SAWMILL TRAMWAY.

THE TIMBER INDUSTRY.

By A. O. GREEN.

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FOREST PRODUCTS.

Among many other natural resources, Tasmania possesses large forests of valuable timbers. It is a land of forests, extending in many places to the water's edge, and producing more than 50 varieties of timber trees, from which woods suitable for almost any purpose may be obtained. There is no lighter Pine than the Tasmanian King William, and none more durable than the Huon Pine. Tasmanian Horizontal is almost the toughest wood in the world; while the Native Ironwood resembles *Lignum Vitæ* in weight and hardness, and is used for pulley-wheels and plummer-blocks. The Tasmanian Beech (locally known as Myrtle) is as strong as English Ash, and in character resembles the hardest and heaviest English Beech. The Native Box and Whitewood are suitable for engraving blocks and fine turnery, and there are more than a dozen species of Tasmanian trees adapted for ornamental and decorative purposes. One of the most beautiful ornamental timbers, the Blackwood (*Acacia melanoxylon*)—often used in the outlying districts for making post and rail fences—has for many years past been extensively used in Melbourne for the manufacture of billiard-tables, and within the last few years by well-known London firms for pianos. Some of it is called locally "fiddle-back," from the resemblance of its grain to that of the back of a fiddle. It is of a rich reddish brown to an almost black colour, banded with golden-brown. The Huon Pine, from which large panels up to three feet in width can be cut, the grain of which is curiously curled and spotted, like the "bird's-eye" Maple, is of a light yellow colour, turning browner with age. Some Red Myrtle trees also produce

good figured-timber. The Myrtle is also subject to a growth which produces large bosses on the trunk two or three feet across and a foot thick, which are prized for veneers and ornamental work. The boles of the Musk, the wood of which is of a yellowish brown colour, and takes a very high finish, have a great reputation for furniture-wood. There are also a number of the smaller trees, from which pretty wood can be obtained for inlaying and the smaller kinds of ornamental work. These are all used locally, and are highly esteemed, but are not to be found in such quantities as to form the basis of a trade by themselves. Tasmania has a great wealth of ornamental wood besides these, which is at present almost entirely neglected. The various Gum trees grow with a straight, clean barrel to an immense height, and above six to ten feet from the ground the trunks have a very small amount of taper, but from two feet below the ground to this height there are curving buttresses springing from the roots which all unite to form the trunk of the tree. This part of the wood is so hard to chop that trees are never felled less than three feet from the ground, and often scaffolds are erected to enable the woodman to cut the tree through at a point from six to twelve feet above the ground. These stumps are left as they stand, and often contain the most beautiful wood, from a yellow to a bistre brown colour, crinkled and waved and barred, the grain of which, when polished, has a singularly bright appearance. Very occasionally such stumps of trees are got up, and are reduced to panels for wardrobes and drawer-fronts, but as a rule they are entirely neglected, and left to decay where they grew. This ornamental wood, if systematically put upon the market, would be valuable, as it can be supplied in quantity, and natural curves very suitable for furniture-making can be got.

In Tasmania the forest lands may be classed as "bush" and "forest." In the Tasmanian "bush" the timber trees are comparatively small, and the undergrowth appears either in patches or, if continuous, is so stunted that little

difficulty is experienced in walking through it. In the forests the reverse is the case. The soil may be of the richest or poorest description, but, thanks to the humid atmosphere, due to the proximity of the sea in every direction, and the fact that the mountain peaks of Tasmania draw down the rain-clouds sweeping up from the Southern Ocean, the prodigality of growth is equalled only in tropical regions. In many cases not a foot of soil can be seen, so dense is this wealth of foliage. The ground is covered with cat-head fern (*Aspidium aculeatum*) from one to two feet in height, or with "lady" fern (*Pteris incisa*) rising to three or four feet. Above these rise the "tree" ferns (*Dicksonia antarctica* and *Alsophila australis*), growing from four to eighteen feet in height. Above these rise the smaller trees locally termed "scrub," though their height ranges from ten to forty feet or more, their diameter being from three to twelve inches—the Musk (*Olearia argophylla*), Dogwood (*Pomaderris apetala*), Wooden Pear (*Hakea acicularis*), Sassafras (*Atherosperma moschata*), and several minor species, some of them flowering shrubs. Above all this wealth of foliage rise the timber trees, straight in grain, because they have to struggle upwards to the sunlight (which rarely falls on the lower growth of ferns), and branchless until they have far overtopped the scrub below them. These forest giants are confined to the *Eucalypti*, or "Hardwoods," of Tasmania, the Myrtle, though it attains a large girth, not being so lofty.

The principal agricultural districts in this State have been "carved" out of the primeval forest. To the agricultural settler the timber, so valuable elsewhere, is (except such as he requires for buildings, fences, &c.), the bane of his existence, and his whole energy is devoted to destroying it with axe and fire. Fortunately for the timber, the inhabitants have so far been too few to appreciably diminish the immense extent of forest with which the Island is covered. Tasmania has until of recent years been far from a market, but the knitting together of the countries of the world by

improved steam communication, and the increased scarcity of timber in the older countries, make it apparent that there is an opening for the profitable employment of capital and energy in rendering marketable the various vegetable products of this State. There is a steady trade with the other Australian States and New Zealand, and timber is also sent to South Africa, to England, and the Continent of Europe. Tasmanian Eucalyptus oil is sent all over the world, but as yet the trade is very small compared with what it might be, and several industries are quite untouched. Pyroligneous acid and potash might be made, also wood-pulp, besides which the distillation of essential oils could be largely increased. One common tree, the Native Box (*Bursaria spinosa*), of the order *Pittosporiæ*, is impregnated with a very fragrant resin, while the Oyster Bay Pine (*Frenela rhomboidea*) exhudes gum sandarach, and the grass-tree (*Xanthorrœa*), a red resin which is used as dragon's-blood for staining and for making varnish. The Tea-trees (*Melaleuca* and *Leptospermum*) and other trees have very fragrant leaves, and contain both essential oils and tannin. Many of the smaller trees, producing excellent timber for a variety of purposes, are neglected and wasted because they are so dwarfed by the giant Eucalypti as to be considered not worth the cutting. Truly the Eucalypti are noble trees, growing in serried ranks, with a smooth, clean trunk, sixty, seventy, eighty feet and more (sometimes over two hundred), without a limb, and from four to twelve feet in diameter. The wood is hard, strong, and tough; some very free, making excellent shingles and palings; some with the grain interlocked. They contain a resin which is used medicinally, and is called "kino." The leaves give Eucalyptus oil, and the flowers are full of honey. The bark contains fibre suitable for paper, also tannin. The wood is rich in pyroligneous acid, and the twigs and leaves in potash and valuable essential oils. The seeds also are marketable abroad. At present trees are cut down for the seeds alone, or for oil or for timber; but it seems certain

that, when the industries of sawing, pulping, and distilling are combined, as well as the utilisation of the small trees that abound among the larger ones, the expenses of each industry will be considerably reduced, the forests will become a large source of revenue, and the old ground be better re-afforested for coming generations than under the present system.

Tasmania, with its temperate climate, reliable rainfall, and land-locked harbours, affords special facilities for the growth and export of timber. Deep arms of the sea run inland, reducing land-carriage to a minimum; and from sheltered inlets the ground rises to a central plateau, where lakes conserve water to feed rapidly-falling streams, which provide ideal sources of motive-power. It is the policy of the Government to encourage legitimate enterprise, and the terms for leases of timbered lands and water-rights are almost nominal, as may be seen by the following extracts:—

SAWMILL AREAS.

A lease may be obtained on application to the Commissioner of Crown Lands, for a period not exceeding twenty-one years, of an area not exceeding five thousand acres, at an annual rental of one pound for every hundred acres per annum, in advance; and the payment of a royalty of—

6*d.* per 1000 superficial feet of Eucalyptus timber, cut in the log.

5*s.* „ „ „ „ of other than Eucalyptus timber, cut in the log.

If a survey is necessary to define the lease, fees have to be paid by the applicant for the lease, at varying rates from five pounds for a fifty-acre block to fifty pounds for a five-thousand acre block, and approved machinery and plant must be put up of a nominal power varying from eight horse-power for a two-hundred-acre block to twenty-five horse-power for a five-thousand-acre block. The lessee must also use due diligence and despatch in removing the

timber from his lease, and employ an adequate number of men.

