

transferred to glycerine, which was changed if it was greatly coloured by the stain.

- (8) A clean microscopic glass slide was taken and a drop of glycerine was placed on the centre. In this drop was placed a small portion of the macerated wood. The slide was then placed under a dissection microscope, and the wood gently teased apart by tapping with dissecting needle.
- (9) A No. 1 cover-slip was placed on and cemented with gold size. A No. 1 cover-slip is essential if measurements are going to be taken under high powers.

**Editorial Note**—Further articles by Mr. Barker dealing with the anatomy of New Zealand woods will appear in future numbers of this journal.

## CANTERBURY'S NATIVE BUSH.

(Arthur F. Clark.)

From about the year 1800 the establishing of small trading posts or depots at various points along the coast of New Zealand was of fairly common occurrence, particularly in the North Island. At these visiting vessels would call and exchange their trade goods (of which the musket rapidly became the most sought after) for Maori produce. The Pakeha-Maori, a white man, in some cases with an exceedingly doubtful history, was often retained by the tribes, and upon the calling in of a vessel at one of these depots his function was to act as interpreter and bargain-maker between the Maori and the trader. The success which attended his efforts in carrying out this delicate task often prevented his conversion into an article of diet. Thus the white man was already known in many parts of New Zealand before definite attempts at settlement were commenced.

Already Nelson and Taranaki were occupied by small but determined bands of colonists, when, in 1847, a movement was set on foot in London which led to the formation of the Canterbury Association, the object of which was to found a colony in New Zealand to be known as Canterbury. The moving spirit in the Association was John Robert Godley, a man of great energy and singular strength of character. Throughout the difficult years before the scheme had definitely matured, when the attitude of the Imperial Parliament towards colonising efforts was by no means encouraging, it was due, undoubtedly, to his untiring efforts that the spirit of the movement

was kept alive. Unlike previous efforts at colonisation the plans of the would-be colonists were most carefully prepared in advance. Captain Thomas preceded the expedition by some two years with authority to act fully in most matters for the Association. The plains of the Wairarapa had first been brought to the notice of the Association, but Thomas encountered difficulties in connection with this site, and as the Canterbury block had already been favourably reported upon, it was upon it that he recommended the foundation of the new settlement. The preliminary mapping of the Port Cooper district and the site of the city of Christchurch was carried out by Edward Jollie, one of the earliest surveyors, with the assistance of Thomas. Arrangements for food were made, and a number of buildings were erected. The plans of the Association were well carried out, and when, in December, 1850, the first four ships arrived at Port Cooper, the foresight and ability of the organisers was well rewarded by the startlingly rapid manner in which the colony proceeded to establish itself. Such, indeed, was the energy and grit of the new colonists, that when Mr. Godley returned to England in the December of 1852, the object of the Association was an accomplished fact; the success of the settlement was assured.

Prior to the advent of the Association, however, Canterbury had attracted several families from Australia, while Banks Peninsula had been the home of a small band of French colonists since 1840. These, too, were well established and thriving. While still in England the settlers of the Association had decided to make Port Cooper, which they now named Lyttelton, the capital of the settlement. On arrival, however, the idea was quickly abandoned, owing, mainly, to the hilly nature of the country, and while some expressed doubt as to the wisdom of the move, the vast majority were in favour of the development of Christchurch as the leading town. From Lyttelton round the beach road, through Sumner, the first settlers came, and upon the broad flat stretch of plains country the new settlement was founded.

The circumstances which influenced Captain Thomas, and, through him, the Association, to choose the Canterbury block were the absence of hostile Maoris and the large amount of open country which was available immediately for grazing and agriculture. This vast stretch of practically useless country must, indeed, have afforded a striking contrast to the densely wooded districts of Nelson and Taranaki. That the first settlers found a considerable area of country in bush, however, is well known. The first recorded estimate of the amount of bush in the Province was in 1830, and the area 300,000 acres. Torlesse later submitted a report to J. R. Godley, then Agent of

the Canterbury Association, which afterwards was published in the "Lyttelton Times" of 1851, Torlesse dealt chiefly, in a general way, with the formation of the plains, but noted that Banks Peninsula was mainly all heavily timbered, and only a small area was available for immediate settlement.

