have power to arrest offenders.

14. Are there any large areas of inferior land in this district belonging to the Crown that you could recommend as suitable for planting?—There are two large blocks at Kuripapango, on the road to Taupo, about seventy miles from Hastings.

15. *Mr. Lethbridge.*] Any chance of getting a railway there?—Not the slightest; but one could be put into it.

16. *The Chairman.*] Have you any more accessible?—The Kaiwhaka Block, worth from £1 to £1 10s. an acre. The value of the other I would estimate at £1 an acre.

17. *Mr. Adams.*] Which block would you expect the trees to grow the best on?—I think they would grow equally well on either block. The first block is 15,710 acres, and the second 14,000 acres. Then there is the Timahanga Block, of 17,000 acres, which is suitable.

18. *The Chairman.*] Have you had any complaints from settlers that the scenic reserves have been allowed to become breeding-places for weeds and rabbits, or have been laid off in unsuitable places?—I do not remember any; they generally only make those complaints when they want to obtain the lands so reserved.

19. *Mr. Lethbridge.*] Then you have had some?—In the Nelson District, but not here.

20. *The Chairman.*] Do you know if the deer are numerous in this district?—Yes, out in the blocks near the Omahi Saddle. I saw two red deer near the track.

21. *Dr. Cockayne.*] Do the sheep-farmers like them?—I do not think they trouble the farms to any extent. They are more troublesome to the cattle-farmers in the rutting-season, when they knock the cattle about. The red deer are spreading very fast in the forest reserve around Lake Waikaremoana. They are eating out the young growth, and no doubt thereby rendering the bush more liable to fire. It also induces campers to go into the bush to stalk the deer.

22. *Mr. Lethbridge.*] Do they shoot in the bush?—Yes. No doubt the deer are a great nuisance in those places and should be exterminated.

23. *Mr. Clarke.*] Are there any areas belonging to the Crown nearer than those you have indicated that could be acquired for planting purposes?—You would not get anything nearer than Kaiwhaka of a reasonable value. That block is Crown land, and not very valuable. It would run a sheep to the acre when broken in.

24. Is there any land in private hands that could be bought for the purpose, say, at from £1 to £1 10s. per acre?—I do not think so.

25. *Mr. Lethbridge.*] What about at Rissington?—You would not get it much cheaper there now. I know nothing so easily accessible as the Kaiwhaka Block.

26. *Mr. Adams.*] What is the difference in the elevation of these blocks?—Kaiwhaka is lower than the other one.

27. *The Chairman.*] What is the position with regard to the wind-swept areas in this district?—I would suggest that the Department might perhaps send an officer to examine them and report whether something could not be done in the way of planting shelter-belts to prevent the wind blowing the pumice and soil away. I am sure the marram-grass would take in these places.

28. *Dr. Cockayne.*] What is the nature of the soil?—Pumice. It blows all over the country and fertilizes other parts, but the places affected are denuded of soil.

29. Is there much of it?—One place is at Glen Ross, 350 acres, on land that ought to be carrying a sheep and a half to the acre, and the tops of the ranges. It would be best to deal with a piece of Crown land, which could be made an object-lesson to private owners. There is Crown land at Glen Ross where the experiment could be tried. I think the area of the "blown" country is increasing.

30. *The Chairman.*] Is there any other bush that ought to be reserved?—There is a patch near Te Puhuhu on Native land—Donnelly's bush—between 2,000 and 3,000 acres. It is the nearest bit of bush to Napier, and ought to be preserved. There is also another piece of bush on the road to Taupo of 300 or 400 acres. It is on the eastern portion of the Kaiwhaka Block; it should be taken as a scenic reserve.

31. *Dr. Cockayne.*] Are there any gullies in these patches of forest which could be preserved as samples of the flora if the surrounding land were cut up?—Yes. A lot of streams in that district are now dry as the result of the stripping of the bush; formerly they were full of water.

JOHN GRIFFIN sworn and examined. (No. 40.)

1. *The Chairman.*] You represent the Napier Builders' Association?—I am the president of the Hawke's Bay Builders' and Contractors' Industrial Union of Employers. Mr. Ward attends with me. As to the timber industry in this district, I may say that our local present supplies are principally derived from Pohui, Patoka, and Puketitiri districts. Besides these mills supplies also come from the Main Trunk line. The present high cost of timber is regulated by the difficulty of hauling from the inland mills, through want of railway service, the timber having to be brought in by traction-engine and horse teams at a cost of about 6s. per hundred feet, independent of 9d. per hundred road-tax charged by the County Council. The supply from the inland districts is good for years to come. The question of the conservation of timber, especially in the inland districts, is rather a difficult one to deal with. A large part of the bush lands is held in small holdings, and where not in a position to be milled commercially the timber is felled and destroyed by fire. It is perhaps opening up a large question to propose a way to get over this matter. In many cases the land is held under lease, in some instances freehold, but there is no doubt that some scheme should be formulated, either by repurchase of the land or bringing a law to bear, to prevent the awful waste of first-class building-timber. There are blocks of Native land carrying large quantities of bush which could be dealt with as indicated here. To give one example, it may be stated that on the Ohurakura Block, near Te Pohui, which skirts the main Napier Road, and is about thirty miles out, there is a block of about 3,000 to 3,500 acres of excellent bush suitable for milling. There are also large blocks of bush country through the Upper Mohaka, Ngatapa, and Te Haroto districts. As to future supplies of timber, we think the Government should acquire land suitable for planting on the route of the proposed Napier–Wairoa Railway. Nearer at hand, running through Hawke's Bay, are extensive river-flats where no doubt certain classes of timber could be grown to advantage.

2. Can either of you gentlemen tell the Commission how much timber is imported here?—

3. *Mr. Ward:* We can buy almost from anybody in the larger towns where they deal directly with the merchants, and the latter with the sawmillers; so that we cannot say what the imports are. We buy in Napier and do not import ourselves. The timber-merchants seem to know nothing about the meeting of this Commission, and one man told me they had received no intimation. I should have thought he could have given valuable information. He is a builder, sawmill-owner, and timber-merchant. I have been sawmilling for the last eighteen months at Puketitiri, but the rates of haulage put me out of court. There is plenty of bush there, and with proper cartage facilities the price of timber in Hawke's Bay would come down, because now the Main Trunk line regulates the price by reason of the cost it puts us to in obtaining timber from the inland bush. The men cutting the timber could tell a great deal better than the Lands Department what the bush is producing.

4. *The Chairman.*] Do you know, Mr. Ward, whether *Pinus insignis* has been milled in this district for building purposes, or gums?—In an experience of thirty-seven years I have not known of any. *Pinus insignis* has been cut for fencing, but the blue-gum is not suitable for building, being of too quick growth, and it splits to pieces.

5. Have you any knowledge of any private lands that could be acquired for tree-planting in Hawke's Bay?—I have not considered the question.

6. Do you agree that this district should be planted for future use?—No doubt it should. It should be made compulsory that when land is cut up so-much of the barren spots should be

planted. Or the Government should take the initiative in the matter. They are acquiring large blocks of land which are not fit for grazing, but would do for tree-planting. These portions could be conserved for afforestation purposes without much loss to the Government.

7. I suppose that as builders you recognize that your supplies in this district are very limited?—Up to within fifty miles from Napier on the inland road from twenty to twenty-five years' supply is all there is in sight with the present demand. If the demand increases it would be cut out under that time.

HENRY MARTIN SMITH sworn and examined. (No. 41.)

1. *The Chairman.*] You are the Crown Lands Ranger, Hawke's Bay?—Yes, and an authorized surveyor. I have been acquainted with this district constantly since 1889.

2. Is there much timber land at the Gisborne end?—A considerable area, but I have not been there for ten years. There is another Ranger there; I meet him at Mohaka. There has been a vast quantity of timber cut in the Motu district, and also destroyed by fire.

3. Do you know the Waikaremoana district?—Yes.

4. What class of bush is there?—Plenty of rimu and birch, but not very much totara.

5. Is the bush there of a kind that is liable to fire?—I do not think so, if ordinary care is taken. I laid off a road to the accommodation-house twelve years ago, and the bush was accidentally fired on one occasion by the fuse used for blasting.

6. Are there any deer running through the forests there?—Yes; moose and red deer. I have not been there for some years.

7. When you were there were the deer living in the bush or in the open?—In the bush; but there were not many. It is within the last ten years that they have increased.

8. *Dr. Cockayne.*] Are the moose increasing?—I cannot say.

9. Do they live in the bush too?—Yes; it is a scrubby sort of bush, and they are occasionally found on the outskirts; they would eat the undergrowth.

10. If they increased rapidly and kept on eating out the undergrowth do you not think the bush would be rendered more liable to fire?—I do not think so. I have had experience lately in respect to plantations which have been fenced in and the stock kept out, with the result that one or two have fired; whereas if the sheep had been allowed in in the spring they would have eaten down the grass and prevented the fire getting a hold. I do not say that cattle should be allowed in the plantations, but sheep do more good than harm.

11. If the underscrub is eaten out the grass will come on, but if there is any growth the grass will not come on: is not that so?—That is so; but in the case of an accidental fire, if the stock have been prevented having access to the plantation the same thing I speak of would occur—the grass would come on and the fire would have something to take hold of.

12. Supposing there were no grass in the forest would the danger from fire be increased?—Probably it would be increased if the underscrub were gone.

13. The under-planting and the scrub is the part which assists the forest to hold water and keep it in the soil. Supposing the scrub is removed by deer, would not there be a greater chance of the bush losing its water-holding power than if the scrub were there?—I do not think so. In the case of a forest reserve here on the ranges, some twenty years ago a huge fire swept over hundreds of acres, and had it not been for the underscrub the fire would not have gone as far as it did. Having once got a hold the whole area was destroyed, whereas had there been cattle in the bush to eat down the underscrub I doubt if the fire would have gone so far.

14. What about the question of the holding-capacity of the soil as regards water being lessened by the removal of the scrub?—It probably would be lessened.

15. *Mr. Murdoch.*] Supposing in the case of birch forests the old trees were dying out, and the deer had free play to roam where they liked and eat the trees and undergrowth, would the forest be able to regenerate itself again?—Under those circumstances regeneration might be prevented; but the great trouble in Hawke's Bay has been through the settlers firing their land and so damaging the forests adjoining.

16. *Mr. Adams.*] Do you know what shrubs the deer eat?—I do not.

17. *Mr. Sadd:* They will eat any shrubs the cattle will eat.

18. *The Chairman.*] Do you know any scenic reserve in this district, Mr. Smith, as to which the settlers have complained that they are unsuitable for the purpose and are becoming breeding-grounds for weeds and rabbits?—I do not know of any complaints from settlers in that respect.

19. *Dr. Cockayne.*] Does any shooting take place in the scenic reserves?—Not that I am aware of; but possibly in the case of the reserve near Waipukurau, which should be in charge of a caretaker, shooting does go on.

20. *The Chairman.*] Have you reported on the estimated quantities of timber in the bush in this district?—Yes, and the position of the mills.

21. What method do you adopt in estimating the timber?—I have taken an acre or two of what I considered was a fair average area, have noted the number of trees in that area, and made my report on that basis.

22. Would you take the measurement of these trees to work out the quantities?—I estimate the height.

23. What formula do you use for calculating the contents?—One-quarter the girth squared, multiplied by the length. I use the Hopper's measure.

24. You know the return for 1909 as to the forest areas of New Zealand, and the number of feet of milling-timber: do you consider those figures anywhere correct?—No; they are very approximate indeed.

25. You would not think it reasonable for a man to go to the top of a hill overlooking miles of country, and from there be able to decide how many feet of rimu, miro, kahikatea, and tawa there were in that bush?—Certainly not; it must be only extremely approximate. As a case in point, take the estimate of the Motou timber: there was no comparison between the ideas of the officers sent to estimate that.

26. Is that on record?—Yes, in Wellington.

27. *Dr. Cockayne.*] Does the Department give the officers a reasonable time to estimate the timber in these areas?—I think so, unless the estimate is wanted urgently, when the officer has to do the best he can. I think, as a rule, he is given ample time to do the work. When a man has to go into the bush his only plan is to count the trees, but if he is where he can overlook the whole area he can form a fair idea of what is in it.

28. Supposing an estimate was wanted of the timber in the East Cape Peninsula, how long would the Department give their officer to do it?—If the matter were urgent the officer has to do the best he can, and probably he would only look over the tops of the hills. But if they wanted an expert report I think they would be quite prepared to give a reasonable time to do it.

29. Could a man over a piece of land like that do the work under several months?—In several weeks.

30. Could he do it at all?—Yes, if properly equipped with a party and tents. Sawmillers seem able to get a good idea of what is in the bush the first time they go through it before tendering for the same, and might consider the time another man would take to do the work wasted.

31. *Mr. Adams.*] Do you think these estimates are under or over the mark?—I have always been inclined to err on the lesser side. Several officers were appointed to estimate the timber in the Motu bush, and they differed from one another from 15,000 ft. to 20,000 ft. to an acre.

32. Can you recall one case where the bush has been underestimated and afterwards cut out and the true quantity ascertained?—The Motu bush has been altered every year by cutting, and by private or Crown lands being further opened up. I do not think I can answer your question.

DARGAVILLE, TUESDAY, 15TH APRIL, 1913.

FRANCIS JOSEPH DARGAVILLE sworn and examined. (No. 42.)

1. *The Chairman.*] You are the Mayor of Dargaville?—Yes.

2. What point do you wish to bring before us?—I wish to refer to the question of the Waipoua Forest, regarding which a section of the community has endeavoured to induce the Government to keep it as a kauri-timber reserve. Speaking from experience, the idea of saving a kauri forest from destruction by fire has in almost all cases proved futile, as the kauri-tree is easily fired. Such a forest is not necessarily set on fire by the scrub in the immediate vicinity, but a spark from a distant blaze very often ignites a kauri-tree at its top, and soon the whole bush takes fire. Another point about the Waipoua Forest that has to be considered is that the bush there is spread over a considerable area of country which is admirably suited for settlement, enjoying an excellent climate, with soil of fair quality, and I am certain that if that area were opened for selection it would be eagerly sought after. I would therefore suggest that the Waipoua Forest should be offered for sale, and that the proceeds be utilized for the purpose of acquiring a forest belonging to Mr. Trounson, and which you will see to-morrow on the road to Waipoua. It is an isolated block, and more easily conserved from fire than any other block of timber in the district. It is also easy of access to a main road, and would be very handy to the proposed extension of the Kaihu Railway at Donnelly's Crossing. Mr. Trounson's area is from 300 to 500 acres. The Waipoua Forest is spread over about 23,000 acres, and this seems a large block of land to lock up for that purpose. The Government would be doing the right thing in disposing of the timber and thereby allowing the land to be utilized for settlement. Mr. Trounson's block adjoins the Kauri Park.

3. Has all the land adjoining the Waipoua Reserve been cut up for settlement?—Some of it is not yet in occupation, but the Prime Minister assured me the other day that the balance would be made available immediately for settlement. But Mr. Maxwell (caretaker, Waipoua Forest) will be able to give you more accurate information as to what sections are settled.

4. *Mr. Maxwell:* It is nearly all occupied, but there would be other sections available if the timber were sold.

5. *The Chairman.*] Is there any other matter you wish to mention, Mr. Dargaville?—As to the question of the export of white-pine, speaking as a settler, and not on behalf of the sawmilling industry, I may say that the kahikatea in this district is within measurable distance of being cut out, and we ought to consider the advisability of preventing its exportation, seeing it is required for a special purpose.

6. Is the kahikatea here growing by itself or is it mixed with other timber?—In some cases it is the sole timber, but on the higher ground it is mixed bush. On the flats there is little kahikatea.

7. In some districts it has been represented that where that timber is mixed with other classes of timber if the kahikatea is not worked it is liable to be wasted through destruction by fire. Do you agree with that view?—That event might occur in the case of the drier country.

8. Where it is growing as a bush solely it is generally on very rich land, and the question arises as to whether it would pay the State to keep that land in standing bush or to put it into grass which would produce butter-fat. Do you care to express an opinion on that point?—It is a matter that requires careful consideration, but personally I am of opinion that the grass would pay this country better.

9. Have you made any experiments in this district in the way of utilizing other timbers, such as tawa or taraire for butter-boxes?—None have been made to my knowledge. The kahikatea has always been so handy, and the time has not yet arrived when we have to think of providing other timbers. Taraire is being utilized for furniture, and it goes to Sydney for that purpose.

10. *Mr. Murdoch.*] Do you know of a bush from which the kauri has been removed and the rimu, leaving other timbers growing, and where fire has not run through?—No. It is difficult to find a bush in this district where fire has not gone through.

11. In that case the bush is done for?—Yes; fire follows the bushman and the settler.

12. *Mr. Clarke.*] And there is no timber available in those old burnt areas?—No, with the exception of the small timber that a few years ago would not be cut. Now they are cutting the "rickers," because they have become valuable.

13. Your main reason for wishing to dispose of the Waipoua Forest is the inability to protect it from fire?—Yes.

14. Later on you suggested the bush should be sold, and the proceeds applied to the purchase of another bush, which you reckoned could be saved from the fire?—Oh, no; but more easily saved. I do not know of any kauri forest that could be saved from fire, but Mr. Trounson's bush could be better protected than the Waipoua Reserve.

15. Do you not think there would be as much danger in the case of Mr. Trounson's forest, seeing that it faces the main road, and will be near the proposed railway?—I think not, for the reason that the road is there and also a lot of open country. It is not so liable to fire, being a small area, as one of over 20,000 acres, with much high fern and grass country surrounding it. Settlement is approaching Waipoua all the time, and the danger arises from the settler who is burning off his land, from whence fire may spread quite accidentally to the reserve. Or it might be set fire to by a gum-digger.

16. Do you recognize that your argument would absolutely preclude the saving of any bush?—To a greater degree as regards Waipoua, and to a lesser degree as regards Mr. Trounson's bush.

17. Why sell one reserve to buy another in its place in the same district?—It is less liable to be burnt than Waipoua.

18. Supposing the Waipoua Forest were opened for sale, what do you think would become of the timber itself?—You are getting on tender ground now. Opinions are divided as to where the timber would go. There would be great competition for the timber, and the State would get a very good price for it, but as to where it should or would go I do not profess to know, as I am not an expert.

19. *Mr. Lethbridge.*] What is the rainfall in the Waipoua Forest?—I do not know.

20. Well, it is so much that it is said that it is impossible almost to burn it?—I have been there on several occasions, and only once met with rain.

21. *The Chairman.*] Is there any other matter you wish to speak about?—With regard to afforestation generally, I am a member of the Hobson County Council, and that Council has now approved of a suggestion to plant all its reserves. In each county there are a large number of reserves fit for nothing, and bringing in no revenue, and we intend to plant them with utility trees, which will also assist the climatic conditions. The Government should encourage and assist local bodies and private individuals in this direction. My Council is going to put its planting scheme in hand this winter. We intend to plant some pines as shelter-belts, and useful trees inside.

WILLIAM THOMAS HUNT sworn and examined. (No. 43.)

1. *The Chairman.*] What matter do you wish to refer to?—I am a farmer, and a member of the Otamatea County Council, and wish to mention the matter of the block of 4,500 acres at Ruawai. It consists mostly of kahikatea, and was known as Butler's timber-cutting right. The Crown set aside Section 4, Block II, of 74 acres, as a reserve, but the timber having been cleared out of the adjoining block this small reserve is gradually decaying, and in a short time the timber will disappear. It is good land for settlement. I would suggest that the reservation be lifted, and the area be exchanged for portions of Sections 1A and 2 of Block XII, Tokatoka Survey District. Kauri-trees are growing on the hilly land in the sections I suggest for exchange, and there is no other bush within a hundred miles of the piece on those sections.

2. *Mr. Lethbridge.*] You think the Government should sell the present reserve?—Yes, and put the reserve I suggest in place of it.

3. *The Chairman.*] Are there not timber-rights over the portion you now want reserved?—Yes, and we suggest that the Crown should buy the timber thereon from the Butler people.

4. Has any estimate been made of the quantity of timber involved?—Yes, all the kauri has been estimated, and 6d. royalty is being paid for it.

5. *Mr. Lethbridge.*] Would it be worth while putting a tram into it?—I think so; but in 100 acres you would not get more than twenty-five kauri-trees. I cannot give an estimate now of the quantity of timber there.

PETER BROWN sworn and examined. (No. 44.)

1. *The Chairman.*] What is your occupation?—I am a settler residing at Waimata, about seven miles from here. I wish to refer to the question of the Waipoua Forest. I agree with Mr. Dargaville that it would be wise to dispose of the timber there, and open the land up for dairy farms, as the latter are a better asset to the community than timber, which is liable to be destroyed by fire at any time.

2. Have you been through that forest recently?—No.
3. At any time?—Yes, all over it.
4. Were you residing there then?—Yes.
5. What was the climate like in those days?—There was a great deal more rain than now, but as the bush has been cleared we have less rain.
6. That being so, do you not think if all the bush were cleared off it would be a bad thing for the district?—No. We are in a swampy country, not hilly, and I do not think we shall ever be short of rain. But I do not want all the bush to go all the same.
7. When you resided in the bush were there any fires?—A few odd trees were burnt.
8. Before Waipoua was declared a State forest was it pretty well run over by gum-diggers?—Yes.
9. Therefore if it were liable to burn it stood a very good chance of being burnt then?—I suppose so, but a kauri bush is apt to be burnt at any time by a man lighting his pipe.
10. On account of the rainfall do you not think that even if a fire did start it would probably go out?—I do not think so. Once a fire starts in a kauri-tree it runs to the top and will spread thence to another tree half a mile away, and so on, even if there is not plenty of fuel on the ground.
11. *Mr. Clarke.*] Has any one a right to start a fire in that forest?—No, but a man might drop a match after lighting his pipe.
12. But I understand that there are no regular roads to or through Waipoua Forest?—Not that I know of.
13. Then what purpose would a man go there for?—Some go pig-hunting and cattle-hunting.
14. I suppose such people know they run the risk of imprisonment if they start fires there?—It would not be done on purpose. The Ranger cannot be everywhere, although he is as good a man as you can get.

JOHN H. MCCARROLL sworn and examined. (No. 45.)

1. *The Chairman.*] What do you wish to state?—I am a settler, but have had twenty-five years' experience as a forester and sawmiller. I wish to support Mr. Hunt in his application regarding the reserve at Ruawai. The present reserve should be sold and parts of the others he mentions taken up for scenery-preservation purposes, as there is not another piece of bush nearer than a hundred miles. I am not pessimistic enough to say that no kauri can be saved: it can be. As to the Waipoua State Forest, I strongly oppose its being opened up, both for sentimental and commercial reasons. We have there a forest that can never be replaced, as a kauri-tree cannot be grown in a hundred generations. As to the talk about fire, I say it is impossible to burn that forest even if you tried after a dry season like the present, on account of the wet vegetation there is in the bush. It would pay the Government to expend a larger sum than at present in protecting the Waipoua Forest from the risk of destruction, as it is a wonderful national asset. To-day the poor man cannot buy kauri timber, but wealthy private individuals are allowed to export it from the country, realizing large profits thereby. If Waipoua is sold our own people should have the benefit of the timber, and on that ground I would hold the present reserve.
2. Have you been over this forest personally?—I know it all.
3. What is the quality of the land there from a settlement point of view?—No good at all, on account of its abnormal rainfall. It is too poor to grow anything once the kauri is removed. In the immediate vicinity of that bush and towards the coast the country is nothing but gum land and fern hills.
4. Do you know the Marlborough Settlement?—I know it well.
5. How are the settlers doing there?—I rode through that settlement seven years ago and every house had the shutters up, and the settlers had deserted it with the exception of one man. I understand that since I was there it has been taken up again, and fresh people are tackling it.
6. Since when?—Within the last two years. They have had a good summer and good burns.
7. Do you agree that if this forest were thrown open a lot of land would be available for settlement?—I contend that the Government would be committing a sin if they allowed that forest to be destroyed. There are different fern-growths there that you do not get in any other New Zealand forest. The only place which is doing any good is Kaitaia, a considerable distance in from the Waipoua Forest.
8. Have you any evidence to give the Commission with regard to the proposed stoppage of the export of white-pine?—The day has arrived when the Government ought to seriously consider whether the white-pine should be sold for export, because that tree is becoming so scarce. I admit you cannot interfere with the private individual, but the Government should sell no more of its white-pine for exportation.
9. But if the Government said none of it could be exported, what about the position of the private individual then?—It would hit some people very hard, perhaps myself included; but, speaking generally, I think the time has come when the prohibition of the white-pine export ought to be seriously considered. The dairying industry is growing rapidly, and what are we going to do when we cannot get butter-boxes?
10. What do you think they do in Canada and Siberia?—I cannot say.
11. *Mr. Murdoch.*] Have you any other timber that will answer the purpose?—I cannot tell you. We have no tawa here in any quantity that would pay to mill.
12. What about taraire?—Yes, but not in millable quantities.

13. *The Chairman.*] Do you wish to state any other point?—With regard to reafforestation, speaking from practical experience I found that when I grew *Pinus insignis* close together I got a millable tree, while if grown apart the tree was worth nothing.

14. Have you had any experience in milling *Pinus insignis?*—No. I have seen it milled, and it turned out very well. I planted them twenty-five years ago, and they are now 3 ft. in diameter and fit to mill. I planted them on very poor gum country. I will forward measurements.

15. Have you planted gums?—No; only *Pinus insignis*, Norway pine, pitch-pine, and *macrocarpa*. I have come to the conclusion that the closer together you plant the cleaner the trunk will be; the tree will shed its branches, and the sun will draw it up into a straight, clean stick.

EDWIN HARDING sworn and examined. (No. 46.)

1. *The Chairman.*] I understand you wish to tender evidence regarding the question we are inquiring into?—Yes. I am a farmer residing in this district, and I wish to urge the desirability of adopting a better method of selection or location of the forest reserves, and as to the class of country to be reserved. Many of the areas which have been set apart for climatic and other reserves have been well adapted for settlement; on the other hand, a good deal of country has been opened for selection which is of no commercial value, but is distinctly adapted for reservation purposes. Hilltops have been opened in this district and in Hawke's Bay for selection which, when the forest has been removed, have proved worthless; while in other places, such as portions of the Pekehekarau State Forest Reserve, and near Puhipuhi, where reserves have been set apart, it has been impossible to prevent fires. Thus the Dominion loses the value that it sought to obtain by making these reserves. Sections on the Tangihua Range, near Tangiteroria—almost bare rock, or with a certain light forest growth—might be set apart with advantage as climatic reserves.

2. Are those sections in the hands of the Crown?—Some are, but others have been in the hands of settlers for some years. They have applied in one or two cases to be allowed to surrender a portion of their leases which contained land useless for pastoral purposes, but nothing has been done.

3. *Mr. Clarke.*] Then they would not have any forest reserve?—The forest is already there, and should be reserved from the climatic point of view. While a member of the Hobson County Council we made repeated application to the Land Board and the Minister for the removal of reservations on the lower-lying hills, and to have reserved in their place similar areas, or even larger ones, on the mountain-tops. Again nothing was done. I would even suggest that the mountain-tops, where they are in private hands, should be purchased and reserved, or exchanged for available pastoral lands lower down; or the latter could be sold.

4. *The Chairman.*] If the Government wanted to purchase land on mountain-tops might not an enhanced value be put on the same?—Yes; but would there not be a still greater commercial value in the case of the lower lands released from reservation?

5. I am not speaking of the intrinsic value, but rather of the chance the owner would have to impose an enormous price on the Crown when he knew the land was wanted for scenic or climatic purposes?—Then I would be in favour of taking the land compulsorily.

6. *Mr. Murdoch.*] I presume there are portions of the Tangihua Range still in the hands of the Crown?—A portion belonging to the Omana Block—known as Wangimatangi—we repeatedly asked should be reserved, as it had no value from a settlement point of view, before that block reached its present high commercial value.

7. *Mr. Clarke.*] Do you suggest that trees should only be planted in situations where the land is absolutely valueless for settlement?—I am talking of land which is covered with virgin forest, and absolutely safe from fire. For climatic purposes some of the reserves have been made in the wrong places and in localities prone to fire; also in districts which would have been better settled.

8. *Mr. Lethbridge.*] You suggest a comprehensive scheme of exchange in connection with all such areas?—I do—holding what is in the hands of the Crown where the areas are suitable for reserves, purchasing the hilltops where required, and selling the lower levels now held as reserves and where the same are fit for settlement.

9. *The Chairman.*] Do you know the Waipoua Forest?—Yes, very well. I have had a life-long experience of that class of country, and taking into consideration what has occurred in this district, the Bay of Islands, and in the Whangarei district, I am distinctly of opinion that it is impossible to preserve that forest from fire.

10. *Mr. Lethbridge.*] Do you know the rainfall?—Not accurately.

11. We are told that it is very high?—That is so; but in such districts there occasionally comes a period of drought, when fires will occur and spread. There is no class of country more inflammable than a kauri bush. Every credit must be given to those responsible for protecting this forest in the past, but the time will come when a huge fire will occur, with the result that, as at Puhipuhi, many thousand feet of most valuable timber will be lost to the Dominion. At Kaihu there is the Kauri Park, and a considerable expense was incurred in preserving that place from fire by cutting the scrub and clearing the ground round the park from grass; but only a few years ago a fire travelled across the country for some distance and destroyed the most striking portion of the park—the big kauri-tree. As to the commercial value of the Waipoua Forest, myself and others feel that it would be a permanent injury to the district if an enormous asset—

estimated at £250,000 worth of timber—were withheld from the market, with its consequent employment of labour; and also if from 25,000 to 40,000 acres of land, capable on the average of carrying from two to two sheep and a half to the acre, were to be permanently reserved from settlement.

12. Mr. McCarroll forms a different estimate of the value of the soil in that forest?—I can only give my own opinion. We have a very successful cheese-factory within a few miles of Waipoua; there is a successful district on the northern side, and we are drawing cream from the eastern side. I have been through the district, and there is not sufficient difference in the quality of the soil to justify me in saying that any large portion of it would be of less value than the land on an average sheep-run.

13. We have been told that the settlers have been starved out of one settlement to the north of Waipoua, and that only lately have others gone in to try and make a living?—I refer to Waimamuku, which is closer to the coast.

14. Do you know the Auckland Settlement, and the result in that case?—Those settlers took up the land in small areas when the road was not passable; but I consider the land there is distinctly superior to that in the Marlborough Settlement, and the settlers there are making a success of dairying on country which was thought nearly impossible for such a purpose years ago. It is on the eastern side of Waipoua. Dairying is not a success, I admit, on the Marlborough Settlement.

15. How many settlers in the Auckland Settlement are supplying cream now?—I think less than twelve. I do not think any of the higher country is now used for dairying, but the quality of the soil has been proved to be such that it can be used as dairying country. Visitors wishing to see kauri-trees can see some of the finest specimens in existence at Kauri Park, and adjoining that area there is a good kauri bush belonging to Mr. Trounson which, if acquired, would justify the State in maintaining it as a kauri exhibit.

16. *Mr. Clarke.*] Why buy Mr. Trounson's bush when we have one of equal or greater value in the hands of the Crown already?—For the reason that the other is inaccessible.

17. *The Chairman.*] Is there any other point you wish to mention?—I wish to suggest the reafforestation of some of our northern lands, which are lying unproductive. We contribute our revenue to the Forestry Branch of the Department and get nothing in return.

18. *Mr. Lethbridge.*] Are you not getting one-half back for your roads?—No, because in the case of a forest reserve on Government land no timber is being cut. We have been told that in the case of royalties derived from State forests from which the reservations have been lifted the money is earmarked by law for reafforestation; so the north gets practically nothing now, although for the first year after the Royalties Act was passed we did get something where the reservations had been removed.

19. Has nothing been done at Puhipuhi?—Very little. There are considerable areas on the west coast here which would grow good trees, and which are fairly safe from fire. They are gum reserves on Crown land.

20. *The Chairman.*] That is the point. We know we can grow the timber, but can we preserve it from fire?—They are doing it at Rotorua.

21. Have you any views on the question of prohibiting the export of white-pine?—There is a general point in that connection which should be considered. Considerable areas of kahikatea have been purchased at a value estimated on the export demand, and large areas are being held by the present owners because of the export value. The question is therefore whether there would not be an injustice done those who have purchased it on the strength of the price obtained for this timber for export purposes if its further exportation is prohibited. That is all I wish to say.

WOOLSEY ALLEN sworn and examined. (No. 47.)

1. *The Chairman.*] What is your occupation?—I am a sawmiller, residing at Dargaville. I do not think the exportation of white-pine should be stopped for a considerable time. The Government should, however, set apart certain areas to meet future requirements, but the exportation should not be blocked for many years to come.

