

lockers, cupboards, etc., and water, gas and electricity are "on tap." A blackboard and diagram rack enable this room to be used for lectures, and portable drafting tables are another feature. Next to the laboratory is the room occupied by Mr. Hutchinson, Lecturer in Forest Utilisation.

These new rooms will solve many of the difficulties of building accommodation that hitherto had beset the School. The staff and students wish to take this opportunity of expressing their appreciation of the courtesy and assistance extended to the School at all times by Dr. Chilton, Professor of Biology, in whose Department the School had for two years lived and moved and had its being.

RESEARCH—1926

I. Canterbury Economic Survey.

This project was the major effort of the School during the past year, and covered the collection and elaboration of data concerning the economic position of forestry in Canterbury. The whole field of forest use was gone into with the object of obtaining a clear view of the consumption by the community of all forms of produce, and the various industries which consume them. When the probable future development of this region is borne in mind, some forecast is then possible of the future forest needs of Canterbury, which will have to be catered for if development is to go on unchecked. Hand in hand with the collection of this data, a survey was made of the existing forests of Canterbury—both native and exotic, and their composition, location, volume and value arrived at, so that it is now possible to ascertain what share of her forest needs, as regards both quantity and utility, is now being obtained within the province, and similarly what share can be hoped for in the future under reasoned forest management and a full utilisation of our latest resources.

The collection and elaboration of these facts was carried on by Mr. Hutchinson, assisted by Mr. Clark, during the summer and autumn of the past year, and represents Part I. of the project as arranged with the State Forest Service.

The second section of this project will be carried out during the ensuing field season, and comprises the drawing up of a forest policy, or plan of future action for the province based on the facts as disclosed in Part I. to meet the future needs of Canterbury to their fullest possible extent.

As this project is being undertaken on behalf of the State Forest Service, the results of the Survey cannot be published in this journal, but it is expected that when the project is complete, the finished report will be published by that Department in bulletin form.

II. Investigations into Growth and Yield of Exotic Plantations in Canterbury.

Work on this project during the past year has been: First, the establishment last December of four sample plots in the Burke's Pass plantations of the MacKenzie County Council; and second, the remeasurement of the trees on the eight plots established last year in the Selwyn Plantation Board reserves. Regarding these latter, the favourable season experienced resulted in uniformly good growth. The four and five-year-old *P. radiata* increased their height by about two feet during the year, while the yearling Douglas fir became very well established. Mortality was exceedingly low with the exception of the *P. ponderosa*, which was badly set back by hares, about 25 per cent. being dead from this cause, with some further losses inevitable. Evidently the successful establishment of this species is going to present a difficult problem. Condensed synopses of the results obtained from the investigation will be published in this journal from time to time.

III. Revision of Wood Identification Key.

The past session saw some considerable revision and amplification by the students engaged in Wood Technology of the macroscopic identification key published in the last year's issue of "Te Kura Ngahere." The receipt of a considerable number of fresh specimens of Australian hardwoods made possible the amplification of that section of the key, while a number of alterations leading to simpler use or more certain diagnosis were made in the hardwoods group generally. The work of revision was not completed this year, so it is not considered advisable to reprint it in this issue. It is hoped that by next year's issue the work will be of great enough scope to warrant the publishing of the key in an up-to-date form.

IV. Check of Cruise made at 1925 Spring Camp.

The last issue of this journal made mention of the fact that arrangements had been made to scale as cut the timber on the twenty-acre block cruised by the students at the Spring Camp of 1925. Unfortunately a change of management occurred on the logging operation shortly afterward, and while the arrangements had been communicated to the new superintendent, through a misunderstanding as to the block in question, the timber was cut without the taking of any record. It is hoped that this project may be repeated during the coming year, so that the students may get a positive and accurate check upon the quality of their field work in this regard.