The composition of the original bush in the Province was determined very largely by the geological formation of the country. The low hills of South Canterbury, with their covering of wind-blown glacial silt or loess, of great fertility, supported a luxuriant stand of dense mixed bush. Banks Peninsula quickly acquired a reputation for having a soil of exceptional productivity. Torlesse remarks upon the wonderful crops of fruit that the early French settlers grew in the small clearings. The bush, which covered a large part of the Peninsula, was a very fine stand of *Taxaxis* and Beech. The poorer shingle hills of North Canterbury were mostly Manuka scrub, while the whole of the Eastern face of the Southern Alps was clothed with a thick stand of *N. cliffortioides*, *N. Solandri*, *N. Menziesii*, and a little *N. fusca*. In some cases this reached out on to the plains, a large patch being found at Oxford. The Plains were covered in the greater part with Manuka, Tauwhinu, tumaturu, fern, a few cabbage trees, flax, Toi-toi and tussock.

It was not until some years after the colony had become firmly established that a detailed and accurate survey of the bush areas was made. The task was entrusted to the Chief Surveyor, Davie, who had succeeded Thomas Cass after years of service as a surveyor within the Province. Davie, in addition to being a capable and experienced surveyor, was also a keen botanist, and his observations upon the composition of the bush are no doubt the most accurate that are upon record. His report, a short pithy document submitted to the Provincial Government in 1869, is, therefore, worthy of some attention. The extent of bush within the Province, according to the report, was, at that time, 270,000 acres, of which some 46,757 acres had become the freehold property of the settlers. Banks Peninsula had 64,000 acres of very heavy Taxad bush, arising in many places almost directly from the water's edge and stretching over the hills toward the plains. The value of the best portions was £12 per acre. Torlesse, in his brief reference to the bush, comments on the very fine specimens of Kahikatea, Matai, and Totara to be found on the Peninsula; the "Black Birch" (no doubt *N. Solandri*), he notes, was often unsound, containing a large percentage of rot. Due west of Christchurch was found the Oxford Bush of 56,000 acres, comprised of *N. Solandri*, *N. Menziesii*, *N. fusca* with a sprinkling of Rimu and Kahikatea. Davie estimated the value of the best of the

bush as £10 per acre. In South Canterbury the Raukapuka Bush (Geraldine), of 928 acres, was all either freehold or reserved. The timber was Matai, Totara, Kahikatea and Manuka, valued at £12 per acre. The Waihi Bush was 2052 acres in extent, but 1372 acres was held as freehold; the timber was Totara, Matai, Manuka, and a sprinkling of Beech. The best of the bush was the freehold portion, which was valued at £6 per acre, and the remainder at £2 per acre. Peel Forest was a Taxad stand of some 1460 acres, of which 860 acres was freehold, valued at £7 per acre. Waimate had much of the best timber in the district with some wonderfully fine specimens of Totara and Matai, as well as Kahikatea and Beech. Three thousand seven hundred acres in extent, the greater part of the site of the now flourishing town of Waimate, was thick bush, in which some of the largest Totara in the Dominion were to be found; several noble specimens of this tree are still preserved in the district. As in the case of the other bush areas the best portion, 2663 acres, had become freehold property, and was valued at £10 per acre, the remainder being worth £2 per acre.

Of the 10,000 acres comprising the Alford Bush, Davie considered 4000 to be inaccessible; the bush was Beech, with small amount of Kahikatea and Matai. Small scattered patches of Taxad and Beech bush were to be found in the moist gully bottoms and in the valleys to the seaward side of the hills; these scattered patches totalled 12,795 acres. The remaining bush in the Province was the forest which covered the eastern face of the Southern Alps, from their foot up to timber line, some 4000 feet above sea level. Beech, mostly *N. Cliffortioides*, made up the stand, the area of which Davie reported at 128,000 acres. It is probable, however, that Davie's figure for this area was rather conservative.

Davie's report shows, by comparison with the previous figure, that by 1869 some 30,000 acres of the bush had disappeared. The utilisation of the Canterbury bush was a great deal closer than in other parts of the Dominion. Torlesse, writing before settlement had really commenced, did not anticipate the rapid development of the young colony, and expressed the opinion that the lack of timber was, to the settlers on the plains, more an advantage than a large amount of bush would have been, and that Banks Peninsula would supply all the needs in time.