2. *Mr. Lethbridge.*] Is there a good deal here?—It is mixed with other timbers, and there is a large quantity left still. Some people want the land cleared as soon as possible, and now you cannot acquire timber-rights for more than two or three years at the outside. If the Government block the export these people will fell and burn the kahikatea, and nobody will benefit. Now the settlers are making money out of the royalty, and slowly getting their farms into order. New Zealand timber-merchants now only use the very best of the white-pine, while the Australian market takes anything—from 2 ft. by ¾ in. upwards, second- or third-class material that we in New Zealand will not look at. I can sell anything from 2 ft. in length and upwards.

3. *Mr. Murdoch.*] What proportion of butter-box sizes do you get in kahikatea?—65 per cent. Australia will take all the 6 in. by 1 in. it can get for lining, and the rest goes into butter-boxes.

JAMES MAXWELL sworn and examined. (No. 48.)

1. *The Chairman.*] You are the caretaker of the Waipoua Forest?—Yes. I have been twelve years in the district, and six years caretaker. I know the Waipoua Block thoroughly. The kauri throughout the area of 23,000 acres is scattered in clumps, with very little on the eastern side.

2. What kind of timber is growing there?—Rimu, miro, taraire, kahikatea, and a little totara.

3. Is the soil fit for dairying supposing the bush was removed?—Certainly, outside the kauri area. Where the kauri is growing some of the soil is fair, but as you know kauri absorbs all the good in the soil.

4. From your experience do you consider the Waipoua climate very wet?—Yes, it is very wet.

5. Is there much danger of that bush being burnt if it caught fire accidentally?—There is no danger of its being burnt so long as some vandal does not set fire to it in very dry weather.

6. Have you known of a fire being started there and going out?—I have seen a fern-fire started more than once and run up, because I have done it myself. In the winter-time, when the wind is blowing from the forest, we sometimes burn a bad bit of fern, as it is the most suitable time to burn. But it is risky even then, and I am extremely careful.

7. Whenever a fire of that kind has been started it has gone out again?—Certainly.

8. *Mr. Murdoch.*] You are quite conscious of the fact that if the fire had got into the bush it would have gone through the bush?—The bush would burn to a certain extent; but the gum-diggers had carte blanche for twenty-five years to try their level best to burn some of it, and they did burn a little, but very little. When these men were camped in the bush they lit fires at the bottom of some of the trees, but only a little of the tree was burnt. The fire never ran through the forest.

9. *The Chairman.*] Are there any settlers living round and about that reserve?—There are none in the immediate vicinity of the kauri forest. The Auckland Settlement adjoins the reserve.

10. How long is it since you were there?—I think, six years ago. I do not know the condition of the settlement now. I could send you a report on it, because I do not think the Crown Lands Ranger has been there lately.

WHANGAREI, MONDAY, 21ST APRIL, 1913.

LIONEL HANLON sworn and examined. (No. 49.)

1. *The Chairman.*] What do you wish to say?—I have been asked to wait on the Commission by the Fruitgrowers' Association here, which has recently asked the Minister of Agriculture to select and plant suitable areas of land in the vicinity of Whangarei for the supply of timber for fruit-cases for the near future. Some years ago fruit-cases cost us 4s. 6d. a dozen, then they went to 5s. 3d., and this month the price has been again raised to 7s. 6d. a dozen. I refer to bushel cases. Native timbers are used—in fact, anything. Apples are sold at 2s. 6d. a case.

2. Have you known of *Pinus insignis* being milled here for cases?—No; but at Port Albert that timber is being used for cases, while at the Tasman Settlement, Nelson, *Pinus insignis* is being planted for the same purpose.

3. *Dr. Cockayne.*] Are the settlers at Port Albert milling the *Pinus insignis* themselves?—No; I think they take it to the local mill. I heard of one settler who planted 5 acres recently for fruit-cases on the same soil he is growing fruit on.

4. *Mr. Clarke.*] Have you used that timber here?—No. A number of *Pinus insignis* trees forty years old were cut down in the town here recently, but the mill would not take them away, as they deemed them worthless. There are many thousands of acres here that would grow *Pinus insignis* well; also apples.

5. *The Chairman.*] Private or Crown land?—Mixed.

6. In the event of the Government entertaining the idea of making a plantation here, at what price could the land be obtained?—Close to the town the value would be considerable.

7. Could they get it for £1 an acre?—Yes, and less. A little out of the way it could be got for from 10s. to £1.

8. *Mr. Murdoch.*] Could a block of 10,000 acres be obtained?—I could not say. Plenty of gum reserves that are nearly worked out could be got.

9. *The Chairman.*] We can only recommend plantations on large areas?—Gums do not kill out the fern for many years, but *Pinus insignis* does it in a few years, and nothing I know of has a better chance here than the *Pinus insignis*.

10. Have you had any experience of the poplar as a fire-resister?—I have not seen a poplar burning, and cannot say whether a belt of that tree would check a fire. The Lombardy poplar does not do well on poor land. The aspen poplar has been taken up locally for cabinetmaking by Harrison and Sons. Some trees at Mairtown are 3 ft. in diameter.

11. *Mr. Murdoch.*] Was fern the cause of the Puhipuhi plantation catching fire?—Yes.

12. *Mr. Clarke.*] Were any precautions taken to guard it?—No.

13. *The Chairman.*] If tea-tree were burnt off and *Pinus insignis* seed sown broadcast, would the latter beat the tea-tree?—I believe *Pinus insignis* would. At Parahaki, near here, you can observe the *Pinus insignis* coming up through the tea-tree.

14. *Mr. Lethbridge.*] Are there many imported birds here?—Thrushes. The blackbird is dying out. I do not think the latter are to be feared, because Waiotapu simply swarms with blackbirds, and still the *Pinus insignus* is increasing rapidly there. They do not kill the seedlings.

15. *Dr. Cockayne.*] Do you use your fruit-cases over and over again?—Only once.

16. Consequently the quantity required is very much increased?—Yes. We have to look out for disease, and there is difficulty in getting them back again.

18. *The Chairman.*] Have you had any experience of taraire as a timber?—Boards of that timber have recently been used in the erection of a factory here in defiance of the by-laws, and it seems a remarkably hard timber with good lasting qualities. You can see the place. I have seen large quantities of it in the bushes close here, while hundreds of acres have been burnt a few miles out from Whangarei. You can see the remains of the trees—50 ft. to 60 ft. high, without a branch, and from 12 in. to 24 in. in diameter. The country there is of a similar class to that in the Nelson District, and, like that land, grows the finest apples.

AUCKLAND, THURSDAY, 24TH APRIL, 1913.

DAVID GOLDIE sworn and examined. (No. 50.)

1. *The Chairman.*] You are a timber-merchant in business in Auckland?—Yes.

2. One subject we have to inquire into is as to whether or not, in view of the increasing demand for white-pine timber in this country, its exportation should be prohibited. We should be very glad to hear your views and those of the other Auckland timber-merchants regarding this question?—It is a great mistake to continue shipping white-pine in planks to the English market, where it is used for piano-cases. I have refused to supply it for that purpose, as it discredits the timber of New Zealand generally; but I was informed that a cheap case was wanted, and the people concerned did not care whether it lasted or not. For that purpose I should certainly put an export duty on that timber. As to butter-boxes, the question turns on the supply and demand. The Lands Department could better supply that information.

3. The white-pine grows on swamp land of the best quality very often for dairying, and the question arises whether it would pay the country better to keep that land in timber or use it for dairying purposes. What is your opinion?—The matter depends entirely on whether the swamp land can be properly drained, and its situation generally.

4. Have you had any experience in using *Pinus insignis* timber?—Two mills here have used that timber for boxmaking, and some of it went to Rarotonga, where it was condemned.

5. That timber perhaps was not grown under forestry conditions?—No, simply for shelter. It was full of knots. Macklow Bros. and the Waitemata Milling Company were the firms that used it. They did so when they had no other logs, but I refused to buy any of it.

6. Have you had any experience as to the cost of building in wood and in brickwork or ferro-concrete?—No. Kauri is not used very much in building now. Rimu and matai are used, but on account of the inferior timber used present-day buildings are not very much more costly than in olden times. Timber grown on pumice soil is not as good as that grown in the north. Totara, for instance, grown on pumice land is not as heavy as that grown in the north.

7. The life of a building erected now is not as long as the life of one constructed twenty years ago?—No, especially if it is built by jerry-builders. There are buildings which have been erected fifty years, and the timber seems as good as the day it was put in. In those days kauri was cheap, and good timber was used—not the cheap stuff they are using now.

8. *Mr. Clarke.*] What are your views as to the question of the future timber-supply for the Dominion?—I think the Department could furnish you with reliable information on that point better than I could. Building is increasing, and the supply is becoming smaller. In the King-country from forty to fifty million feet has been cut in recent years by a few mills.

9. Do you find it more difficult to obtain supplies than you did formerly?—Yes. Royalty in the case of kauri is now 4s. and 5s. per 100 ft., when formerly it used to be only 6d. Then we have to pay much higher wages, and do not get an equivalent amount of work.

10. We are told that forests which have already been milled are now being gone over again, and trees that at one time were rejected as unfit for the saw are now being cut up and supplied as marketable timber. Is that correct?—Quite true. The mills are now taking it all out, when before it was rejected, kauri especially.

11. Do you think the Government are in general getting sufficient payment throughout the Dominion for the standing timber?—As far as the north is concerned they are getting the full value—every tree has to be paid for; but in the south the same system is not followed. There the Government are not getting the value, and the system is unfair to us. We pay for timber that it does not pay us to take out, and the Government gets it.

12. Do you not think that our supplies are not as great as they are commonly supposed to be?—They will not last as long as it is thought.

13. *Mr. Murdoch.*] Do you not think some method could be adopted to check the waste that goes on in connection with our bushes?—The kauri you cannot possibly save, because that tree is easily killed. Smoke will almost kill it, while the tapping for the gum destroys the trees wholesale. In some cases gum-diggers are allowed to tap the trees to prevent their setting fire to the forest, and in a dry season like the present there is an ever-constant danger of a bush-fire spreading and destroying thousands of pounds' worth of kauri.

14. What effect has tapping on a tree?—We never like it tapped unless we are going to cut it within three years.

15. Does tapping cause any injury to the wood?—It is like taking the life-blood from a man, and the timber is not nearly as good, to my mind.

16. *Dr. Cockayne.*] Have you had any experience as to the lasting-powers of timber which has been tapped and of timber which has not been tapped?—When cutting it up I thought the tapped kauri seemed very much softer and spongier.

17. *Mr. Murdoch.*] You have found great difficulty in saving a kauri bush from fire?—You cannot save it unless it is a large area and you have plenty of men on watch; then there is great difficulty. You can save any other timber but kauri.

18. *The Chairman.*] Is there any other point you wish to mention?—I suggest that you should consider the advisability of growing wattle, which forms capital wood for staves for butter-barrels. It grows rapidly, fire does not affect it, and it is used in Australia for the purpose I mention. Black-wattle is the one to grow.

19. *Mr. Clarke.*] Do you not think some of the gum lands could be profitably utilized for planting for future requirements?—The only trouble is as to the time it will take to grow the trees. Any tree to be of any value will take a long time to mature. You might try the Tasmanian gums. We use the peppermint-gum for shingles, and the stringy-bark for flooring and joists. These gums might do better in the south on account of the climatic conditions there corresponding to those in Tasmania, but they might be tried up here also.

20. What is your opinion with regard to planting these gum lands with pines of a commercial value?—It would depend on the price of labour. If you utilized prison labour it might work out all right, but with free labour at its present price it would never pay. You could import your timber very much cheaper.

21. But supposing other countries are in the same predicament as ourselves, and have no timber to spare for us to import, what then?—That will not be in your time or in mine. There is plenty of timber in Siberia, and it is being imported into Melbourne now. Vast forests are being opened up there, while in the Pacific islands there is good timber. I submit you will be able to import timber very much cheaper than you can produce it here, and you only need to grow forests for climatic reasons.

22. I suppose you know that not only here but in other parts of the world, including Siberia, the estimated timber-supplies are very much in doubt?—We have no difficulty in getting timber, and foreign agents are continually pressing us for orders.

23. What about the future? Do you not think it would be a wise policy to be prepared with local supplies, so as not to have to depend on countries we might go to war with?—If you are going to pay two and three times the value of the timber it would not be worth producing it here.

WILLIAM ARTHUR CUMMING sworn and examined. (No. 51.)

1. *The Chairman.*] I believe you are the president of the Auckland Branch of the Institute of Architects?—Yes.

2. Could you tell the Commission the comparative price of building, say, a six-roomed house in timber and in permanent materials such as brick, stone, or ferro-concrete?—The better reply would be that the price to-day in brickwork would be about from 19 to 20 per cent. more than it would be in timber, taking the question on broad lines without regard to any special-sized house.

3. How would the price in ferro-concrete compare with that in brickwork?—The difference would be comparatively trifling in the case of a small job, as the amount of labour involved in fixing up the false-work is inconsiderable.

4. I suppose the timber used in that case would be inferior?—It is not necessary that it should be of a durable nature for false-work, and *Pinus insignis* lends itself extremely well to such a purpose.

5. Can timber used for false-work in the case of a concrete building be used over again?—There is always a tremendous lot of waste on account of the odd lengths required for the frames and moulds, and only a very small percentage may be used again.

6. In the event of the price of timber going still higher, of course the margin between the price of the building in wood and the one in permanent materials would lessen until it would be cheaper to build in permanent materials than in wood?—Providing there is no corresponding sympathetic rise in the cost of the permanent materials, such as brick, lime, and cement.

7. Do you think it is probable there will be such a sympathetic rise?—One can only speak from the experience of the past. Bricks have gone up considerably in price of late years. I may say that this inquiry has caught me quite unprepared, and if you will formulate questions as to the information you require we will call a meeting of the Institute and be only too pleased to supply the particulars the Commission wants.

8. *Mr. Murdoch.*] Do you think the time is fast approaching when the present supply of timber here will run out?—I think the day is very far distant. There are so many uses in connection with a building to which timber can be applied, and the other methods, such as steel for sashes and frames, becomes very expensive. Such material may be suitable in a building like the Post-office here, where cost is of very little importance, but private individuals would find it beyond their reach.

9. *Mr. Clarke.*] Does it not appear rather absurd to talk of getting substitutes when we can get the original itself?—It is acknowledged all over the world that the timber-supply is getting less, but it would seem that the energy and ingenuity of man would be capable of designing some means of meeting the demand. At present there is a material on the market which when it is used looks like timber, and it is used for lining. Nothing, however, can replace, as far as the structure is concerned, the timber in a wooden building.

10. Are you aware that, notwithstanding the supposed substitutes and other things being used in place of wood, in reality the actual consumption *per capita* is increasing throughout the civilized world?—I have heard so.

11. Can you refer us to any official data on the question?—No; I have seen it in a magazine.

12. *Dr. Cockayne.*] Is timber being used to a greater or lesser extent for building purposes than it was twenty years ago?—Taking Auckland, the consumption of timber in the city is considerably less per head on account of the brick area. Buildings in that area have to be replaced in brick.

13. *Mr. Clarke.*] But the buildings that are being pulled down now are being replaced by others ten times as big?—Yes, and the building that would take ten times as much wood as the present one it is replacing would also accommodate ten times as many people.

14. *The Chairman.*] Do you wish to add anything?—I only wish to say, on the question of tree-planting, that if it is decided to introduce an extensive scheme of planting the locality planted should be as near the market as possible, and the question of the temperature and climatic conditions under which the trees should be raised should be carefully studied, in order that good, durable timber can be produced. My reason for urging the latter consideration particularly is that an oak, which I am informed was planted in Government House grounds here

fifty-five years ago, was cut down fifteen years since and sawn into planks, and the timber was allowed to season. I got a small piece to make a memento of the occasion, but it was more like working up a piece of sappy cork than oak. I made a small frame of it, but within four years' time it was completely riddled with worm, and I threw it away. Therefore the question of climate should be carefully watched. Some of the Scotch fir that grows in Norway and Sweden, and also in England, is very inferior in quality when cut into timber.

15. *Mr. Adams.*] Are you sure that the oak you refer to was British oak?—Well, it seemed like American oak. I do not think it was English oak.

16. *Dr. Cockayne.*] Do you think it would be advisable to have made an accurate examination of our latest plantations to ascertain what relationship their wood bears to the wood of similar trees when grown in their native country?—I am sure the information would be very valuable.

17. With regard to growing timber close to the market, have you thought of the question of the price of the land required, and how that factor would bear on the ultimate cost of the timber, reckoning over the cycle of years involved the compound interest on the rental value of the land?—That would have to be considered. It might cost you more than the freight required to bring that timber into the country from some place where land is cheaper, but occasionally there should be an opportunity, all things being equal, of selecting some cheap land near the probable market. It might pay the State to acquire land at a higher figure for the sake of obtaining the necessary suitable climatic conditions under which to grow the trees. You must consider that factor in selecting the site.

WILLIAM BROCK LEYLAND sworn and examined. (No. 52.)

1. *The Chairman.*] You are a member of the firm of Leyland and O'Brien, sawmillers?—Yes, but we have not had a special meeting of sawmillers as to this question. I might mention that I was a member of the Timber Commission, and during that inquiry we had it in evidence that, whereas in the United States substitutes for timber were used more largely than in any other country in the world, the consumption of timber *per capita* had, over a period of twenty years, increased 94 per cent. as against an increase in the population of only 50 per cent.

2. Would not the increase respecting timber be largely accounted for by the demand for timber for paper-pulp?—I think not, because the bulk of the latter comes from Canada.

3. Do you think the time has arrived when, through timber getting too high in price, other materials will be substituted, and thus automatically obivate the demand for timber?—The price of timber is regulated by the cost of its production and placing on the market, plus royalties.

4. If the cost of timber goes higher and higher do you not think more building would be done in other permanent materials?—In the case of buildings finished in permanent materials, such as ferro-concrete, a lot of timber is used and afterwards wasted. More timber has been used in constructing our ferro-concrete wharves than was used in the wooden wharves. It is low-grade timber that is used.

5. Timber which can be grown cheaply?—Yes, not necessarily of a durable material.

6. *Dr. Cockayne.*] Is it possible that in the future there will be a greater demand for second- and third-class timber than in the past?—Yes. I do not think the demand for high-grade timber will decrease, but it will fluctuate according to the volume of trade and the money-market. As to the area where timber should be planted, at one time we looked to Te Kuiti for a large supply of timber. A large population has sprung up there, and timber will be required for the local population, and so I see no objection to planting in that district. By the time it grows the population will be there to use it. On the other hand, the importation of timber should be encouraged in view of the timber-famine that is inevitable in this country. I should allow the people living near the coast to use the imported timbers, while the inland population could take advantage of the supplies locally grown inland. Thus the transit problem will become a vanishing quantity. It is quite immaterial where it is planted so long as there is the supply.

7. *The Chairman.*] Do you think the export of white-pine should be prohibited in view of the demand for it here for butter-boxes?—I do not think I can speak with authority on that question, as we do not export timber.

8. Is there any other matter you wish to mention?—As to kauri, when the Government offer a bush for sale a time-limit is imposed in which the timber must be removed, and if an extension of time is required the miller has to pay 5 per cent. on the capital value for such extension. I suggest that a longer period should be granted, and the conditions as to holding the timber minimized. This would be in the interests of timber-conservation, as under the present system the miller is forced to cut it sooner than he requires to.

9. *Mr. Lethbridge.*] Would not that be in the interests of the large sawmiller as against the small man?—Possibly; but the smaller man cannot buy this timber in small lots, and we have to look at the general effect on forest-conservation and the timber-supply.

10. Supposing the United States prohibited the exportation of timber, where should we be if we have not enough local supplies?—We should be thrown back on Canada if they would give it to us, but they have increased the price.

11. *Mr. Clarke.*] That means that we must plant?—Yes, and if we are to conserve our own timber we must also import. I speak as a fairly large holder of New Zealand timbers. If you do not import you raise the value of timber we are holding. Timber rises in value as supplies get scarcer.

12. *Mr. Murdoch.*] Your contention is that in other countries timber is getting scarcer every day?—Yes, and some countries are getting very jealous of their reserve supplies, and not inclined to let them go out.

13. *Mr. Lethbridge.*] What is your opinion of the Waipoua Forest?—It would be a good thing to preserve it, but can we? Mr. Mueller, late Commissioner here, stated that wherever civilization approached the kauri it was doomed. In every case, in spite of Government protection, it has gone, as at Puhipuhi.

14. *Dr. Cockayne.*] Do you know that the gum-digger has been operating in the vicinity of Waipoua for the last thirty years?—I know that as the result of advancing civilization lots of fires have occurred. There is a great risk of fire in the case of that forest.

15. *The Chairman.*] Have you considered the value of taraire as a milling-timber?—I am glad you mentioned it. It grows very rapidly. Eighteen years ago I planted a taraire for ornamental purposes, and it now measures 38 in. in girth. The taraire will grow anywhere, and it is a very useful tree.

16. *Mr. Lethbridge.*] Do you know that all over the north the frost has killed a lot of taraire?—No.

17. *Mr. Murdoch.*] In your experience do you find any difference in the quality of timber in a kauri-tree which has been tapped for gum?—I do not know from my own experience, but other sawmillers have told me that it deteriorates a tree to bleed it, but they do not mind that if they are going to cut it down soon. If it is to remain as an asset they will not allow it to be tapped.

DAVID ALEXANDER HAY sworn and examined. (No. 53.)

1. *The Chairman.*] Your occupation?—I am a nurseryman.

2. Have you grown exotic trees in connection with your business?—Yes.

3. Have you planted any of them out under forest conditions?—Not very many. I have only supplied them.

4. Do you consider the poplar a good fire-resister if planted in belts?—It would be a good fire-resister when planted close together like a row I saw in Blenheim. I recommend as a fire-register in this northern part the *Phytolacca dioica*, a native of Central America. It is almost impossible to burn it

5. *Dr. Cockayne.*] But will it stand frost?—I am afraid not.

6. *The Chairman.*] Is it a valuable tree for commercial purposes as regards timber?—I think not, because it grows very rapidly, and the wood is soft. It grows to about 50 ft. high.

7. Have you ever taken any measurements of the growth of the *Pinus insignis?*—No. It is considered a fast grower on forest land. I think it would grow on the poor gum land, and could be grown by scattering the seed broadcast after burning off the manuka if you disced it in to save it from the birds.

8. *Mr. Murdoch.*] Could you name any trees that would make good milling-timber in the shortest possible rotation?—I believe in the eucalypti, which would be good timber-trees for New Zealand if carefully selected. *Gunnii* is one of the best, and *Cryptomeria japonica* would be valuable for the northern part; it has made with me 9 ft. of growth in two years.

9. If planted under forest conditions would *Pinus insignis* be a useful timber to grow?—I think so, but the great danger is fire. With the gums you will not have so much trouble in that respect, for if the fire goes through them it does not kill the trees. All varieties of Japanese trees succeed very well in the northern part here. Japanese larch is being planted.

10. *Mr. Adams.*] Did you hear Mr. Cumming speak of an oak in the Government House grounds here?—Yes, but I do not think it could have been the English oak.

11. *Mr. Murdoch.*] Have you seen any large trees of *Cryptomeria japonica?*—One about 50 ft. high, but with no bulk of timber in it. If close planted they would form good stems.

AUGUST CHARLES KOCH sworn and examined. (No. 54.)

1. *The Chairman.*] You are the District Engineer of the Railways Department?—Yes.

2. We would like to get an opinion from you as to the experience of the Railway Department in regard to the powellizing process for railway-sleepers?—I have had very little experience respecting the matter. We had a few hundred sleepers on the line here that were powellized, and they were not satisfactory—white-pine and rimu. After being twenty months in the track they were examined, and out of 200 white-pine sleepers 7 per cent. were found to be bad, and out of 100 rimu 3 per cent. were found to be decayed. After being two years and eight months in the track, fifty white-pine sleepers were examined and 62 per cent. were found to be bad, and 40 per cent. were found to be bad in the case of a further lot of 192 white-pine sleepers. 149 rimu sleepers, after being two years eight months in the track, were examined, and 22 per cent. were found to be bad. The proprietors of the process stated that there was something defective in the treatment.

3. Is your Department still having sleepers treated by the powellizing works?—I could not say.

4. What timber is being used now in your work?—Mostly imported ironbark for bridge-work. We use jarrah sleepers.

5. Has *Robinia* been tried for sleepers in New Zealand?—Not that I am aware of.

6. Is the Department using ferro-concrete for bridges?—They are using steel for railway-bridges. We use ferro-concrete in some cases.

7. How does the cost of steel compare with wood for bridge-work?—Steel costs more, but it has a longer life, and in the end should prove cheaper.

8. Is the consumption of sleepers a growing one in this district?—We are using more than we did ten years ago, but the last five years the average has been about the same.

9. *Mr. Murdoch.*] In your opinion, would white-pine ever make a satisfactory sleeper?—Some of the creosoted ones have been very satisfactory.

10. With powellizing?—I do not know. It depends whether the process is satisfactory or not. Creosoted sleepers have proved very satisfactory, but they have been in the line only some thirteen years.

11. Have any larch sleepers been tried?—I could not say.

11A. *Mr. Adams.*] Is there any reason why maire sleepers should not be used?—I think the Department will take maire sleepers in time if they can get them. There are, however, a lot of borer-holes in maire, and that would not be satisfactory, as the holes are where the dogs go in.

12. It was represented to us that many sleepers were rejected by the Government for very small defects. Is that so?—Possibly they had worm-holes where they wanted to put the dogs in.

13. *Dr. Cockayne.*] Do the powellized sleepers decay?—Our experience with the few we had on the line was that they were decaying.

14. Did you find the creosoted ones decay?—No; they are very satisfactory. There were creosoting-works at Woodville ten years ago.

15. What does creosoting cost per sleeper?—A creosoted sleeper costs 3s. 6d., delivered, but I cannot tell you what the creosoting costs.

HENRY PAUL KAVANAGH sworn and examined. (No. 55.)

1. *The Chairman.*] I understand that you were connected for many years with the Timber Branch of the Lands Department?—Yes, for four years. I am now a retired Civil servant.

2. Do you wish to make any statement?—In all cases I think it is a shame to fell really valuable milling-timber to provide land for settlement purposes. In the Wairarapa district, which was the finest milling-area I have ever seen, mills were erected, after the country was in grass, to cut up a few odd logs here and there, so scarce was timber. I am strongly of opinion that any milling-country that contains 7,000 ft. to the acre, if it is easy of access, should be reserved for timber purposes, and not burnt to provide land for settlement. In all cases where the land contains 10,000 ft. to the acre, no matter how remote it may be, the surveyors should be instructed to report on the quantity and quality of the timber with a view to reserving the bush. The land is of more value to the settler—by £2 an acre—if the heavy trees are reserved. He has not to fell them.

3. In that case would the land be thrown open for settlement immediately the bush is cut?—Yes, if the adjoining bushes are not interfered with, otherwise a fire would be fatal when standing bush in the neighbourhood is being cleared. In the case of fire the Government should provide grass-seed, and see that it is sown as soon as the country is burnt. My plan would mean that good milling-timber would be taken out before the land was opened for settlement, and consequently the value of that timber would be saved to the State.

4. Do you think the time has arrived when the Government, in disposing of timber, should have the trees measured and the contents computed before disposing of milling-areas?—If the timber is worth 1s. a hundred feet, or more, the trees are worth measuring. Then the sawmiller can have no complaint, because if he says he has not got his quantity the number of each tree can be ascertained from the schedule. I was Crown Lands Ranger in the Wairarapa, and was sent to Auckland to take charge of the kauri forests, and I initiated the system of measuring I now advocate should be enforced in all districts. The practice then was not to take any notice of undersized trees, but that was altered, and now such trees have to be paid for. Prior to that time the timber was sold mostly on an estimate, and the kahikatea and other good milling-timbers were not calculated in the schedule—only kauri—so they got those for nothing. At one time the Crown would sell a clump of bush, but there were no boundaries; as soon as I came here the areas were laid out according to the creeks, a line being cut round each boundary. All sections and boundaries were distinctly shown, and it was not possible for the miller to go over his boundary. If he did the other man would soon stop him.

5. In measuring trees here do they use the Hopper's measurement?—They use a "ready reckoner," possibly a Hopper's. It is quite different to the railway measurement, which generally indicates a great deal less timber than is sold to a company by the Government. Of course, the millers say it does not pay to put second-class timber on the railway-truck, and so we are losing a lot of valuable timber which would be suitable for many purposes. I would not use sap of rimu for any durable work; it is fit only for packing-cases. When the Government set aside milling-areas they should make provision for a road reserve between those areas and the railway, otherwise the millers are blocked in getting the timber. So with creeks; 1 chain wide on each side of a river should be reserved to give access for the purpose of floating timber down the creeks. I know of cases where settlers have planted orchards to obstruct the access to the creeks and rivers, and then have claimed heavy damages in case of a fresh, when the timber has done no harm to their holdings at all in floating down the creek. In one case a man claimed £968 from a timber company for damages done by their logs to his fences, and finally he took £19.

6. Have you any suggestion as to how to obviate these matters in the case of private lands?—I am now only referring to reservations of standing timber before the land is thrown open for selection. I want to give the miller a clear run for his money. All reserves should be fenced to keep cattle out, otherwise the bush is spoilt and destroyed. Many of the reserves here are not fenced. As soon as settlement gets up to a reserve the farmers want it. There was a fine bit

of bush in the Wairarapa—the only piece of native forest left between Napier and Wellington—and many attempts were made to get hold of it, the last excuse a settler urged being that his wife had rheumatism on account of the shade.

7. *Mr. Lethbridge.*] What was the ultimate fate of that reserve?—I suppose they got it at last. I came away.

8. *The Chairman.*] What are your views as to water-conservation?—The great difficulty we had when I was in the Department was to conserve the sources of the water-supply. In places in the Wairarapa you can see the dry beds of creeks where now after a heavy rain the water does not flow at all. From one-quarter to half a mile of shingle is now exposed at Ngapara Bridge, near Woodville, and there is great trouble in regulating the flow of the river. Where there is alluvial soil and a shingle bed the tendency is for the river to make on one side and lose on another, the reason being that too much bush has been felled. Settlers should be encouraged to plant trees, but the Government should make it a condition, when setting aside a reserve containing bush, that that bush should be retained in order to keep the water-supply intact. As to the question of forming plantations in suitable localities, in putting timber on a railway-truck you take the cream out of the profit. I would urge that plantations should be made in suitable localities where there is water carriage, in order to reduce the cost of production. The American red-pine grows very fast at Remuera, and is a fine timber. Silting is very prevalent in parts of the country, and is due to the bush being cleared off the hills, causing the rivers to silt up. As to officers' reports on timber land suitable for reservation, it is only necessary for a Minister to visit the district and the proposed reserve is wiped out. As to loss in the value of timber in milling operations, if we take the Waipoua Forest, it is estimated to contain 100,000,000 ft. of timber. That does not mean 100,000,000 ft. of sawn timber, but only 60,000,000 ft. perhaps, the loss in value being 33 per cent., and only two-thirds of the remainder is first-class material at the most. "Railway freights" simply mean freights on second-class timber. There is a lot of second-class timber left in the bush that it does not pay to bring out. A competent valuer should be appointed to decide what is first- and second-class timber, and adjust the matter accordingly. The Kaihu Valley Railway was not finished when that timber was all cut out, and a Commission recommended that the line should be taken up. The demand for timber is increasing, and too much is exported, notwithstanding that half enough timber is not put into the houses now. In the case of an eight-roomed house I inspected the other day I could carry all the timber in the roof in one load. I bought 42 ft. this morning for lattice-work, and paid 14s. for it. As to the use of kauri timber for mining purposes, this timber is too valuable for such use, and yet it is used for sleepers, posts, and mining.

9. Do you see any reason why a miner should get his timber for nothing?—Certainly not. He should pay just the same as any one else. Those regulations should be amended, for the mixed authority as between the Warden and the Commissioner imposes no check as to what is bought and what is taken away. A competent Ranger should be appointed to measure all timber. I notice that many people advocate putting an export duty on timber. I do not think it is fair that a man holding a timber-area from the Crown, in addition to rates and taxes, should have to pay an export duty on what he sends out. The position might be met by providing, in the case of all timber-areas now held by the Crown, that the preference should be given to any applicant undertaking to utilize the timber in the Dominion. More timber has been exported than has been used in the Dominion, and the best at that.

10. *Mr. Murdoch.*] Have you ever known of a kauri bush that was not burnt when the settler or gum-digger came about?—When Puhipuhi settlement was started I tried to prevent the gum-diggers going in, and suggested it should be confined to settlers only, so that in the event of a fire the latter would be able to give their services in putting it out. But the bush was burnt by the diggers eventually. When I came to this district there were townships in Waipoua Forest, and roads through it, but I had the whole lot cleared out. Then I started on the cattle, and the last time I saw it it was in as good a condition as ever. There is an excellent man acting as caretaker, and he loves every tree in that bush. The only way to preserve that forest is to put on more than one caretaker to guard it, and keep everybody out.