Detailed information may be obtained on application to the Agent-General in London, or to the Commissioner of Crown Lands, Hobart, Tasmania.

WATER.

The general rate for the use of water is one pound per annum for a flow of twenty-four cubic feet per minute, which is known as a "mining sluice-head."

SHIPPING TIMBER AT HOBART FOR DOVER (Eng.) BREAKWATER.
Average Length 100 feet.

TASMANIAN TIMBER.

MYRTACEAE.

GUM TREES *(Eucalypti).*

Eucalyptus means well-covered, because the flower-bud is covered with a lid, which is forced off when the flower expands.

Of all Tasmanian trees Gum trees are the most remarkable, from the immense size to which they attain, their very general distribution over the Island, and the wide range of uses to which their products may be put. The trunks of these trees are straight and cylindrical for a hundred feet and upwards, with only a small amount of taper; the whole tree will measure from two to over three hundred feet in height; the diameter of well-grown trees, varying from three to six feet commonly, and up to twelve and fifteen feet above the buttresses. Piles have been recently cut for the Admiralty Works, Dover, one hundred and twenty feet long and twenty inches square. Bridge beams and large wharf-timbers also are cut on "the quarter," not sided down out of the round timber, as is done with smaller European trees.

In Tasmania timber is got from the virgin forest, not from plantations or artificially-made forests, as sawmills have not been established for a sufficient length of time for secondary growths of the Gum or Eucalyptus timber to grow to their full size. In consequence of this, trees that are somewhat past their prime may be cut with others. In aged trees the first part to fail is the centre or heart-wood, the wood increasing in strength towards the outside of the tree, the best part being the ring inside the sapwood. This is always borne in mind in getting or inspecting timber; any showing signs of being near the heart is either rejected or very

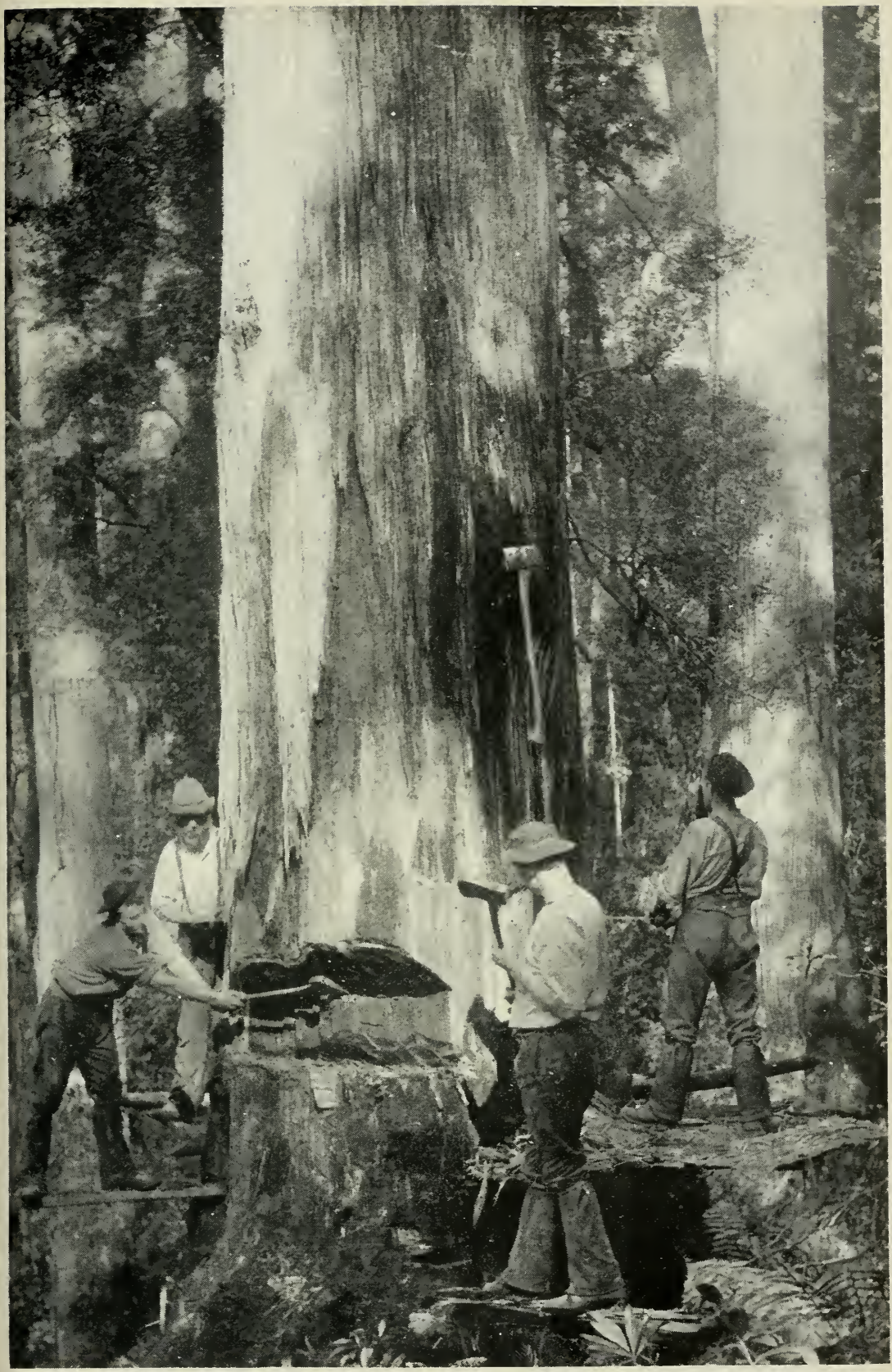
carefully tested. The growing tree and felled timber left in the bush is also subject to the attack of grubs (the larvæ of beetles), which riddle the wood with small holes the size of a pin-head. The holes are so small that the roughness left by the saw will hide them unless carefully looked for, and any timber showing them should be rejected. This is known as "specky timber."

The timbers of the various Eucalypti or Gum so closely resemble each other that it is a matter of great difficulty to say with any degree of certainty from which particular variety any specimen was cut. In the two best-known varieties—Blue Gum and Stringy Bark—the leaves, flowers, fruit, and bark are quite distinct. Blue Gum is, on the average, seven to eight per cent. heavier than Stringy Bark, though mature, slow-grown Stringy Bark will be much heavier than some specimens of Blue Gum, so that identification of the wood after the tree is cut up is difficult.

BLUE GUM (*Eucalyptus globulus*).

This tree takes its name of *globulus* from the large seed-vessels, which appear of a globular form on the tree. It is named Blue Gum because of the colour of the young growth, which is of a glaucous blue tint. It is found abundantly in the south-west, but is not generally distributed, like the Stringy Bark.

Blue Gum grows up to two hundred feet in height, and one hundred and twenty feet before the first branch springs, with a diameter of from four to ten feet at the butt. The colour of this timber when planed is of a golden yellow to purplish brown or buff. The grain, especially of the butt of the tree, is considerably crossed and interlocked; in the upper portions of the tree the grain is freer, and splits well when green. It is especially esteemed for piles, owing to the large size that it attains, and the comparative immunity it enjoys from the attacks of the Teredo. It is also used for ship and boat building, the superstructure of wharves and bridges; builders' scantlings of all kinds, joists, frames,



FELLING A STRINGY-BARK.

beams, floor-boards; wheelwrights' work, for naves, shafts, swingletrees, felloes, spokes, and body work. It is very durable, both in the water—especially sea-water—and in the air.

In the Exhibition held in Hobart, in 1894, amongst the Government exhibits was a sample of bridge-decking that had been about fifty years under foot-traffic, and which was still hard and sound. A timber also was shown which formed part of the original Bridgewater Ferry punt, built in 1818. The punt had been destroyed by blasting about fifty years before, and the wreck had been lying on the foreshore, between high and low water mark, and where there is Teredo, ever since. This timber, when cut out and planed in 1894, showed no sign of decay, and beyond being stained by the iron fastenings the wood was absolutely fresh. At the same Exhibition were shown bent shafts, turned naves, spokes, and hammer-handles, all cut from Blue Gum timber.