The settlers early realised the value of their timber resources; the falling and burning of the bush to clear land for agriculture and grazing, so common a practice in other parts of the Dominion, was practically unknown in Canterbury. The large amount of open country already existing was ample for the needs of the settlers, and it was thought that the small amount of bush would not go

far in supplying the needs of the community. This was indeed the case. So rapid was the development up to the early eighties, mainly due to the energetic policy of Sir Julius Vogel, that the settlers, particularly on the plains, felt a very decided shortage of timber. Houses made of sods and cob became quite a feature of the early life, contrasting strikingly with the slab whare of the other Provinces.

In 1858, of the total number of occupied dwellings throughout Canterbury, 23 per cent. were of sods or cob; in addition to these some canvas dwellings were also erected; in 1861 the percentage was 22; 1871 showed a decrease to 17 per cent., and as timber from Southland and the West Coast became more plentiful, the wooden and brick building completely superseded the earlier type.

The first of the whites to utilise the bush were the whalers, who dipped anchor in the bays of Banks Peninsula and cut spars (probably of Kahikatea) for their ships.

The early settlers on the Peninsula also soon found employment in the bush. From 1840 one of their chief occupations was the splitting of shingles and firewood. Buildings which were erected at Lyttelton before 1850 were made of timber from the Peninsula.

For the first few months of settlement there was no restriction upon the cutting of timber upon land owned by the Association. As soon as conditions became, to some extent, established, this state of affairs was terminated. Public notices appearing in the "Lyttelton Times" of March, 1851, warned the settlers that the temporary relaxation of the law in their favour having ceased to exist, they would be required to obtain a license to cut timber from the Lands Office.

The conditions upon which the first timber cutting licenses were issued are as follows:—

Persons occupying waste land of the Crown for the purpose of cutting timber will be required to pay a fee of £5 yearly to the Crown on the issue of the license.

The Commissioner of Crown Lands will determine the extent of the land to which such license shall give occupancy, and the licenses are only to have effect within the district specified.

No fresh applicant for a license will be permitted to interfere with a portion of the forest upon which another person may have expended capital and labour.

In the event of any occupant of a portion of the forest upon which he may have expended any considerable sum of money in the formation of roads or improvements to facilitate the removal of timber wishing to resign his license, he will, if in the consideration of the Commissioner he should be regarded as having established a claim to his indulgence, be permitted to transfer his license and right

of pre-occupancy to such person as he may select.

No person will be allowed to cut or reserve timber on or off Crown Lands which have been reserved by the Government for public use.

In addition to the foregoing clauses there were two others dealing with the payment of fees, and the manner of submitting the application for a license. With the issue of these licenses the utilisation proper of the bush may be said to have commenced.

The millable timber, as has been seen, was in three distinct and widely separated districts, so that each of these became the centre of a milling industry. In the Oxford district, upon Banks Peninsula and in South Canterbury, the industry developed, solving the difficulties peculiar to each district.

Transport of produce, and particularly of timber, was both a difficult and extremely costly business. Although railway and road construction was pushed ahead with great rapidity, particularly in the neighbourhood of Christchurch and in North Canterbury, it is not surprising that much of the products of the bush found a ready market close at hand.

In South Canterbury many of the flourishing towns now to be seen first owed their existence to the bush operations which were being carried on close by. Waimate, Geraldine, Rangitata and Woodbury are perhaps the chief among these. The rapid growth of South Canterbury between 1861 and 1864 was due to the Otago Goldfields, which were then being exploited, and from which there was a very considerable amount of migration to South Canterbury. The tremendous advance between 1874 and 1878 was due to the energetic immigration policy of the then Government, the population of the district doubling itself during this period. The new-comers to the district needed housing accommodation, and the bush was called upon to supply that want. So rapid was the growth of this district in common with the rest of the Province that not all of the settlers were able to secure wooden dwellings. The number of dwellings closely followed the growth of population, the proportion being approximately 5.4 persons to a wooden dwelling during the early years up to 1874, and a slight reduction then on. Buildings of other materials, mostly of sods, cob and clay, played a very large part in housing the growing population. In 1871 31 per cent. of the houses were sod or clay. In 1874 they represented 28 per cent., and by 1878 they had been further reduced to 17 per cent. By comparison with the figures previously given for the whole Province it will be seen that the cob house lasted longer in this district than elsewhere, mainly because this class of house was more easily built on the Downs country than upon the shingle plains of the North, and also, for many years the district had to rely strictly on their

own local production of timber, railway and road transport being too lengthy and too costly a business. The Provincial Government also encouraged this class of dwelling by granting to immigrants £10 towards the erection of a slab or sod cottage. By far the greater proportion of the cottages were of sods, a settlement springing up south of Orari acquiring the name of Sod Town through the large number of these cottages which were erected.