11. *Dr. Cockayne.*] Even with all those risks that bush is not being burnt?—If the gum-diggers were allowed in there would not be a stick that would be worth removing.

12. Did these men burn the bush when they were living there?—No; there were plenty of places for them to camp. They did not start fires inside. It is the only kauri forest I know of that has not been burnt.

13. Can you account for that by the extreme wetness?—To some extent; but that bush is not as wet as Warawara, which is absolutely isolated. Some sections were about to be thrown open on the creek, near Waipoua, and I reported to the Government that to open that land for settlement would mean the end of the forest, as the trees would ignite at the tops from outside fires. To preserve that bush there should be fences and banks to check an approaching fire. At certain times you should burn off the strip of fern approaching it.

14. *The Chairman.*] That would cost a great deal of money?—The caretakers could be used for doing the work.

15. Do you advocate preserving that forest for all time?—It should be preserved as a nest-egg. It will be cut down eventually, but it should be reserved for the use of the people in the Dominion or for Government purposes.

16. *Mr. Lethbridge.*] And cut by the Government for Government purposes?—Yes.

17. *Dr. Cockayne.*] Supposing a recommendation were made that that bush should be milled by the Government, would it be a popular thing in Dargaville?—In milling by the Government you create a new staff, and incur large expense.

18. Would these agitators like the Government doing it?—The Government could not cut it out as economically as the large mills.

19. *Mr. Murdoch.*] From your experience do you not think Warawara could be kept?—It has been bled and bled. I counted in some trees from seventy to eighty incisions, and there were many more in others. Some of the trees were sickly, and the young ones everywhere dead.

20. But there is a natural barrier around the back of the Warawara bush?—It is an easy bush to keep providing the trees are living, but it is a problem how to get the timber out. I would say, keep both bushes as long as you possibly can.

21. *The Chairman.*] Is there any other matter you wish to mention?—I support Mr. Leyland's suggestion as to the question of the extension of time for timber-cutting, and always recommended it. Give the millers a reasonable time to work out the area—say, two or three years—and if it does not suit their convenience to do the work in that time then charge them a rent equal to that obtainable for the land for settlement purposes, and let them hold it as long as they like. Bleeding kauri-trees is fatal to the lasting qualities of the timber, as the gum is a vital necessity to its life.

22. Have you had any experience in country where deer are roaming?—In the Wairarapa I have seen them, but I cannot say if they were damaging the native bush. Cattle destroy the bush, and I suppose deer also. The remaining bush should be preserved if possible, as people will soon feel the want of timber-supplies. At Herekino two 50-acre sections containing kauri were abandoned. I recommended that they should be reserved for the future use of the local residents, but the amount of pressure that was brought to bear on the Department for a number of years to open the sections again would surprise you.

ROBERT CRAIG POLLOCK sworn and examined. (No. 56.)

1. *The Chairman.*] What is your occupation?—Government timber-measurer. I have been twelve years with the Government, and with private firms fifteen years before that.

2. What is the system adopted in this district for measuring timber?—In some cases the boundaries are defined for us, and we only measure small sections already surveyed; but where the area is large we work on our own lines around the boundaries. We then clear the tree of vines, and take the girth at the base at a point as high as one can reach. We take the height with an Abney level.

3. Are the trees branded as they are measured?—They are branded below the saw base, and they are also numbered.

4. How then do you arrive at the superficial contents?—We use a ready reckoner, and 1 ft. in 20 ft. is allowed for tapering. With a 40 ft. tree we only allow 1 ft. There is no uniform rate; it is a matter of experience.

5. What allowance is made for the bark in measuring kauri?—6 in., no matter the size of the tree.

6. What other deductions are made?—With dead timber we chop straight into the heart, and where the sap is deep and worthless we take off whatever is on it by the depth. For other defects, as far as we find them, we take 20 ft. off the stem.

7. What is the average cost of measuring a bush, per acre?—Less than 1d. per 100 ft.

8. In a fair average bush how many trees could a man measure and brand in a day?—Two men in good bush could do from ninety to a hundred a day of kauri. Rimu might be a little more scattered and require more clearing.

9. How are the brands put on a tree?—We cut them with an axe as near the root as possible. We put the Government brand on with a hammer.

10. Is it a more satisfactory way from a departmental point of view to have all the timber counted and measured before it is sold?—Decidedly. The present system was initiated by Mr. Kavanagh. Before that we used to mark the trees above where they would be cut off.

11. Has any difficulty been experienced in this district respecting the dual control between the Warden and the Commissioner?—Yes. At Tapu Creek there is a lot of timber which is rapidly becoming worthless, but the Warden will not sell it. It should be sold, otherwise it is a loss to the State.

12. Is there any demand in that locality for timber for mining purposes?—There are no mines working there. One fire would render it worthless.

EDWARD BARTLEY sworn and examined. (No. 57.)

1. *The Chairman.*] I understand you are an architect?—Yes, practising here since 1880. Before that I was a builder.

2. One question we are inquiring into is the probable demand for timber in the future, and how far that can be met by the Dominion's supplies. We should like your opinion on the point?—For the last three years I can safely say that three-fourths of the timber I have been specifying and using in my work has been Oregon pine.

3. Do you find that suits the purpose better than the local timbers, or is it on account of the price?—On account of the impossibility of getting local timber. We can get Oregon up to 70 ft. lengths, but we would have to wait months to get that length in kauri. If I had had to rely on kauri for the King's Theatre I do not know when it would have been built. The addi-

tional cost for kauri also is very great. We want the long lengths for tie-beams. One line of wrought weatherboards I complained of only three months ago. It was charged up at £1 8s. a hundred. No wonder our villa residences are all stopped, and carpenters are walking about.

4. How would building in permanent material compare with wood?—About 30 to 40 per cent. higher.

5. As the price of timber advances do you think more buildings will be erected in permanent materials?—In our climate there is nothing to beat the large wooden villa. Properly built it will last fifty years, as some of the old buildings are doing now. Forty years ago they used nothing but heart timber; now either a medium kauri or O.B. rimu. I am living in a house thirty years old, which is just as good as the day I built it, and it will last another twenty years. Give me a good wooden building on a concrete or brick foundation, with slate roof, and you have a house that will last a lifetime.

6. Are there houses such as I describe now being built of brick or concrete?—Yes, and that means plastering inside, adding 50 per cent. to the cost. In using Oregon pine we can plaster with some security; not so in the case of kauri, on account of shrinkage at the ends.

7. Is the Oregon pine as durable as our good kauri?—Years ago we used a lot of Oregon pine, and about 1860 a cottage was built here of that timber, and it is perfectly sound to-day. In Durham Street, also, a store was erected in the early "sixties" of Oregon, and the joists are just as good to-day as when they were put in.

8. How would the insurance on a wooden building compare with that on one of permanent materials?—There is a considerable difference. At the same time it is generally supposed that a brick building will not burn. There are about ten thousand villas in and around Auckland, and how few are burnt in twelve months? The heavy insurance losses are in connection with brick buildings.

9. The companies must consider wood a worse risk, or else their rates would be lower?—A brick building is a much lower risk—6s. as against 12s. or 14s. for wood.

10. Have you had any experience with *Pinus insignis* timber?—None whatever.

11. *Mr. Lethbridge.*] Do you think the Oregon pine now coming in as good as that imported some years ago?—I could not say with any confidence, but my impression is that it is not as good as we got in the "sixties."

12. Have you had any experience of tawa or matai as a building-timber?—No; ten years ago we had plenty of kauri, and now we cannot get heart of rimu.

13. *Mr. Clarke.*] Do you not think it would be wise to immediately start planting in view of the difficulty of getting timber now?—Yes, if you plant quick-growing trees.

14. Do you not think our native forests are practically at an end, or within reasonable distance of it?—In another ten years the kauri will be pretty well wiped out.

15. Would you favour a proposal to retain the balance of the millable kauri in New Zealand for the use of this Dominion solely?—It is very deplorable that if we want a bit of kauri for our own use we cannot get it, while shiploads have been taken away of large flitches—all heart. What little we are able to get is sap—second-class stuff.

16. And that process is still going on to-day?—Yes. It is not doing New Zealand any good to have all its kauri going away overseas.

17. Then you consider it would be a wise policy to retain it here for our own use?—I think so. The exportation of kauri ought to have been stopped many years ago, but I understand the high price locally has stopped the exportation a lot.

18. Do you remember that during the Timber Commission evidence was given that rimu could only be depended on to produce from 7 to 10 per cent. of heart timber?—Certainly.

19. In the case of the other timbers we know that when the kauri is worked out we must of necessity depend very largely on timber which is not heart?—That is correct. If we want heart of rimu now we have to give a fancy price, because the heart is selected for the cabinetmakers.

20. Then if we want good strong timbers in the near future is it not the duty of the country to immediately carry on a large system of planting and afforestation?—That is a question of policy; but it is a great shame to see our timber going away, and we cannot get a stick.

21. Independently of the question of policy, do you not consider it is a matter of national necessity to start and replant largely?—Yes, but there is another side to the matter. Supposing you have from 2,000 to 3,000 acres of land of good quality, it would not be advisable to plant that area with trees when butter-fat would be more productive. Dairying is better than trees.

22. Assuming we have areas not fit for dairying, but which would grow trees, would it not be as well to plant them?—We have not those areas in the Province of Auckland.

23. *Mr. Lethbridge.*] What areas?—Areas that we can say are valueless excepting for planting trees.

24. *Dr. Cockayne.*] What would it cost to turn the waste gum lands into lands yielding butter-fat?—That is too difficult a question to answer. It would be only the gum lands you could plant with any chance of making the venture profitable. The gum lands look very poor, but I built a house in Union Street, and you cannot imagine anywhere a worse bit of clay soil than there is in that district, and before very long I had a garden there which could be worked by the spade and could not be beaten in the district. Gum land, if properly drained, will grow anything, especially fruit.

25. *Mr. Lethbridge.*] Do you advise any one with capital to take up fruitgrowing on those lands?—There is a great future before the north in regard to fruitgrowing.

26. *Mr. Clarke.*] Would not the proposed plantations on such land act as a protection to the gullies which could be used for fruitgrowing?—Yes. I have seen paddocks up north on the gum lands with good grass on them.

JAMES TROUNSON sworn and examined. (No. 58.)

1. *The Chairman.*] You are a sawmiller, I believe?—Yes.

1A. One matter we are inquiring into is whether, in view of the increasing demand for white-pine timber and the diminishing supply, its exportation should be prohibited. Have you any remark to make on that question?—I think its export should not be prohibited. The Government sells the timber for the highest price it can get for it—on their own conditions—and it would be wrong to put a tax on that timber after the miller has bought it. If the Government wish to preserve the timber, and desire to impose certain conditions with that end in view, a very important question is raised. I pay rates amounting to £200 a year to the Hokianga County Council for a bit of kauri bush I hold at Kaihu. It is all very well to talk of saving your timber when one is paying £200 a year to one local body, but how is it to be done? You cannot very well compel the owner of the land to reserve the timber and then rate him to the full limit. The Government lately sold some timber-rights at Kirikopuni to the Kauri Company at 6s. a hundred feet. Would it be fair to put another 3s. on that before allowing the company to ship it?

2. *Mr. Lethbridge.*] Is there any taraire in the bush you allude to?—Plenty of it. I intend to put in a tram and work the whole of that area. It would not pay me to leave any live trees.

3. Do you know the Waipoua Forest?—Well; and also the value of kauri timber. I gave a piece of 60 acres to the Government, and it turned out all right. I saved it. I consider the land at Waipoua Forest is more valuable to turn to good account than to reserve the timber, which is in danger from fire through the progress of settlement. For twenty years I paid rates on kauri timber. Then I bought some land near the place where I held the timber-rights, and I contemplated spending any money I got out of the timber on that land; and on it I subsequently carried from five thousand to six thousand sheep, and got £1,000 for the wool off it the other day.

4. What was the area?—A lot is carrying two sheep to the acre, and it is paying me now far better than leaving the timber would have done. The area of the Waipoua Forest is nearly 25,000 acres, and that is being kept locked up for the sake of a bit of kauri bush which nobody can see. The settlers are made to go round, but as settlement progresses the fire will go in and that bush will be destroyed. You might expect me to be naturally biased in favour of my own district, as I want it to prosper; but I have the finest flock of sheep in New Zealand on the land I speak of, which is an argument in favour of utilizing it.

5. *The Chairman.*] You consider the land in the Waipoua Forest is suitable for settlement?—It is land equal to, and in some places better than, the land I have in my holding. I felled everything, got a good fire through it, obtained the best grass-seed, and I was surprised at the result. I held a piece of bush at Kaihu, and offered it for sale before clearing the timber off my land. I offered it at £2 an acre, but the timber being there nobody would buy it. I then put it in grass, and I have since been offered £15 an acre for part of it.

ROBERT HALDANE MAKGILL sworn and examined. (No. 59.)

1. *The Chairman.*] You are M.D., and District Health Officer for the Province of Auckland?—Yes.

2. You wish to offer some evidence on the question of tree-planting by consumptives, and the suitability of that occupation in connection with the treatment of consumption?—Yes. My evidence is really contained in the departmental report for 1908, a copy of which you have, on the suitability of the Taupo district for the purpose mentioned. It is considered a very suitable district for the treatment of consumption, and tree-planting is a suitable kind of work for such patients. It is very difficult to find suitable work for convalescent consumptives, but as tree-planting is required in that district the two matters seem to work in rather well.

3. How long was the scheme in operation at Taupo?—There was a little trial scheme in operation for two years with about fourteen patients, but it was not at Taupo but at Rotorua, about eight miles out. On the whole the experiment was satisfactory, and I think the men were able to sustain themselves from their wages. In fact, some made a little over, and were able to do sufficient work to pay their own expenses, although they were scarcely the class of men I intended it for, but a little more advanced in regard to the disease. I hoped to secure people who were in the early stages of the disease, and these men had been under treatment at Cambridge.

4. Why was the system given up?—It was abandoned about the middle of 1910, the chief reason being that the land immediately around the camp was all planted and the men had to go a very long distance, and it became beyond their powers to take a long walk to the planting-place, do a day's work, and return at night. It was felt at that time that the question was one largely of land, and I did not care to start on a fresh basis on a larger scale.

5. On what basis were the patients paid?—On piecework, I think. They were paid by the Forestry Department.

6. In the event of any recommendation being made by this Commission that such labour should be utilized for this purpose, could you state what number of men would be available?—It is a difficult matter to estimate, but it would be quite easy to have a camp of sixty patients able to do a reasonable day's work.

7. Would it be necessary in such a camp to have a medical man stationed?—Not strictly necessary, because the class of patient would not be men requiring medical treatment; but it would simplify matters to have a medical man there to enable us to have a freer hand in sending patients to such a camp.

8. It would be at least reasonable to have a doctor within easy distance if required, would it not?—It would be sufficient if there were a well-trained nurse in the district, and I trust that before long we shall have a district nurse in the Taupo district, whose services would then be available.

9. Is the Auckland District the only one in which there are homes for consumptives?—In connection with all the large hospitals there are similar institutions—Otaki, Cashmere Hills, and Palmerston South. Those are places for the treatment of consumptives who require medical attention. I want an outlet for patients who are cured. It is difficult to get people to take them, as they seem to fear a patient who has been in a sanatorium more than one who has not been there. We have a serious difficulty in finding an outlet for these people who can work, and this would provide a most excellent way of dealing with them.

11. *Mr. Lethbridge.*] I suppose a good many of the patients are without means of livelihood, and you want to help them over the difficulty?—That is so. We want to give them work for two or three years, because occupation of that kind would fit them to go back to their ordinary duties.

12. *The Chairman.*] In the camp you had what provision was made about cooking?—They had a cook who was one of the ex-patients, and there was a nurse in charge. I would make the place one not only for patients who had been in the sanatorium, but also those approved of by the Department before going to a sanatorium. They would then not be sent to the sanatorium, but would go straight to a place like Taupo. They are rather spoilt by the treatment at the sanatorium, so it would be better to send them to Taupo direct.

13. What provision would there be for overseeing their work?—I cannot give you that detail, I am afraid, as the work was all done under the supervision of an officer of the Forestry Department, Mr. Goudie.

14. *Dr. Cockayne.*] Have you had any experience of the climate of Central Otago?—I should imagine that it would be a very suitable climate for the treatment of consumptives, even better than Taupo, excepting for the dust-storms.

15. Do you not get dust-storms on the pumice plains?—Not so bad. But I have had no personal experience of Otago Central. One of our officers reported it to be a very suitable climate excepting for the dust-storms.

ALEXANDER MCCOLL sworn and examined. (No. 60.)

1. *The Chairman.*] What is your occupation?—I am a timber-merchant, and wish to refer to two matters. I have had a lot to do with the forests of New Zealand, and my fifteen years' experience has convinced me that our architects, builders, and people generally need educating as to the value of many native timbers which are now destroyed as worthless, but which are of real utility for milling purposes. I suggest that the Government should circulate leaflets containing full information respecting the qualities of the woods I refer to. You cannot now sell either tanekaha or silver-pine.

2. *Mr. Lethbridge.*] Is taraire any good?—Yes, a splendid timber.

3. Are you acquainted with Kirk's "Forest Flora"?—Yes.

4. There is an account given of every timber in that work?—It should be abbreviated a bit. That book is only looked at by a few people—1 per cent.—and it should now be revised and brought up to date.

5. *Mr. Murdoch.*] How are you going to save the timber you speak of? Can you induce the settler to hold the trees if he wants to put the place in grass?—The settler will have other timbers to work on, and, that being so, if the information I suggest were disseminated the taraire would be worked out along with the kauri and other timbers. There has been a great change in the market in favour of secondary timbers the last few years. There is a market here for millions of feet of taraire.

6. *Dr. Cockayne.*] Supposing a settler cuts down all the rewarewa, in what market does he sell it?—That timber comes in for a number of secondary purposes, and if the public were educated up to its use we could find a market for it, and also for other New Zealand timbers—in fact, for all.

7. You ask that leaflets should be published defining the qualities of New Zealand timbers?—Yes. Tawa is overlooked a lot. The difficulty about it is with regard to seasoning. It will rot very quickly in the ground, but if seasoned it will last a long time. Fifteen years ago I sent some to Queensland, and was informed that it was the finest possible timber for wine-casks. A trade in tawa timber could be developed to an enormous extent with Australia, and I could not supply the orders I got for it.

8. *Mr. Murdoch.*] I suppose they used large quantities of tawa for butter-boxes twenty-five years ago?—Yes; it is better than kahikatea, because with the latter you have to wax the boxes, but there is no necessity to wax the tawa boxes.

9. *Dr. Cockayne.*] Do you have to wax the kahikatea boxes? Is it not the one timber in the world you do not need to paraffin?—They paraffin it here, but in my opinion it is not equal to tawa. There is always a certain odour from kahikatea.

10. *Mr. Lethbridge.*] Do you know the Waipoua Forest?—I issued a paper on the question of afforestation some time ago. That forest is a bone of contention, inasmuch as if forestry is going to be carried out on an extensive scale in New Zealand the Waipoua Forest should be set aside as a national forest, and the Government ought to take out all the kauri timber it requires solely for the purposes of the State. The whole bush should be placed under a forestry law whereby the age and growth of the native trees there now would be measured and tested. The actual growth per year could be ascertained. Then the Government should take out all the matured timber every year, and not interfere with the natural growth Thus the forest could be protected and kept going for all time. Replanting could go on at the same time.

11. With native trees?—With certain forest-plants.

12. *Mr. Adams.*] What about fires?—In America, where fires were very frequent, since they have gone in for practical forestry and put their bushes under competent Rangers fires have been reduced to a minimum.

13. *The Chairman.*] Have you been in the Waipoua Forest?—No.

14. Are you aware that there are not sufficient saplings in that bush to keep regeneration going?—I cannot say; but I understand that certain portions contain a fair quantity of young bush.

15. What is about the quickest-growing native tree?—Taraire is about the fastest, and you can get fair-sized trees of it in twenty-one years.

16. *Dr. Cockayne.*] Would you advocate settling the thousands of acres of available open land before dealing with the forest land?—Exactly. Conserve the forests under every condition possible. Five hundred million feet per annum will be required in future for various services.

17. How are you going to get it?—Conserve all you can, and plant if you are going to continue exporting.

18. Would you still advocate planting if every £100 worth of timber were going to cost £200 to produce?—Under those conditions, certainly not. It must be produced under proper commercial conditions.

WILLIAM JOHNS sworn and examined. (No. 61.)

1. *The Chairman.*] You are a member of the Crown Lands Board of Auckland?—Yes, and a farmer.

2. Are there any special points in connection with our inquiry you wish to speak about?—Bearing generally on your order of reference I think I could give you some useful information, as my experience extends over half a century in New Zealand. After I arrived here in 1863 I worked in the bush on Coromandel Peninsula. After the lapse of fifty years I visited that locality, and I found one-third of the creeks dry because the land has been denuded of its forest covering. Those creeks that are not dry are simply turgid streams in wet weather, and comparatively dry at ordinary times. From a climatic point of view the denudation of our forests is extremely injurious to the Dominion. The way we are wasting our timber is a matter of deep regret to myself, and I am glad we are beginning to appreciate the value of the forests. A great deal of our timber which is of high economic value is thought very lightly of. As to the Waipoua Forest, the Land Board recently visited it, and in my opinion it would be a national calamity if that forest were allowed to be destroyed wholesale at present. It is about the only remaining big kauri bush, and should be preserved if possible, although I do not say that the timber should be altogether kept from our own people.

3. *Mr. Murdoch.*] There is a bush at Whangape?—Yes; there are three altogether. The timber people look at the matter only from the £ s. d. point of view, and so I strongly support the reservation of the remaining kauri forests as long as possible to prevent their wholesale slaughter. So far we have only played with the question of afforestation, and should be more alive to the necessities of the immediate future. I do not think the remedy lies in reafforesting with native timbers, as they are of extremely slow growth. It would be better to start with a few of the exotic timbers. I suggest the *Sequoia sempervirens*, or red-cedar, of California. It is the best timber-tree you could introduce here, being of rapid growth. Then the larch and *Pinus insignis* are not to be despised. I planted a clump of the latter, and the trees grew to the height of a ship's mast; and the timber is useful for boxmaking, lining, and many other purposes. This pine is a splendid timber-tree which we cannot have too many of. It should be planted in large areas to be of any commercial value. One-fourth of the Auckland Province is unsuited for anything but fruitgrowing and afforestation with *Pinus insignis*. I had one tree of the latter twenty-four years old, 127 ft. high, with a diameter of from 3 ft. 6 in. to 4 ft. It was grown in Waikato. A great deal of injury is done to our climate by cutting down belts of timber that should be preserved, when we have a vast area of good, open country that should first be settled before wooded lands are thrown open. Many a settler cuts down every tree on his holding, and looks on trees as enemies. It is advisable to conserve our little remaining bush, cutting what is actually needed under strict supervision. Titoki is a good timber for bark for tanning purposes, but it does not attain a large size, and would not be worth planting. Puriri will not grow where there is frost. The kahikatea should be conserved as much as possible, as it is our best timber for butter-boxes. I have grown it on good land in a moist situation, and the trees have made 5 ft. a year. I do not profess to be much of an authority on gums, but I do not think it would be wise to plant the *Eucalyptus globulus*, as it has no value as a hardwood. Ironbark, jarrah, red-gum, and stringy-bark would prove payable timbers, but I do not think the common gum should be planted. Some years ago I went through the West Australian jarrah country, but they are doing what we are—cutting the timber, sending it away, and wasting it. The Australian hardwood is really invaluable, but is probably too slow to grow here.

4. *Dr. Cockayne.*] Would north of Mangonui be a good place for them?—Ironbark grows to a great height. I had several 50 ft. high by 1 ft. through, and they seemed to thrive. In Western Australia, at Harvey, eighty miles from Perth, there is an experimental farm where many young forest-trees have been planted. Twenty-eight acres of *Pinus insignis* have been planted, and at seven years eight months old they were from 20 ft. to 30 ft. high. The manager considered they were his best. In South Australia the director called our attention to a splendid patch which had been sold at £100 an acre. The trees were twenty-five years old, and had been sold for boxmaking—nearly 60 acres. We cannot go wrong in planting our poor gum lands with *Pinus insignis*.

5. *Mr. Adams.*] Have you taken into consideration the fact that the *Sequoia sempervirens* loses its leader in New Zealand?—I grew twenty of them in my experimental ground in Waikato, and when I left they were over 70 ft. high. Planted on a large scale they would not be likely to lose their leaders. The *macrocarpa* also is of value as a timber. Sir George Grey recommended the red-cedar, and sent me a few trees, which I am trying in my orchard now.

HARRY MAY SKEET sworn and examined. (No. 62.)

1. *The Chairman.*] You are the Commissioner of Crown Lands for the Auckland District?—Yes.

2. I believe you have had experience in Westland and Southland districts as well as in Auckland in regard to dealing with timber matters?—Yes.

3. Do you consider from your experience here that the system of having the timber all measured before it is sold a better one than the one in vogue in the South Island?—Yes.

4. Under it the Government get better returns, and there is less waste of timber?—Yes. I consider that not a single stick of timber should be sold excepting under proper measurement. Then we know what quantity we have, and the buyer knows what he is buying. There should be only the one system, and the administration should be entirely under the Lands Department, thus saving the expense of the present dual control. Under the latter system you never know what is going on.

5. And also for the reason that the Warden has no officers with the technical knowledge requisite to enable them to deal with these matters?—Of course, he gets the information from the Lands Department. But he also sits as a Magistrate, and is always amenable to legal argument, and the more plausible the lawyer is in putting his case before the Warden-Magistrate the more likely is the latter to be swayed by the interests advocated by the lawyer. I have always noticed that when a decision is dependent almost solely on legal argument it is likely to be very amenable to the same. However, we do not deal with lawyers at all, but with the matter simply on its merits in the interests of the State.

6. In regard to the laying-off of scenic reserves, would you advocate that they should be confined to broken country which is unsuitable for agricultural or pastoral purposes, or also set apart in connection with settlement lands where there is a piece of bush?—I would not lay off a scenic reserve excepting it is in a position where it would be reasonably safe from fire, or from the damage caused by settlers. If it is abutting on a road-line you could protect that piece, but to distribute these reserves about in little odd corners is an absolute mistake. The settlers fire the environments; then there is the excuse of the spread of noxious weeds—which generally come from their own land—and many other pretexts to get the Government to spend money on clearing the weeds or something else. Unless in large areas absolutely protected from the risk of fire I am not in favour of setting aside such reserves. I am in favour of making reservations for climatic purposes.

7. Would you advocate the tops of the high hills being preserved for climatic purposes?—That is the whole consideration. Here in the north we have had no rain for six months, and the streams are dry. It is only by means of these bush-areas on the tops of the hills that there is any water conserved. My experience is that above a certain elevation the land is not very useful for stock-raising, and we have not got enough bush on our hilltops to preserve the natural rainfall of the country.

8. As to the State Forest Reserve at Raetea, would it not be better to change it to a climatic reserve to prevent any dealing with it in future as the result of pressure?—The Land Board has nothing to do with the State forests—only the Commissioner. This reserve should be made, as far as the low land is concerned, inalienable, and then it would be a national asset in years to come. Bush collects the rain, and we are told the Auckland Settlement up north has been a failure because of the wetness of the climate; but if we felled the bush on the high land that collects the moisture we shall have dry years in the future.

9. *Mr. Murdoch.*] Central Otago over again?—Yes. Oamaru is one of the driest parts in New Zealand. The clouds are drawn away from the coast and collect away back on the hills. The rain does not fall on the coast, but with large areas of bush along there the moisture would be held and distributed.

10. *The Chairman.*] When in the Taranaki District did the question of deer damaging the scenic reserves come under your notice?—We had no deer then. Two were let go on Mount Egmont, but one was killed. The cattle are eating the bark of the trees at Mount Egmont on the Stony River side. They bark the houhou, but will not touch the mahoe or tawhero.

11. And if all the young shrubs are eaten out there is the greater liability of fire sweeping the bush away?—Certainly.

12. In regard to the estimates of timber available in the forests made by the Department at various times without accurate measurements taking place, do you think much reliance should be placed on those estimates?—They are only estimates. In Westland I used to write them down to one-third. The timber may not be there. If you can get small areas you can make your estimates with a reasonable degree of accuracy, but not over miles of country.

13. What about estimates of timber growing in the Fiord County of Southland?—You could not do it. Our estimates here of small areas are sometimes one-third less than they should be, and sometimes a bit more.

14. *Mr. Murdoch.*] As to the forest reserve at Broadwood, the Ranger evidently recommended that a large area of 9,000 acres should be cut up for settlement?—Sold, I think.

15. Was that recommendation due to local pressure?—No. He recommended a large area being kept back and made a climatic reserve—it was on the top of the hill—but the other part being fit for settlement should be cut up and used. His report would be subject to revision, of course. He recommended a strip along the main range.

16. It looked to me when the Commission inspected the locality as though what is there should be retained?—Well, all the better. There is a legitimate demand for land, and people tackle places now they would not take up years ago.

WANGANUI, MONDAY, 28TH APRIL, 1913.

THOMAS DICK CUMMINS examined. (No. 63.)

1. *Mr. Adams.*] I understand you wish to make some representations on behalf of the River Trust?—Yes. I am the chairman of the Wanganui River Trust, and our duties are somewhat in common with those being performed by your Commission. The principal work of the Trust is clearing the river-channel and keeping the river open for navigation, but if we cannot maintain the water at a certain height our position will be a bad one, involving the stoppage of navigation and the waste of the expenditure already incurred. Looking to the future, unless the forests at the source of the river are reasonably conserved navigation may become impossible in the summer months, when the river is naturally low. The vast quantity of the water that comes down the Wanganui River is from the mountains of Ruapehu and Tongariro, and the Ongaruhe Stream and tributaries. Therefore, if the bush in these localities is destroyed, our sources of water-supply will be seriously endangered. I beg to hand to the Commission a copy of a report by one of our late members, Mr. John T. Stewart, C.E., on the subject of bush-preservation on the watershed and banks of the Wanganui River. The late Mr. Stewart was a very live man, of more than ordinary intelligence, keen powers of observation, and well qualified to deal with this matter. It will afford all information on the subject of water-conservation as the matter affects the Wanganui River. I support his views on behalf of the Trust, and strongly urge the Commission to take the necessary steps to conserve the bush at the headwaters of this river for climatic reasons, commercial reasons, scenery-preservation, and in the interests of the river and district generally.

2. We are in sympathy with you regarding the matter. Have you any specific recommendation to make to the Commission in support of your views?—I base the whole of my argument on the report of Mr. Stewart.

3. *Mr. Clarke.*] It has been represented to us that an effort is being made by some one to acquire a portion of the area now supposed to be under the control of the Trust. Is that the fact?—All Crown land to a strip one mile wide has been reserved up to the skyline for scenic purposes. As far as we are concerned we are not so keen on that reservation as we are over conserving the sources of the river. If you look at the map of the river supplied by Mr. Stewart you will find that the watershed is rather a peculiar one. Local rains do not affect the watershed from Pipiriki down, and we do not think that close to the river great damage would be done by small holdings of from 50 to 200 acres being allowed; we are looking more to the necessity of protecting the sources of the river. Four years ago I made an inspection of the river when the water was lower than ever before in its history, and we found a reasonable quantity coming in, but it was all flowing from the larger streams, the smaller ones not affecting the river at all, which flow from the source. It is probable, however, that the one-mile-wide strip on the banks is of material assistance to the river flow. The Trust is very jealous in regard to any bush being touched, as it is anxious to conserve the whole mile reserve with the exception of a small unimproved place here and there which will be revenue-producing.

4. *Dr. Cockayne.*] That one-mile reservation is of great assistance in preserving other parts from fire, and if you allow settlement here and there in that reserve are you not increasing the risk of the bush being burnt and thus affecting your water-conservation?—I appreciate your argument, but the only portion of the land on the river-bank that is likely to be brought to a profit for the sake of producing revenue is the area that is fern-clad only. We conserve all the bush at the head of the river, and only lots not held for scenic or water-supply purposes do we wish to put on the market.

5. *Mr. Adams.*] Do you appreciate the danger from fire?—Quite. On occasions the Scenery Board has only taken up to the skyline, when it would have been far better to have taken the one-mile-wide radius for fire-prevention purposes.

6. *Mr. Murdoch.*] You are of opinion that the headwaters of the streams from the Ongaruhe downwards should be conserved also to help feed the river?—Yes. I might say that recently two deputations waited on the Trust regarding their fencing-lines. They wanted a certain amount of bush land leased to them in order to improve their boundaries. I agreed with them, as I think that bush that is not needed for scenic purposes or for conserving the water, but which might possibly be revenue-producing, should be sold or leased. At a meeting of the Trust next Friday we will probably ask the Commissioner of Crown Lands or the Under-Secretary to detach an officer to accompany a member of the Trust to examine these lands that we think are fern-clad with a view to utilizing them for revenue-producing purposes, or retaining them for scenic purposes. On that report we will act later on. I do not think the Trust would ever ask for more than from 6,000 to 7,000 acres over the whole four hundred miles of the river to be placed on the market, and it is all fern-clad hills.