In Tasmania the rainfall of different districts varies from twenty to sixty inches per annum; the Government Railways are ballasted with gravel, and on these railways Blue Gum sleepers six feet six by nine inches by five inches have an average life of fourteen years.

The life of the wharf-piling in Hobart is reported to be twenty-five years. These piles are up to eighty feet in length, and are driven in forty feet of sea-water, where they are subject to the attacks of the Teredo. The oldest wharf now in use was erected in 1868, and has stood till now (1902) without renewal. The waggon ferry-steamer plying across Hobart Harbour, built of Blue gum, has been running about fifty years without any repair or caulking to the hull.

Throughout the country there are several small factories, where the essential oil is extracted from the leaves. This oil is exported for medicinal use and for varnish to various parts of the world, and is probably the only example in which what may be termed the "by-product" of a tree is

utilised in Tasmania. The Blue Gum has been largely planted in Southern Europe, South Africa, America, and India, both for its timber—which it produces more rapidly than almost any other tree—and for the beneficial effect it has upon the climate of marshy and malarial districts. The exhalation of its essential oil and its vigorous circulation together purify the air, and make the soil more healthy.

RED GUM (*Eucalyptus stuartiana*).

This variety produces timber very similar to the Blue Gum, but of a red-brown colour. It is not a large tree, and is rather branching.

MUELLER'S GUM (*Eucalyptus Müelleri*).

This is a fine, tall, straight tree, with a very heavy reddish timber, hard and strong, but does not grow in quantity near a shipping port. It is a valuable tree, and appears to stand a considerable amount of frost.

STRINGY BARK (*Eucalyptus obliqua*).

The distinguishing name *obliqua* is from the leaf, the two lobes of which are unequally divided by the midrib, and the foot-stalk springs from one side obliquely, not from the middle of the end of the leaf. It is termed Stringy Bark from its bark, which is of great thickness and of a fibrous nature.

Stringy Bark trees are very much more widely distributed through the Island than the Blue Gum; growing over large tracts of poor, hilly country, they attain to an immense size, up to three hundred feet in height and from two to ten feet in diameter. The wood is on the whole of a lighter colour than Blue Gum, and varies from a pale straw to a reddish brown. In appearance brown Stringy Bark is somewhat like Oak, and it would be a difficult matter for most people to distinguish a picture-frame made of Stringy Bark from one made of Oak.

BLUE GUMS AND SASSAFRAS.

The timber varies very considerably, according to the situation and soil in which the tree grows. In appearance it is freer than Blue Gum, but lacks the purplish tint, and is more subject to gum-veins. It is the most general timber for all sorts of constructive works in this State. It makes excellent piles, especially for fresh water, but is not considered quite so good as Blue Gum for salt water, being more subject to the attacks of the Teredo.

It is also used for shipbuilding, the construction of wharves and bridges, and for railway sleepers; for the dado, flooring, and fitting of houses, and for furniture; it is also an excellent wheelwright's wood. When polished it very much resembles Oak, but has a more sparkling grain; it has a very pretty effect when used for a ballroom floor, or for wainscotting.

Besides being sawn for almost every purpose, Stringy Bark is split into fence-rails, palings, and shingles. It is certain that if this wood and the Blue Gum, properly prepared, were exported to London, a ready sale would be found for it for the construction of carts and vans. It would very well take the place of English Oak and Ash used for this purpose, which are every year becoming scarcer.

In the Tasmanian International Exhibition before-mentioned a Stringy Bark sleeper was shown by the Government that had been twenty-five years under traffic. The usual life of this timber in bridges is from twenty to twenty-five years; sleepers average about fourteen years, and none of the Government Railway buildings—some of which were built twenty-seven years ago, chiefly of this timber—have yet been renewed.

Wood Pavement.

The Stringy Bark of Tasmania is especially suited for wood-paving. It is preferable to Jarrah, being quite as durable, gives a better surface, and is also lighter in weight. If properly laid on a good foundation Stringy Bark blocks

will wear out two sets of the Deal or Beech blocks which are largely used in European cities.

Stringy Bark is evenly hard all through, the annual rings of growth not being so well defined as in Fir timber, and there are no alternate layers of soft spongy wood to absorb moisture. Stringy Bark blocks do not polish under traffic, but give a good foothold for horses. The mode of laying found most successful in Australia is, first, to form a solid concrete foundation, accurately rendered, to the camber and incline of the roadway; second, to dip the blocks in boiling gas-tar, drain them, and again dip and drain; third, to bed the blocks, end grain up, close together, in hot pitch and tar, grouting as the work proceeds with hot tar, pitch, and sand; fourth, to pay the surface with a good coat of hot tar and pitch, with plenty of hot, coarse sand, sprinkled as the work is payed. An expansive joint is usually left between the blocking and the kerb. Stringy Bark blocks laid as above will last under heavy traffic from fourteen to twenty years. The Stringy Bark paving of the roadways of the Hobart Market building, laid in 1853, are still doing duty.

PEPPERMINT (*Eucalyptus amygdalina*).

This variety is called *amygdalina* from its almond-like leaves, and *peppermint* from the scent of the leaves, which contain a larger percentage of essential oil than those of any other Tasmanian Gum. This division of the Eucalyptus family produces several very different classes of timber; one variety, growing upon dry ridges and reaching a height of one hundred feet, with two to three feet of diameter, supplies the most durable wood of any of the Gums in the State. It is especially used for sinking in the ground, or for shingles; and fence posts, in districts where it can be obtained, are always specified to be of Peppermint. The wood is more of a brown red than the Blue Gum and Stringy Bark.

This quality of timber is not to be found in large quantities at any point of the Island within easy reach of a shipping port.

GUM-TOPPED STRINGY BARK

(*Eucalyptus haemastoma.*)

A second variety of the *amygdalina* division is known as Gum-topped Stringy Bark from the base being clothed with rough hairy bark, like the Stringy Bark, while the upper trunk and limbs have smooth grey bark, like the Blue Gum. This tree is very plentiful throughout large districts of the Island, and produces fine straight timber; it grows up to two hundred feet in height and four feet in diameter.

The wood is easily split, and when sawn makes excellent house-framing, floor-boards, skirting-boards, &c., but it has not the strength of the Blue Gum or the Stringy Bark; neither is it so good for resisting the weather. It would be an extremely valuable hardwood for any purpose not requiring the utmost strength, and makes good staves for casks.

SWAMP GUM (*Eucalyptus regnans*).

Swamp Gum, another variety of the *amygdalina* subdivision, grows to a large size, has a wood of a light brown colour, which, when kept dry, is of great strength, and when planed up and polished makes an excellent furniture-wood for wardrobes, &c., and inside fittings of houses. It has a bright sparkling grain, and takes a very good finish. This wood is discredited chiefly because it is sometimes sold for Stringy Bark or Blue Gum, and used for purposes for which it is entirely unfit. It is not lasting in the ground or if exposed to the weather.

WHITE OR MANNA GUM (*Eucalyptus viminalis*).

A sort of willow; is called *viminalis* from its growing upon the Viminal Hill of Rome, and White Gum is called *viminalis* from the leaves resembling those of the Willow Viminalis. Called White Gum from its very white, silvery

bark, and Manna Gum from a peculiar exudation from the leaves and bark somewhat resembling the icing of a wedding-cake, and caused by the punctures of insects. This tree grows to a very large diameter, eight to twelve feet; the timber is reddish when green, and from a pale straw to ivory colour when seasoned. When dry it is brittle, and does not last in the weather, and so has the name of being useless; it is, however, a very useful hardwood for internal fittings. It can be got in wide planks, and when properly cut and seasoned will stand very well. When used for wardrobes, and polished, it has much the appearance of Ash.

IRON BARK (*Eucalyptus sieberiana*).

This is a tree that is locally distributed in the higher land of the north-east, and produces a very fair timber. The trees grow from a hundred to a hundred and thirty feet high and from two to four feet in diameter, but are not within reach of a shipping port. The timber is used for general construction works, piles, post and rail fences, builders' scantlings, &c.

CIDER GUM (*Eucalyptus gunnii*).