V. Anatomy of New Zealand Woods.

Mr. C. S. Barker, a third-year student, has been engaged during the year in various researches in connection with the anatomy of

New Zealand woods. Most of the work has been carried out by him for the Forest Products branch of the State Forest Service.

Mr. Barker's work included the following:—

- (1) A Structure Study of *Pinus radiata*.
- (2) A Study of the Tracheids of *Pinus Laricio* and of the fibres of Makomako (*Aristotelia racemosa*).
- (3) The Living Tissues in the Wood of Rimu (*Dacrydium cupressinum*).
- (4) The Anatomy of the Chief Native Commercial Woods of New Zealand.

An article by Mr. Barker is contained in this issue.

THE VALUE OF GROWTH RINGS IN NEW ZEALAND MENSURATION STUDIES.

(Frank E. Hutchinson, B.Sc.F.)

The scientific forest mensuration which is now being brought into practice in New Zealand is based, naturally enough, on the principles which have been worked out mainly on the continent of Europe during the past five hundred years, with the addition of many improvements in methods of application developed within the last twenty-five years by the admirable work of the United States and Canadian forest authorities.

For all purposes concerned with growth and yield, the methods elaborated for northern hemisphere forest mensuration have been based on the growth rings as shown on the cross-sections of the trunk. These rings have been found to furnish a true and reliable record of the past growth of the tree, upon which record can be built up data concerning yield and increment from which accurate conclusions can be drawn regarding the economic rotation, and the comparative financial profit which may be expected, as between different species and different sites—factors which are the very foundations of all forest working plans.

The methods which have become adopted as standard for work in the northern hemisphere were developed to suit a forest whose constituent species were almost entirely trees characterised to a marked degree by a smooth and regular circumferential habit of growth, and growing in a climate of continental extremes of temperature, causing a short but hot, and more important, an uninterrupted growing season, followed by a winter of such severity that all growth is at a definite and complete standstill until the following spring. Under these climatic limitations, the trees, characterised by the smooth, even shape of

their boles, have taken to laying on their annual increment in the form of a layer or ring which, under average conditions, is clearly visible, owing to the juxtaposition of thick-walled cells of the late growth of one season against the lighter thin-walled cells of the following season, and which is so even in form and in thickness as a rule throughout any cross-section, that it can safely be used as an indicator of volume, and it is entirely upon this function of the growth rings as volume indicators, that the whole of their usefulness in forest mensuration is founded.

In applying these methods of volume calculation, then, to New Zealand forests, it is necessary first to be sure that the same conditions which make for dependability of the growth rings as indicators of volume by time periods exist in New Zealand forests as in the north temperate forests for which these methods were evolved. If these conditions are not present, then evidently the whole of the data that may be gathered may be clouded with such uncertainty as to greatly negative its value.

There are, as has already been referred to in passing, two essential conditions which must be fulfilled if the growth rings are to be of any value from the standpoint of mensuration studies. First, the conformity of the rings must be such that an easily applied measurement of them will give, by a simple formula, a correct function of the volume increment desired. It is almost essential, therefore, that the wood be laid on smoothly, evenly and uninterruptedly throughout the whole of the circumference of the bole at any given cross-section. If the wood be laid on in such manner as to cause fluting or scalloping of serious nature, or if the wood is not laid on continuously or evenly all around the trunk, it is evident that an increment boring or even a complete section will yield data of highly questionable value for the purpose of volume computation. Second, it is imperative that the rings can be relied upon to furnish an accurate index of time. If the rings are not annual, they must at least be regular, so that they may be interpreted chronologically. Without such definite relation the value of the growth rings for mensuration purposes is exactly nil.

Are these two conditions fulfilled in New Zealand in such measure, upon the average, as to enable these methods of computation based upon the growth rings to be generally used?

The results of a considerable quantity of stem analysis work on both native and exotic forest in the South Island have led to the conclusion by the writer that in many cases these two essential conditions are not present, and the investigator must proceed with caution lest a great deal of the value of the work be vitiated.