7. *Mr. W. A. Veitch., M.P.*] I indorse all Mr. Cummins has said. The Wanganui River is a very important public highway, and if its present utility through the want of conserving the water-supply is minimized the State will be put to an enormous expense in building roads and railways to carry the traffic that now is, and should in the future be, carried on that river. Even if the reservation of all the land the Chairman has urged should be taken costs the country a large sum it will be money well spent, and will mean a saving in the end. Owing to the importance of the Wanganui River and its tributaries to the commerce of this country, it seems out of the question for the Commission to adequately deal with the matter in the short time allowed, and I therefore suggest that your members should return to Wanganui before making their report and deal more fully with the question brought before you to-day. I propose to make representations to the Prime Minister to the effect that the local requirements are of such magnitude to Wanganui in particular and New Zealand in general that it is absolutely necessary that the matter should be dealt with finally and adequately by this Commission.

NEW PLYMOUTH, WEDNESDAY, 30TH APRIL, 1913.

WILLIAM ANDREWS COLLIS sworn and examined. (No. 64.)

1. *The Chairman.*] We shall be glad to hear what you have to say?—I am the New Plymouth representative on the Egmont National Park Board. Yesterday the Commission visited the Everett Road Reserve, which was laid off not because the country was rough and bad, but in order to preserve some specimen of the lowland forests in this district. Probably in a few years' time that piece of forest will be the only bit left of the genuine lowland forest. For that reason we oppose the lifting of the reserve if that question is being raised. If any attempt is made to interfere with the Egmont National Park we soon know all about it, as nothing can be done excepting by Act of Parliament; but in regard to the Everett Road Reserve there is a danger of the real facts of the case not being put before the Commission, with the result that the reservation might be lifted.

THOMAS C. LIST sworn and examined. (No. 65.)

1. *The Chairman.*] What matter do you wish to refer to?—I am the chairman of the New Plymouth Expansion and Tourist League, and we desire to bring under your notice the matter of the preservation of river and mountain scenery in north Taranaki. For some time past the League has been urging upon the Government the necessity for protecting and reserving what remains of the incomparable river scenery on the River Mokau. Some of the best stretches have already been destroyed, and more is now threatened with destruction. The former owners of one large block, I understand, were willing to reserve without compensation the bush fronting the block on the riverside, from the water's edge to the skyline, but for some reason that has yet to be explained the Government of the day did not take prompt steps to proclaim the land involved a scenic area. The block subsequently changed hands, and most of the bush was felled and the fire put through; so that where a short time ago some of the most beautiful bush in the world adorned the river-bank, bush which took probably decades to grow and cannot be replaced in less time, if ever, is now a scene of desolation, a veritable eyesore to the visitor. One could probably understand this destruction if the frontage to the river were of any value for settlement, but for the most part it has no value other than scenic. It is to prevent more of the river scenery sharing the same fate that our League is anxious to enlist the support of your Commission. There are considerable areas still remaining that have been surveyed as scenic reserves, which have not yet been gazetted and taken over by the Government. There are also portions of bush scenery on Native land that should be proclaimed. Again, there is a fine piece of bush on a section the lessee of which is willing to hand it over if the Government will pay for the necessary fencing. When approached by the League on this matter recently the Prime Minister expressed his entire sympathy with our desires, but explained that it was a question of finance, involving a cost to the Government of £10,000 for compensation to owners. I submitted then, and do so now to you, that the preservation of this bush for which compensation is being sought is absolutely necessary in the interests of the settlers themselves. Once destroy the bush, and the banks, especially soft banks like those of the Mokau, will sooner or later fall into the river, impede the flow of the water, and ultimately seriously affect if not absolutely block the river as a means of communication—the only means of ingress and egress the holders of most of the sections have, or ever will have, to their properties. But apart from this important consideration, the price put upon the land required to preserve the river scenery could, it appears to those qualified to judge, not be justified before a Compensation Court, and if the State had to pay compensation it would probably be found to be a sum considerably less than that mentioned by the Prime Minister. In any case, it is felt by our League that a strong effort should be made by the Government to secure for present and future generations what is left of the scenery on the Mokau, even if it does entail the expenditure of a few thousand pounds. This river will before very long be as popular a tourist route as the Wanganui River. The road connecting Totoro, at the head of the river, with Te Kuiti is being improved, and with the opening-up of settlement the upper reaches of the Mokau will have to be snagged to allow vessels reaching Totoro. Tourists will be able to leave Te Kuiti, motor or coach to Totoro, and go down the Mokau to the township, thence coming on to New Plymouth. A prettier trip there is not in New Zealand, and everything should be done to preserve the scenery. The mistake was made years ago, before the bushman's axe began its work, and when the whole of the bush for a mile on each side of the river, with necessary outlets, of course, for settlers, should have been reserved, as in the case of the Wanganui River in Mr. Ballance's day. This may not have been easy on account of the complicated ownership of most of the lands affected, but for these laches posterity will have something very pertinent to say of our legislators. Another matter to which our League would direct attention is the maintaining of the Patua or Kaitake Ranges as a scenic reserve. An effort is being made by interested parties to have the low-lying land on these ranges thrown open to settlement, the statement being made that at present the reserve is nothing else than a seed-bed for noxious weeds. To cut down this bush will be a scandal and a calamity that would fall most heavily on those anxious to bring it about, and I trust you will not agree to it. The bush-clad ranges act as nature's reservoirs for the whole of Taranaki. But for this provision the province would not be the well-watered, fertile, and prosperous district it is. The water, unrestrained by the natural forest covering, would tear its way quickly to the sea, carrying probably much good land with it, and in summer-time soon drying up and so depreciating the stock-carrying capacity of the land. As for the ranges harbouring weeds, it is difficult to see how this can be so where the bush and undergrowth is luxurious. Once cut that away and the weeds would have an opportunity to flourish which they do not possess now.

The League is anxious only to see national assets of pre-eminent value and importance preserved, and we trust the Commission will also take this view.

2. Is the Patua Range permanently reserved now?—Yes.

3. Is it fenced?—Partly, but the open part of the range is let.

4. Could that open part be fenced against cattle?—It is not fenced between the bush and the open country, but only as between the reserve itself and the surrounding country. We want to prevent any encroachment on the reserved portion of the range. The society has made repeated representations on the subject to prevent cattle destroying this forest, but nothing has been done. When it was attempted to have this made a reserve and inalienable, the objections some years ago came from the very people adjoining the land in question.

5. Are you aware that some of the land fronting the River Mokau is reported to have changed hands lately at £6 an acre?—No. A lot of the land facing the river is of a precipitous nature, and the most valuable from a scenic point of view. There are one or two very valuable flats, and you might allude to those. They were cleared years ago, and do not affect the scenic aspect of the question.

6. A sub-committee has already visited the Mokau, and we recognize that a great deal of the country is precipitous, but when these cases go before the Compensation Court the price put on some of the frontages to the river is very high?—The League recognizes the necessity of giving access to the sections fronting the river and these flats, and I presume the price paid for the flats—£6—can be justified. We do not wish to stop settlers getting access to their holdings, but we do say that land of no value from the point of settlement has been burnt and the scenery destroyed.

7. *Mr. Lethbridge.*] Do you think the people holding that land, and who should know something about its capabilities, would fell bush and grass country that was of no value?—You never know what they will do. I was speaking to a contractor a few months ago on this subject, and he said, "We had a contract to do so-many acres, and we have felled the bush right down to the river; but I admit that the land will not carry a rabbit to the acre."

8. *The Chairman.*] Are there any patriotic people in Taranaki who would be inclined to subsidize any efforts that might be made to preserve the places you mention?—Taranaki is well provided with reserves, to the credit of its people, who have done much in that direction. The recreation-ground was practically made and has since been maintained out of public subscriptions. The expenditure on Mount Egmont Park has been borne by the people of this town, although certainly the Government have helped. I think we have done our share. With regard to Mokau, I submit it is a national matter, the most valuable asset to New Zealand, and should be treated accordingly. The late Prime Minister, Mr. T. Mackenzie, told us that Mokau River contained easily the best scenery in the Dominion. The Wanganui people were not asked to bear the cost of reserving the bush on that river, and why should not the State treat this district similarly? Then, again, the Mokau River is fifty miles from New Plymouth, on the border of the Auckland Province, and the Auckland people might very well be asked to contribute their share to conserving the Mokau bush. It is a national matter and in the interests of settlement that the scenery along the Mokau should not be destroyed, otherwise the river will become a sludge-channel, and the people who are now asking exorbitant sums by way of compensation will be the first to cry out.

ROBERT CLIFTON HUGHES sworn and examined. (No. 66.)

1. *The Chairman.*] Do you wish to make a statement?—With regard to the remarks of Mr. List on the Mokau River, I wish to state that I saw that country before a tree was felled, when it was in a state of nature. I saw it again after a lot of useless clearing had been done, and it was heart-breaking to see how the trees that made the place so beautiful had been destroyed. They were felled on the steep cliffs, and the charred stumps were lying on the cliffs. The country was consequently opened up to the blackberry and other noxious weeds, country which is wholly unsuitable for grazing or reproductive occupations. I sympathize with the Government over the question of funds, but the State should bear in mind that New Zealand stands almost foremost in the world as a tourist resort. I trust the Government will supply the funds to preserve the scenery on the Mokau River up to a reasonable extent. I would not allow another tree on the river-bank to be cut down.

2. Are there any patriotic men in Taranaki who would be inclined to subsidize any efforts in the direction of preserving the places you mention? In certain other districts where the Government have been approached to secure places of interest they have done so on condition that some contribution towards the expense was made by the people in the district, and in several cases that has been agreed to?—We have not many wealthy people here who could put down their cheques for £1,000. It is not a common practice here, but I am sure an appeal to the public generally would be responded to to some extent. I would back my feeling with a small contribution. As to the Everett Road Reserve, some time ago Mr. Bakewell, a farmer living on that road, told me that efforts would be made to have the land there thrown open for settlement, and he was strongly opposed to it. I wish to represent his view on the matter to this Commission. He is an adjoining settler to the reserve.

3. *Dr. Cockayne.*] Is there a considerable quantity of land available for settlement in Taranaki still, and not yet occupied? Is this the last piece that can be settled?—Mr. Collis could perhaps answer that question.

4. *Mr. Collis:* There are large areas in the back country coming in, and in the back districts, if the settlers were to farm their land better, it would be a wiser policy than throwing open fresh areas of bush land for them.

CLEMENT WILLIAM GOVETT sworn and examined. (No. 67.)

1. *The Chairman.*] Will you please make a statement?—I am a solicitor, and have been in practice here about thirty-six years. At the present time it seems impossible to build small houses suitable for artisans and working-men except at a loss. I am of opinion that to build houses which will not pay at least 8 per cent. on the cost of the building and 5 per cent. on the cost of the land may be philanthropic, but from a business point of view it is madness. I have endeavoured by means of correspondence in the local papers and by interviews with builders and carpenters to endeavour to find out how the object I have in view can be attained, and I thought perhaps that something might be done by way of building houses to stock measurements, but I have been always told that houses cannot be built at the present time at a profit owing to the price of timber, which is notoriously rising in value every year. Under these circumstances it seems to me that with a scarcity of New Zealand timber it is the imperative duty of the Government for the time being of New Zealand to do everything in their power to encourage the importation of timber from every direction possible, and in order to do this to reduce or abolish altogether duties on imported timber. The present policy of endeavouring to stop the importation of foreign timber keeps up the price abnormally high, and encourages the destruction of timber, some of which has not properly matured, and also the cutting of timber at probably unsuitable times of the year when the sap is rising instead of falling. I have no special knowledge about timber, but my professional experience shows me that the houses which have been put up during the last few years will never last like the timber used in the houses built, say, more than thirty years ago. I have had for some twenty-five years a good deal of experience with regard to planting and growing native trees, and am at the present time Chairman of the Pukekura Park Board, one of the main objects of which is to grow native trees in the park. Though the young trees there are extremely well sheltered, and have every advantage, their slow growth shows that it would be quite hopeless ever to think of growing New Zealand trees for the sake of their timber when there are so many exotic trees which grow so much quicker and are also so much hardier. I say nothing about the evil climatic effects which are following the denudation of the forests, and the necessity of making large forest reserves (though I feel very strongly on this subject), as well as regards the loss of beauty.

2. Could you give the Commission the date when the gardens here were started?—No planting was done before 1876.

3. When were the large *Pinus insignis* planted?—About the end of 1876.

4. Is much building done here in concrete or brick?—Very little, for the reason there is such a great difficulty in regard to getting stone.

5. Is the timber used in the town locally grown or imported?—Lately there has been some importation of Oregon pine. Nearly all the timber used is New Zealand timber, but I cannot speak with certainty.

GEORGE HENRY BULLARD sworn and examined. (No. 68.)

1. *The Chairman.*] You are Commissioner of Crown Lands and Chief Surveyor for the Taranaki District?—Yes.

2. It has been alleged that the Everett Road Reserve is a hotbed for noxious weeds. Is that correct?—Probably you noticed at your inspection yesterday that the noxious weeds were chiefly on the road frontage and along the part of the reserve that had been run through by fire. We let a contract lately for clearing them. I cannot give the exact cost, but sometimes it amounts to about £20. That is the annual cost.

3. Are there many reserves in the district in the same position?—Yes, Pukerangiora Pa cost us lately £100 to clear of weeds. It is an historic spot on the Waitara River. I will supply a list of the reserves and cost of clearing the same.

4. Are there any climatic reserves in your district or Crown lands back in the ranges that could be set aside for climatic purposes?—We do as a rule reserve the very rough portions in the case of every block of Crown land opened up, but the pressure for settlement land is so great that we have to open every acre that is worth it. Taranaki is well off for reserves. Our policy is to reserve any portion of a block that we think too rough for profitable settlement. As to the quantity of Crown land left in Taranaki, at the beginning of last year there were 250,000 acres, but by the end of this year there will not be 150,000 acres left unalienated.

5. Is Native land being purchased here on behalf of the Government?—Very little Native land is left unalienated, and little is being bought. One or two blocks are left, but they have been leased, and we have no chance of getting them.

6. Have you any trouble in this province over the deer?—No. But we have trouble through settlers putting their cattle into the reserves during the winter. We find it hard to get a conviction against them. We tried, and were advised that all we could do was to impound the cattle. The trouble has been very bad in the Egmont National Park.

7. I understand there are very few timber-mills in this province?—Very few. The Taranaki bush does not carry a large amount of milling-timber to the acre. I had an assessment made of some bush on land at Mangapehe before the land was opened for settlement, and on 1,000 acres the assessment only came to 820 ft. to the acre, and on 200 acres to 6,500 ft. to the acre. On a 1,200-acre reserve there was roughly about 7,000,000 ft. of timber. We borrow the timber expert of the Wellington District for work of that kind.

8. When the timber is sold is it disposed of according to the schedule rates of royalty under the regulations?—Yes; but I have had it pointed out to me lately that these are the minimum royalties, and the Department prefers the timber being put up to auction. We have so little that we have not done so yet, but in one case we will auction it.

9. You also have had experience in the Gisborne district?—Not much in the bush. There is very little Crown land there carrying timber, but even there pressure was brought to bear to throw it open for settlement. At Motu we did keep back several thousand acres that had *Fagus* in it.

10. Is that timber milled there?—They tried some for sleepers and fencing, but it warps badly. It is used in Reefton for mining props, studs, and joists. I have never seen it used for furniture.

11. Have you reported on preserving the bush at Mokau?—Lately I was asked to report in detail on the scenic reserves there. A proposal has been made to exchange part of the Crown lands along the bank of the river for a scenic reserve.

12. *Mr. Lethbridge.*] Would it not be better to buy the land right out?—I have told the Government that as far as the land above the mines is concerned I would not have it for pastoral purposes even if they gave it to me. I do not put any value on the scenic reserves. It would be a great pity to fell the bush on the land I refer to, because the land would then only slip into the river. Some of the bush will have to be destroyed to give road access if the land is ever settled.

13. *Dr. Cockayne.*] If this country is so rough that it cannot be settled, how can it be of any value?—A lot is of no value, but there is some good land.

14. In estimating your timber do you take tawa into account?—No.

15. Are there any areas of tawa country which are of little value for farming purposes?—There would be a certain amount, but a lot of our country is so very rough that I question whether you could mill the timber properly for butter-box purposes.

16. Could it be kept for future milling when the white-pine is cut out?—Not in the country we have left in Taranaki.

17. *Mr. Clarke.*] What building-timbers have you?—Chiefly rimu, and a little matai and totara.

18. How much of the remaining 150,000 acres of Crown land contains milling-timber?—I could not tell you. But I gather there is very little good milling-timber in the district now.

19. Do the millers get their supplies from the King-country?—The milling is chiefly done on the Auckland side. Part of the King-country is in my district.

20. *Mr. Murdoch.*] Is it desirable that that long, narrow strip of reserve at Everett's Road should be kept?—There is a good deal of the original bush there.

21. It seems all second growth?—Yes, but it is the native second growth coming back again. The original bush was trampled out by cattle.

22. Seeing it is such a long, narrow piece, and that the residents are doubtful about its being retained, would it be wise to continue it as a reserve?—I suggested not long ago we should cut out the part which has been burnt. Some of our reserves are costing a lot of money for upkeep, and the financial burden is rather great accordingly.

23. *Mr. Lethbridge.*] What is that land worth if opened for settlement?—£4 to £5 an acre; at any rate, £3 10s.

24. *Mr. Murdoch.*] We were told that it would fetch £30?—That would be cleared and grassed; but they would not get that in the bush. They would realize on the timber first. The land alongside only runs to £20 an acre. £30 would mean stumping and clearing, a work of many years.

25. *Dr. Cockayne.*] Does not a good deal of the Wanganui River have a frontage to Taranaki?—One side is our boundary as far as Pipiriki.

26. A good deal of the river-front is not reserved?—There are Native blocks fronting the river in one or two cases, and a number have been surveyed for scenic reserve purposes.

27. But it is not yet acquired?—It is not gazetted yet.

28. Could the Maoris lease that land?—Some has been leased.

29. Could they lease in the meantime to outsiders the portion you have surveyed and recommended as a reserve?—I suppose they could.

30. *Mr. Lethbridge.*] Do you not issue a Proclamation?—In some cases they have leased it because no Proclamation has been issued.

31. *Dr. Cockayne.*] Then the land recommended for scenic purposes is in the same position as unsurveyed land?—Yes. Some of it has been gazetted, and we are negotiating for an exchange respecting some scenic reserves proposed to be taken in the Kohuroa Block.

32. *The Chairman.*] In such a waterway as the Wanganui River, where land suitable for settlement abuts on the river, do you not think it would be as well to allow that land to be settled to afford a contrast to tourists coming down the river from Taumarunui, to whom otherwise the scenery might get a little wearisome?—I think so. Too much stress can be laid on reserving a lot of the bush along the river, as some amount of civilization does afford a relief. It would be unwise to fell any bush on the steeper slopes of the Wanganui and Mokau Rivers, as it would be detrimental to their navigation to do so.

JOHN JOHNSTON sworn and examined. (No. 69.)

1. *The Chairman.*] Kindly tell us your position?—I am the Dairy-produce Grader at the port of New Plymouth.

2. From where do the butter-factories here obtain their timber for butter-boxes?—From locally grown timber, principally from the Main Trunk line.

3. Have the Dairy Association a mill there?—Yes.

4. Have any experiments been made here with other timbers than white-pine for butter-boxes?—Not in Taranaki. In Wellington an experiment was made with *Pinus insignis*, and it turned out very well.

5. Was the timber treated in any way?—No, just the plain timber, well seasoned.

6. With the butter-boxes used here is any preparation placed on the white-pine?—No.

7. In Otago and Auckland evidence was given that the white-pine was first paraffined. Is that done here?—No. That is the system followed in Otago and Auckland, but I do not think it has any value. The parchment paper, used properly, is quite sufficient. Nothing is gained by paraffining.

8. In the experiment in Wellington was the parchment paper used?—Yes. I had the box opened at the Palmerston Show three years ago. The butter had been in the box about three months, and it was of good quality. Tawa timber has been used for years for casks, but casks are not very satisfactory for butter exporting and storing.

9. Has poplar timber been tried?—I do not know.

10. *Dr. Cockayne.*] We were informed in Auckland by Mr. Thornton that if parchment paper was used for lining butter-boxes almost any timber would do. What is your opinion?—I think that would be correct, providing the parchment paper was of good quality; but at present we have a lot of inferior parchment paper, which becomes soft like blotting-paper, and it is damaging the butter.

11. Have you had any experience of butter-boxes made of paper-pulp?—I have seen the boxes here, but not used them or tested them. I should think they would be quite suitable if of reasonable cost.

12. Can we do without the white-pine if we can find somthing else to take its place?—You might have to use more lining to keep the wood from the butter, and it would be more costly. I do not consider it absolutely necessary to have the butter-box made in one piece of timber, as in the past.

13. *Mr. Clarke.*] With regard to white-pine timber, in the interests of the dairy industry do you think it advisable to prohibit its exportation—I should say Yes.

14. *Dr. Cockayne.*] Even supposing the white-pine forests were standing on land which for the production of butter-fat was much more valuable than holding it for milling the forest?—I understood the supply of timber was rather on the short side.

HENRY OKEY, M.P., examined. (No. 70.)

1. *The Chairman.*] You wish to refer to a certain reserve, I think?—Yes, the Everett Road Reserve. It is in Mr. Hine's electorate, but some settlers have asked me to inform the Commission that they wish the reserve sold, and the land brought under settlement; otherwise it is going to be a nuisance to the district on account of the spread of blackberry. It is a costly matter to clear it, and as a reserve they do not consider it is required. Roads have to be maintained by the settlers, and if the reserve were brought under grass the land would be rated, and the rates would go towards the upkeep of the roads. There is no objection locally to the reservation being uplifted.

CHARLES AHIER sworn and examined. (No. 71.)

1. *The Chairman.*] What is your position?—I am a timber-merchant here, and may be able to give you some information as to the timber-supply of this district. The only Taranaki mill I know of is one owned by Mr. Symons. It is at the foot of the mountain, and turns out from 80,000 ft. to 100,000 ft. per month. Another mill on the Egmont Road, near Inglewood, is not turning out more than half that quantity. There is plenty of timber in Taranaki, but not handy enough to a railway to make it profitable to work. Until the railway is running between Opunake and New Plymouth, around the coast, where there is a good deal of timber, the latter supply will not be worked. Our supplies come from the Main Trunk, but it is very inferior timber to what we have formerly received in Taranaki, which produced the best rimu in New Zealand.

2. Is the timber at Opunake a red-pine forest—Yes.

3. Is there a large quantity of it?—A great deal.

4. On Crown or private land?—I cannot say. We also get supplies from Mokau, a good class of timber. We import a considerable quantity of Oregon pine.

5. What price per hundred is good-quality rimu sold at here?—It averages according to quality from 15s. 6d. to 19s.

6. Do you utilize other timbers here, such as matai or tawa?—Tawa is not used for building. We have white-pine, but it is nearly all exhausted, until the railway is built.

7. Where is the white-pine growing?—It is mixed with the rimu.

8. What is the local price of white-pine?—I cannot land it in my yards under 11s. 8d. a hundred feet.

9. Do you do any manufacturing?—Yes, we have a large factory.

10. What can you supply butter-boxes at?—Until this year we have been supplying them at 1s. 3d., but next year we shall have to add a little extra and make it 1s. 4d. a box. There is always keen competition in New Plymouth, which keeps the price down. At the price I have quoted they are made at a loss.

11. Do you attribute the proposed increase to the supply of timber becoming scarcer?—Hardly. At Eltham there is a company of farmers who have bought up a line of white-pine bush up the Main Trunk line and erected a factory there. They are making butter-boxes for the farmers at cost price.

12. Are you personally acquainted with the bush that has been bought by the Egmont Box-factory?—No.

13. We saw a paragraph this morning stating that bush contained a fifty-years supply of white-pine for the whole Dominion. Is that correct?—I do not think there is any bush in the North Island with fifty years' supply of timber in it. I read the paragraph, and thought it was a matter of "blow."

14. Can you tell us the price of Oregon pine here?—We are retailing Oregon at anything between £1 and £1 5s. a hundred feet.

15. From a timber-merchant's point of view is it a satisfactory timber to deal with?—It is a much superior timber to the timber that comes from our Main Trunk line, the latter being full of sugar, which is what a worm lives on. The Taranaki red-pine is very hearty timber, and when dried there is very little chance of the worm getting into it.

16. Do you think the time of the year the timber is cut has anything to do with its softness?—No. I have read of such being the case, but my experience of a lifetime indicates there is nothing in the contention. It would never do to close the mills so many months in the year, and only carry on operations at the time deemed proper for cutting the timber.

17. Has *Pinus insignis* ever been milled here?—No.

18. I suppose you know a good deal is used in Canterbury now?—So I hear, and also in the Bay of Islands. I have not much faith in *Pinus insignis* as a timber for building purposes. The reason our houses decay so quickly now I attribute to painting them too soon after erection. If the paint were kept off a house for two or three years and plenty of time allowed for evaporation the house would last one-third of the time longer. Fifty years ago I built a house in the Waikato of white-pine, and it was left unpainted for seven years on account of the difficulty of obtaining white-lead and oil. It was afterwards painted. I saw it eight years ago, and it was in splendid preservation. I never send out timber for joinery unless it has been in my yard two years for seasoning. The fault in the past has been that the timber is put into a house too soon after being cut.

19. *Mr. Lethbridge.*] You say the insects attack the wood for the sugar. Are you aware that the powellizing process is to put sugar into the wood?—No. I object to that process, because I think you injure the timber if you dry it too quickly. Timber must be dried naturally.

20. Do you object to powellized timber?—That is my view of it. Last month I sent away over 50,000 ft. of timber I have had in my yard over ten years, and the buyers are satisfied it will make good joinery. I have not the slightest doubt that it is the sugar in the wood that attracts the worm.

21. *Dr. Cockayne.*] Have you considered that the sugar contained in growing timbers differs at different seasons of the year?—The sap rises and falls, and no doubt sugar is contained in the sap, and there is a certain amount of rise and fall of the sap at different periods of the year; but it would be impossible to carry on this business so as to arrange to fell trees at certain times of the year only. I have never seen a comparison between timber felled in December and that felled in June. I think there is very little in the argument.

22. *Mr. Clarke.*] You agree that the duration of the timber-supply in Taranaki is very short?—Yes.

23. Do you consider it a matter of importance that some scheme of replanting should be carried out at an early date?—At my age I do not think that I should trouble much about the next generation. As soon as the timber is exhausted the generation affected will find a substitute, and they are doing so now. The day is not far distant when all the houses will be built of concrete, even to the doors and sashes. The joists will be of reinforced concrete, and the walls.

24. Do you consider that it would be better to provide the material we know all about rather than trust to a substitute that may not eventuate?—I think our land is better turning out butter than growing trees for a generation that may not want them.

25. Supposing we have land that is not suitable for growing butter-fat, would it not be better to plant those areas in timber?—I find that good timber grows on good land. At one time it was remarked in Auckland that the gum lands were miserable country to farm, but to-day that land is producing butter that is putting Taranaki in the shade. I hear people remark on the wholesale slaughter of timber in this country, and I should regret it also as a timber-dealer; but I do not, because as far as our trade is concerned we owe more to butter than we do to standing timber.

26. At the same time you must admit we must have timber for butter-boxes?—There are already half a dozen substitutes.

27. Mostly made of wood-pulp?—No.

WELLINGTON, THURSDAY, 15TH MAY, 1913.

KENNETH WARING DALRYMPLE sworn and examined. (No. 72.)

1. *The Chairman.*] What is your occupation?—I am a farmer, residing at Rangitikei.

2. What matter do wish to mention?—There is a large block of country from Turakina down to Rangitikei belonging to the Government, but at present leased to neighbouring landowners. It is a part of the national endowment, but is practically one-third worthless now, and, with the exception of one man, the holders are willing to allow the Government to take and plant one-third of this block without asking for any reduction of their rent. The land is held on the condition that it can be resumed on twelve months' notice without compensation. The block consists of 8,000 acres. The part resumed would have to be planted with marram-grass first, and I suggest that the area along the coast should be taken in hand first in order

to obtain the necessary shelter for the rest. There is a block of 6,000 acres across the river belonging to Mr. McKelvie, who is, I understand, prepared to deal with it in the same way. If the Government agree to plant the block I first referred to, the owners stipulate that the rabbits must be kept down, and that no lupin be planted, as it is apt to spread. As to planting building-timbers, possibly you have had evidence that the quantity of softer or inferior timbers that will be wanted in the future is likely to increase very much, and also for the butter, cheese, and fruit industries. For this purpose *Pinus insignis* seems the most suitable, as it grows very quickly, within twenty-five years yielding a certain amount of millable timber. Inland of the district I mention gums grow well, and would prove generally more payable and useful than the soft woods.

3. What is the average width of the belt of sandy country you refer to?—About half a mile.

4. What rentals are the holders of the leases paying?—Very small rentals. McKelvie's lease of 6,300 acres carries with it a rent of £132 10s. a year. One I am interested in, of 1,818 acres, involves a rent of £31 per annum. In the case of a lease of 3,500 acres, farther up the coast, the rental is £59 per annum.

5. In the event of the Government deciding to plant these dunes would it be necessary to erect fences to keep the stock off?—Yes, but the marram-grass could be planted in the meantime, as the stock would not interfere with it.

6. Are there any rabbits on the sand-dunes now?—Practically none, but they would go there if marram-grass were planted.

7. Are they very bad on what might be termed the mainland portion?—Not very plentiful, but still they are always there, and there is a liability for them to increase.

8. Do the runholders keep them down?—Yes, by poisoning and killing generally.

9. Have you made any personal experiments in reclaiming sand-dune areas?—In a very small way I have planted some marram-grass, and it has taken very well. I tried sowing *Pinus maritima* seed on the marram-gras, but no result followed. I planted *Pinus muricata*, also a few natives, but they died.

10. Did you meet with any success?—No; the sand seemed to kill everything.

11. What area did you plant in marram-grass?—7 or 8 acres, and after nine years it is still growing well.

12. It prevented the spread of the sand?—Quite.

13. *Mr. Lethbridge.*] Do you know of any plantations on private land along that coast?—There are none very close to the coast, but there is one at Heaton Park, inland from one of the runs I have mentioned. It has in it a good many pines, which have been planted twelve or fifteen years. I recommend the Commission to visit the place and note the growth of these pines on the bare sand. The owner is Mr. J. Simpson. The plantation is six miles from the sea.

14. *The Chairman.*] In regard to the offer the landholders are prepared to make in respect to tree-planting, has there been any meeting authorizing you to speak on their behalf?—I wrote to and saw them all, excepting one man named Wilson, who owns land in the centre of the sand-dune block. He seemed not quite certain as to what view he would take, but I think he would fall in with the others. He was afraid of rabbits spreading over his place from the proposed plantations. His run is numbered 18 and 19.

15. *Dr. Cockayne.*] Has the Heaton Park Estate done much planting?—Yes, on the inside of the sandhills. I wish to add that the area I refer to is going back rapidly, the quantity of feed there is falling off, and if something is not done to check the sand-drift it will become entirely valueless.

16. Is the sand going farther inland?—Not much, because its spread was stopped by the marram-grass.

17. *Mr. Murdoch.*] If the area were planted what opportunity is there of getting the timber to the market?—The railway-line is near.

WELLINGTON, FRIDAY, 16TH MAY, 1913.

WILLIAM HENRY BENNETT sworn and examined. (No. 73.)

1. *The Chairman.*] What matter do you wish to bring forward?—I am a builder and contractor, and chairman of the executive of the New Zealand Builders' Association. For a number of years our federation have had the matter of the future timber-supplies of the Dominion under their earnest consideration, and the matter was brought to a head last year in a memorial to the Government setting forth our views on the subject. I beg to hand a copy of that petition to the Commission.

2. I take it that this pamphlet sets forth fully the opinions of the federation on the question?—Yes, and it is not necessary for me to add anything to it.

3. Is there any marked shortage in the timber-supplies of this district?—Yes; within the last month or two certain classes of building-timber have advanced very much in price. For O.T.G. heart-of-rimu lining, 4 in. and 6 in. by $\frac{3}{4}$ in., the quotation is £1 5s. and £1 6s. per hundred feet superficial. That is a large increase, and the excuse is that heart timber is very difficult to get, and it is very largely sought after for joinery purposes and general inside finishing-work. O.B. timber has also risen slightly. It has been urged that foreign timbers should be admitted free of duty in order to help the local supplies out, and the fear was expressed that the market would be swamped with Oregon pine; that fear has not been borne out by facts. To-day we are paying £1 1s. per hundred feet for Oregon in lengths

up to 20 ft., by 12 in. in width. For sizes beyond that the price rises 6d. per hundred feet, which makes Oregon a very expensive timber; so that the fear of its swamping the market has not been justified. I think our own timber-supplies should be conserved for our own use, if possible, as we consider that we have not more than from thirty-five to forty years' supply of timber in the Dominion according to our present rate of consumption. On the basis of an increased rate of consumption the position becomes more serious still. We are using up our supply and making no provision to take its place.