Named from its sweet sap; is rather a branching tree, from which long planks cannot be obtained. It will stand a considerably colder climate than the other Gums, and the seeds are sometimes inquired for from abroad for sowing in districts subject to frosts.

WEEPING GUM (*Eucalyptus coriacea*).

This is a mountain species, and does not grow to a great size. The timber is somewhat similar to the *viminalis* or White Gum.

The last three varieties have been mentioned more with a view of completing the list of trees that will produce timber than for any use they may be commercially. There are some three or four other species that do not grow beyond the size of a bush; but, besides producing essential oils, these are only of interest botanically.

IDENTIFICATION OF TIMBER.

As before mentioned, the identification and differentiation of the above-mentioned timbers, if not absolutely impossible, requires a lifelong acquaintance with the subject. The present botanical classification is not exact; each name may be said to cover several closely-allied varieties, rather than one specific kind. The bushman and the man who lives amongst timber would scout the idea of Gum-topped Stringy Bark being called a Peppermint; but Peppermint is a division to which this tree comes nearest botanically. Then trees, acknowledged to be of exactly the same kind, will produce very different timber, according to where they grow. For instance, upon a rocky eminence or in a sheltered river-bottom, the timber will differ in texture, in colour, in durability, and in weight, according to soil and situation.

Then, as to durability. Timber cut when the sap is in full flow will shrink and warp to a very much greater extent than that which is cut when the tree, either through cold weather or from drought, is in a dormant stage; it will also decay more readily.

Of course, when a mill has to be kept cutting logs, it is difficult to arrange all the felling at the most suitable time of the year; but if the tree is ring-barked six months before it is felled, the timber got out of it will be of a better quality than that taken from a tree in full growth. Young and free-grown trees will give a very different class of timber to that got from a slow-growing tree of the same class. To these difficulties must be added the fact that timber from all the varieties of trees before-named is put upon the market as "Tasmanian Hardwood," and from the descriptions of the various sorts given, and from the specific gravities and strengths shown in the accompanying tables, it will be seen that the terms "Hardwood," "Gum," or "Eucalyptus Timber" are not terms under which timber for any special purpose should be bought.

CORYLACEAE.

MYRTLE OR BEECH (*Fagus cunninghami*).

This is a true Beech, but the local name is Myrtle, probably so-called from its small dark leaves. It is a tree that grows in great abundance over the western half of the Island. It attains a height of one hundred and fifty feet, with a diameter of from two to four feet.

The wood varies from a greyish-brown to a brown pink; when planed, it takes a beautiful surface, and, like the European Beech, always wears smooth. It is a strong, close-grained timber, and except for the colour, resembles European Beech, but is of considerably greater average strength. If cut from a level of eight hundred feet or upwards above the sea, and felled in the winter, it is a very fairly durable wood for outside work, but it is apt to "go" between wind and water. It makes splendid felloes, staves for tight casks, saddle-trees, gun-stocks, and all sorts of turnery, floors, skirtings, and dados. The pinker tints make handsome furniture. The seasoning and treatment of this timber should be exactly that of European Beech, and it must be felled in the winter to get the best results. Although there are such large quantities of *Cunninghami* to be obtained in the Island, very little of it has been exported hitherto; probably because the chief beds of this timber are not near a shipping port. It is very generally distributed, and produces an excellent timber for a variety of purposes. The difference between the grey and the pink is hard to account for, as they are botanically identical, and there is no apparent reason for the difference.

The railway from Emu Bay to Zeehan now passes through many miles of Beech country, so that there is a better prospect of this timber being utilised.

ACACIAS.

BLACKWOOD (*Acacia melanoxylon*).

Melanoxylon means blackwood. This tree is very generally distributed, but only grows in single trees or in clumps. It attains a height of sixty to eighty feet, and a diameter of from two to four feet. It is of a dark-brown colour, with reddish rings, but sometimes of a light-brown. It has much the appearance of Walnut, and makes an excellent furniture wood. Some trees are beautifully figured. It is used for all kinds of furniture, including pianos and billiard tables. The timber varies in quality, and the sort where the reddish grain predominates is called, locally, "Pencil Cedar." Again, a third variety, which is of a lighter colour, lighter weight, and freer grain, is called "Lightwood." These three names for varieties of the same timber sometimes cause confusion.

There is a small but steady output of this timber, and it is exported to the other States of the Commonwealth for furniture, carriage-building, and as staves for casks; but there it not sufficient quantity of it, in accessible places, for a large trade.

SILVER WATTLE (*Acacia dealbatá*).

So called from its blue-green silvery foliage. It is a tree that grows up to fifty or sixty feet in height, with a diameter of from twelve to thirty inches, and produces a somewhat porous timber of a dark-brown to a yellow-brown colour, easily split, fairly tough, and used and exported chiefly for cask staves. It is occasionally used for furniture, and when polished has a very handsome grain.

This timber is not to be had in large quantities. The bark is used for tanning.

BLACK WATTLE (*Acacia decurrens*).

Called "black" from its dark bark and dark green leaves, and *decurrens* from two lines "running down" from the

base of the leaf-stalk. It produces a wood similar to the Silver Wattle, but darker in colour, heavier, and stronger The bark is so valuable, and largely used for tanning, that very few large trees are to be found. It will grow to a height of forty feet, and a diameter of two feet. It comes up readily from seed in light soils, and may be made a profitable source of income, if systematically cultivated, for the bark.

CONIFERAE.

HUON PINE (*Dacrydium franklinii*).

The Huon Pine, so-called from the Huon River, where first found, and also named after Sir John Franklin, is a pine which grows to a great size in the river-bottoms of the West Coast, with a diameter of eight or ten feet, but the ordinary size of the tree will give a plank of from fourteen to thirty inches in width and up to twenty feet in length. The wood is straight-grained, and heavy for a pine, of a bright yellow straw-colour, and very full of an essential oil, which causes it to be almost rot-proof. When made into furniture, the essential oil slowly oxidises, and the wood turns to a smoky-brown colour with age. It is a splendid joiner's wood, and is especially useful for boat-planking, as the teredo objects to the essential oil.

The supply is little more than sufficient for the local demand, but it is a timber that is well worth systematic cultivation. Most of the finest timber grows below flood-level, and it is an exception to the rule that durable timber does not grow in swampy ground, Huon Pine being one of the most durable timbers known. It is not a tough wood, having rather a short fracture, but it steams and bends well. Some trees will cut very handsome figured panels. It has a strong and, to some people, rather a sickly odour. The logs are cut in almost inaccessible gullies, and floated down the streams to the seaport, where they are shipped, generally, to Hobart.

KING WILLIAM PINE (*Athrotaxis selaginoides* and *Athrotaxis cupressoides—Cypress-like*).

This pine is so named from the leaf resembling the selaginela, an ornamental tree-moss well known in hot-houses. It grows on the high lands in the north and west from two to four feet in diameter, and forty or fifty in height. It is not very plentiful. The wood varies in colour from a pinkish-yellow to pink. It is extremely light, and has a scent like cedar, from which it is called "Pencil Cedar" locally. After it is planed up, there is a slight exudation of the resin. It is used for cabinet and joiners' purposes, and for making sculls for racing-boats. Notwithstanding its extreme lightness, it has considerable toughness and strength, and is very durable in the weather, being second only to Huon pine in this respect.

CELERY TOP PINE (*Phyllocladus Rhomboidalis*).

So called from the leaves in the young plant resembling those of the celery. A heavy, strong pine, of a clear yellow colour, useful for boards, internal fittings, or implements. It is very tough, and the shrinkage so small that the general belief is that it will not shrink at all. The smaller trees furnish masts for small vessels. Though not very plentiful, it is well distributed. This tree might also be very usefully cultivated.

OYSTER BAY PINE (*Frenela rhomboidea*).

A tree on the East Coast, deriving its name from the locality in which it is chiefly found. It grows from ten to fifteen inches in diameter. The supply of timber from this tree is nominal, as the trees have been nearly all cut out, or burnt, but it is a tree well worth preserving and cultivating, as its timber is of extreme durability. It makes good posts; is also used for hop-poles, gates, and carpenters' work, and is a strong useful timber. It produces a fragrant resin (like gum sanderach) suitable for varnish.