Bush operations proceeded in the district as rapidly as possible, endeavouring to meet the growing demand for timber. So early as 1854 an advertisement appeared in the "Lyttelton Times" for two sawyers to cut 50,000 feet of timber near Timaru, and in 1857 another appeared requiring 35,000 feet. The bush, therefore, soon became a fruitful source of employment to many a rough but genial bushman. A return giving a list of the occupations of the people, dated 1861, shows that sawyers and bushmen ranked fifteenth on the list—in fact, the bush provided the only industry other than pastoral\* of any size. At Waimate the bush industry first commenced in the late fifties, the needs of the bushmen requiring a store to be erected in 1863. The store was kept by one Saul Shreeves. Saul could neither read nor write, so evolved a novel form of book-keeping. Crosses of various kinds were put down to represent his customers, and against these sketches were made to represent singlet, shirts, boots, or whatever article was bought. The method, while distinctly original, was evidently quite a success.

Extensive fires swept through the bush in 1865 and again in 1866, but by far the most destructive fire occurred in 1878, and is still distinctly remembered by many of the old residents in the district. Commencing on 18th November, 1878, and fanned into a fury by a strong north-westerly gale, the fire raged without check until the 23rd of the month, during which time three mills, and at least twenty-seven houses, were burned, and many thousands of pounds' worth of damage was done. This fire virtually spelt the beginning of the end for the Waimate bush. The timber in this district was soon in the hands of the freehold owners, and in 1874 there was considerable agitation against the price of the timber. The price rose rapidly, reaching 20/- to 25/- per hundred. The fire of four years later was practically the end of the bush industry in the district. In the Geraldine district bush workings commenced in Pleasant Valley, where the first store was opened. However, Geraldine itself rapidly grew in importance as a milling centre, and with the general

introduction of hand-sawing into the bush in 1864, progress was both marked and rapid. Two years later a steam sawmill was erected, and a further impetus was given to the industry, which proceeded steadily until the exhaustion of the bush.

The Rangitata settlers first found employment at Peel Forest, which became the centre of a thriving milling industry; but by 1908 the industry had practically ceased through lack of timber. At this time the Government, by exchange, acquired 520 acres of bush which remains as scenic reserve.

Operations in the Waihi bush gave rise to the town of Woodbury. Starting somewhat later than in other districts when milling first commenced here in 1866, the progress of the district was rapid. By 1874 two mills were in full swing. Progress continued until 1877, when on July 28th a disastrous fire broke out in the bush, which burnt unceasingly for a week, destroying much of the timber, the sawmills and a house. As in the case of Waimate this was practically the end of the bush operations.

The milling of the Banks Peninsula bush was largely connected with the development of the city of Christchurch, in the building of which most of the timber was used.

The foresight of the leaders of the Canterbury Association is well evidenced by the fact that before they arrived arrangements had been made for deliveries of Tasmanian and New Zealand timber to be made at Lyttelton. Arriving in mid-summer, the settlers obtained a false idea of the Canterbury climate. Many strange houses were put up made of clay and raupo, and even blanket tents made their appearance. There were very few houses with a weatherproof roof when the first real storm broke over the settlement. The effect of this was disastrous to the temporary buildings, and quickly dispelled any false impressions as to the nature of the climate. The demand for timber became at once very intense, and even in the first year of settlement sawn timber was sold at 25/- a hundred in the city. There was some hope that bricks would be plentiful and cheap, especially as there was a considerable number of brickmakers among the settlers. This hope, however, was not realised.

Before dealing with Banks Peninsula there were three small patches of bush in the vicinity of Christchurch, which played no small part in the life of the early settlers; these were at Riccarton and Papanui. A portion of the Riccarton bush was reserved for public use, and from it the settlers carted their firewood. Another portion of the bush was milled, and a further small portion was reserved by its owner, and still remains as a public reserve. The bush, which was mostly Kahikatea, was surveyed in 1849, and then contained 50 acres.

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\* Occupations ranking before sawyers and bushmen were labourers, domestic servants, stock owners and shepherds.