4. Are you not aware that the Government are planting certain areas?—Yes, something is being done, but in our opinion it is totally inadequate for the requirements of this country.

5. This Commission has to face the problem of growing timber in such a way that it will not cost £200 to produce £100 worth of timber. Have you any opinion to offer on that point?—I think there are many large blocks of waste land that are suitable for afforestation but not for any other purpose, and they should be dealt with in that way, and so made a valuable asset to the Dominion.

6. The cost of labour and the price of money make it a harder matter to grow timber economically in this country than in Europe?—I understand the difficulty. Have you considered the question of making it obligatory on the part of landowners to plant a certain area of their holding?

7. Whatever might be done in that respect in the future, I do not think the principle could be made retrospective. Settlers might be encouraged to plant trees on the remaining hilltops by the supply of trees at cost price. Would you support that proposal?—The benefit derived by the farming industry from tree-planting would compensate them for the loss of the small area that would be planted. The Government might encourage them to plant by imparting the necessary information as to the trees that should be used, or the seed that should be planted. But I would not urge that the farming industry should be subsidized by special grants or the remission of rates. I would oppose such a suggestion.

8. Is much foreign timber being imported into Wellington now?—Not very much. The only foreign timbers at all largely used here are Oregon pine and a few of the hardwoods for wharves and bridges.

9. Is much kauri used here?—No; we cannot get it.

10. I suppose you do not use the white-pine either?—No. I do not think my federation would urge that that timber should be conserved, for the reason that it grows on a class of land it does not pay to keep idle, and also in the forest it is mixed with other timbers like rimu, which you cannot mill without also destroying the white-pine.

11. Would your federation be in favour of means being adopted to prevent waste in the cutting of milling-timbers in our present forests?—The system followed in the Auckland Land District is the proper one, the timber being sold as it stands, and not allow the millers to cut the best only, destroying what they do not want.

12. When the Commission was at Taumarunui we inspected some automatic machinery for the utilization of the smaller pieces of timber which otherwise would be wasted, thus using up another 25 per cent. of the log. Have you seen that machinery?—No; but I have no doubt that if the work can be done economically it would help our timber-supplies to last out.

13. Have you had any experience in building in ferro-concrete?—As much as the average builder.

14. In that class of building you require a considerable amount of timber for moulds?—Yes.

15. I presume that timber used in that kind of construction need only be of a cheap and inferior class, a non-durable timber?—Certainly, as it could not be used more than twice. You can use the scantlings over and over again, but not the boards. An inferior class of timber would do.

15A. Such a timber as *Pinus insignis?*—Yes.

16. *Dr. Cockayne.*] Would not the knots spoil it?—It would scarcely do for the frame of a building where it has to bear a certain strain, but would probably answer for the timbering for ferro-concrete work. Going into that matter a little farther, as a rule where ferro-concrete is used we are pulling down the very small buildings and replacing them with large buildings. Therefore the timber required in connection with the larger building of ferro-concrete would be double the amount now used in the smaller building.

17. Of course, the larger building would have very much more accommodaiton?—Yes, in the case of business premises and offices. For dwellings I doubt if more accommodation is afforded in the new buildings, which are not very lofty.

18. If a small building is replaced by one in ferro-concrete in connection with which as much timber as there was in the smaller house is used, would not there be a *per capita* increase in the amount of timber consumed?—Possibly not, because an inferior class of timber would be used. In a ferro-concrete building the only timber that is used is round about the doors, frames, and windows, and the internal fittings, such as shelving and dado; but even in a ferro-concrete building people are doing away with all the timber they can in order to make the building fireproof.

19. How would the cost of a building in ferro-concrete compare with one in wood?—The ferro-concrete building would cost about 25 per cent. more than the other.

20. And the upkeep charges would be less?—Yes, both for maintenance and insurance.

21. The cost of painting would be very much less?—Yes, although even ferro-concrete buildings have to be attended to. They are not quite waterproof.

22. *Mr. Clarke.*] With regard to the last questions the inference is that in consequence of the new methods of construction less timber will be required, but is it not the fact that most of the ferro-concrete buildings are not dwellings, but stores and warehouses, where it would be

impossible to erect a wooden building sufficiently strong to take the weight required?—That is quite correct; in fact, in Wellington City I cannot point to more than about twelve ferro-concrete dwellinghouses, all the concrete work being in the business portion.

23. So that if these stores had to be constructed in wood they would spread over a large area, which would mean increased expense in the handling of merchandise?—That is so. But I would like to point out that in this city the building regulations provide that in certain areas you cannot use wood at all.

24. You are aware that certain authorities show clearly that notwithstanding the increase of substitutes for building purposes the quantity of timber used also shows an increase?—Yes. From our inquiry when memorializing the Government on the matter we found that in America, the home of ferro-concrete, although that composition has come into use very largely, still the consumption of timber has risen to a very great extent. It points to the fact that we need not expect much relief from ferro-concrete as a substitute for timber.

25. Do you not consider it would be better to provide amply for what is known to be a suitable building-timber rather than to attempt to rely on a substitute which may afford only a problematical relief?—Decidedly so, especially as far as this Dominion is concerned, because here timber will always be sought after as a building-material.

26. Certain questions were asked you relating to the cost of planting here and in other countries where labour and land are cheaper. Notwithstanding the cheapness of labour in other countries, is it not the fact that if we require timber from there we still have to pay a high price for the timber produced under what are supposed to be more favourable conditions?—That is so.

27. Is there any guarantee that New Zealand will get timber from those other places any cheaper on account of the favourable conditions supposed to be operating there?—There is no guarantee. In regard to Oregon pine, here we pay £1 1s. per hundred feet for it, but in Melbourne for the same sizes the price is only 16s. 6d. I cannot understand why there should be such a difference.

28. Perhaps it is due to certain methods of trade that are not practised here?—I do not know if the matter comes within the scope of this Commission, but if the merchants give evidence they might be asked about the matter.

29. *Mr. Murdoch.*] Regarding the milling of our timber, supposing the bushes were cleared out more thoroughly than at present, and more timber being consequently turned out, could a reasonably paying market be found for it?—I think so. That timber could not be much worse than we are getting now in many cases.

30. You think the millers are clearing the bushes out pretty well at present?—Yes.

31. Do you get much timber from the west coast of the South Island?—A good bit. I was on the west coast recently, and was informed that the timber grown there was sought after, as it was so much easier to work.

32. *Mr. Lethbridge.*] Did your committee ascertain information as to the best classes of timber suitable for New Zealand requirements?—No, because we only met in November last, and then found this Commission was going to be set up almost immediately. We thought it would possibly have better facilities for obtaining the information, so we deferred collecting it.

33. *The Chairman.*] In reply to Mr. Clarke you mentioned that your federation had gone into the question of increasing consumption of timber in America. Do you not think that a great deal of the increased consumption is due to the wood-pulping industry?—Possibly so. But it seems to me that it does not signify whether it is used for wood-pulping or for building purposes, as the timber has to be provided all the same, and it accentuates the necessity of making provision accordingly.

34. If the increase is due to the large use of timber in wood-pulping, and the same industry arose here, we would require to plant timber suitable for the purpose?—That would be so.

HARRY BORRER KIRK, M.A., sworn and examined. (No. 74.)

1. *The Chairman.*] I understand that you are Professor of Biology at Victoria College?—Yes.

2. Have you had any experience in connection with the microscopic examination of woods?—Yes, somewhat limited in scope, but exact as far as it went. What I sought was to determine the histological character of a number of New Zealand timbers, and I determined seven of them, but I never published the result.

3. Do you think if such an examination were made of all our New Zealand timbers it would serve a useful purpose?—It is difficult to say if it would serve an economic purpose, but it is quite likely that it would be of great scientific value. You know that the uconifers yield specific resins, and we get different compounds from different trees. That was not my work, but I thought there might be some histological constant that would go with the timber products, and so I carried on the investigation in conjunction with Professor Easterfield, and as far as I went I failed to find the constant. That is to say, trees that were most alike histologically yielded products that were quite different; while trees that yielded resins very much alike in connection with the small group I have mentioned showed different microscopic characters. Professor Easterfield did the chemical work, and I worked out the histological characters. Although I did not carry on the work far enough to be sure there was nothing in it, I carried it far enough to show that there was no immediate encouragement to be expected, and under pressure of other work I abandoned it for the time being.

4. The reason I ask you this question is not altogether from a scientific point of view, but from the practical standpoint. I will give an illustration: the Australian colonies admit our white-pine free of duty. Some timber was exported from one of our southern districts, but when it arrived in Australia the Customs authorities were not satisfied that it was white-pine,

but thought some other timber was being "run in" in its place. They sent a specimen of the timber over to New Zealand, and without a microscopical examination of the wood it was very difficult to determine whether it was white-pine or not. Therefore, the question is, if our woods had been properly examined by the microscope it could have been definitely stated at once whether the wood in question was the species it was claimed it belonged to. What is your opinion on that point?—As far as I know the species could be determined. I can certainly tell white-pine from any other timber I have examined.

5. Would it be a very expensive business to have our New Zealand woods examined microscopically, and the results tabulated?—It ought not to be an expensive matter, because there is certain equipment in the Colleges for the teaching of science which would suffice for the purpose. The only difficulty would be in collecting the best samples. That is to say, we should not only want samples of every timber, but samples from every possible locality, and of as many different ages as we could get.

6. If these samples were furnished to the University you think the authorities have the plant there to carry out the work?—An expenditure of £25 would be sufficient to secure a good plant to do all that would be wanted. But with regard to the question of a scholarship, that is another matter. I thought of proposing that this very question should be a subject for Government research this year, but I found, unfortunately, that although we have a qualified student available, the scholarship is considered to be awarded this year to a man who is already working, and so I am afraid that my chance of getting the matter taken up is likely to suffer, if not to disappear altogether.

7. What is the value of the scholarship in question?—£100 a year for two years, with a possible extension, and it is given to graduates in Honours.

8. Would it be a good thing if the Government awarded another scholarship that might go to a suitable student?—I think it would be.

9. Would any other University College in New Zealand have any one well qualified who could take up such a branch of work?—I do not know of any one, but it is quite likely.

10. With regard to the educational qualifications of young men seeking to enter the Forestry Department, are there the facilities in the University Colleges to-day to enable them to obtain the necessary scientific groundwork in such subjects as botany, zoology, meteorology, &c.?—A man can get a thoroughly good grounding in botany and zoology in our University Colleges, but we have no facilities at present for dealing with the economic aspect of any subject. I think I can express the position by saying that we are qualified to teach botany, but not to teach any technical application of botany, the staff being inadequate for such a purpose.

11. You are referring now to the Victoria College?—The same remark applies to every other College in the Dominion, the staffs being inadequate to take up such work. There is a further limitation that applies to Wellington particularly: we are handicapped by the large majority of our students being night students, which means that they can only come to us for four or five hours at the end of the day, and we have to get them to do work we consider ought to be done by a man fit to take a degree. That leaves little time for special work.

12. Considering the importance of the question of forestry to New Zealand, do you think it would be well if one of the Colleges should specialize in that branch?—Undoubtedly I do. I do not know whether any mention has been made to the Commission of the fact that Auckland University College is now about to appoint a Professor of Biology. It has been suggested in that connection that they should appoint a Professor of Botany, and, of course, a man up to date. It seems to me quite possible that they could appoint a Professor of Botany who could take forestry, and give him a lecturer. That would be a good foundation to start on. There is no Professor of Botany in New Zealand; but the men who teach botany have also to teach zoology, two subjects of enormous range, and for a man to keep up to date in botany, with zoology added, makes it impossible for him to take up the technical branches of the same science.

13. Have you had any experience with regard to the treatment of timber by means of preservatives—either the creosoting or the powellizing process?—I have seen many samples of powellized timbers, and have co-operated in experiments. They have not gone far enough to be exhaustive, but I do not think they tended to complete confidence in the powellizing process. Of course, one often sees much fungoid or bacterial growth on timber of that kind.

14. Have you experimented in regard to the creosoting process?—I have never tried it, but I have examined creosoted samples of timber whenever I have had the opportunity.

15. *Dr. Cockayne.*] Would it surprise you to hear that we saw on some powellized timber at Invercargill the finest crop of a species of mould that any one could ever see?—I have seen a crop on powellized timber. I am inclined to think fungi would not get inside the timber for a long time.

16. Before a man can learn economic botany he must understand the preliminaries of science. Cannot they be perfectly well taught at Victoria College?—It depends on the student. If he is up to university standing then we can teach him; but one of the difficulties in connection with men from an expert department is that they sometimes have a limited secondary-school education, and so find it difficult to assimilate the ideas readily that can easily be done in the case of men with moderately good secondary-school training.

17. Do you think a man who has the ability to enable him to take a high position as a forester should be able to grasp the principles of elementary botany such as are required for the B.A. degree?—Undoubtedly I do.

18. *Mr. Murdoch.*] In the course of your experiments with the powellized timber you found that the liquid had not penetrated very far?—It seemed to me that it had not.

19. I thought from what I saw that the liquid only penetrates a quarter of an inch. What is your opinion?—Probably less than one-quarter of an inch, except with the grain. In the case of the timbers I saw I do not think the liquid had penetrated to a greater depth than that. The timber was all quite green.

20. That being so, what would be the result in the case of hardwood as street blocking?—The powellized portion of the wood would wear out presently, and there would be left exposed the untreated timber.

THOMAS HARCOURT VALINTINE, M.R.C.S., D.P.H., sworn and examined. (No. 75.)

1. *The Chairman.*] You are the Inspector-General of Hospitals and Chief Health Officer?—Yes.

2. Do you wish to tender evidence regarding the employment of consumptives at tree-planting camps?—Yes. I would like you to consider the possibility of employing those consumptives who are practically cured of the disease, but not sufficiently to permit of their going back to their ordinary occupations involving sedentary lives and confinement in offices.

3. On what basis would you propose that they should be employed—on piecework? That is to say, if it costs 12s. 6d. a thousand to dig the pits for the trees would you pay the consumptives at the same rate?—Certainly. Mr. Goudie, who is present, can speak, of course, with much more authority on the point than I. We used to pay 9d. an hour in the case of consumptives doing that class of work. If they were put on contract work it should be at the rate of so-much for digging a certain number of holes.

4. Here we are faced with the question of paying for the labour, as a rule; the interest charge on the money invested is heavier than in Continental countries. If we place forestry matters on a proper basis we could not recommend anything in the shape of charitable aid, and we have to arrange regarding the employment of consumptives on a basis of paying for their services. We wish to ascertain what would be a fair sum to pay. Have you any opinion on that point?—I quite understand your position. The labour of consumptives cannot be regarded as reliable labour; but tree-planting is an occupation which particularly lends itself to the treatment of consumptives, and therefore any increased cost in connection with tree-planting I would suggest might be supplemented by assistance from the various Hospital Boards. Otherwise it would not be fair. You cannot look at this question from a business point of view; but it is just the employment that is wanted in the interests of the country, and of these people in particular.

5. Can you give the Commission any idea as to what number of men would be available if it were decided to employ consumptives in tree-planting?—I reckon there are about two thousand consumptives in the Dominion at present—males and females—and I consider that employment should be found for from one hundred and fifty to two hundred a year. That number would be available. As soon as we get the sanatoria into working-order it would be found that there would be a sufficient number discharged to allow of that number being available.

6. Has not your Department a large area of land at Kihikihi which it is breaking in now?—Not my Department, but the Mental Hospitals Department. But that land would be very suitable for the purpose.

7. Seeing that the subject is somewhat allied in connection with the two Departments, do you not think it would be possible to find employment for these people in that locality?—It is quite possible.

8. Then they would be able to obtain medical attendance if wanted?—It would be a way out of a difficulty. I believe one of my officers has reported on the advisability of land at Taupo being used; but that is too far from the railway. Kihikihi is admirably situated in that respect, being close to the line.

9. *Mr. Lethbridge.*] Then it would not be the Forestry Department that would employ them there?—I admit that the proposal to employ them at proper tree-planting camps would be the best for afforestation purposes.

10. *The Chairman.*] In the event of such camp as you contemplate being established in connection with the Forestry Department, what arrangements would be made in respect to medical attendance?—The cases would have to be carefully drafted in the first place from the various consumptive sanatoria. The idea is that only those practically cured of a disease, but not sufficiently to allow them to go back to ordinary occupations, would be drafted out, and there should be little risk of those cases breaking down again. At the same time you have to consider that contingency, and therefore it would not do for these camps to be too far removed from medical assistance.

11. How would the cooking arrangements be carried out?—That would be done by the men themselves. We have tried the experiment already at Rotorua, and spent in three years about £2,400 on a camp there, but at first it was not a success, because a matron was put in charge, and the patients used to go to her if they did not feel well or inclined to work. Therefore Mr. Goudie was greatly handicapped in regard to knowing how many men would be available. In fact, the camp was more of a hospital than a tree-planting camp. I altered the arrangement and put the camp under Mr. Goudie, and then it was in no sense a hospital. There was no nurse there, and it was much easier for Mr. Goudie to carry on.

12. How were the men supervised?—There was a foreman appointed from amongst the patients.

13. Had they the requisite knowledge to enable them to instruct the others?—They had no special knowledge excepting what they obtained by working under Mr. Goudie. These men were appointed specially to look after the camp and generally manage it for the Department.

14. Was there any return for the expenditure at Rotorua?—The only return was the number of trees they planted, and the fact that the men were kept employed, and isolated from the rest of the community, during the time that they might have been to a certain degree infectious.

15. Was the work they did credited to your Department?—No. They were paid direct from the Forestry Division.

16. How many men were there in the camp?—The number varied from eight or nine to twenty-two.

17. *Mr. Murdoch.*] Dr. Makgill estimated we could rely on sixty patients. I suppose he referred to the Auckland District only?—Yes.

18. *The Chairman.*] If the net cost to your Department was about £800 a year and there was an average of twenty-five men employed, it cost about £32 for each man independently of

what he earned?—It cost about 2s. 8d. a day for each consumptive employed for the expenses of the camp.

19. Was the amount of their keep deducted from what they earned?—Yes. The manager used to work it out and then it was deducted from their earnings.

20. Did your Department not get anything back?—Just the working-expenses of the camp. We paid the wages and the men found themselves.

21. *Mr. Murdoch.*] As Taupo is a very suitable place for tree-planting and where consumptives could be employed with advantage, in the event of operations being started there would your Department erect the camp?—I think there is every possibility that the Government would erect the camp.

22. If these men were employed for a couple of years could they afterwards return to their ordinary labour?—Some should be able to return long before two years had elapsed.

23. *Dr. Cockayne.*] Are you forced to find employment for convalescent consumptives?—No; but it is the best form of employment for them.

24. Would Central Otago, where there might be considerable planting in the future, be a suitable place for them?—Certain parts of it would be.

25. Possibly better than anywhere else?—I would not say that; but there are certain districts in Central Otago that would be extremely good places, such as the high land about Cromwell.

26. *Mr. Lethbridge.*] Would not the dust there be too much for them?—I do not think so.

27. It is very bad there?—Then the dust would be bad. Is it dusty on the high land there? I would not propose to establish a camp on the plains where it is dusty; but between Cromwell and Queenstown you would not get much dust on the hills. I was thinking of the high lands, and not that there would be any planting on the plains.

AUGUSTUS HAMILTON sworn and examined. (No. 76.)

1. *The Chairman.*] I understand you are the Director of the Dominion Museum?—Yes.

2. Do you wish to tender any evidence?—Yes, on the effects of the removal of forests, on denudation generally, and kindred matters. On behalf of the Philosophical Society I wish to express our sympathy with any steps that can be taken in the way of restraining the effects of denudation, and for preserving the climatic reserves on the high ranges. The society presented a petition to the Prime Minister, and I believe it was passed on to the Commission, on the subject of the National Park. Professor Easterfield, the president of the society, was appointed, with myself, to wait on the Minister on the question, and the professor would have been here this morning but was unable to get away. He would have supported the prayer of that petition. I now wish to support the recommendations of the society, and also of other societies throughout New Zealand, in favour of the extension of the areas of the National Park.

3. Are the deer, as far as your knowledge goes, damaging the climatic reserves in this district?—I think not. They may damage the undergrowth, but I have no special evidence to offer to that effect.

4. In the event of the deer eating out the undergrowth and preventing natural regeneration would it not tend in time to the destruction of those reserves?—Certainly it impairs the usefulness of the forests and retards the growth.

5. With consequent greater liability to fire?—That is so.

6. Are you aware if the deer are barking the trees here at all?—No. I have no doubt that deer, like all ruminants, would chew the bark of the native trees, the same as they chew the willows.

7. Are you of opinion that the deer, instead of being allowed to roam all through our national parks, should be restricted to certain deer-preserves, and destroyed if they come outside those preserves?—That is a matter that requires some consideration, because I have not any evidence to indicate that the deer are harmful in their habits.

8. Here are some photos showing trees at Hanmer which have been badly damaged by deer. After seeing these photos do you think the deer should have the full run of our forests?—If it is a birch bush where these photos were taken, then no doubt the deer appear to be very destructive to some trees, and it becomes a question of whether we are going to have deer or trees.

9. And we shall have the country ruined by the denudation of the hills?—Certainly; much more damage will be done by floods due to the denudation of the forests than good will be done by the presence of the deer.

10. *Dr. Cockayne.*] Do you know the Tongariro National Park?—Yes.

11. Are you aware that within the area of the present boundaries there is virtually not a single tree?—There are no trees within certain limits.

12. You wish to see the upland forest on Ruapehu brought into the park?—Certainly.

13. Do you think the area of this park should be extended as far as the railway-line and Hauhungatahi?—I certainly think it should extend as far as the railway-line, but I am not quite certain about the lay of the country there.

14. What other societies have supported yours in endeavouring to get the National Park extended?—As far as I am aware most of the societies replied favourably to our circular asking their support.

15. The proposal is a necessary one because of the source of the Wanganui River being there?—Yes, its principal source is in that park, and certainly the preservation of the forest would tend to maintain high water in that river, thereby benefiting the river traffic.

16. In additon to the area forming a splendid national park, it is also of the greatest importance as a climatic reserve?—Certainly.

ALFRED KINGCOME NEWMAN, M.P., sworn and examined. (No. 77.)

1. *The Chairman.*] What matter do you wish to mention?—When I was in Parliament on a former occasion I asked that the district around Ruapehu, Tongariro, and Ngaruhoe should be formed into a national park, and Mr. Ballance adopted the suggestion. The Philosophical and other societies have petitioned the Prime Minister to extend the boundaries of this park, and I understand the matter has been referred to this Commission. I visited the park last year, and it is of very considerable importance that the area should be enlarged. Unfortunately there are a number of rabbits getting in, and they are gradually eating out the herbage. The park is also the watershed of a large number of streams, the Wanganui River amongst them, and if the forest is removed the rivers will be disastrously affected, and perhaps the low-lying country will be subjected to floods. On the northern slopes of the park are some of the finest hot springs in New Zealand, and I am exceedingly anxious that the land where these springs are situated should be acquired by the Government for the benefit of the people of Wellington and the Dominion generally. There is a small Native reserve on the slopes of Tongariro at Ketetahi and Te Mari, and I have asked the Native Minister to purchase the Ketetahi springs. He told me he would negotiate for them. They would then be included within the boundaries of the park, and that is an additional reason why the area should be extended. A lot of the land proposed to be included is very poor country, and if it were turned into sheep-runs it would carry very few sheep. The railway is now running near the park, and we have around those mountains a very fine reserve which will be in time a playground for the people of Wellington. Hitherto it has been very inaccessible, but there are two or three roads leading into it, and if the Government will bridge three or four of the big creeks the Ketetahi hot springs will be brought within easy distance of this city. The nearest part of the park is within ten miles of the railway, and the principal necessity is that all the land down to the railway should be included in the park, as it is of very little value for settlement.

2. A portion of the land you advocate should be included in the park is, I understand, private land?—No; most of it is Crown land. On the eastern side of Ruapehu and Tongariro there are Native leases—forty-two years—held in huge blocks, and I believe that the owners are willing to surrender. The result has been that these people have held too much land, and it is all going back to the wilderness and to noxious weeds.

3. Have you any suggestions to make as to dealing with the rabbits in the park?—The work is being done with so few rabbiters that it is not being well done. The rabbits are exterminating the native flora, and more money should be spent in keeping them down. Of course, the flora is of vital importance to the usefulness of the park. It is quite clear that without my suggestion this Commission has power to recommend the Government to largely extend the boundaries of the park, and I hope you will do so.

4. Have you observed if any damage is being done to the climatic reserves by deer?—I know nothing about that matter, not being interested in the question of the deer.

5. *Mr. Clarke.*] Do you propose that the whole of the forest-area from the Waimarino end to Waiouru should be included in the reservation?—Some of the bush might be milled and some preserved. The bush that is cut may grow again, but at present denudation is going on rapidly in regard, not to the big trees, but the small flora. I think the reservation should go round from the railway-station at Ohakune and on to Waimarino, and so preserve the scenery for passengers by the Main Trunk line.

6. *Dr. Cockayne.*] You know that within the present boundaries of the park there is not a single tree, the boundaries being so high up the forest is excluded. Is not that so?—Yes; that is why I am here to-day—to get it included.

7. Have you seen the map Mr. Phillips Turner prepared of the proposed extensions suggested some years ago?—Yes.

8. Do you not think, even if you leave Ohakune out, where there is a good deal of milling-timber, that the whole of Hauhungatahi should be taken in?—Yes.

9. Because there is there a piece of forest that comes down close to the Waimarino Plain?—I quite agree. I think the two big canyons at Makinokau and Te Whero, with the trees on either side, should be preserved. I might say that there is an extraordinarily large number of rabbits in that area, principally of a black colour, and it is advisable that steps be taken to keep them down.

10. There were some deer turned loose around the mountain hut on Ruapehu, and they will certainly damage the indigenous plants. Should they not be cleared out of the park?—Undoubtedly they should. I think some were killed. The deer and rabbits both should go.

11. *Mr. Lethbridge.*] Do you know if the piece of freehold land from near Ohakune and right up the mountain has been acquired by the Government?—No. The Government have bought a lot, but I have not seen the recent plans. The plains I refer to would be included in what I want reserved.

12. Do you not think it would assist in preserving the park if some of the lower ranges were afforested?—Undoubtedly it would.

13. You think it would be wise if some afforestation were to be undertaken on the plains referred to?—Yes. I would propose to employ some of the prison labour in afforesting a lot of that country.

14. *Dr. Cockayne.*] In the bush at Hauhungatahi I understand there is very little milling-timber?—Very little. It is covered with a stunted bush in which the mutton-birds nest. The time has now come when the boundaries of this National Park should be enlarged and finally fixed.

HALBERT ALEXANDER GOUDIE sworn and examined. (No. 78.)

1. *The Chairman.*] You are the Superintending Nurseryman for the Government for the North Island?—Yes. I am under the Lands Department.

2. Do you consider that the present system of employing prison labour in tree-planting operations under the Forestry Branch is satisfactory?—It has been satisfactory on the whole, but during the last three years the supply of prisoners has gone down.

3. What was the average number employed in your district during the past year?—Speaking from memory, I think there were eleven at Whakarewarewa and twenty-six at Waiotapu. I will supply the actual figures.

4. How is the prisoners' labour estimated?—We put a value on it according to what it would cost to do similar work by free labour. Clearing the land costs £1 an acre by free labour. By prison labour it would not be valued at all. The cost of pitting and planting is treated in the same manner.

5. When you make up your accounts is the Prisons Department credited with the value of the labour done by the prisoners?—I do not think so. The total expenditure shown in the 1912 returns does not include the cost of the prison labour, but in order not to allow the southern plantations that do not employ prison labour to compare too unfavourably with our plantations in the north we have included the prison labour in calculations.

6. In the event of the afforestation operations being very much extended I suppose you could not count on receiving a much greater supply of prison labour?—It appears likely that we cannot; but I do not know the views of the Prisons Department on the subject.

7. Has any application been made to the Prisons Department for further men?—I understand they have not the men available. Nearly every month I call attention to the dearth of prison labour, and I understand the Department is in communication with the Prisons Department about the matter.

8. What class of prisoner is generally sent to this work?—I do not know a great deal about the method of classification, but I think in the first place they send out good-conduct men who it was thought would be amenable to such treatment. Latterly the Government have been a little more strict in selecting the men, and the Waipa camp is really a first-offenders' camp. I do not know, however, the ideas of the Prisons Department on that point.

9. Have the tree-planting camps been of benefit in the treatment of these prisoners?—I think the system has had a good effect in reforming the men. After leaving prison they are in a better position to engage in an honest living. We have employed a number of discharged men, and, of course, we have not had success with every one; but there are plenty of men I know of who have stayed with us some months, earned a few pounds, gone back to the towns, and got into a fairly decent job. In employing men after they have been discharged we are very particular in selecting them. Latterly the Prisons Board have allowed men out on probation on condition that they would get work at tree-planting.

10. What is your opinion as to utilizing consumptives in this work?—The chief fault I had to find with the labour of consumptives was its uncertainty. A Sister was put in charge of the place—it was an offshoot of the Cambridge Sanatorium—and the men did not realize that they had to earn their living. They were told that if they could not pay for their keep there the Health Department would remit it; consequently they were not keen on work. Latterly the system worked better, although we found that only about half of the patients sent to us were capable of doing the hard work, the other half being incapable of doing heavy work such as fencing and digging the holes.

11. Was each man on piecework?—They were paid on the co-operative system, and that was one of the faults, the men who were comparatively strong not caring about sharing with the men who could do but little in a day.

12. Can you suggest how that difficulty could be obviated?—If we are going to utilize consumptives' labour it must be done with one large camp, or perhaps two. If there are a hundred men to be employed there had better be one camp established in such a place where there will be plenty of tree-planting for five or six years to come. Then it would pay to have a doctor in charge to advise whether a man was fit to work or not. With a Sister in charge the men simply traded on her sympathies, and many would not work at all.

13. In such a camp would it be necessary to employ an overseer to instruct the men as to their work?—Occasionally you would have to send some one to overlook the work, but you would not want a man stationed there permanently.

14. Should such work be treated as on a strictly commercial basis, the Forestry Department not being saddled with any more cost in regard to planting than would be the case if it were done by free labour?—If there is any deficiency the Forestry Department should not have to pay it. It would be far better to give these patients a piece of land to plant, and at the end of the year pay them by results.

15. *Mr. Murdoch.*] Then you would have to provide supervision?—Yes. With a camp of a hundred it would pay to do so.

16. *The Chairman.*] What is the least area you consider should be planted to do the work on economical lines?—I would not advise anything under 5,000 acres, unless you planted blocks of 1,000 acres each close to one another, so that the supervision would not be heavy. 5,000-acre blocks would be better than 1,000-acre blocks, as the fencing would be less; also the boundary fire-breaks would be more extensive.

17. If a camp were established in a central place, what radius could be planted with economy without having to move the buildings?—It is not profitable to ask the men to walk more than two miles. A mile radius would be all right.

18. Two miles would mean a planting-area of nearly 10,000 acres?—Yes; that was the object in placing the Kaingaroa camp where we did, so that we could work quite a large number of areas from there and keep the work going a long time from the same camp.

19. Do you consider it is more economical to have one central nursery for each Island, or to have nurseries in the localities where plantations are likely to be established?—One nursery would not do for the whole of the North Island, but I would not favour having a nursery for every plantation or every little district you are going to plant.

20. Do you say that because of there not being sufficient planting-ground at Whakarewarewa, or on account of the difficulty of distribution?—On account of the latter. It would be rather costly to send trees from Rotorua to be planted in the Wellington Province, whereas it might prove inexpensive to send trees from Rotorua for planting anywhere between there and Auckland City.

21. In the event of any plantations being started on the Karioi Plains would it be easier to bring the trees from Rotorua than to establish a nursery on the plains?—It is largely a question of the railage and other carriage from Rotorua. I feel quite certain trees would succeed there, they grow so rapidly. It is far better to confine your nursery operations to big nurseries rather than small ones, because there is the cost of planting which would run the expense up to a very high figure.

22. Have you made any experiments in sowing seed *in situ*—pines or gums?—Yes. Some years ago we tried several species of *Eucalyptus*, but the results were not encouraging. Last year I made a sowing of Douglas fir and *Pinus radiata* seed, and also some eucalypti, on the Kaingaroa Plains, but still we had no success. Very few seeds germinated, and those that did died out. The experiment was tried on a piece of land that was ploughed up for a fire-break, but it was a dry season. I intend to try again on some fern country where the young seedlings would get some protection, and I think they will do better.