SASSAFRAS (*Atherosperma moschata*).

This tree grows in creek bottoms to a height of forty to a hundred feet, and from twelve to eighteen inches in diameter. It is a light timber, suitable for wooden pails, brushware, casks, wooden screws, &c., and is a good wood for carving; but it is essential that it should be cut when the sap is down, or it very quickly decays if exposed to weather. The bark and leaves have a pleasant bitter flavour, and the extract is used as a tonic.

SMALLER TREES OF TASMANIA.

PRODUCING USEFUL TIMBER, WHICH IS NOT EXPORTED.

LEATHER WOOD (*Eucryphia billardieri*).

A small tree twenty to forty feet in height, with a trunk of from twelve to thirty inches in diameter, producing an excellent pinkish-brown mottled wood, which is very useful in the manufacture of implements, being somewhat akin in nature to the English ash, but stronger.

TEA TREES.

MELALEUCA ERICAEFOLIA

(*Leptospermum lanigerum*) and (*Kunzea corifolia*).

Called "Tea" trees because Captain Cook's sailors are said to have used the leaves for tea.

These trees have a brownish timber, which is very lasting, either in the ground or in the water. The swamp tea-tree grows in salt-water and morasses, and is useful for shelter and the reclamation of land. The leaves, like others of the myrtle tribe, contain essential oils, amongst them, cajeput, which is used medicinally. The timber is used for pick-handles, shafts, wheelwrights' work, paddles, and small piles.

HE-OAK (*Casuarina suberosa*).

SHE-OAK (*Casuarina quadrivalvis*).

These are short, bushy trees, growing usually through the open country, having a trunk of six to ten feet and a diameter of eight to ten inches. When green, the colouring of the wood is very rich; but this fades to a brown colour with age. The grain, especially the medullary ray, is very

marked, giving the wood a bold figure. At present it is used almost solely for firewood; but it is fairly tough, and useful for implements, and would cut small veneers.

LANCEWOOD (*Eriostemon squameus*).

A tree of small growth, with wood of a yellow colour, which is fairly tough, and of a very fine grain; useful for shafts, swingle-trees, and implements.

IRONWOOD (*Notelaea ligustrina*).

This is a handsome tree, giving a trunk of ten or twelve feet, with a diameter of from one to two feet. The outer, or sap-wood, is yellow, and the heart-wood of a dark brown, getting darker with age. It is extremely hard, and is used in place of lignum vitæ, also for tools of various kinds.

HORIZONTAL (*Anodopetalum biglandulosum*).

A small-growing tree, which branches over the surface of the ground and forms impenetrable thickets on the West Coast. Before it is thoroughly dry it is of extreme toughness, almost impossible to break. It is used for tool-handles and implements. When dry it has not the toughness of English Ash, or American Hickory.

DOGWOOD (*Pomaderris apetala*).

A small tree growing thirty to fifty feet in height, but only up to ten inches in diameter. The wood is similar to that of the English pear tree, and is useful for carving, fine turners' work, and drawing instruments.

MUSK (*Olearia argophylla*).

A small tree producing a hard brownish wood useful for furniture. Some of the boles would cut veneers of good figure.

HONEYSUCKLE (*Banksia marginata*).

This is widely dispersed over the open country, and produces a very curious yellow to pinkish-brown wood of a reticulated or netted appearance. Larvæ of certain moths and beetles are so fond of this tree, that it is extremely difficult to get a sound plank of any size.

TALLOWWOOD (*Pittosporum bicolor*).

A small tree producing a yellow smooth-grained wood useful for implements and furniture.

BOX (*Bursaria spinosa*).

A handsome bushy tree, with white, sweet-scented flowers; the wood is ivory in colour, and of an even grain, suitable for carving or engraving-blocks. This wood is also very much eaten by larvæ, and it is difficult to find a tree over ten inches in diameter that is not perforated.

NATIVE CURRANT (*Leptomeria billardieri*).

This tree grows little larger than a bush, but produces a very nice yellowish-brown timber useful for small tools, also for ornamental works and boat-knees.

PINKWOOD OR ROSEWOOD (*Beyera viscosa*).

A small tree with a reddish wood, something like the Rosewood of commerce, but of very small size. It is used for ornamental work and tools.

WARATAH (*Telopea truncata*).

This tree may be got up to six inches in diameter. It is famed for its flowers; but the wood is also used for ornamental joiners' work, and has a very pretty grain.

LABURNUM (*Goodia lotifolia*).

NATIVE LAUREL (*Anopterus glandulosus*).

MINT TREE (*Prosthanthera lasianthes*).

All the above are small trees, occasionally used for inlaying and turnery.

NATIVE BIRCH (*Dodonea viscosa*).

Has a pink sap and a dark heart-wood of extreme hardness, but this tree rarely grows to any size in Tasmania; it is useful for rulers, turnery, &c.

NATIVE CHERRY (*Exocarpus cupressiformis*).

This tree will grow a trunk of six or eight feet long by ten inches in diameter; the wood is a warm red brown. It is used in cabinet work, but is not of commercial value. Its claim to notice is that the fruit is spoken of as the "Australian Cherry," which grows the stone outside instead of in the centre of the fruit; though, as a matter of fact, the fruit is more like that of the Yew-tree than the Cherry.

COMPARATIVE TABLE OF WEIGHTS AND TRANSVERSE STRENGTHS OF EUROPEAN AND TASMANIAN TIMBERS.—(A. O. Green.)

Name of Timber.	lbs. weight per cubic foot.			Transverse strength $\frac{LW}{4bd^2}$			Experimenters
	Min.	Max.	Mean.	Min	Max.	Mean.	
Ash, English	43	53	47	1471	2445	2130	Barlow, P. W. Barlow, Beaufoy, Denison, Ebbels, Peake and Barrallier, Tredgold, and Rankin.
Beech „	37	50	43	1557	2031	1794	
Yellow Deal (Sylvestris)	30	44	36	1183	2058	1600	
Oak, English	43	62	54	1092	2892	1788	
Blue Gum, Tasmanian, Fresh Cut	60	80	73	1957	2100	2019	Mitchell, Green, Mann
„ „ Dry	52	67	60	1867	3361	2706	Mitchell, Laslett, Green
Stringy Bark Fresh Cut	55	75	69	1377	2046	1874	Kernot, Green
„ Dry	48½	66	57	2514	3661	3273	Mitchell, Ransome, Green
Gum Top Stringy Bark „	48½	51	50	1524	2391	1958	Kernot, Victorian Timber Board, Green
Swamp Gum „	..	..	54	1400	3334	2367	Green
Peppermint „	50	65	59	1599	1646	1623	R. M. Johnson Green
White Gum „	44	48	46	1646	1788	1717	R. M. Johnson, Green
Myrtle or Beech „	39	54	47	2712	2946	2804	Ransome, Green
„ „ Fresh Cut	..	..	67	..	..	2257	Kernot
Leatherwood Dry	42	49	45	..	..	3258	Green
Celery Top Pine Fresh Cut	..	..	64	..	..	1378	Kernot
„ „ „ Dry	40	44	42	2124	2326	2225	Kernot, Green

TASMANIAN-AUSTRALIAN TIMBERS.

(A. O. Green.)

Approximate Breaking Weights for Stresses, of Crushing, Shearing, and Tension, in pounds per square inch, from experiments of Professor Kernot, Melbourne University.

	Crushing along the grain.	Crushing across the grain.	Shearing across the grain.	Tension along the grain.	Tension across the grain.
Stringy Bark .. Fresh cut	4400	2000	2000	10,000	
,, .. Dry*	8000	4500	2000	22,000	
Blue Gum ... Fresh cut	—	—	—	—	
,, .. Dry*	9000	4500	2000	22,000	
Leatherwood.. Fresh cut	—	—	—	—	
,, .. Dry*	8000	6000	2000	—	
Myrtle ... .. Fresh cut	5000	—	—	10,000	
,, .. Dry*	7000	4500	3000	12,000	
Celery-top Pine ..... Fresh cut	4000	—	—	3000	
,, .. Dry*	7000	1000	1400	12,000	

EUROPEAN TIMBERS.