Papanui Wood, as it was called, contained some 200 acres, and was sold in small lots. When the supply of wood from Riccarton gave out, a road was made to Papanui, a cart bridge being put across the Avon river at the old market place, and this road afterwards became the commencement of the main north road. Bullock drays brought the wood into the city, but the transport was costly. In 1852 firewood stacked in the bush cost 7/- a cord, but by the time it reached the city the price had increased to from 21/- to 24/- per cord. The Papanui bush was soon exhausted, and an event which was considered of great importance in those days was the making of a coal fire in the Lands Office with coal from the Selwyn river bed. The coal was evidently not plentiful, as the settlers still had to rely upon wood for their firing, and this was brought from Banks Peninsula, or even from Oxford.

The densely-wooded inlets of Banks Peninsula had attracted the French in 1840; they had formed, together with some English settlers, the town of Akaroa, and from there the colonists had spread to the various bays, in each of which a small community formed. The size of these small settlements was increased by the large number of runaway sailors, who, tiring of chasing elusive whales, had deserted and settled in the bush. There they lived a lonely life, many being engaged in bush work. Le Bon's Bay was settled rather later than the other bays. Pit sawing was first resorted to, but in 1857 a sawmill was started which cut mostly Matai and Kahikatea. The early settlers had found a large number of Totara stumps, showing that the Maori had also carried on bush operations. The mill changed ownership several times, and a long length of tram and a jetty were installed in 1865. This transport scheme was a failure, not a single load of timber ever leaving the jetty. A second mill was started about 1866, and worked steadily until the exhaustion of the bush. So dense was the bush in this district that in the early days a trip to Akaroa was considered quite an expedition.

In Okain's Bay pit sawing was carried on by the early settlers and runaway sailors. As clearings were made dairying was introduced. A large sawmill was started in 1875, with a weekly capacity of 7000 feet. This mill, which was the largest ever erected on the Peninsula, employed many men, and kept three small vessels running continuously from the jetty to Lyttelton. The bush was very soon cleared out, and the mill shut down in 1879.

Even before 1850 Little Akaloa was the home of some 17 or 18 pit sawyers, mostly ex-whalers. The bush was very dense; to penetrate a mile and get back again was a strenuous business. A sawmill started about 1860, and found work for many men who afterwards settled in the district. In common with the

other Bays, the settlement suffered from bush fires, one in 1868 doing very extensive damage and destroying much of the bush.

The original French expedition numbered 63, of which six were Germans. The Germans left the main body soon after the arrival of the expedition and settled in German Bay, now called Takamatua. Here they engaged in pit sawing, and worked steadily until the bush was cleared. A large number of English arrived in the Bay later, and took up the cleared land for dairying and agriculture.

In Robinson's Bay bush work commenced in the usual way with pit sawing, but in the early fifties a small sawmill was put up, which was driven by water power. A second mill was erected shortly afterwards, but neither of these mills cut much timber. In 1865 one of them changed ownership, and was greatly enlarged, a jetty and tramway were added, and nearly all the settlers found employment in the mill. In a short time no less than 1,000,000 feet of timber was produced yearly. The bush was worked until its exhaustion in the eighties.

In 1859 the first sawmill was erected in Duvauchelles Bay. A very bad start was made; engineering difficulties were encountered, and the first two shipments of timber were lost; but under new management the milling progressed rapidly. Cutting nearly all Totara, by the time the bush was exhausted, in about 1880, it was estimated that 20,000,000 feet of timber had been produced.

Pigeon Bay received its name from the large number of those birds which lived in the thick bush. The Maori name was Warakoa. A small number of English landed in the bay in 1840, and some French settlers joined them. Pit sawing, splitting shingles and cutting firewood found employment for the early settlers. Some of the timber which was used to build the barracks at Lyttelton before the first four ships of the Canterbury Association arrived was obtained from Pigeon Bay.

The district known as "Head of the Bay," near Akaroa, was the centre of a ship-building industry which started in the early days of settlement. Torlesse, writing before 1850, comments on the industry, stating that the Black Birch (no doubt *N. Solandri*), while having rather a large amount of defects, was found to be the most suitable for the building of ships. A sawmill started in 1857, and changed ownership and locality several times, giving employment to nearly all the old settlers. Practically all the ships which were used to carry the timber were made locally at one time, as many as 30 men being employed in boat-building. The milling gradually ceased through lack of material, and with it the ship-building industry died out.