23. Have you had any experience of planting on the north of Auckland gum lands?—Yes.

24. Would you recommend that an experiment of sowing *in situ* should be tried there?—It ought to be tried everywhere where we are carrying on forestry operations. If it were a success it would certainly reduce the cost of planting.

25. Have you made any experiments in connection with fire-belts by planting fire-resisting trees?—No.

26. If the poplar were planted on the outside of the plantation for the width of a few chains for fire-resisting purposes, would it be of great assistance in preventing the spread of fire?—I think so. Of course, there is always the danger of the poplar leaves carrying a ground fire; but a belt of poplar between big areas of inflammable trees like pines would be of great assistance in stopping a fire.

27. You know the native fuchsia-tree: would it be possible to grow that tree in connection with a poplar belt?—I think so.

28. Would a side bank help to keep a fire from spreading?—A side bank or ditch or rough-ploughed furrow will stop a ground fire. With a belt of poplars it would be a good idea to have a cleared piece of ground on each side of them; then they would be far more effective.

29. Then a comparatively narrow fire-belt under those circumstances would probably be sufficient?—Yes.

30. What size do you estimate the larch would be at fifteen years of age?—The figures in the Forestry Report for 1909 are not mine, although my name appears there. They were made up at the time Mr. Matthews took ill and left for Auckland, and I had to send them into the Head Office.

31. You would not then be prepared to endorse the figures in that return?—No.

32. *Mr. Lethbridge.*] What is the best plan to adopt to try and prevent danger from fire in the nurseries and plantations?—Our present system ought to do. I think you all saw it.

33. *The Chairman.*] Do you think the fire-breaks are wide enough?—I think there is sufficient ground taken up by them, because the spread of the fire depends very largely on the direction of the wind. Of course, you cannot always get fire-breaks running in a direction that is the most desirable. We try to do so, and if the prevailing wind is north-east and south-west we arrange the breaks to run north and south, and east and west; so that the plantation would be protected accordingly. That is one point that could be considered—the direction in which the fire-breaks are running. On the Kaingaroa Plains we have made the fire-breaks to run from north to south and from east to west. With regard to the upkeep of the fire-breaks, the boundaries of the plantations do not show much land unoccupied or even not brought into cultivation, as the boundary fire-breaks will always have to be kept ploughed and cultivated.

34. And the land along the public roads will have to be kept ploughed and cleared?—Yes.

35. Is not that the most dangerous place?—The most dangerous places are where fires can start on private land and spread to ours. The utilization of deciduous trees is also a good idea. Then there is the watching of plantations. In a dry season you will have to appoint a man simply to patrol the boundary and keep a lookout for fires. Then I would recommend keeping a number of workmen living on the place, who would be handy in case of necessity.

36. In case of a fire I suppose you have some difficulty in getting the men necessary to put it out?—We have had that experience, and it should not be the case. You want means of suppressing a fire expeditiously; also means of conveying water to the men engaged in fire-fighting, both for pouring on the fire and also for drinking.

37. Does the Government allow you to offer double wages at the time of a fire?—I did pay double wages, and the Department did not disapprove of my action.

38. Have you asked the Department to provide means for carrying water or for getting men to a fire?—I have not done so so far, but I have made certain recommendations in that respect this year. If we provide places along the Waiotapu Road, and at Whakarewarewa and along the Wairoa Road, where we can get water handy, we could carry on our work to greater advantage,

39. Apart from prison labour have you any difficulty in obtaining free labour when you require it?—At times we have, but at others we can get plenty of labour.

40. Do the free labourers work on piecework or by contract?—On day-wages—8s. a day.

41. With regard to Puhipuhi Plantation, would you suggest that in future such land as that should be planted with forest-trees?—I think so, where the land is poor. But it is no use planting a 1,200-acre block in the centre of an area of 10,000 acres. Plant the whole area suitable, and open the rest for settlement as soon as possible, because if you have close settlement alongside the planted area you are the more likely to be keeping down the growth which would otherwise carry fire.

42. The Commission visited that plantation and found that a number of eucalypti which had been scorched by fire were sending out shoots from the bottom. Do you think those trees will come up again and prove fit for timber?—Yes. I would like to see the Department pursue an active planting policy there, or else abandon the place altogether, otherwise we are inviting a repetition of what happened from fire.

43. You are aware that outside the 1,200 acres reserved for planting the area has been subdivided for settlement?—No. Under those circumstances I would recommend the place being abandoned. 1,200 acres is not a sufficient area, and that particular area is very badly stocked with trees.

44. *Mr. Lethbridge.*] Here is a specimen of timber from a *Eucalpytus* tree grown by Mr. Reynolds near Cambridge. It has been in the ground for twenty years and used for stock-yards. It is *Eucalyptus Macarthuri*. What do you think of it?—It should be a very valuable timber for the farmer.

45. What is your opinion of the *Robinia* for farming purposes?—We tried it, but it was not a great success. It is a good timber for the farmer, but the piece of *Eucaylptus* you have shown me would be far better.

46. *Mr. Clarke.*] With reference to future planting, are you giving special attention to growing trees for building-construction as against fencing and that kind of thing?—Our planting now is all for building-timbers.

47. What pines do you recommend should be planted?—The Douglas fir is the most valuable tree we can grow; for special purposes the *Pinus radiata*. I also recommend the *Pinus strobus* or Weymouth pine, the *ponderosa*, and the Corsican pine (*Laricio*).

48. Have you tried the Scotch pine at anything like a high altitude?—We tried it at Waiotapu at about 1,200 ft.

49. In view of the considerable amount of high land we have in this Dominion is it desirable to experiment with other trees, such as the *Pinus sylvestris*, for the planting of such areas?—Certainly.

50. Are there any other American trees you recommend for the high rocky ground—the yellow-pine, for instance?—We have had difficulty in getting the seed. I would suggest the *Pinus palustris*, *Pinus taeda* (the loblolly pine), the *resinosa* (red-pine)—all very good trees—and also the *Lambertiana*.

51. If there is any difficulty in getting certain seeds is it not advisable to set apart an area to test the growing-properties in this country of, say, the yellow-pine?—If you cannot get the seed such trees are useless in regard to afforestation here.

52. Is it not possible to get the seed from anywhere?—That tree is grown only in America. The only American species you can buy in Europe is, I think, the *strobus*. You might also get a little redwood seed there, but not here.

53. Would you suggest starting a plantation for seed purposes later on?—We might try 100 acres for that purpose.

54. *Mr. Murdoch.*] Do you think the fire-breaks are reasonably safe at present?—Yes, with an additional constant supervision.

55. In the event of a heavy fire from any direction, could it be stopped before it reached the plantation?—It is very difficult to stop a fire in the crown of a tree—a flying fire.

56. I admit you can stop a ground fire if you have your men there in time, but do you think the present fire-breaks are protection against a fire in the leaves on the ground?—The present fire-breaks are naturally a help in stopping a ground fire.

57. Do you not think wider fire-breaks, supported by poplars, would be much safer?—I do.

58. In that case we would not be wasting the ground, because the poplar timber would be employed afterwards?—Yes.

59. Would it be safer?—I look on the present system of fire-breaks as valuable in this way: you can get about, and have a place to fight the fire from, if you keep them ploughed.

60. Besides you always have a road round the plantation?—Yes.

61. Would it not be much better for the Government to go to the extra expense of making breaks that would be reasonably safe than the present narrow breaks?—Well, instead of leaving them at 1½ chains as now, if we were to leave 1 chain, and plant 2 or 3 chains on each side of these breaks with deciduous trees like the poplar, that would certainly be of very great value in stopping a fire.

62. And a good insurance fund?—Undoubtedly.

63. In ordering seed would it not be better to obtain it as far as possible from pedigree trees, or the very best trees in any plantation?—That is the ideal state of affairs. We do that in the case of the *Pinus radiata*, and possibly some of the eucalypti, but I do not know of any tree we can get sufficient pedigree seed of.

64. In the light of experience would you continue to plant many of the trees now growing in the Government plantations?—I would not advise the planting of any more of the *austriaca*

pine. Possibly it would be a good plan not to grow so many larch, but rather timber suitable for building-construction. Beyond the *austriaca* pine and the larch I do not think we have planted anything but useful timbers.

65. What about the alder? Will that be of much use?—Only a few dozen were planted on bare shingle along the river-bank where nothing else would grow.

66. Would not gums grow there?—No.

67. *Dr. Cockayne.*] You say that the fire-breaks on the Kaingaroa Plains are so arranged that the fire would strike them obliquely. Is that the case also with regard to fire-breaks at Whakarewarewa and Waiotapu?—No.

68. Then the oblique fire-breaks are a more recent development?—Yes.

69. Are not the older fire-breaks therefore much more dangerous than the new ones?—Yes, some of them, not all.

70. How much of the Douglas fir have you got planted?—Roughly speaking, about 300,000 trees.

71. How much *Pinus strobus?*—About the same number. It is doing very well.

72. How does its growth compare with the *Pinus ponderosa?*—About equal.

73. Is that and the *Laricio* doing well?—Both are doing equally well.

74. Then the *strobus* is quite as good in your experience as the *ponderosa* or *Laricio?*—Yes, in regard to rate of growth.

75. Have you had any experience in regard to getting the seed of the Norfolk Island pine?—No.

GEORGE GUIDO SCHWARTZ sworn and examined. (No. 79.)

1. *The Chairman.*] I understand that you are an architect?—Yes. I am the president of the Wellington Branch of the New Zealand Institute of Architects.

2. The Commission thought that probably you could give us some valuable information in regard to the timbers you consider might be useful to plant here for building purposes?—Any of the Home timbers would be suitable here.

3. How long have you been in the Dominion?—Thirty-five years.

4. In practice all that time?—Yes.

5. I suppose your experience is similar to that of others, that timber is increasing very much in price?—Yes.

6. Is the quality of the timber as good as it was ten or fifteen years ago?—Nothing like it. The quality is steadily going down.

7. What are the principal timbers used here?—Red-pine, matai, and totara. Some black-birch growing in this neighbourhood is used for piles.

8. What is the difference in building in timber and in brick or concrete as regards a dwelling-house?—It would run from 30 to 40 per cent. more in the case of brick or concrete, timber being that much cheaper. We have not advanced so much in the case of ferro-concrete as far as machinery goes to make it cheaper.

9. In the event of timber rising to double its present price would it be cheaper to build in permanent material than in timber?—Decidedly.

10. In that case the demand for timber would slacken off?—It would indeed, and as more machinery comes into the country, and people better understand how to work concrete, the latter would be even far cheaper than brickwork. But that is not the case at present.

11. Is the expense of upkeep much less in the case of permanent material than with a wooden building?—Yes. With any building-timber the cost of upkeep is altogether too much in this country.

12. Is there much Oregon pine being imported into this city now?—A big load came in two months ago.

13. Is that considered a satisfactory timber by architects?—Provided always you get the quality. A large number of trees in America have been tapped for resin, and they are being cut down and sent out for building-timber.

14. How does tapping affect the timber?—It makes it very poor and takes the life out of it.

15. Do you know the timber called the "three-ply" timber?—Yes.

16. Is much of it used locally?—In joinery only. It all comes from Norway.

17. Is there anything you wish to add?—In regard to New Zealand timbers, one thing should be observed—that is, the time of the year when the tree is allowed to be cut. On the Continent of Europe—I am a German—nobody can cut a tree without the permission of a forester. The offence of cutting without permission is punishable with imprisonment.

18. Whether on private or Government land?—Every class of timber land is under the supervision of a forester, and he is the only man who can grant permission to cut a tree He sees that only matured timber that does not shrink is cut. If our timber-trees were treated in the same way we would get better-quality timber. At present it twists and shrinks only because it is cut down out of season.

19. Have you had any experience in regard to birch timbers—the red-birch, for instance?—Only in respect to the silver-birch from the West Coast, used for boards round the foundation.

20. *Dr. Cockayne.*] Do you think if that birch were cut at the right time it would not warp?—It would not; the difference would surprise you.

21. *Mr. Clarke.*] Do you agree that afforestation should be undertaken in order to supply our wants when our native forests are exhausted?—It is a most essential matter. It is the duty of the forester in Germany to see that the man who cuts the timber replants ten times as much as he cuts, consequently the Germans have not cut out their supply. A similar law is wanted here.

22. Then the State here would be doing a wise thing by immediately establishing plantations to enable us to be independent of foreign supplies?—Rather, because you have the country here that will grow timber well. There is any amount of land here that will grow nothing but trees.

23. *Mr. Murdoch.*] Can you give the Commission reasons for saying the quality of our timber has been steadily going down for the last ten years?—Yes. The first trees that were cut were mostly growing on high ground, and were matured trees. As the years have gone on the timber has been taken off land lower down, and there it is not of the same density as the timber that grew higher up. Now it is taken off wetter ground, and the fibres are not so close as those of the timber we used to get in the past. There may be some of the old class of timber left, but we do not get it.

24. Do you not think that the exportation has something to do with the matter: that the best is exported to Australia, and now everything else that comes off the saw is sent to the local market to make things pay?—That is partly the reason.

25. *Dr. Cockayne.*] Have you had any experience in connection with powellized timber?—I have used some of it, but they do not powellize any heart timbers. It discolours the timber, and the original colour cannot be replaced.

26. What class of powellized wood have you used?—Red-pine, for ordinary building.

27. Do you think the timber loses any of its quality by the powellizing process?—It gets slightly rough in the grain.

28. Was it in the building long enough to enable you to form any opinion about it?—Five years, and my experience of it is that you cannot get what you want by that process.

DAVID CUDDIE sworn and examined. (No. 80.)

1. *The Chairman.*] You are the Director of the Dairy-produce Division of the Department of Agriculture?—Yes.

2. Has your Department experimented with any New Zealand timbers for butter-boxes other than white-pine?—Not extensively. We made a small experiment two years ago with poplar, and it turned out very well.

3. Do you think it would be a good thing if some exhaustive tests were made with other New Zealand woods?—I do.

4. Say, with taraire and tawa?—Tawa has been used for making butter-casks, but now casks are not used. It suited the purpose well, and there is no reason why it should not be used for butter-boxes.

5. Have you tried *Pinus insignis*, or *Pinus radiata* as it is now called?—No. I see no reason why it should not be useful in that respect if paraffined or used with parchment paper. Wood of that description when thoroughly seasoned would make a very good package.

6. Are you aware that the Commission has been making experiments in a small way as to other timbers?—I happened to be in Auckland the day the butter was packed, and I would not approve of the test as being reliable, as the packages were too small. You want to pack it under normal conditions, using the same class of butter that is packed in the white-pine boxes, so that you would be able to note the deterioration, if any, between the two lots.

7. Here is a sample of dovetailed white-pine boards turned out at Mananui Mill. Would timber dealt with in that way make a good box?—So long as the dovetailing does not apply to the ends of the package there would be no objection to it.

8. What is the objection in the case of the ends?—A great many of the packages have to be opened for examination prior to shipment, and the lids have to be forced off, and it is possible that with the dovetailed boards the ends would part and the package break to pieces.

9. Then you do not think it would do as regards the ends?—A series of exhaustive tests could be made with such boards to see if they would do, but at present I do not see any serious objection to them being used for the top and bottom of the packages, and perhaps there would be no objection to the ends also.

10. How old was the poplar timber you experimented on?—It was from a tree fifty years old.

11. *Mr. Lethbridge.*] Where did you get it from?—On the Nelson side. It was a Lombardy poplar. The boards showed this little difficulty, that they did not hold the nails as well as the white-pine, but that might be got over by having a barbed nail.

12. *Mr. Murdoch.*] What class of timber do they use in Siberia?—I fancy, Baltic timber. Some years ago a dairy factory in the South Island could not get white-pine for their cheese-crates, so they used birch, or beech, but it was found in the nailing that a great many packages got broken, the wood being more friable than the white-pine.

13. *Mr. Lethbridge.*] Do you know what timber they use in Canada?—Spruce for butter-boxes; bass and elm for cheese-boxes.

14. *The Chairman.*] What qualities are required in timber for butter-boxes?—The first essential is that it will not taint the produce readily. Another is that it has an attractive appearance, white in colour, fairly tough, and not too heavy.

15. In regard to cheese-crates the conditions would not necesasrily be so rigorous?—No; I think it would be possible to allow a little more latitude in the case of cheese, as it is not so easily tainted as butter.

16. Are many of the white-pine boxes used here for packing butter in paraffined?—No, very few of them.

17. Why do they paraffin some and not others?—Some of the dairy companies have an idea that a little is saved in shrinkage by paraffining, and others again deem it a sort of insurance against green timber. But it is not really essential if you use two thicknesses of parchment paper.

18. *Mr. Lethbridge.*] But paraffining would not be so expensive as two thicknesses of parchment paper?—About the same. It costs about 1d. a box to paraffin.

19. Do you know what price the Dairy Association in this district is paying for their boxes?—I understand they are paying up to 1s. in some cases.

20. In Dunedin we had evidence that they were paying 1s. 8½d.?—They are not paying that here, but only about 1s.

21. Where do they get their boxes from?—Many are made in Wellington by the Wellington Cooperage Company.

22. *Mr. Murdoch.*] Is it essential that the white-pine should all be seasoned?—Yes. It is detrimental to the cheese if it is not seasoned.

23. Seeing the large demand there is likely to be for timber for agricultural produce, do you consider it would be a wise policy for the Government to encourage the planting of trees by settlers so that there may be a timber-supply distributed throughout the country, thus saving heavy accounts for freight, &c?—Yes; it is only a matter of time when we shall be very badly off for timber for our boxes, so I would encourage the planting of trees, especially quick-growing varieties that will come into profitable use at an early date.

WINNARD MELTON SINGLETON sworn and examined. (No. 81.)

1. *The Chairman.*] What is your position?—Assistant Director of the Dairy-produce Division.

2. You came from Canada?—Yes. I have been twelve years in New Zealand, and had considerable experience in dairy matters before I left Canada.

3. Can you tell us what style of package the butter is packed in there, and the class of timber used?—At one time they used the round tub a good deal, of spruce timber, but of late years they have used boxes like ours here, of the same dimensions, to hold a similar quantity. The pine is used principally, but it differs somewhat from our pine in that it imparts a flavour to the butter which is not desirable, and to overcome it they use paraffin. They also use parchment paper as well as the paraffin.

4. Have they unlimited supplies of the required timber?—I believe so, and they are getting now a large quantity from British Columbia. Although the timber is limited in North Ontario the supply there is by no means exhausted yet.

5. Do you think the *Pinus insignis* timber, as per this sample, would do for butter-boxes if treated with paraffin?—It would seem all right as far as quality goes.

6. Is it a timber that it would be advisable to experiment with seeing that it can be grown very rapidly?—Yes, paraffined it should be worth trying.

7. A lot of the white-pine boxes are paraffined here, are they not?—Yes; it is claimed that a saving is made in regard to the shrinkage of 4 oz. of butter. Some firms put in as much as 4 oz. less on that account.

8. Here is a white-pine board made up of some small pieces by means of a dovetailing machine. Would that do for butter-boxes?—We had trouble with some boards which had been put together in only two pieces, and on the grading-room floor when we were opening up the boxes they came apart. At the same time, in my experience of cheese-crates, when two pieces of board were put together for the ends the boxes were satisfactory.

9. Is there much butter exported from Canada now?—Practically none was exported last year. The export has been decreasing for some years.

10. Then there is likely to be an increasing demand on New Zealand for butter from abroad?—Yes. They export a good deal of cheese, and there is a tendency in a number of districts to return to butter on account of the increased local demand for the latter.

11. How is the cheese packed there?—It is packed in something like a hat-box made of cardboard, with a belt around it.

12. Of what timber?—Elm for the belt, and bass wood for the headpiece.

13. *Mr. Murdoch.*] Can you say what class of package is sent from other countries, such as Denmark and Siberia, to Britain with butter?—A good deal was sent in casks when I was there five years ago.

14. And from Siberia?—I did not see much from there, but am speaking of Danish more particularly.

GIBBES CLAUDE BORLASE JORDAN sworn and examined. (No. 82.)

1. *The Chairman.*] You are the Under-Secretary for Justice?—Yes, which includes Prisons.

2. What percentage of the male prisoners is engaged in tree-planting operations?—The numbers at the different camps for the year 1912 were: Waiotapu, 35; Waipa, 20; Hanmer, 25.

3. What was the total number of male prisoners in prison during the year ending 31st December, 1912?—We have between eight hundred and nine hundred prisoners.

4. Can you give us any idea if the number employed at tree-planting in 1912 is likely to be increased?—We could increase it, but we have to be very careful what class of prisoners we send to these camps. We have been very strict of late, and that has reduced the number. It was necessary, because the camps were not in the condition they ought to have been in; but by employing a larger staff and having more supervision we can probably send a larger number of prisoners there that could not be sent out with the present staff. There are forty prisoners at Kaingaroa and four officers, and all those prisoners could run away at any time they liked. We have to depend on their good behaviour. But these prison camps are very expensive to run; the smaller the number of prisoners the greater the cost of maintenance.

5. Has the system of employing prisoners on these plantations proved satisfactory to your Department as regards the reformation of the men?—I think so. It is probably about the only thing that has a real reformative effect on the men. But the system does not affect those who do not wish to be reformed. Then, again, there are numbers who ask to be sent back again to the city prisons. They do not like the camps, but prefer to be in the town prisons, where they can get the latest news of what is going on.

6. In employing prisoners in plantations is it considered advisable to concentrate them in large camps, or in a number of small ones?—In my opinion it would not be advisable to concentrate them in large camps, but it would be better to have small camps. From fifty to sixty men would be quite enough to put in one camp.

7. Is the Prisons vote credited with the value of the work done by the prisoners?—No, we get no credit for it, and that is a point we are going to take up.

8. In the case of all other Departments it is the practice to credit a Department with the value of the work done by it for another Department. Do you think that would be a satisfactory way of dealing with this matter from the point of view of your Department?—Yes, something ought to be done from that point of view, and it would then lessen the cost of the system to the Prisons Department.

9. What is the average cost of keeping the prisoners?—In Auckland Prison the average cost is £38 per annum; at Hanmer, £50; at Waiotapu, £72; at Waipa, £64. On the average it costs nearly double to maintain these prisoners at the camps.

10. Supposing it cost 12s. 6d. per thousand to dig the pits for tree-planting by free labour, would your Department be satisfied if the prisoners were credited with the same rate for the same amount of work?—Yes.

11. Would that put the matter on a commercial basis?—Yes. The present idea is to make provision for paying prisoners sentenced to reformative treatment for the labour, beyond the cost of maintenance, and this is one of the works which might enable us to do something in that direction. They would have to earn anything they got in the shape of payment. The payment, of course, would be only small. Tree-planting is a case where you can class and value the prisoner's work. Of course, we cannot take any step in that direction until the finance is provided, and other Departments do not now pay anything to us for prisoners' labour. They take our labour but do not pay for it.

12. Those are the principal matters on which I wished to get your opinion, but if there is any other you would like to bring before the Commision we shall be very glad to hear your views?—I do not think there are any. Dr. Hay is getting some figures on the question, and may be able to further deal with the question from the departmental point of view. As to the tree-planting camps, Hanmer seems to be the least profitable to the Department. We have a difficulty in getting a number of men there, but we have to keep a staff we would be glad to send elsewhere. It has struck me that it is the least profitable of the camps, and we would like to close it up; and in fact we propose to do so.

13. Is there any particular reason why it should be closed? On account of the more rigorous climate? Or is it because there is not sufficient land there to extend the planting operations?—It seems to me that that camp is bound to come to an end within a short time on account of the want of land—within a couple of years, I understand.

14. In the event of further land being acquired in the vicinity would that get over the difficulty about closing the camp?—Undoubtedly, if we could maintain the camp properly we could give the Forestry Department a fair number of prisoners for two camps. We have the Invercargill reformatory and the Waikeria farm, and we propose to send a number of young men there who would be suitable for tree-planting.

15. What class of work do the prisoners do at Invercargill?—At the present time the men are engaged in reclaiming land which will do for farming purposes and vegetable-gardens.

16. Is your Department credited with the value of the work done there?—We are just in the same position there as we are in respect to the tree-planting for the Forestry Department. We get 650 acres of land in payment of the labour for the reclamation. With regard to reclamation we only provide the labour. At Auckland we do stone-breaking, for which we get a fair amount of cash—for the stone which is obtained on the prison reserve.

17. Is the stone paid for by the local bodies?—Yes. In Wellington there is some brickmaking done, but we do not sell the bricks outside. The Government takes them, and credits us with their value. We have not got any money to provide for all these growing forms of prison reform, and especially for the payment of prisoners; but there is a good deal to be said for the latter proposal. You can get a fair amount of work out of the prisoners if they are handled properly and kept going. You get a class of men who as long as they are kept at work will work hard; but we also have men who will not work at all, and you cannot make them work.

18. *Mr. Murdoch.*] You think you could only supply prisoners for two camps?—It would be better to concentrate on two camps, and maintain them with a fair number of prisoners.

19. *Mr. Clarke.*] Is there any other method of dealing with prison labour whereby the work of the men can be assessed at the same rate as free labour?—I would not say that it is even necessary to assess it at the same value as that of free labour, but I would like to get some remuneration for it which would enable us to make some small payment to prisoners, though not necessarily at the full value of the work.

20. How would it do, if they dug a thousand holes, instead of crediting the Department with the amount the work would cost if done by free labour, to credit it with the actual cost of the work by prison labour?—That plan would not give us anything; you have also to maintain the prisoners.

21. Assuming that it cost 50 per cent. more to maintain a prisoner in a camp, how would it do to value his work accordingly?—That would leave us no margin for the prisoner himself, but would only pay our cost.

22. But a percentage of profit or reward would still be added on at the end. Is it fair to compare prison labour with free labour under any circumstances as to value?—That is a matter the future will determine; apparently people consider this system of paying prisoners is going to be of great value.

23. Do you not think it might also turn out a disadvantage to your Department? If it costs 12s. 6d. to dig a thousand holes by free labour, but your Department 15s. by prison labour, would it not be a loss to the Government, and therefore inadvisable to pursue the policy?—If it costs our Department 15s. it would be a loss. From one set of figures given to me it looks as though the cost was considerably more than that per thousand trees.

24. In that case does it not go to prove that your Department is on the wrong line altogether, and that it would be better to abandon the system and leave the work to be done by free labour?—It is a good thing from a prison point of view, even if we do have to pay a little more, to have a place like a tree-planting camp to send the better class of prisoners to.

25. Would you still advocate this proposal even if it is shown that the system costs more than the free labour?—Up to a limited point I would.

26. *The Chairman.*] I think the point is that you would have to maintain these prisoners whether they were tree-planting or not, and that if you could utilize their labour and get credit for their work it is so much gain to your Department?—Yes. If you can employ prisoners at some labour that they consider is of some use or value, which they can take an interest in, it will do them good, but if it is mere routine work it is of no value.

27. *Dr. Cockayne.*] Does the tree-planting work bring in more to the State than the ordinary prison labour?—I suppose the tree-planting would pay the State, but I would not advocate it for the sake of the prisoners only, because, after all, the one idea of prison-management is to fit the prisoner who has no trade to do something for himself when he comes out. Tree-planting is all very well, but he would not find in the open market employment at it.

28. *The Chairman.*] Then if you are making the prisoner a better man by giving him a trade he will be more useful to the State eventually?—We cannot do in that respect the things we would like to do, because we must not come into competition with the public in the towns. I think you make better men of the prisoners at the tree-planting camps than of those left in the prisons.

29. If some of the men you do not send out at present were put to tree-planting would a percentage of them be reformed?—It would be hard to say. You might expect a percentage to be, but it would be a very small number that would be benefited by the treatment.

30. *Dr. Cockayne.*] Were the prisoners we saw at Hanmer any worse-behaved than those elsewhere?—No, there is a good class of men there.

31. The conditions there seemed to be more pleasant than at the Kaingaroa Plains: is there any particular reason for that?—From a prison point of view they had a little bit too good a time at Hanmer. You can go too far in regard to indulging the men, and that is what happened at that camp.

32. We noticed pictures in the huts at Hanmer, but nothing at the other place?—Yes; when it comes to plastering the walls all over with the pictures you saw it has not a very good effect on the prisoners' morals.

33. Well, the Maoris were working very well at Hanmer?—So I understand. When I was there I noticed the men were working really well, but whether it was only a spurt for the time being I do not know.

FRANK HAY, M.B., sworn and examined. (No. 83.)

1. *The Chairman.*] You are the Inspector-General of Mental Hospitals and Inspector of Prisons?—Yes.

2. It has been suggested that in dealing with the convalescent consumptives they might be employed in tree-planting operations, say, in the Waiotapu district, or possibly in Central Otago. One of the difficulties that might crop up might be in regard to medical attendance, so it was thought possible that work might be found for these people on the land your Department has acquired near Kihikihi, where they would be quite close to medical supervision. Have you work of that kind at that place?—We have not got any land there for tree-planting. It is all agricultural land, which we will want for farming. There might be a few shelter-belts required, but that is not what you mean, I presume.

3. If you had a large amount of agricultural work going on there could not the consumptives be employed at it?—The question comes in of their fitness for it. We would need to have teams of horses, ploughs, &c., and I am not sure that these people would be sufficiently strong for that kind of work.

4. Would there not be a good deal of clearing, draining, and ditching to be done on the site?—Draining is, of course, a laborious operation, but the clearing of that class of country is only a matter of putting a match into it.

5. Then you do not consider the suggestion a practical one as regards employing such patients there?—Not from the mental-hospital point of view. From the standpoint of the prisons the idea is absolutely excluded, because you cannot have free labour associated with prison labour. When you employ expensive teams of horses you cannot trust them to people who are not expert in those matters. If such a scheme is brought forward naturally one desires to do the best one can for that class of unfortunates, but just now I am looking at the matter purely from the business point of view.

6. Is the work you speak of to be done by the inmates of the mental hospitals?—We have a certain amount of paid labour always on the estate, and there are also a number of the inmates who are able to do this work, having been expert farmers.

7. Have you any data available in conection with the cost of the prison camps?—Yes. At Waiotapu the cost per thousand trees was £1 5s.; at Hanmer, £2 6s.; at Waipa, £1 19s. The latter is a newer camp, and there has been a good deal of fixing up to do. Roughly speaking, these figures indicate that were we paid for the work the camps would be free of cost, taking the rates paid at those paid for free labour.

8. Are there any other matters you wish to mention in regard to the employment of consumptive labour?—I think Central Otago would be a magnificent place to send these men to, the climate being so fine, but it might be difficult to cater for their comfort there on account of the district being so far back.

9. *Dr. Cockayne.*] But the camp would be placed near the railway-line?—I suppose so. Medical attendance would only be required in an emergency, and with the railway handy a medical man could be brought down on a trolly if necessary. There must be a good nurse in charge who could apply first aid.

JAMES BURNETT sworn and examined. (No. 84.)

1. *The Chairman.*] You are the Chief Engineer, Working Railways Department?—Yes.

2. Can you tell us the number of sleepers used by the Department at present and that are being treated by preservative methods, such as creosoting or powellizing?—At present we are powellizing about fifty thousand a year. There are a number of creosoted sleepers in use in the lines now.

3. Have the creosoted sleepers proved satisfactory?—Yes, comparatively. It certainly doubled the life of the softwood sleepers that were so treated, but there was a great difficulty in getting the creosote here. That being so, it was determined to make a trial with a new process called powellizing, which requires molasses only, a substance which is easily procured.

4. Was it on account of the cost that the creosoting process was abandoned?—No, mainly because of the difficulty in getting a supply of creosote, which comes from Great Britain.

5. What is the cost of creosoting a sleeper?—About 1s. 8d.

6. What class of timber was so treated?—Kahikatea, rimu, and a small quantity of miro.

7. What time did the creosoting add to the life of a sleeper?—The average life of the creosoted sleeper would be about sixteen years. There are many in the lines now which have been in about twenty years, but the average would be about sixteen years, as against two for white-pine and perhaps seven for rimu untreated.

8. Was any of the beech, or so-called "birch," timbers treated?—I think not. They tried to find means to make it penetrate, but the timber would not take the creosote, which is put in under pressure.

9. Are any birch timbers being used for sleepers by the Department now?—We are trying some in the south by the powellizing process.

10. Have you used any in their natural state?—We have not used any in their natural state for perhaps eight years.

11. Was the experience of the Department when they were used satisfactory?—Yes, taking the average sleeper; you will find some that will be sound after twenty-five years, but the average life worked out at about eight or nine years. There would be quite a sound surface on the face of the sleeper, but the rest of it was often a mass of pulp with hard ribs or spurs between. The acids in the birch have a bad effect on the fastenings and rust the spikes badly.