	Crushing along grain.			Tension along grain.			Tension across grain.		
	Min.	Max.	Mean.	Min.	Max.	Mean.	Min.	Max.	Mean.
Ash dry	8700	9500	9000	16,000	19,600	17,600	—	—	—
Beech ,,	7700	9500	8500	11,000	22,000	17,000	—	—	—
Oak ,,	6500	10,000	8300	9000	20,000	13,600	—	—	2316
Deal ,,	5500	6500	6000	12,000	18,000	15,400	540	840	626

* Note.—For Australian timbers, and given as an approximate guide, for the breaking weights of Tasmanian timbers, data for which are wanting. The weights given for European timbers are from results obtained by the experimenters enumerated at the head of the Table of Weights and Transverse Strengths on page 29.

For purposes of comparison, the "Shearing across the grain" shown for the Tasmanian woods may be taken as equivalent to the "Tension across the grain" shown for European.

TRANSVERSE STRENGTH, DEFLECTION, AND ELASTICITY.

(A. O. Green.)

Experiments made in Hobart in May, June, and July, 1902.

Size of specimens 30 x 1 x 1 inches, of Tasmanian timbers of the ordinary quality accepted by the Tasmanian Government Railway Department for maintenance purposes—the Deal and Oregon the best that could be got. The time of each experiment was about an hour. About three-fourths of the load was put on slowly, with thirty-pound lead-weights; then fourteen pounds, then lighter weights, until the breaking load was attained; all at about the rate of thirty pounds in five minutes.

The specimens were supported on fixed wooden supports of two feet clear span, and the weights were placed in a scale-pan hung on the centre of the specimen by a half-inch shackle. The specimens weighed from half to about a pound each, but this weight is neglected in the deductions.

In all the experiments but two the sap-side was down and the heart up. The deflection was taken by means of a scale divided to fiftieths of an inch, standing on the specimen and against a fixed board, with a vernier, bridging the span.

In the accompanying table the symbols used in the formulæ are as follows:—W = weight in pounds, L = length in inches, b = breadth in inches, d = depth in inches, δ = deflection in inches, l = length in feet. S, E and A are constants for transverse breaking "Strength," modulus of "Elasticity," and for the stiffness of beams, the deflection of which does not exceed one four-hundred-and-eightieth of the span. The last, A, is Tredgold's formula for the stiffness of beams, which is often quoted in tables for European timbers where depth in inches, $d = \sqrt[3]{\frac{l^2 \, W \, A}{b}}$ and $\delta = \frac{l}{480}$. $S^{\times}$ = the breaking-weight of a beam 1 foot x 1 inch x 1 inch, supported at the ends and loaded in the centre.

EXPERIMENTS MADE IN HOBART, 1902, BY A. O. GREEN.

Date cut.	Name of Timber.	Weight per cubic foot.	$\frac{\delta}{\frac{WL^3}{4bd^3E}}$ Deflection Load 100 lbs.	$\frac{W}{\frac{4bd^2S}{L}}$ Breaking Weight.	$\frac{S}{\frac{LW}{4bd^2}}$ Specific Transverse Strength.	$\frac{E}{\frac{WL^3}{4bd^3\delta}}$ Mean Modulus of Elasticity.	$\frac{A}{\frac{40bd^3\delta}{Wl^3}}$ Constant for Stiffness.	$S^{\times}$ Breaking Weight of beam 1ft. × 1in. × 1in. supported at ends and loaded in middle.
	TASMANIAN TIMBERS.	lbs.	inches.	lbs.	lbs.	lbs.		
	Eucalyptus obliqua.							
1892	Stringy Bark, dry	60·1	·115	610¼	3661	2,988,939	·0058	1220
	Eu. globulus.							
1900	Blue Gum, dry	59·2	·170	560¼	3361	2,048,047	·0085	1120
	Eu. Regnans.							
1894	Swamp Gum, dry	53·6	·100	555¾	3334	3,423,086	·005	1111
	Eucryphia billardieri.							
1894	Leatherwood, dry	48·6	·150	543	3258	2,283,927	·0076	1086
	Fagus Cunninghamii.							
1894	Myrtle or Beech, dry ...	54·0	·210	491	2946	1,626,287	·0106	982
	Phyllocladus Rhomboidalis.							
1894	Celery-top Pine. dry...	40·3	·238	387¾	2326	1,447,775	·0121	775

1902	Unseasoned Stringy Bark	58·8	·155	341	2046	2,263,680	·0076	682
1902	Unseasoned Blue Gum.....	69·7	·195	326¼	1957	1,759,963	·0098	652
1894	*Athrotaxis Selaginoides.* King William Pine, dry	22·1	·650	182	1092	541,975	·0319	364
	IMPORTED PINES.							
Unknown	*P. Douglassii.* Oregon Pine, dry	34·4	·180	378¾	2273	1,937,728	·0089	758
,,	*P. Sylvestris.* Yellow Deal, Annual Rings vertical*	30·25	·188	353	2118	1,879,417	·0092	706
,,	Yellow Deal, Annual Rings horizontal*	31·7	·195	304¾	1828	1,769,037	·0098	609
	ENGLISH TIMBER.†							
	Fraxinus Excelsior. Ash, English, dry	47·	·211	333	2000	1,640,000	·01	666
	Fagus Sylvatica. Beech, English, dry	43·	·257	333	2000	1,345,000	·013	666
	Quercus Vars. Oak, English, dry.....	58·	·243	282	1690	1,420,000	·013	563

* Both cut from same deal.

† Highest values for English timbers from Molesworth's Engineering Pocket Book.

In the dry woods the elasticity was unimpaired to $\frac{3}{4}$ of breaking strain; in the green ones to about a half.

The nature of the fracture in each case will be seen from the illustrations. Tasmanian trees are very large, and may be got quite free from knots and with the grain evenly hard, so that the above may be taken as ultimate breaking-weights of well-selected timber free from shakes and defects.

The results obtained for Deal could not be got in ordinary work, except with small scantlings, chiefly owing to the presence of knots; also, from the trees being small, the hard grain may be at many angles in a single plank. From these causes the timber does not give evenly throughout, and a large plank will not carry so much weight in proportion to its size as a small one will, in which these causes of failure have been eliminated.

TASMANIAN AND OTHER TIMBERS.

(A. O. Green.)

Arranged in order of stiffness from the deflections of specimens one inch square, supported at ends, span two feet and load one hundred pounds in centre of span.

Name.	W = 100 lbs. Deflection inches.	Breaking load. lbs.	Deflections at breaking.
Swamp Gum .....dry	·100	555¾	1·1
Stringy Bark ..... „	·115	610¼	1·0
Leatherwood ..... „	·150	543	1·5
Stringy Bark .....fresh cut	·153	341	1·1
Blue Gum .....dry	·170	560¼	1·1
Oregon Pine ..... „	·180	379	1·25
Yellow Deal—annual rings vertical* „	·188	353	1·0
Yellow Deal—annual rings horizontal*.....dry	·195	304¾	1·1
Blue Gum .....fresh cut	·195	326¼	1·2
Myrtle or Beech .....dry	·210	491¼	1·4
Ash, English..... „	·211†	—	—
Celery Top Pine..... „	·238	387¾	1·1
Oak, English ..... „	·243†	—	—
Beech, English ..... „	·257†	—	—
King William Pine ..... „	·655	182	1·655

* Cut side by side from one Deal.

† Calculated from the value of E given in Molesworths' Engineering Pocket Book.


Stringybark Unseasoned
Blue gum Seasoned
Stringybark Seasoned

Results of Experiment to ascertain the Resistance to Deflection and Rupture under a gradually increased Bending Stress of One Log of Blue Gum, received from Messrs. Richardson & Co.

Load applied at centre. Distance between supports, 10′ 0″.