At Little River the first milling was started about 1860, the transport of the engine from Christchurch by bullock wagon present-

ing some difficulties. The process of getting the timber from the mill was a laborious one. A tramway was made to Lake Forsyth, and the timber taken over the lake to Birdling's Flat. Placed on another tram at the Flat it was transported to Lake Ellesmere, over which it was taken to Hart's Creek, Leeston, and from there into Christchurch. The immense amount of handling involved made the timber expensive, and only the high prices for timber ruling at the time made the venture profitable. This mill gave employment to many men, who, as elsewhere, settled down in the district.

Milling started in Gough's Bay very much later than elsewhere. Totara, Matai and Kahikatea was the chief timber cut.

The whole of the Peninsula bush suffered very severely from fire. The spring of 1859 was one of the driest that had been experienced, heavy N.W. winds were prevalent, and fires raged through the bush. In German Bay three or four families were burnt out, and the utter destitution of many of the pit sawyers in the bays was a distressing feature, many houses, as well as sawmills, being destroyed. Nearer Christchurch the Hoon Hay bush was burnt, firewood, sawn timber and much property being lost. Davie reports that in 1862-3 another serious fire swept through the bush, wholly or partially destroying 20,000 acres of standing timber. Very small scattered patches of native bush are left now upon the Peninsula, and with the many charred and blackened stumps are all that remains of one of the very finest stands of timber in the Dominion.

It is interesting to note that many of the old settlers remark upon the change in climate since the bush has disappeared. The moister atmosphere, with slight cool air currents, has given place to a drier, hotter and more parching climate.

The objection of some of the first settlers to the making of Christchurch into the chief city was that it was too far from the coast, and transport of goods would be costly. This, of course, was true; the problem of getting the timber from Banks Peninsula to Christchurch was a difficult one. The near-by timber, from the Hoon Hay Bush and other small patches close at hand, was hauled directly into the city. In the first days of settlement the Avon and Heathcote Rivers were evidently considerably deeper, and were navigable for light draft vessels.

Three wharfs were established on the Heathcote River, the best-known of which was the "Steam Wharf," which was erected where the tanks in the Ferry Road, owned by the Tramway Board, now stand. To this wharf much timber was brought in scows, and later in light draft paddle steamers. The landing on the Avon River was called the "Bricks," and to this also timber was brought and unloaded. The energy of the early settlers is

clearly shown by the manner in which they set about solving their transport problem. When the first sod was turned in the making of the Lyttelton tunnel on 17th June, 1861, sceptics were not wanting who mournfully prophesied disaster. The story of the making of the tunnel is one of a long and ultimately successful fight against enormous difficulties, but when the first train ran through the completed tunnel in 1867, Canterbury had solved to a great extent her most difficult transport problem. The bringing of the timber into Lyttelton and the railing of it direct into Christchurch then became the most frequent route of transport.

From the hills surrounding Lyttelton the early arrivals in Canterbury were able to view North Canterbury, with its small but extremely valuable patches of bush. It was not long after the first four ships arrived that migration to the North commenced, and in many cases the prospect of profitable occupation in the bush was the attraction.

The areas of bush between the Waimakariri (or Courteney, as it was first called) and the Ashley Rivers, were the Maori Bush, the Church Bush and the Rangiora Bush. The areas of these are not definitely known; the records that exist are few, and do not furnish data upon which reliance can be placed, but it is safe to say that the total area of the bush in the Kaiapoi-Rangiora region did not exceed 1500 acres.

Early housing accommodation was as big a problem in the North as elsewhere, especially as the geological formation of shallow soil overlying shingle beds did not lend itself readily to the making of sod and cob houses.

Kaipoi was the first township to develop. To satisfy the needs of the nearby settlers the Maori and Church Bush were used. The bush was bought from the Maoris, the commencing price of £28 per acre rising rapidly to £70 and £80 as timber became more valuable; but Government interference put an end to this practice. The bush was a stand of enormous Kahikatea and Matai. The high price of timber, 20/- to 25/- per hundred, which was ruling about 1855, led to a large increase in the number of bush workers. Pit sawing was the common method employed. The timber which was not sold locally was sent to Christchurch, the journey being a very long and expensive one. Bullock drays, urged on by exacting whips and much picturesque language, took the timber from the south bank of the Waimakariri into Christchurch; the road was not of the rocky kind—mud, swamps, and bog-holes were its chief characteristics. However, the report that one notorious bog hole swallowed up a bullock team, the dray and the driver is not substantiated. To get the timber across the Waimakariri it was rafted down the Cam River, which ran alongside the bush, down the