12. Have you had any experience with larch as a sleeper-timber?—No.

13. Does your Department import many foreign sleepers, say, from Australia?—We import as many jarrah sleepers as we can induce the Government to bring in, as we have never had anything to compare with them for durability and general stability.

14. What is the average price of the jarrah sleepers landed here?—4s. 9d. I might instance a branch line in Canterbury which was laid with jarrah and kauri—kauri at the joints and jarrah elsewhere. After thirty years the original sleepers were all taken out, and 75 per cent. of the whole were in a good usable condition, but they were so small that they would be unsuitable for sleepers now. In the case of another line seven or eight miles in length, at Catlin's, south of Dunedin, which was laid twenty-four years ago entirely with jarrah, only two sleepers have been removed in that time for decay.

15. What do you think of silver-pine sleepers?—They are good.

16. Have any experiments been made in New Zealand in regard to utilizing ferro-concrete for sleepers?—No, the cost is prohibitive, and the sleeper of ferro-concrete is inferior to one with greater elasticity.

17. Do you know whether they are being used in other countries?—Only experimentally, as far as I have heard.

18. Is ferro-concrete and iron replacing wood to a large extent in bridge-building?—Yes, to a considerable extent. We have not attempted to construct piles of ferro-concrete yet, because we can get first-class ironbark piles, which last at least thirty years, and are half the cost of the ferro-concrete ones.

19. If it cost you as much to build in timber as it would in ferro-concrete I suppose you would prefer ferro-concrete piles?—They are worth more than the timber. It would pay to spend more, but not to spend double. It is better to rebuild your structure at intervals of thirty years than to pay half as much again to begin with, and have the interest running on. The Australian hardwoods have reached such a price now that it is more economical to use steel for stringers instead of timber. We are increasing the use of steel very largely.

20. This sample of gum was taken from a tree which was cut down when it was nineteen years old. It was then 22 in. in girth at the butt. Do you think such timber would make a

suitable timber for piles?—Yes, if you can judge from one specimen. But I do not think it is at all wise to judge from an isolated sample of any timber.

21. If we can get a tree that comes to maturity in a short rotation of time and fulfils the conditions of supplying suitable timber, would it not be a good thing?—Yes, but none of the eucalypti I have seen converted into timber appeared to be anything like well matured. None of the timber I have seen cut from big blue-gums forty years old has stood. It splits and warps, and decays comparatively quickly, but this sample may be from the right tree. I am not sure if it would suit every locality.

22. Would you care to express any opinion at this stage as to the effect of the powellizing process? Do you consider, as far as the experience of the Department goes, that it is going to be a success in this country?—It is impossible to express a definite opinion as to it yet. Up to the present the timber which has been treated in the North Island by the Powell Company has been anything but a success, and I attribute the fact more than anything to the way in which the treatment has been applied. The company stipulated and made a strong point of having any timbers submitted to them for treatment as fresh as possible from the saw, so that the sap would be liberated freely in the powellizing process. Of all the sleepers which we had treated there, on examination—I think there were some seven thousand, most of which came as nearly as possible direct from the mills to the works—only fifteen hundred gave any greater life than the ordinary untreated kahikatea. These fifteen hundred kahikatea sleepers, which were an overflow from the Woodville works, where there was not sufficient creosote to treat them, were sent to Rangataua for treatment by the powellizing process. Only these fifteen hundred exhibited any greater length of life than the ordinary untreated kahikatea sleepers. They were all seasoned when they went to the works, and at last reports they were still sound, with no deterioration at all. That was after two years' trial; whereas from 40 to 60 per cent. of the others were bad.

23. *Mr. Murdoch.*] And did not show any increase of life from the ordinary timber?—I think not. You might depend on kahikatea for eighteen months, but if you got the heart it would last well; there is, however, so little heart in that timber.

24. In your experience does the treatment by the powellizing process affect the strength of the timber in any way?—No. The company asserted that their treatment increased the transverse strength of the timber, and to ascertain this some tests were made, but it was found that there was nothing in the contention. Seasoned timber, of course, is stronger than unseasoned; but there is no deterioration in strength that I could detect.

25. *Mr. Lethbridge.*] Does the process keep it from warping and splitting?—No. We had a metal bin attached to a stone-crusher. It was constructed of powellized birch, and the report I got about it was that this timber had done everything which the company guaranteed it would not do—it warped, split, twisted, and shrank.

26. In the case of the sleepers treated in the Southland works, is that timber seasoned before it is treated or taken straight from the saw?—We give it as long a seasoning as is convenient, and hold it back from treatment as long as we can in regard to keeping the works going, especially since the result of the trial up here.

27. What classes of timber have been treated there up to the present?—Kahikatea, rimu, and red-birch so-called down there (*Fagus Menziesii*)—that is, birch from the Longwood Range.

28. Any kamahi?—No. We tried creosoting it a few years ago, but it splits all to pieces, like hinau.

29. *The Chairman.*] We saw some timbers under treatment which were badly infected with the worm?—You refer to kahikatea?

30. Yes?—Well, the Powell people claim that the process will arrest any insectivorous decay. We have submitted treated sleepers to the Colonial Analyst to ascertain whether the preservative has penetrated through the whole sleeper, and those that were treated at Kew showed arsenic in the centre of the sleeper. Those treated in the north showed the preservative going in only a short distance. The arsenic is intended to render the timber immune from insects, and I understand it has had that effect as far as the white ant infesting the Australian timbers is concerned.

31. *Mr. Murdoch.*] If we could grow timber such as that represented by the sample of *Eucalyptus* you have seen to-day, would it be a good thing for the Government to plant that kind of timber?—There can be no doubt about it.

32. *Dr. Cockayne.*] As to the birch sleepers, some, I understand, were cut up after twenty years?—I have seen sound birch sleepers after twenty-two years—an odd one. I have seen a stockyard built of birch—*Fagus Solandri*—and quite sound after thirty years.

33. Have you noticed the kind of sleeper where there has been a fungus growing on it?—I cannot say I have. I do not think I would have attached any importance to the hard fungus that grows on the outside of a tree.

34. Do you think an examination of all our beech-trees, in order to determine the effect of this fungus on the trees, would be an important and useful matter commercially for the country?—I think it would.

35. *The Chairman.*] Is there any other matter you wish to mention?—Our Department has always tried to get the timber for its use felled during the winter-time, but we have never yet been able to succeed thoroughly in doing so. We are quite sure that the winter-felled timber is the best. The sap is then down and the timber does not warp and split in the same way as timber felled at other times of the year does.

36. *Dr. Cockayne.*] When you use the term "birch" in regard to sleepers do you include any of the birches which are supplied by the timber people?—No; we specify that the timber shall be only *Fagus fusca*, *Fagus Solandri*, or *Fagus Menziesii*.

37. Then you are using three different timbers?—Yes, and we class them all as "birch." In some districts we know of only *Fagus fusca* being used. On the West Coast, between Grey-

mouth and Jackson's, the line was laid almost entirely with *Fagus fusca* sleepers, which had an ultimate life of about ten years.

38. And in Southland it is *Menziesii* they are using?—They are getting some *fusca*, but a comparatively small quantity.

39. From Ruapehu or Rangataua you would use both *Fagus fusca* and *Menziesii*?—They are marked separately for our purpose.

CHARLES ANDREW COTTON, M.Sc., sworn and examined. (No. 85.)

1. *The Chairamn.*] What is your profession?—Lecturer on Geology in connection with Victoria University College.

2. Do you wish to tender some evidence with regard to the effects of denudation?—The effects of reckless clearing. The term "denudation" has been applied to the matter in a report I would like to bring under your notice. It is an American report—Paper 7, on "Denudation and Erosion in the Southern Appalachian Region and the Monangahela Basin, 1911." This is the only copy in the University library, and therefore I am sorry I cannot leave it with you. Perhaps you will be able to obtain a copy. The term "denudation" has been applied to the subject, but the other word "deforestation" is, I think, very much better. "Denudation" is usually used in the sense of the second term mentioned in this report—"erosion"; but I would prefer to call it "deforestation and erosion." This paper is of special value because it contains a very careful study of the results of reckless clearing in a climate which appears to be very similar to ours. Most of the accounts have dealt with rather arid climates, and the results which have taken place on limestone plateaux. I suppose you know of cases in eastern Austria, Greece, and Cyprus, where in the old days there was a thin soil covering which supported the forest growth, and evidently had taken an enormous length of time to accumulate. The Turks, I suppose, and others cut down the timber and made use of it, and these areas then became limestone deserts on which soil has to be accumulated again in order to enable timber to be grown. This American report, however, deals with an entirely different region—the Southern Appalachian region, in the United States, which is considerably loftier, and regarding which it has been found that the trouble is caused by the reckless clearing of slopes which are really too steep to be cleared. From what I have seen in parts of New Zealand—I have not as yet had much experience in it—it seems to me that certain slopes in this country have been cleared on which the bush ought to have been allowed to live. The result brought about in that way seems to be twofold: there is, first, the direct result—a little grass may be got to grow on these slopes, although too steep at first; but apparently, after the tree-roots decay, slips cause a loss of surface soil, and so the slopes become absolutely barren. One point which is brought out in this paper is that the angle of slope on which it is safe to clear is not a fixed one—it varies with the underlying rock, and the type of soil which is produced by weather on that rock, and no doubt also to a very great extent by climate. The variation is so great on the Southern Appalachians that some slopes of 10 degrees should not be cleared, while other slopes of 30 degrees it is quite safe to clear. This paper by the United States Geological Survey Department is a complete application of correct physiographic principles, as far as I have seen, to the consideration of this question, to which I have given a considerable amount of attention, and as far as I can see the results seem to be justified. This is the first result: the slopes become useless in respect of cultivation or the growing of grass. The second result is, however, very much more far-reaching: the soil exposed by reckless clearing is washed off, and when clearing has been resorted to too much at the headwaters of streams that material is carried down-stream, leading in the lower courses of the rivers to a much greater liability to flooding. That result affects very large areas of agricultural land down-stream, and is due to the much more sudden rainfall on the land. It is well known that afforested ground holds the water that falls on the soil, but the bare ground runs that rain off immediately, with the result that there are floods, as seen recently, in the lower courses of the rivers. Another reason is that the gravel and soil when washed down into the lower courses of the rivers fills up the channels, the effect being that the channels have not the holding-capacity they formerly had, and immediately the flood takes place on the plains and in the lower courses of the rivers. A similar case results in the very rapid filling-up of reservoirs erected for different purposes. The reservoirs in the Southern Appalachian Mountains are built chiefly for power purposes, and some very large ones have been rendered almost useless for their purpose in two years. Denudation began as late as from 1885 to 1890 in that region, and the disastrous floods there have been brought about in a very few years, and the silting of the channels in the lower courses of the rivers has rendered them almost useless in some cases for navigation. At any rate it has entailed a very great expenditure of public money to keep the channels clear. I do not know that that remark applies to our rivers; but about £2,000,000, I think, has been spent in a few years in keeping open the Tennessee River, but I think that in spite of that expenditure the channel is worse than before.

3. *Dr. Cockayne.*] Have you ever been to Lake Waikaremoana?—No.

4. That lake is surrounded entirely by forest, and it is a very important place, because from it will be derived the electrical energy required for a great part of this Island. Will it be detrimental to the conservation of the water of that lake if the forest were burnt off all round the lake?—I am sorry that I am not able to give an opinion on the point. You will quite understand my reason; it requires a study on the ground to allow one to form an accurate opinion of that kind. I believe it is a limestone country there. Speaking, however, without very much authority, I should say that the basin is so large that it is not likely to be filled very readily by the removal of the forest owing to the increased amount of waste washed into it. Of course, floods

will be liable in the streams entering the lake if the forest is removed. The contour of the streams will be entirely altered. I might mention that the slope in New Zealand will probably vary very greatly between the old rocks such as we have in Wellington and the newer ones—mostly Tertiary—which form a considerable portion of the North Island and the South. Probably the angles of slope will be found to be very different, a matter that would require full and careful investigation in every district. I might say that the New Zealand maps are not of course made with the object of showing the topography, without which it would be very difficult to delimitate the slopes that are too steep to be cleared.

WILLIAM HENRY FIELD sworn and examined. (No. 86.)

1. *The Chairman.*] You are a barrister and solicitor residing at Wellington?—Yes.

2. Do you wish to tender some evidence with regard to the matters we have to inquire into?—Yes. Though possibly unable to add materially to the information already in the possession of the Commission, I feel that as one deeply interested in the subject of the preservation of our national forest and in afforestation, I should like to express my views on several of the subjects which the Commission is set up to consider. Respecting the preservation of existing native forest, I feel that a strenuous endeavour should be made to save more of the remnant of our bush than appears at present to be proposed. Though it is naturally held, speaking generally, that bush land which is fit for farming purposes should be felled, there are many cases where it would be wise to preserve our forest even though growing on land which might be successfully grazed. I refer particularly to bush growing within the watersheds of rivers, the flooding of which is likely to wash away rich alluvial land lower down. The reply to the outcry that this land is required for settlement is that large areas of open land even in the vicinity of our great centres of population are to-day not fully farmed, but are capable of much increased productiveness and of carrying a largely increased population. I have in my mind particularly the Waikanae and Otaki Rivers. At Waikanae in particular at the present time every flood is destroying land worth £40 to £50 per acre, as the result of the destruction of bush on land much of which when grassed and fenced cannot be worth more than £5 per acre, and which will in course of time decrease in value. In one case a rich section of about 25 acres has become reduced in recent years by 12 to 15 acres by the flooding of the Waikanae River, and, though a considerable sum has already been spent in river-protection, unless further effective protection works, at a cost to the settlers, the local bodies, and the Government of at least £1,000, are at once constructed, the river is likely to make a new outlet to the sea, and wash away not only more valuable land, but roads, houses, and other improvements, entailing loss to the settlers, local bodies, and the country of many thousands of pounds. Before the bush was felled the larger floods were rare occurrences, owing to the fact that the rains were to a large extent absorbed by the trees and floor of the forest, much of the water escaping by evaporation. The water now comes down as from an iron roof, bringing down larger volumes of flood-water than formerly, and with great suddenness and violence, and enormous accumulations of shingle, which raise the river-beds, causing serious erosions, and forcing the flood-waters over the surrounding level country. Where the hills felled are of a steep character every heavy rain takes with it a portion of the soil, thus rendering the land less fit to carry a sward of grass, and eventually we shall have the same desert conditions as are found in China, Cyprus, and other parts of the world, where the hills have been finally reduced to barrenness by the denudation of the forest. Already hills in the Wellington District felled in the early days of settlement are found to be of appreciably less carrying-capacity than formerly, and some are even already approaching desert conditions. And this is what was some years ago one of the beauty-spots of New Zealand, within my recollection. In my opinion the larger portion of the remaining bush in the watersheds of such rivers as the Waikanae and Otaki, on the lower slopes of the Tararua Mountains, should be preserved from destruction. I am informed that the slopes of the Ruahines, too, are fast becoming stripped of bush, chiefly by fire, and this on land which can never be farmed. As a member of Parliament I used my utmost endeavours years ago to induce the Government of the day to purchase from the Manawatu Railway Company all unfelled bush land in the Otaki Gorge, and so keep the magnificent scenery there in its natural loveliness, save the flats towards the sea from destruction, and preserve the climatic conditions. This once beautiful locality is now hopelessly marred by forest-destruction, whereas in the interests of the district and the country generally not a tree should have been felled. There are thousands of acres of native forest still remaining behind Otaki and Manakau and elsewhere which should be preserved. The land has now, however, for the most part fallen into the hands of syndicates, and the price which would be asked for it would be considerably in excess of the amount for which it could have been purchased a few years ago. There are cases, too, where settlers are led to take up and fell bush land which is quite unfit for farming, and which after a few years is taken possession of by fern and other vegetation. Such enterprises must result in serious loss if not in financial disaster. I know of whole hillsides which have been cleared of the bush, and upon which settlers have fruitlessly spent large sums in clearing the second growth of vegetation, but which have since been abandoned, and are now clothed with shrubs, tree-ferns, and the smaller forest-trees. The clearing of all the bush on the lower levels has the effect of robbing our native birds of their natural feeding-grounds, and finally compassing their extinction. The boundaries of the forest reserve of the Tararuas should be extended, and much of the bush land in the hands of Natives and Europeans on the lower slopes of the range, particularly bush adjoining existing forest reserves, should be acquired and preserved, otherwise existing forest reserves will suffer from the felling and firing of adjacent forest. A beautiful bush hillside immediately behind the Waikanae Township especially should be saved. The trustees of the deceased Native owner

would, I feel sure, sell at a reasonable price. Each year it is being further eaten into by fires, and in a few years it will be hardly worth saving. Fencing and judicious planting of fire- and wind-resisting trees and shrubs on the edges would effectually prevent further inroads into this as into other forest-areas. The Paraparaumu Bird Reserve, which is the first bush reserve of any magnitude on the Manawatu line after leaving Wellington, the whole of the forest for a distance of forty miles having been ruthlessly destroyed, should be extended by the purchase of adjoining native forest. Though perhaps beside the subject, I would strongly urge more drastic measures to save our native birds. At the present season of the year, when the koekoe is in bloom, the bush about Waikanae was at one time alive with tuis feeding on the koekoe flowers. Now there is hardly one to be seen. The pea-rifle is largely responsible for this. The native pigeons have met with a similar fate, and are now practically as extinct as the huia in the bush still remaining at Waikanae. I have myself preserved several areas of beautiful bush in the Waikanae district, and regret exceedingly that I did not save more. The preservation of bush is, however, an expensive matter for the private owner of limited means. The erection and maintenance of fences is costly, and it is usually impossible to save reserves from the ravages of wind and fire unless the margins are suitably planted. In addition to these outlays, and the struggle against natural forces, there is the continual annoyance and discouragement resulting from marauders who, when in need of timber or saplings for rough sheds, yards, and other purposes, do not hesitate to help themselves from the nearest bush reserve belonging whether to the Crown or a private individual. A severe penalty ought to be provided by statute to meet such cases. As the owner of a considerable area of sand-dune country at Waikanae, with two miles and a half of sea frontage, I should like to say a word on this subject, though the valuable report of Dr. Cockayne, F.R.S., on "The Dune-areas of New Zealand" does not leave much to be said. The checking and planting of bare and wandering sand-dunes is certainly a subject in which the State should be taking much-increased interest. The Crown should resume and treat with prison or other labour all areas which private owners are neglecting, and owners who, at great expense and often with signal failures, are striving to combat the evil should receive some encouragement in the shape of advice, and where possible a supply of suitable young trees for planting. The Crown should acquire a sand-dune area on the sea-coast, and conduct experiments for the benefit and guidance of all interested in this difficult subject. Personally I have spent considerable sums in checking and planting drifting sand, and, partly through dry, windy, and otherwise unfavourable seasons, and partly through lack of knowledge, much of the money spent has been wasted. The advice contained in Dr. Cockayne's report has, however, been a great help to me. I am convinced that the true and permanent remedy for sand-drift is afforestation, which will furnish not only timber for the distant future, but posts, rails, &c., in the near future for farm use, and much-needed shelter for stock, and to break the force of the prevailing winds, and so reduce the danger of drift-creation among the dunes farther inland. I have established numbers of plantations which are already of great benefit to me, and I have a small nursery of forest-trees ready for planting this year, but my difficulty has up to the present been to provide the first line of shelter along the sea-coast to take the first force of the westerly gales which beset the coast in which I am particularly interested. I am quite satisfied from my own experience that our sand-dunes are eminently suited for the growth of certain timber-trees, particularly conifers, eucalypti, and wattles, if only the coast shelter can be provided. As an instance of the growth of certain trees in sand, I may mention that in poor sand, though of course in a sheltered situation, I have planted seedlings of the ordinary silver-wattle in the spring, and twelve months after, in the succeeding spring, they were 12 ft. high and in flower. A subject to which I think the Government might turn its attention is the establishment of a State botanical garden. Adjoining the Levin State Farm is a beautiful and historic spot, the late Sir William Buller's Papaitonga Lake property, containing about 300 acres, of which about half is lake, and which I believe the trustees are willing to sell at a reasonable price. The North Island agricultural college is likely to be established on this State farm, and Papaitonga should, I think, form an adjunct of the farm. Already there is a considerable area of beautiful bush upon it, containing most of the forest-trees and shrubs found in low altitudes in the central province of the Dominion, and the land would, I think, be found to be well fitted to grow all our native trees and plants, except perhaps those indigenous only in the extreme north and south, and those which require alpine or other special habitats and soils. Such an institution would be of enormous interest and educational value. With regard to the question of State encouragement and assistance in tree-planting, I am strongly of opinion that all private bush reserves, plantations, and nurseries should be absolutely freed from general and local taxation, and the State should as far as possible provide, free of cost, up-to-date advice to all persons desirous of afforesting their lands, and in some cases give trees also. While saying this I should mention that the officers of the Agricultural and Lands Departments are always ready and willing to furnish advice on afforestation, as on other subjects within their ken, but up to the present there has not been sufficient specialization in the science of forestry.

LEONARD OWEN TRIPP sworn and examined. (No. 87.)

1. *The Chairman.*] You are the Chairman of the Wellington Acclimatization Society?—Yes.

2. In the South Island we had a good deal of evidence regarding the depredations of deer in the climatic reserves. We also took evidence from the presidents of the various acclimatization societies as to the other view of the question, and we should now like to hear your views on the subject. Do you go into the bush at all?—I go deer-stalking generally every year on the

White Rocks Station, adjoining the Haurangi Reserve, in Wairarapa. Of course, I am aware that deer do bark certain trees, and are very fond of a shrub called "whitewood"—the mahoe. Last April I found on a portion of this property, where we used to get many heads, no deer at all, but the whitewood was coming up again where it had been destroyed. I do not know of my own knowledge that they are doing any damage to the timber-trees. They will eat the shrubs, of course. The deer got very numerous in the district I mentioned, and the owner of the station got permission from the Government to kill them off, and we could see that the deer had gone from the way the mahoe was growing again.

3. Do you think it would be practicable to set apart certain areas of forest country as deer-sanctuaries, confining them to such areas, and shooting all found outside?—I think it would be practicable, but whether you are going to do any good by it is another question. If there are goats and pigs in the forest, why clear only the deer out? You must get rid of all animals. There is no doubt that in the past deer herds ought to have been kept in check. In the Haurangi Reserve there are too many deer, and the acclimatization society last year hired men to go up and shoot a certain number. The settlers have also shot a number; but what we ought to be able to do is: wherever there is a herd getting beyond a certain size, to shoot out any stags with bad heads, or old hinds that are the cause of the deterioration in the herds. If the societies had had the experience fifteen years ago they have now the herds could have been kept in check that way, and if that were done I should not think the deer would do much harm. They will damage orchards and turnip-patches, and in a district like Nelson the question would arise of whether for a certain year the restrictions regarding shooting them should not be taken off altogether.

4. In the vicinity of the Government plantations at Tapanui, and also at Hanmer, the deer are coming down and eating the young trees. What do you think should be done in such a case?—They are fairly easy to scare with a few shots and dogs; but, still, I cannot say that deer do no harm, because they will eat something. On the other hand, they are a considerable advertisement to New Zealand, and there is a large sum of money spent annually here by the many Englishmen and others who come here for the stalking, in addition to the money spent by ourselves.

5. Can you give the Commission any idea of the number of licenses taken out in your district by people who reside outside New Zealand but come here for the sport?—No. I am sorry to say there are not so many this year as in the past, because there is no doubt that in the Haurangi Reserve the herds are deteriorating, because there are too many deer there. When we get the good heads again we will get the stalkers. You can get better heads in Otago than here.

6. Have you anything you wish to add?—I am very interested in the preservation of the native birds. It may not come within the scope of your Commission, but I hope you will recommend that the bush in Canterbury and Otago, as far as possible, should be preserved—not necessarily the timber bush. I know those provinces well, because my home was in Canterbury, and there are numbers of the mokomoko or bell-bird there. Near where my people live there is a reserve, and there are other areas that could be secured for the purpose. It would be a simple matter to obtain them, as there is provision in the Act for the Government to exchange Crown lands for bush for scenic purposes. Also, it is not a question of the country having to find money for the purpose of the reserves in question, because in the districts of Canterbury and Otago the pastoral runs are Crown lands. The Act has been taken advantage of I know, but then it can be taken advantage of in every case where there is a bush concerned. The point is that the taxation is increasing, and if a man has 400 acres of bush country preserved, and his taxation is going up on the land going up in value, he begins to think he must get something out of it.

7. *Dr. Cockayne.*] Do you think there should be no taxation on the land where a piece of bush is preserved by a private owner?—There should be no rates or taxes on such a piece of bush.

8. You are aware that every scenic reserve is now a bird-sanctuary?—Yes.

9. Would that fulfil your purpose?—Well, in order to preserve our reserves they want, of course, much more looking after, and that brings in the matter of expense. My suggestion is that every Rabbit Inspector, every acclimatization society ranger, and every policeman should be instructed to keep an eye on any reserve in his district. What happens now is this: in a certain district there is a reserve, and a man who has got land alongside it will invariably get a burn into it either wilfully or by accident. Then the settler's stock very often finds its way on to that reserve. If the Rabbit Inspector and the local policeman knew that they had an interest in preserving these reserves and birds I think some good would accrue to the Dominion generally. In that way I think we could save the birds.

10. *Mr. Lethbridge.*] We want notices posted up at all the railway-stations as to the reserves, and asking the public to assist in keeping them intact?—Yes. In America the public are educated up to taking great interest in their reserves.

11. *Mr. Clarke.*] You were asked the question as to whether in your opinion reserved areas should be exempt from taxation?—Yes.

12. Supposing such an exemption were enacted, might it not happen that after a man had held for some years a reserved area which had been exempted from rates and taxes he might determine that by clearing the land he could get a greater profit out of it—and by selling the timber off it—than by holding it as a reserve?—That might arise.

13. What guarantee would you impose to prevent such a contingency arising?—I would like to think the matter out. I think you could come to some equitable agreement with the owner that he should not sell the land for a certain number of years.

14. What would the agreement be worth when the timber was down?—There would have to be a bond that he should not cut the timber or sell it for a number of years.

15. If the land escaped taxation for fifteen years would not it cost the State more than it was worth if afterwards it was proposed that the timber should be cut and the land sold to preserve the interests of the community?—It should be done by an Act of Parliament providing that the owner should not sell for a certain number of years after the place was proclaimed a sanctuary. The question wants a lot of consideration, I admit.

GEORGE PERCIVAL NEWTON sworn and examined. (No. 88.)

1. *The Chairman.*] You are the Assistant Under-Secretary of Internal Affairs?—Yes.

2. Can you form any estimate as to what proportion of the licenses issued for deer-stalking are taken out by people residing out of this country?—No, but I could write to the acclimatization societies and ask them for the information.

3. I suppose you are from your position conversant with the complaints from time to time made with regard to the damage done by deer?—Yes.

4. Do those complaints refer chiefly to the artificial plantations and orchards?—Probably, but not altogether. We have had one or two complaints from the Lands Department as to damage done in their State nurseries at Hanmer.

5. I have here some photos showing damage done by deer barking the trees. Would you consider if they were doing damage to that extent in a climatic reserve the value of such reserve would be very seriously minimized?—After seeing these photos I would certainly consider its value would be detrimentally affected. At the same time I do not quite see if the reserve affected is one set apart under the Scenery Preservation Act or the Animals Protection Act how the difficulty is going to be got over as to allowing deer to be shot in that reserve.

6. I appreciate your point, because I understand that firearms are not allowed to be used in these reserves?—Yes; it would necessitate an amendment of the law.

7. *Dr. Cockayne.*] You can shoot in a climatic reserve?—Yes, but not in a scenic reserve under the Animals Protection Act.

8. *Mr. Lethbridge.*] Cannot settlers get permission to shoot where deer are doing damage?—There is a provision in the Animals Protection Act that where animals and birds are doing damage to property the Minister has power to grant authority to destroy such animals or birds then on such property. That is granted on the application of the person concerned. Of course, such sanction would not be given without other inquiries being made. One way is to ask the local acclimatization society to supply the Department with any remarks they desire to make regarding the application. If the evidence in favour of the request is sufficient the Minister almost invariably grants the necessary permission to shoot. I do not know of any case where damage is proved that the permission has not been granted.

9. *Mr. Murdoch.*] For a limited period?—As a rule, three months; but if the damage still continues people can apply for an extension.

10. *Dr. Cockayne.*] Can the Minister now send a man into a scenic reserve to shoot wild cattle?—I doubt it, because under the Scenery Preservation Act I do not think you can take a gun on those reserves.

11. Then it would mean an amendment of the Act in that direction?—Yes. That leads up to the question I heard Mr. Tripp asked, if it would be possible to have the deer confined to certain fixed areas, and if they went outside those areas they could be shot by any one at any time. In connection with that question I might say it would be a very good thing if such an arrangement were possible, but I do not see how it could be arranged, as one of the difficulties would be in the event of a person being found in possession of a deer of his being able to prove where he got it from. It is difficult to see how the matter could be equitably managed without destroying the whole sport. Then, unscrupulous people might send some dogs into a reserve for deer, where they cannot be shot, turn them out of the preserve and then slaughter them indiscriminately just outside the border. The question has become rather an acute one, especially at Rongahere, near Tapanui, where the deer have done a great deal of damage, and where a number of permits have been given to shoot. The acclimatization society were asked to try a bird-scarifier, which it was considered would frighten the deer away, and they proposed to experiment with it. There is no doubt that the whole question, in some of those places where the trouble is acute, must come up for consideration as to the removal of the protection altogether.

12. *Dr. Cockayne.*] That would be equivalent to having no deer-parks or sanctuaries in those districts?—Yes. If you remove the protection off deer in any acclimatization district any one can shoot there.

13. The whole of the Southern Alps will in time be one huge deer-park, and as the deer become a nuisance permission may have to be given to shoot them in a district adjoining a non-shooting area. Would that give rise to a difficulty?—Yes. You are quite right; that is one of the difficulties we have to deal with. With the knowledge we have, and with the wish there is to preserve both the native flora and fauna, there must necessarily be numbers of sanctuaries, and if those sanctuaries were places where no one could go with a gun because of the native birds, but there were deer there, then it means if you want to destroy the deer that the birds also might go. At present the birds are protected in their sanctuaries.

14. But the sanctuary is also for the plants as well as the birds, and if deer are allowed in, such plants as the ribbonwood would be wiped out. Would that be a wise thing to allow?—No, but the thought was only passing through my mind as to the best way to restrict deer within certain areas without their being a nuisance, and I cannot quite see how it can be done. All the power given under the law at present is to destroy them on property when it is found they are committing damage to such property. You cannot drive them off that property and destroy them somewhere else.

15. *The Chairman.*] At present the deer are mostly in inaccessible places, but it is in just those areas where there is bush that the damage is going on, and where it would not be likely to be reported until the damage was almost beyond recall. Have you considered that point?—I see your contention: the more inaccessible the bush-area the more likely you are to have numbers of deer, of course.

16. *Dr. Cockayne.*] We do not say that the deer will destroy the forest, but they will help to destroy the undergrowth, which is the most important part of the climatic reserves, because that growth is required for water-conservation purposes. If it is destroyed the fire gets in and the reserve is ruined. Have you considered the question from that point of view?—The result you mention is certain to follow if the undergrowth is destroyed.

Approximate Cost of Paper.—Preparation, not given; printing (1,500 copies including maps and illustrations), £165.