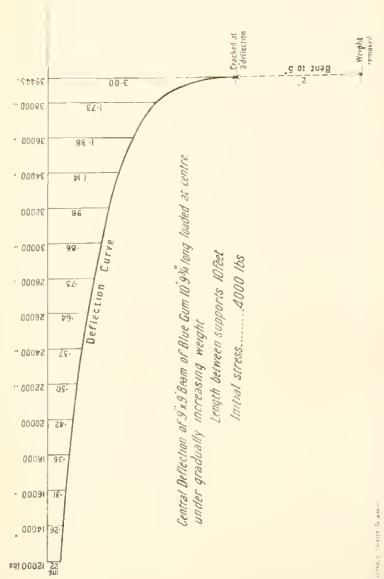
Test No.	Description.	Dimensions, B.D.	Length.	Weight.	Total Stress in Pounds. — Deflection Inch at 12,000.	14,000.	16,000.	18,000.	20,000.	22,000.	24,000.	26,000.	28,000.	30,000.	32,000.	34,000.	36,000.	38,000.	40,000.	Ultimate Stress.		Remarks
		inches.		lbs.																lbs.	tons.	
H.H.	*Received 21 feet long.*																					
2375	*Blue Gum Log, 9″ × 9″ (sawn)*	9·00 × 9·00	10′ 0¾″	427	·22	·26	·31	·36	·42	·50	·57	·64	·75	·86	·98	1·14	1·38	1·73	...	39,445	17·6	*Failed by top side compressing. Cracked at 3 ins. deflection. Bent to 5 ins. Weight removed.*
	Sketch showing grain of wood Top side in compression / Bottom side in Tension																					

Initial stress, 4000 lbs. (S = 1023. Average E = 2,666,840.—A. O. G.)

Results of Experiment to ascertain the Resistance to Depression and Rupture under a gradually increased Thrusting Stress.

Length for testing, 120 inches. Ends faced accurately true in lathe.

Test No.	Description.	Dimensions.	Area.	Weight. Actual.	Per cub. foot.	Total Stress in Pounds. — Depression Inch at 40,000.	60,000.	80,000.	100,000.	120,000.	140,000.	160,000.	180,000.	200,000.	220,000.	240,000.	260,000.	280,000.	300,000.	320,000.	340,000.	360,000.	380,000.	400,000.	Ultimate Stress. Total.	Per sq. in.	Remarks.
		inches.	sq. ins.	lbs.	lbs.																				lbs.	lbs.	
H.H.																											
2376	*As above* ...	8·08 × 8·90	79·92	397¼	71·57	·028	·046	·058	·070	·082	·094	·105	·118	·130	·142	·154	·166	·179	·195	·212	·229	·255	·309	...	380,100	4756	*Crushed.*



Messrs. S. Pearson & Son, 10, Victoria-street.

DAVID KIRKALDY & SON, 99, Southwark-street, London, S.E.
21st July, 1899.

The values given in the preceding tables for S, the transverse strength of a beam supported at the ends, and loaded in the centre of the clear span, are for breaking-weights, but the working load should never exceed one-third of this for static loads or one-sixth for moving loads; it is usual practice to take one-fourth for static and one-eighth for moving loads. The practice for railway bridges is one-fifth for static and one-tenth for moving loads.

To find the deflection that any weight in the centre of span will cause in a rectangular beam of any of the woods given in the table, supported at the ends—$\delta = \frac{W L^3}{4 b d^3 E}$

Multiply the weight in pounds by the cube of the length in inches, and divide the product by the product of four times the breadth, by the cube of the depth and by the value given for E in the table.

To find the breaking-weight in a rectangular beam of any of the woods given, loaded in the same way, $W = \frac{4 b d^2 S}{L}$

or multiply four times the breadth by the square of the depth by the value given for S, and divide the product by the length in inches. Or, by using the column $S^\times$, multiply the breadth by the square of the depth in inches by $S^\times$, and divide the product by the length of span in feet; or, by formula $W = \frac{b d^2 S^\times}{l}$

Again given the span in feet, the load in pounds, and the breadth in inches, of a beam, to find the depth in inches, so that the beam shall not bend more than one-fortieth of an inch to a foot, or one four-hundred-and-eightieth of its span, the formula is $\sqrt[3]{\frac{l^2 W A}{b}}$, or multiply the square of the length in feet by the load in pounds by the value given for A, and divide the product by the breadth in inches; this will give the cube of the depth, and the cube-root will be the result required.

It must be remembered to add half the total weight of the beam itself to the load for the total centre load upon the beam in all cases.

SEASONING AND SHRINKAGE.

Rankin's "Machinery and Millwork," page 471:—

Seasoning for carpenters, two years; for joiners, four years, and often much longer.

Shrinkage 2 to 8% transverse, usually 3%; loss of weight 6 to 40%.

Molesworth's "Engineers' Pocket-book," page 113, Mahogany, Walnut, or Oak seasoning:—

Inches of Thickness	$\frac{3}{8}''$	$\frac{1}{2}''$	$\frac{5}{8}''$	$\frac{3}{4}''$	$\frac{7}{8}''$	$1''$	$1\frac{1}{2}''$	$2''$	$3''$	$4''$
Months of Time	12	13	14	16	20	24	30	36	46	52

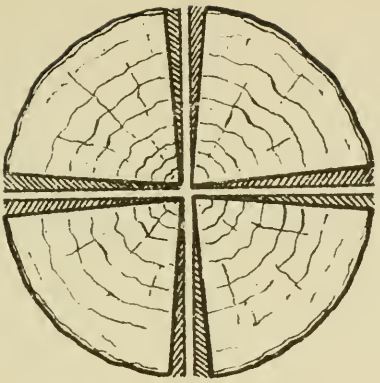
Barlow gives the shrinkage of Oak as 3% for the butt, 5% for the top, and the loss of weight as, at least, a third in drying.

T. A. Knight, in "Philosophical Transactions," vol. 107, p. 269, shows that Ash and Beech cut on the back, or parallel to the rings of growth, shrank 14% of the width, and warped; while the same cut on the quarter, or across the rings of growth, shrank $3\frac{1}{2}$% of its width, and did not warp.

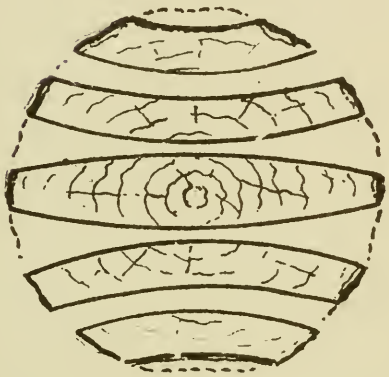
Tredgold quotes Rondelet's experiments, showing that ordinarily dry Fir will expand up to $1\frac{1}{3}$% of width, and Oak to $1\frac{1}{4}$%, under ordinary changes in the dampness of the atmosphere.

Tasmanian timbers lose from 22% to 40% of their weight in drying. The usual allowance for the shrinking of Tasmanian hardwood is from half an inch to an inch to the foot, or 4 to 8%; but this is only a rough general assumption, and no exact experiments have been made for the determination of the shrinkage. It is known generally that it varies considerably in the different timbers, that of Celery-top Pine being the least, and that of Stringy Bark probably the greatest; while, from the same kind of tree, timber grown on good moist land will shrink more than that grown upon poor rocky soil, and the young wood more than that of matured trees. It would be very useful indeed if the percentage of shrinkage, both radially and along the rings, were settled by experiment, for each kind of timber.

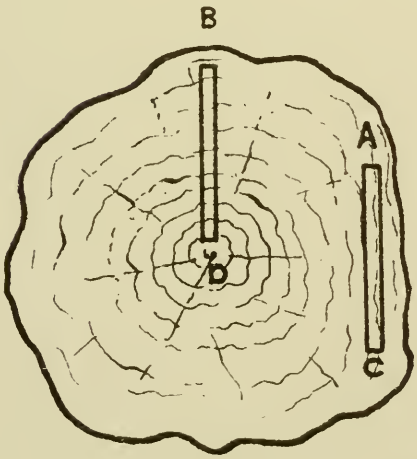
With regard to seasoning (most Tasmanian timber is sold unseasoned), the practice in England is given above, but after the length of time allowed for seasoning, for carpentry and the rougher sorts of work, the joiners will either season for several years more, or further dry the timber in a hot room before using it. During the time of drying, the timber is carefully stacked with numerous slats between the planks, and sufficiently weighted to keep it from buckling. As has



If a log is cut in four through centre, as the shrinkage is along the ring, the angle at centre will become less than 90° in drying.
Also, the wood of the outer layers of the tree being less consolidated, shrinks more than that near the centre.