Waimakariri, and landed near Harris Island. As times improved punts were used. Kaiapoi first developed as a seaport, and it is highly probable that an amount of timber was shipped directly into Lyttelton. The railway from Christchurch was soon in the course of construction, 1872 seeing its completion, and with this event the coastal shipping from Kaiapoi rapidly diminished. Fires were all too common in the bush, destroying much of the timber, and by 1880 the Maori and Church Bush had disappeared. The bushmen played no small part in the life of the early settlement, appearing mostly at week-ends, and clad often in blue jerseys and white pants they were welcome visitors to the town. One particular character who gained fame was Yankee Sam. Sam, after spending most of his time in the hotels, used to go back to work, but there discovered that he soon developed a thirst that was far beyond his wildest dreams. Trips from his work to the whare to alleviate it became far too frequent, so meeting a Maori, he strapped a square case of gin on his back with flax, and gave a modern version of "Mary and her Lamb," the Maori consenting, for the sum of five shillings a day, to play the role of the lamb indefinitely.

The Oxford Bush which Davie mentioned in his report was the main source of timber in North Canterbury. Known also as the "Harewood Forest," the early run-holders and settlers around Christchurch soon grasped the importance of this forest asset. It is not surprising, therefore, to find that the run-holders eagerly took up any section having standing bush upon it, and that competition for these sections was very keen. The timber was very good, Kahikatea, Matai, Rimu and Nothofagus spp.; the three former species were of exceptionally fine quality.

Milling first commenced in 1860 between East Oxford and Sladden's Hill. The flats of this district were covered with a fine stand of Kahikatea, and the demand for this and other timber was such that its price was soon in the vicinity of 20/- a hundred. The first mill was moved, by bullock wagon, from Rangiora. This move soon encouraged others, and the milling industry commenced to expand very steadily. This first mill moved westward, and was followed by others on the "Mill Road," upon "Bay Road," just at the foot of the hill, and about 1865 a further mill was erected on Gammon's Flat, at West Oxford. Here was the scene of the greatest activity, especially while timber prices remained high. Beech was fetching approximately the same price as the other timbers, and this was the most abundant of the available timbers. In the early 70's milling extended further westwards to Cooper's Creek, and then to View Hill. The early '80's marked the decline of the industry, the best of the bush had been used by 1890, and prices of pro-

duce fell as low as 8/- a hundred for Rimu, Kahikatea and Matai, and 5/- a hundred for Beech. The many workers whom the mills had attracted mainly left the district and moved to the West Coast, which was then developing as the great timber region. In addition to sawn products, the splitting of firewood, posts, rails, stakes and sleepers for the railway, utilised much timber. In the early days posts and rails were fetching about 20/9 per hundred, stakes 10/- a hundred, and sleepers about 7/- a-piece. Transport, as elsewhere, was the greatest difficulty. The moving of heavy machinery was extremely tedious, and much of the early work was done by pit sawing.

A quantity of the bush products were used locally by the settlers, and in the township of Rangiora and Kaiapoi. However, the city of Christchurch was the main market, and the 40-mile haul into the city was, in the early days, no light task; indeed, the time and labour employed ate up a large proportion of the profits which the relatively high prices afforded. Bullock drays were first commissioned, but a disturbing factor was introduced when one well-known carter from East Oxford lost practically his whole team from eating Tutu (*Coriaria* spp.), which was apparently abundant in parts. After this incident horses were popular, and as a large punt was put across the Waimakariri at Dagnun, the cost of transportation became more reasonable. The completion of the railway line to Oxford in the seventies greatly eased the transport difficulty. Fire, the great enemy of the Canterbury bush, was soon at work in the Oxford Bush. A great fire started in the later '70's, causing destruction to the standing timber, and driving away the native birds (mostly parakeets and Kakas), which were previously very abundant. Another fire occurred in 1880, and the third and largest, in 1898, which started at the foot of Mount Oxford, and reached the Ashley Gorge, destroying in its path over 20 residences, and causing much suffering. This fire marked the passing of the bush. In recent years a few small mills have been at work, but mostly they are connected with clearing land; such millable trees as are met with are utilised by the mill, but operations are directed, in the main, to clearing, and not to milling.