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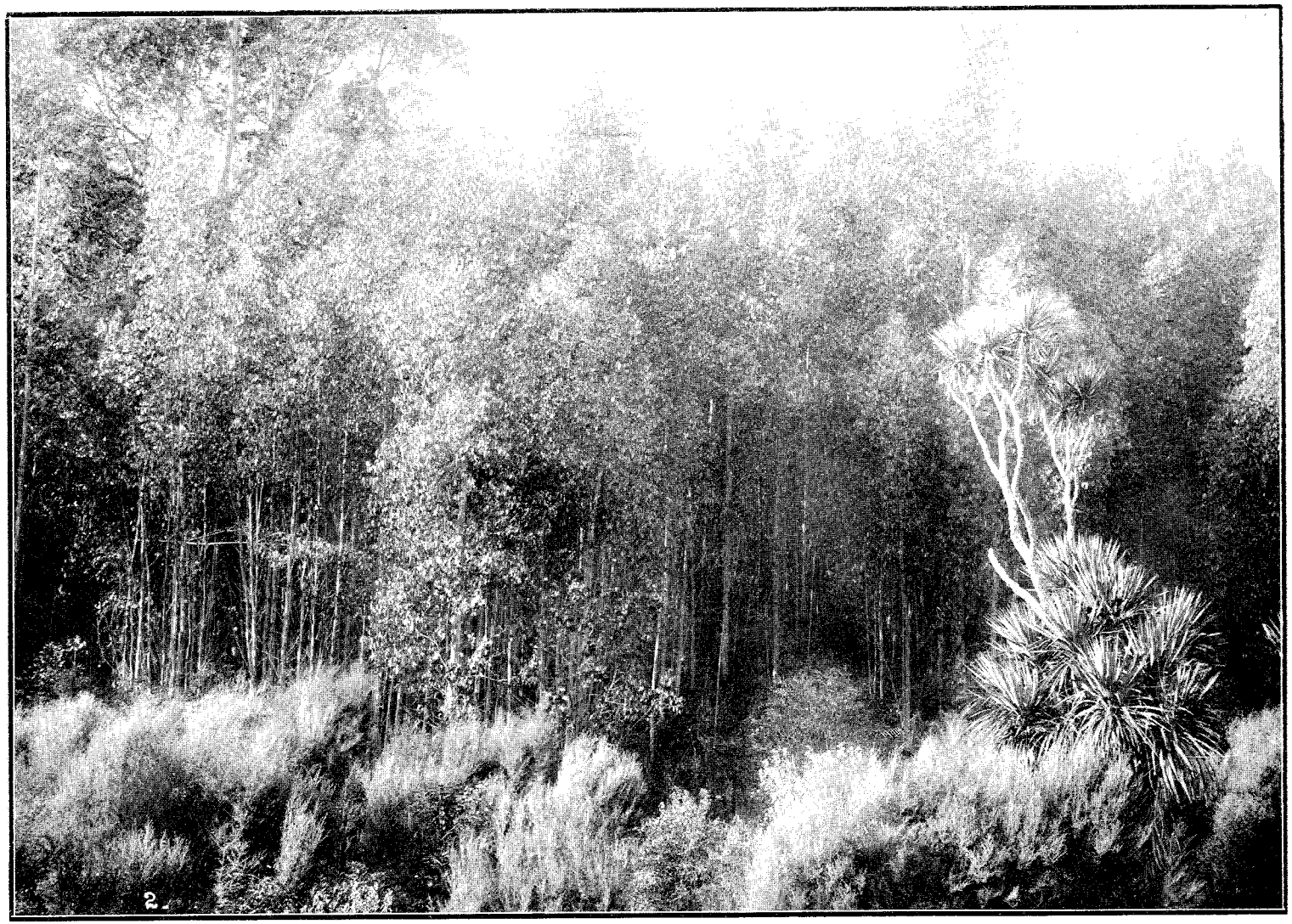
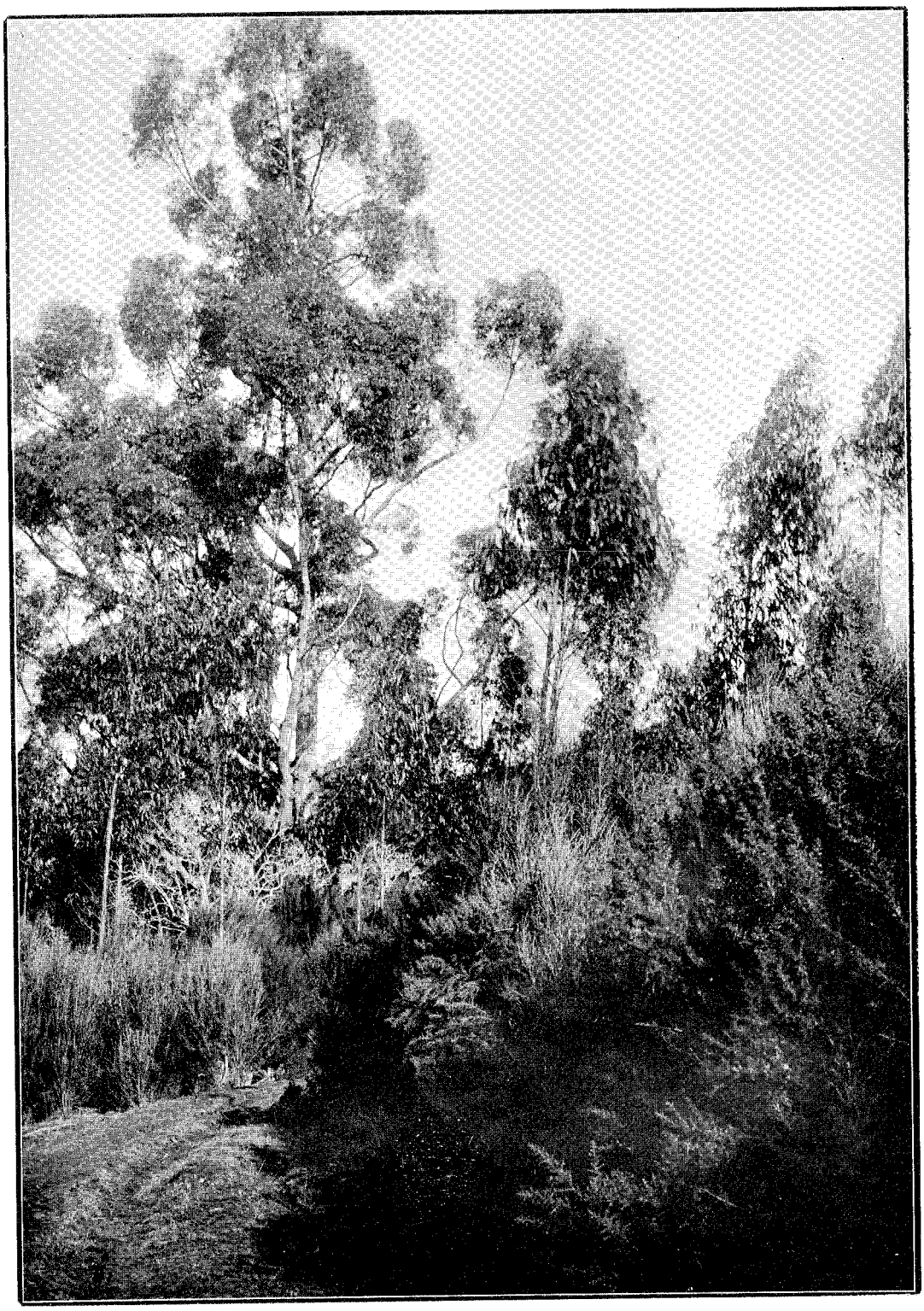
Price 3s. 6d.]



General View of Natural Plantation of Australian Gums at Waitati, Otago.

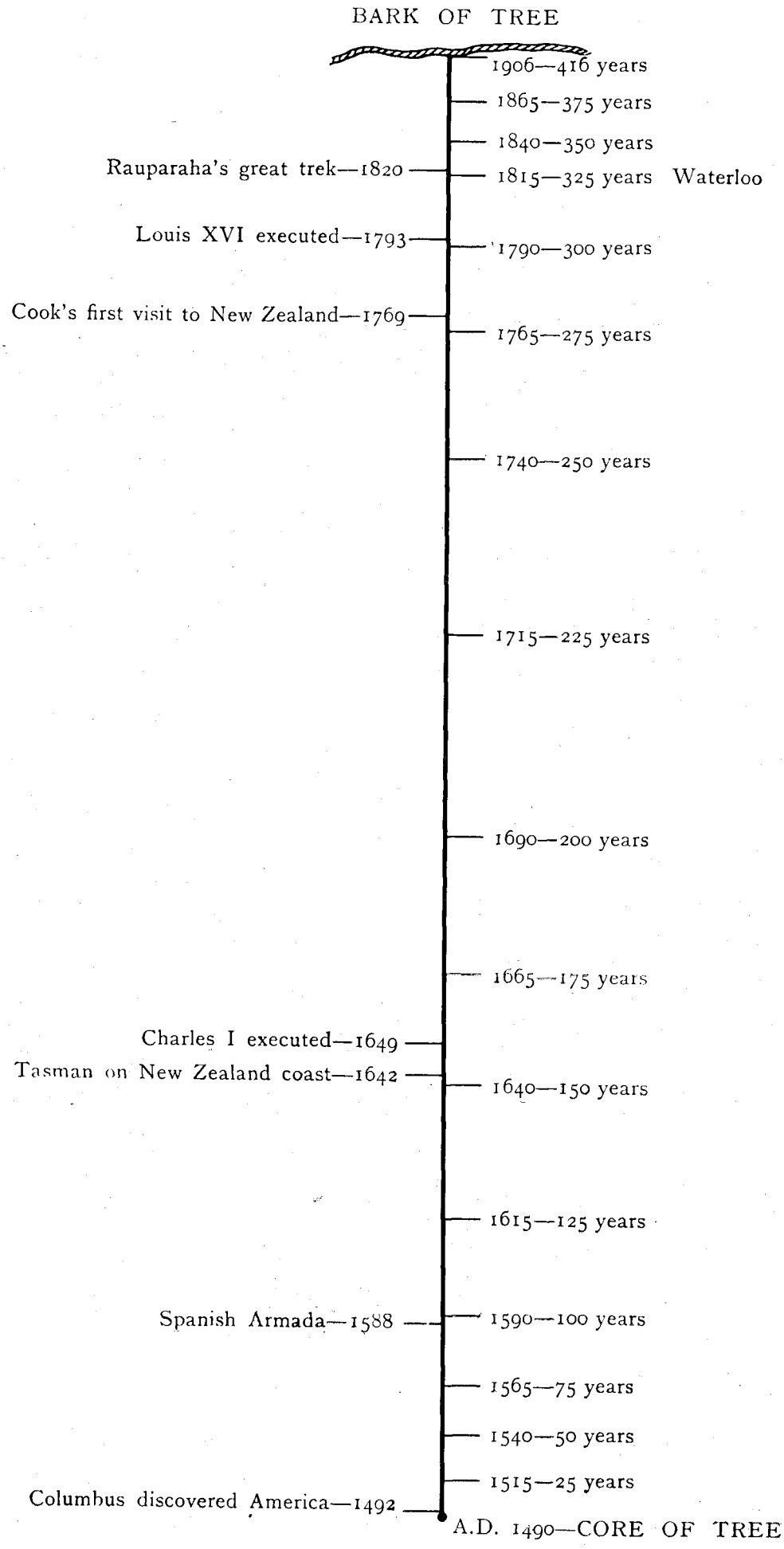
View of Interior of Natural Plantation of Australian Gums at Waitati, Otago.



Parent Tree of the Natural Plantation of Australian Gums at Waitati, Otago.

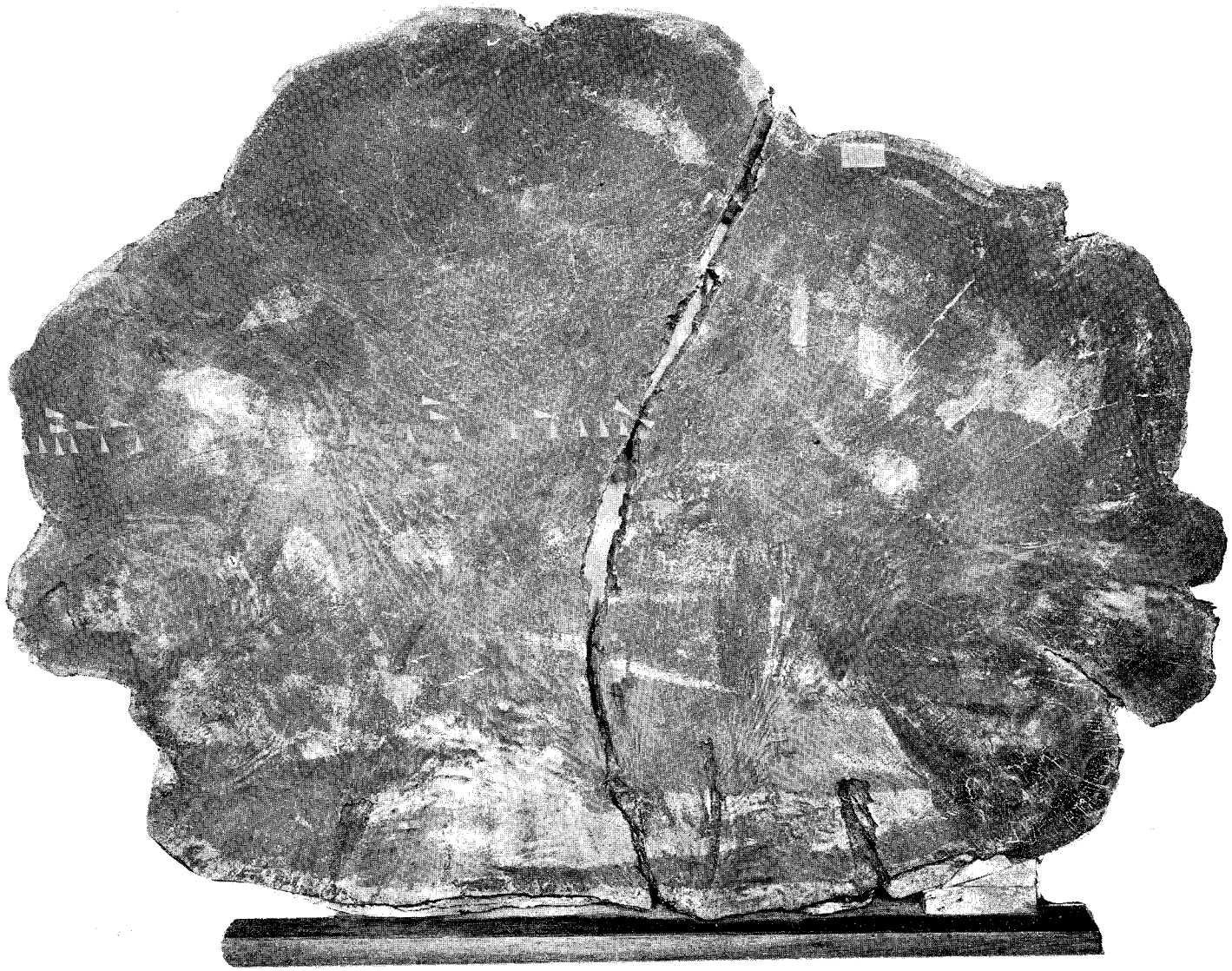
Exterior View of a Natural Plantation of Australian Gums, mainly the Blue-gum, at Waitati, Otago.

DIAGRAM EXPLAINING PHOTO OF TRANSVERSE SECTION OF TOTARA LOG.



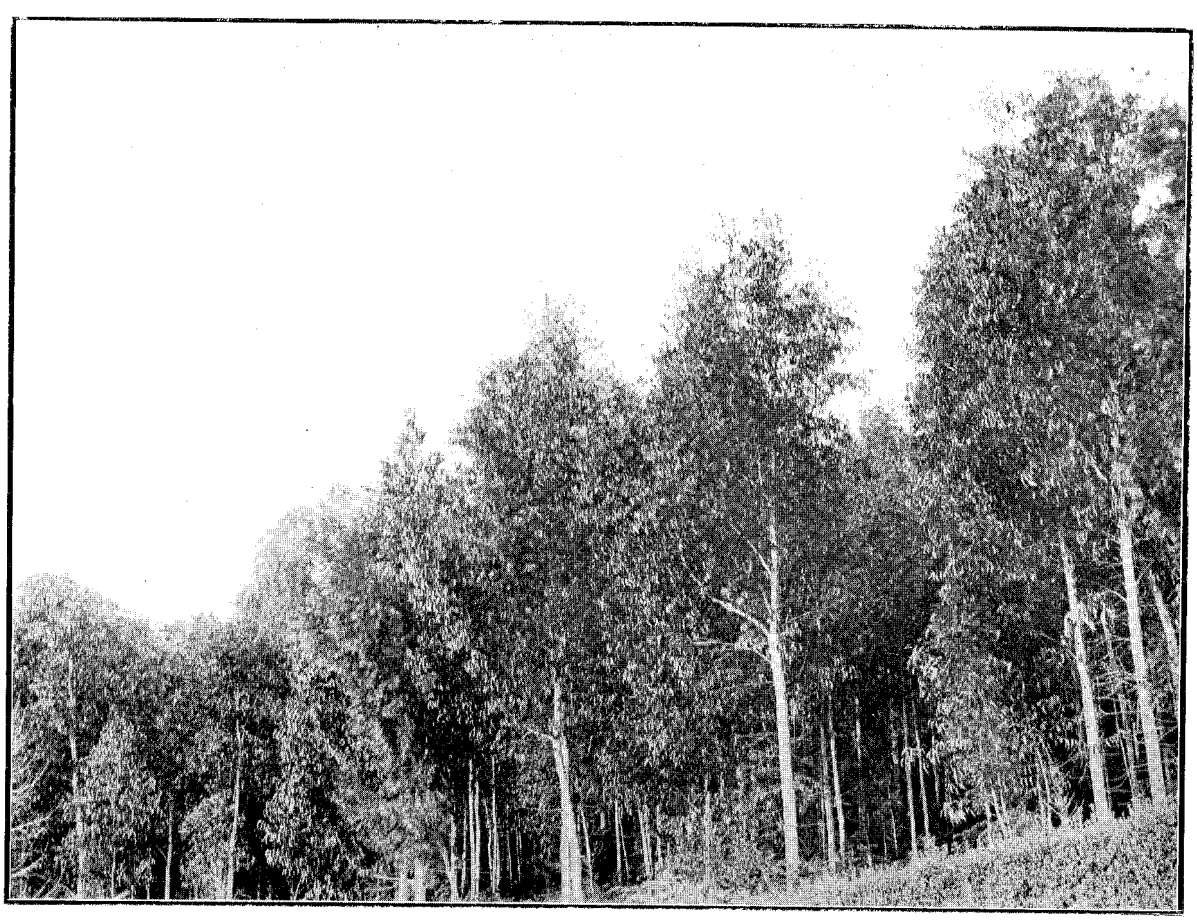
Scale: 1 in. of diagram equals 4·48 of original.

Radius of transverse section of the totara log shown in photo No. 6; length of radius, 4 ft. 2 in. The total age of the tree was 416 years; its diameter was 8 ft.; and two years before the discovery of America it was a seedling. The increment for every twenty-five years is shown on diagram.



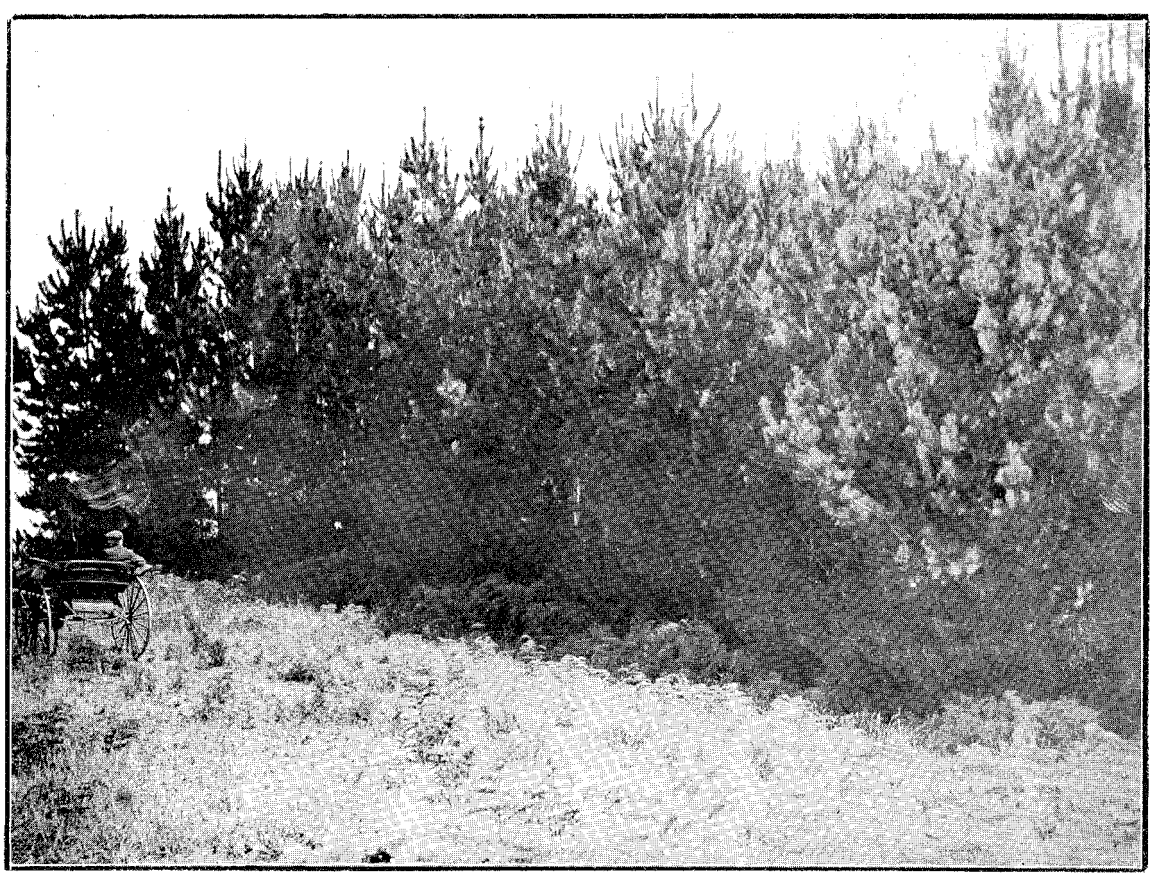
Cross-section of Totara Log, 8 Feet in Diameter. Scale, 13·14 times less than original.

Larch Plantation at Whakarewarewa, Thirteen Years, 32 Feet.

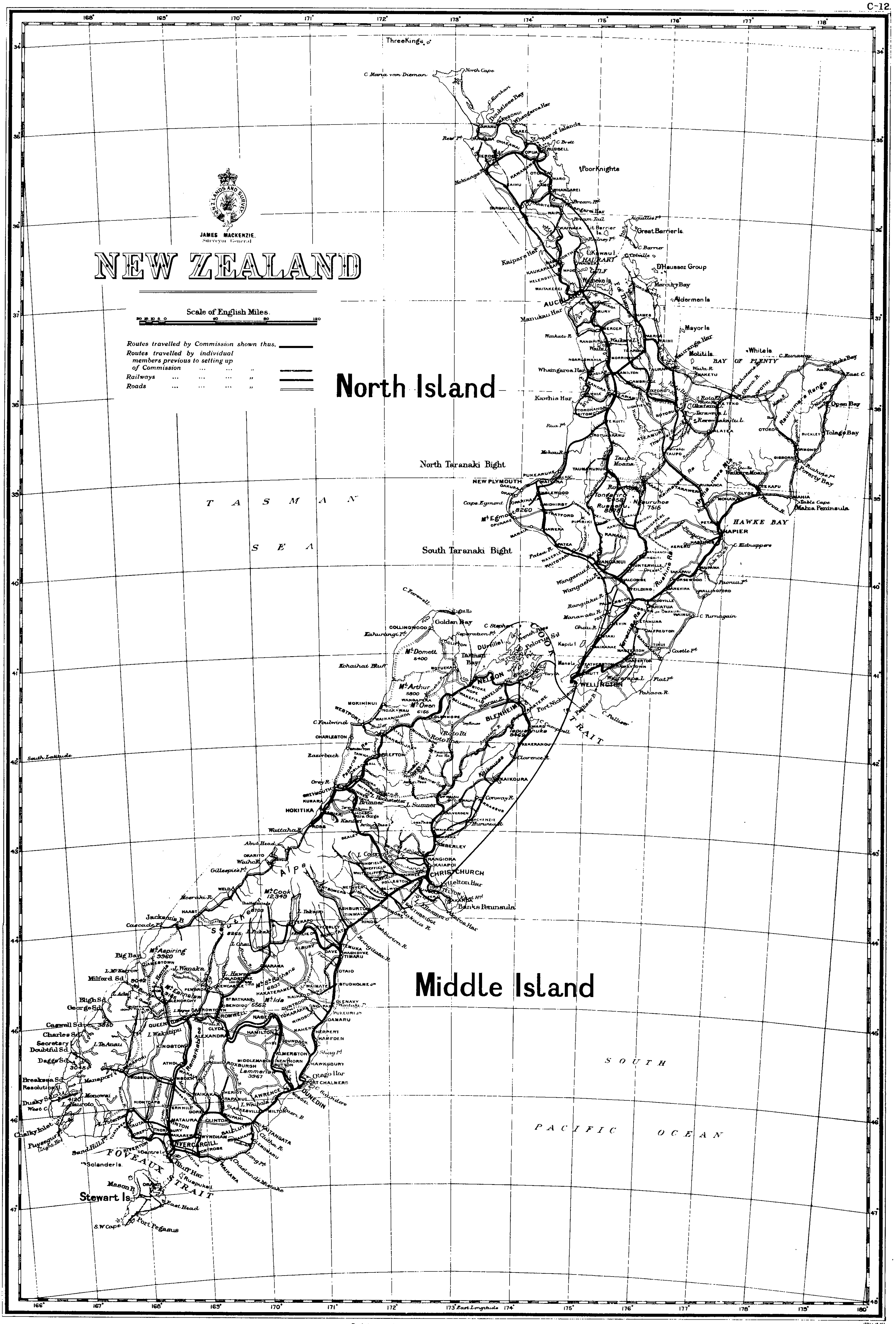


Eucalyptus Sieberiana at Whakarewarewa, Thirteen Years, 45 Feet.

Pinus Laricio at Whakarewarewa, Fourteen Years, 24 Feet.



Pinus radiata at Waiotapu Plantation, Nine Years, 35 Feet.



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JAMES MACKENZIE

SOUTH ISLAND
(TE WAI-POUNAMU)

NEW ZEALAND

Showing Proposed Climatic Reserves.
(Coloured Red.)

Scale of English Miles

Reference

Cities
Boroughs
Towns and villages
Railways and stations
Roads
Boundaries of Land Districts
Projection – Rectangular Tangential

4000 ac.
50,000 ac.
19,000 ac.
6020 ac.
134,000 ac.
2350 ac.
34,500 ac.
87,000 ac.
1410 ac.
2000 ac.
64,800 ac.
153,000 ac.
214,000 ac.
224,200 ac.
134,700 ac.
115,700 ac.
Golden Bay
Tasman Bay
Karamea Bight
Pegasus Bay
Banks Peninsula
Canterbury Bight
Otago Peninsula
South Latitude
T A S M A N S E A
S O U T H P A C I F I C
(TE MOANA-NUI-A-KIWA)
O C E A N
FOVEAUX STRAIT
Stewart Island

AUCKLAND I^DS

CAMPBELL I^DS

(REKOHU or WHARE-LAURI)
CHATHAM ISLANDS
Scale of English Miles

167° 168° 169° 170° East Longitude 171° 172° 173° 174°

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JAMES MACKENZIE
Surveyor-General

NORTH ISLAND
(TE IKA-A-MAUI)
NEW ZEALAND
SHOWING FOREST AREAS.

Scale of English Miles

Reference
Cities
Boroughs
Towns
Railways
Roads
Boundaries of Land Districts
Projection - Rectangular Tangential

REFERENCE
Crown lands under forest . . . . . *shown thus*
State forests . . . . . " "
Permanent Reserves with standing forest . . " "
Other forest lands . . . . . " "
Plantations, Nurseries, &c. . . . . . " "

NOTE.—National Parks and State Forests in many cases contain large areas of Reserve land

RAOUL or SUNDAY I.
Scale

MACAULEY I.
CURTIS I.
L'ESPERANCE RK.
KERMADEC ISLANDS

COOK ISLANDS

Hauraki Gulf
Bay of Plenty
North Taranaki Bight
South Taranaki Bight
Golden Bay
D'Urville I.
Tasman Bay
Karamea Bight
Cloudy Bay
Palliser Bay
Mahia Peninsula
Hawke Bay
TASMAN SEA
SOUTH PACIFIC OCEAN
TE MOANA-NUI-A-KIWA
MIDDLE ISLAND
South Latitude
East Longitude

172° 173° 174° 175° 176° 177° 178°
34° 35° 36° 37° 38° 39° 40° 41°

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JAMES MACKENZIE

SOUTH ISLAND
(TE WAI-POUNAMU)
NEW ZEALAND
SHOWING FOREST AREAS.

Scale of English Miles

Reference

Cities — thus
Boroughs
Towns and villages
Railways and stations
Roads
Boundaries of Land Districts
Projection – Rectangular Tangential

Crown Lands under forest — shown thus
State Forests
Permanent Reserves with standing forest
Other forest lands
Plantations, Nurseries &c.

Note. Scale [illegible]

Golden Bay
Tasman Bay
Karamea Bight
Cloudy Bay
Pegasus Bay
Banks Peninsula
Canterbury Bight
Otago Peninsula
Stewart Island
FOVEAUX STRAIT
South Latitude

T A S M A N S E A

S O U T H P A C I F I C
(TE MOANA-NUI-A-KIWA)
O C E A N

ANTIPODES I^DS
AUCKLAND I^DS
CAMPBELL I^DS
(REKOHU or WHARE-KAURI)
CHATHAM ISLANDS
Scale of English Miles
Rekohu
PITT STRAIT

168° 169° 170° 171° 172° 173° 174°
167° 168° 169° 170° East Longitude 171° 172° 173° 174°
41° 42° 43° 44° 45° 46° 47°

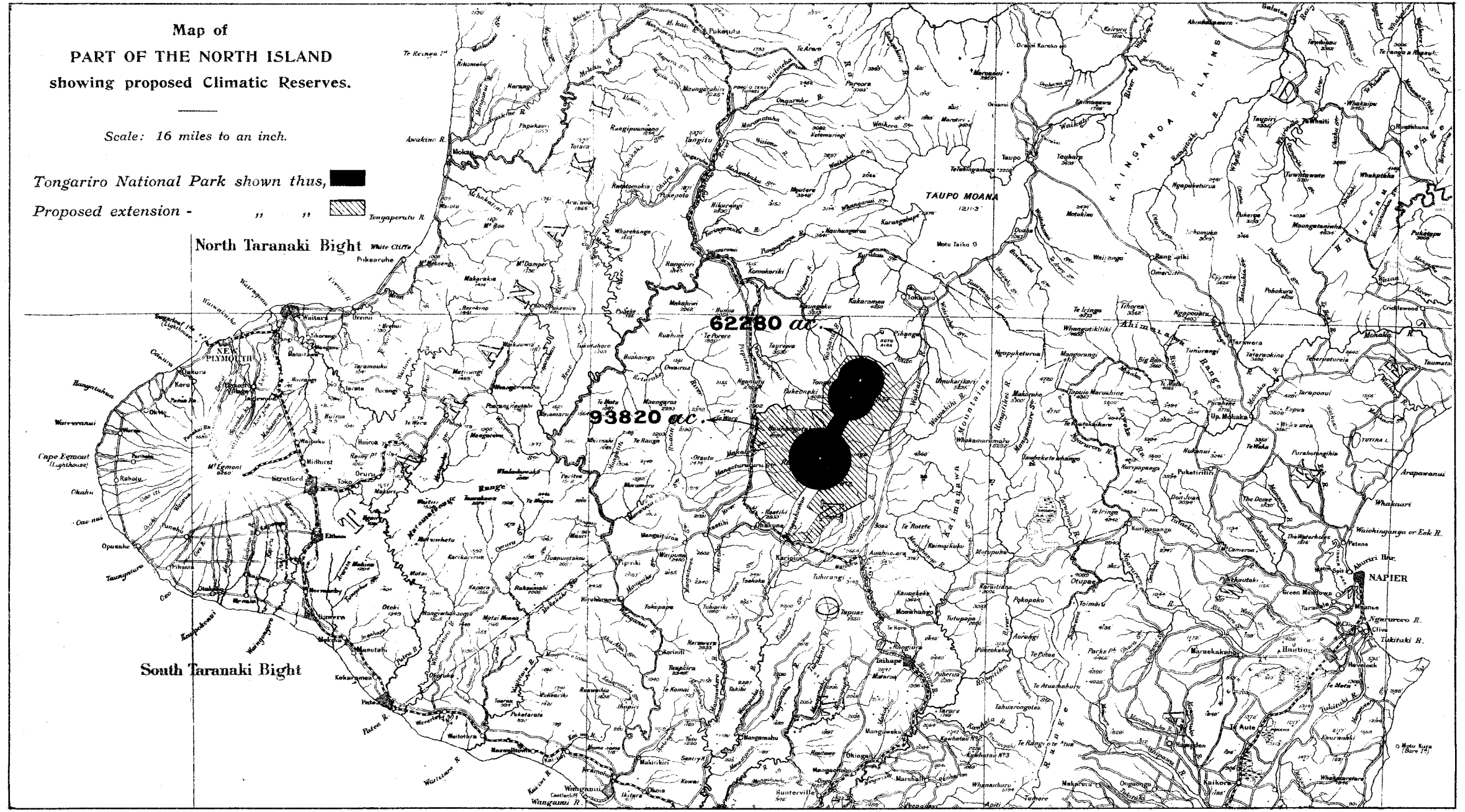
By Authority: John Mackay, Government Printer.

Map of PART OF THE NORTH ISLAND showing proposed Climatic Reserves.

Scale: 16 miles to an inch.

Tongariro National Park shown thus, ■

Proposed extension - ,, ,, ▨



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