The Beech Bush, mentioned by Davie as covering the Eastern face of the Southern Alps, still remains almost in its entirety. The misguided efforts of some of the settlers have led them to fall and burn patches of bush on the steep hillsides, the final effect of this being that the eroding power of the rain and melting snow is given full license, and bare, shingly slopes, devoid almost of all vegetation, result. Fortunately this is not a very extensive practice with the back-country settlers, most of whom realise that the bush must be maintained purely as a protection forest regulating and control-

ling the many little torrents which arise in the mountain ranges. It has been seen how the millable native bush of Canterbury has all disappeared, until only small patches of reserve now remain at the old milling centres and at Riccarton.

Throughout this account the difficult housing problem confronting the early settlers has been strongly stressed. Practically the whole of the sawn timber that the native bush produced was used for building purposes. Other wood-using industries are of comparatively recent origin, their birth being a consequence of the depression of the late seventies and the eighties. In these industries, until very recent times, the most widely-used timber was Kauri, which, of course, Canterbury's native bush could not supply. Other forms of utilisation were firewood, the amount of which was enormous, but quite impossible to estimate; sleepers, which were used in railway construction and fence posts. The adequate supply of the latter was always a difficulty. In 1854, of the 4,000,000 acres then comprising Canterbury, only 7000 acres were fenced, and the acute shortage of fencing material is reflected in the many Cattle Trespass Bills passed from time to time by the Provincial Government. The introduction of gorse fences later helped, to some extent, to solve this pressing problem.

From the first days of settlement timber was brought into Lyttelton from the North Island, Tasmania, and England. Kauri was the chief New Zealand wood imported for a long time, and much of this was used in building the city of Christchurch. Shingles, palings and Australian Cedar came from Tasmania, while Oak and Baltic Pine were imported from Europe. The foreign imports were subject to a tariff which was passed by the Legislative Council on 3rd July, 1851. Under it came the following items:—

Wooden boards, planks and	
scantling . . . . .	1/- per 100 ft.
Cedar . . . . .	2/- per 100 ft.
Shingles and laths . . . . .	1/- per 1000
Palings . . . . .	10/- per 1000

How far the imposition of this duty affected the utilisation of the bush it is difficult to judge; probably the effect was not at all great.

There is no doubt, however, that the efficient utilisation of the bush was adversely affected by the loose manner in which the timber-cutting licenses were issued. There was no provision for any control of the licensee, who could go into any part of the district to which his license referred and cut and destroy timber without check. It is true that the licenses only applied to waste lands, but these waste lands comprised a very great deal of the bush. Davie, in his report commenting on the license, said that in his opinion the bush licenses were not advisable, and that that was the unanimous opinion of all concerned in the

administration of waste lands. The holders of the licenses had no permanent interest in their work, and often destroyed as much valuable timber as they brought to the market. The revenue from the issue of the licenses was insignificant.

The fires which occurred in the bush were the result of ignorance or from the absolute disregard of the possible or even probable consequences of burning long grass and scrub on adjoining land that was needed for agriculture. The scattering of the brush and tops in the bush during logging operations, coupled with the carelessness of the bush workers in leaving fires, was a fruitful cause of destruction.

The early settlers, realising the importance of the bush, transplanted seedlings from the bush to their gardens in an effort to perpetuate the chief timber trees. In practically every case no success was met with. It is, indeed, tragic to note how very little we have advanced, since those days, towards dealing with what is, after all, our main forestry problem—the regeneration of the native bush—and by the solution or otherwise of which the reputation of our trained foresters, both present and future, must stand or fall. The settlers, finding their efforts to perpetuate the bush a failure, reluctantly turned to exotic species, and it redounds greatly to their credit that long before the native bush was exhausted, the plains were dotted with flourishing plantations, mostly of Eucalypts and Pines, which were to help form, together with the native bush from the West Coast, Canterbury's future timber supply.

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In that portion dealing with South Canterbury, much data was obtained from Johannes Andersen's very valuable book, "A Jubilee History of South Canterbury" and Jacobson's "Tales of Banks Peninsula," supported by much other information concerning that region.

## AFFORESTATION BY THE DUNEDIN CITY COUNCIL

(W. S. Tannock.)

**Introduction.**—So far the chief reason for most of the tree planting operations carried out by the Dunedin City Council is the conservation of the water on the catchment areas. So I will first mention a few of the reasons for planting trees on Water Reserves.