Shows shrinkage of plank from above cause.

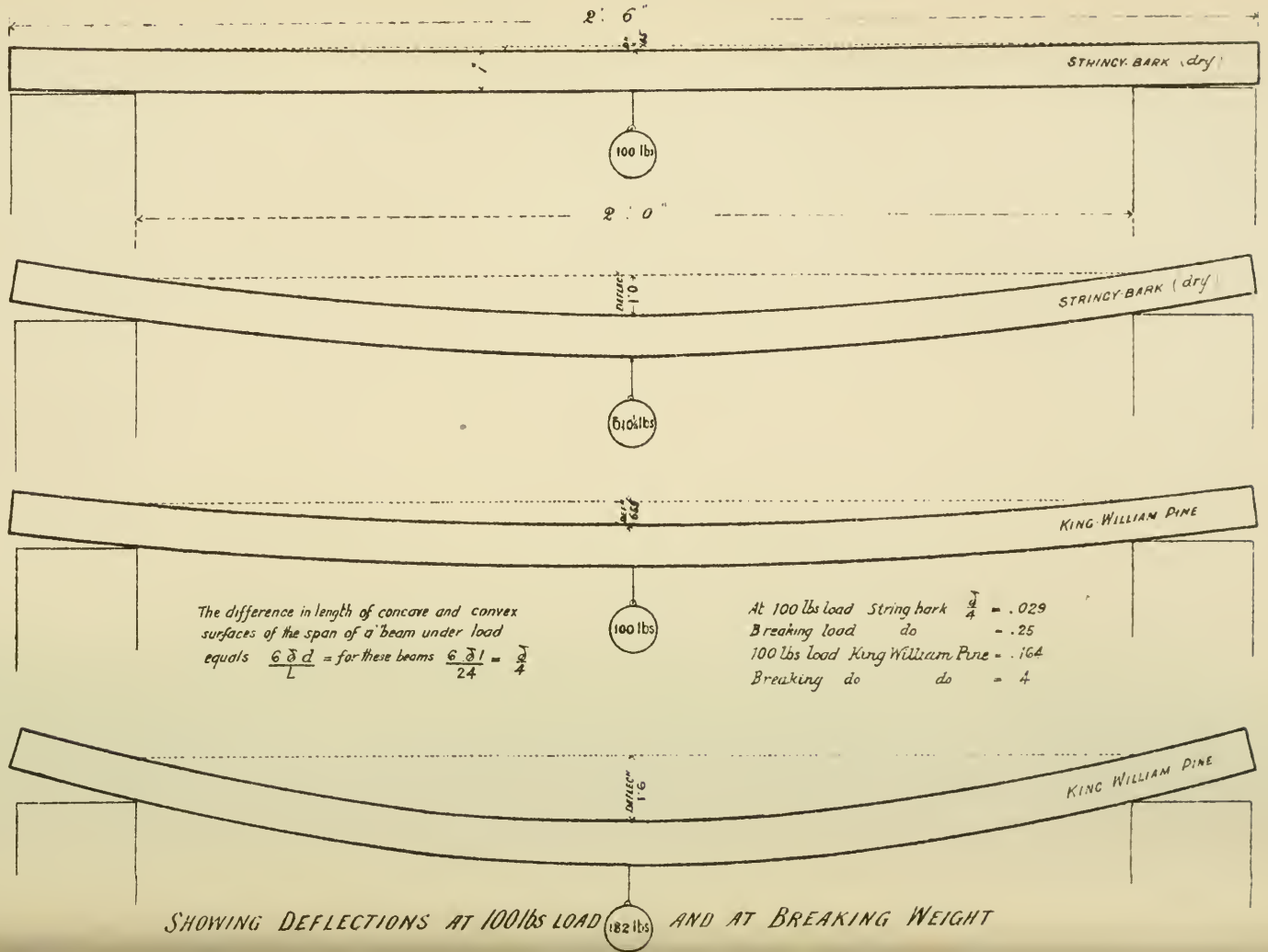


B. D. on quarter
A C. on back.

See. Tredgold; Joinery, Edition 7. Ency. Brit., Knight F.A. 91 Vol. Phil. Trans experiment on Oak, also, Vol CVII. p269. " " Ash & Beech cut on back or parallel to rings shrunk up to 14% of width and warped, the same cut on quarter 3½% of width & did not warp.

Scale

Experiments in Hobart on Stringybark & King William Pine



Showing Deflections at 100 lbs load and at Breaking Weight

been before stated, one of the essentials of placing Tasmanian timber on the European market in plank is that it should be well seasoned and properly stacked during the seasoning.

The length of time given above as the practice of air-seasoning in Europe may be shortened to a few months by the use of properly-constructed drying-rooms, in which green timber can be stacked, slatted, weighted, and dried, at a temperature of from 100° to 140° Fahrenheit. The room should be so arranged that the atmosphere within it may be kept saturated with moisture, in order that the outer part of the timber shall not dry before the inner; this can be very readily done by the use of exhaust-steam. Towards the end of the process the moisture should be gradually diminished, and the timber allowed to dry off, and cool slowly. There is little doubt but that excellent results would be obtained at a very moderate cost from this treatment.

SUNDRY WEIGHTS OF ROUND, SPLIT, AND SAWN TIMBER.—(A. O. Green.)

Blue gum Piles at 75 lbs. a cubic foot.

Diameter in feet and inches—	1′ 0″	1′ 4″	1′ 8″	2′ 0″	2′ 6″	3′ 0″	4′ 0″
Weight per foot run of pile in pounds .. ... About	59	104	163	236	368	530	942
Number of running feet to a ton ... ... About	38	21½	13¾	9½	6	4½	2⅓.

Stringy-bark piles weigh about 69 lbs. a cubic foot, or say 10 per cent. less than blue-gum.

Other Tasmanian woods weigh from 55 lbs to 70 lbs. a cubic foot in the log.

One foot super. or board measure of hardwood fresh cut weighs 5¾ lbs. to 6 lbs.

8⅓ cubic feet or 100 feet super of fresh cut stringy-bark weighs about 560 lbs.
8⅓ „ 100 „ dry stringy-bark „ 450 lbs.
8⅓ „ 100 „ imported deal „ 373 lbs.

THE FOLLOWING QUANTITIES WEIGH ABOUT A TON.

Timber.

Cubic feet.	Super. feet.		
33·	or 400 of	hardwood is usually considered a ton	= 68 lbs. a cubic foot.
32·6	or 390 of	fresh cut stringy-bark	= 68·7 lbs. a cubic foot
30·	or 360 of	fresh cut blue gum	= 74· „ „
32·	or 384 of	fresh cut blackwood	= 70· „ „
37·3	or 448 of	fresh cut wattle	= 60· „ „

50· or 600 of imported pine or deal is usually considered a ton = 45 lbs. a cubic foot.

66· or 792 of deal dry enough for use is considered by English builders a ton = 34 lbs. a cubic foot.

60· to 72· or 840-864 of deal thoroughly dry weighs a ton = 30 to 32 lbs. a cubic foot.

Sleepers, Posts, and Rails.

No. to a ton.			Cubic feet.
12·34	blue gum sleepers weighs 182 lbs.	7′ × 10″ × 5″. 1 sleeper	= 2·4305, and
13·3	stringy-bark sleepers weighs 168 lbs.	7′ × 10″ × 5″. 1 sleeper	= 2·4305, and
14·7	blue gum sleepers weighs 152 lbs.	6′ 6″ × 9″ × 5″. 1 sleeper	= 2·031, and
16·	stringy-bark sleepers weighs 140 lbs.	6′ 6″ × 9″ × 5″. 1 sleeper	= 2·031, and
27·2	stringy-bark posts weighs 82·2 lbs.	7′ × 7″ × 5″ × 2″. 1 post	= 1·191, and
51	stringy-bark fence rails	9′ × 7″ × 2″ × 1″. 1·55 rails	= 1 cubic foot.
70	,, ,,	9′ × 6″ × 2″ × ½″. 2· rails	= 1 cubic foot.

Firewood.

80 Cubic feet of green gum weigh about a ton.
100 Cubic feet of dry gum ,, ,, ,,

Staves.

No. to a ton.			
504	Wattle	2′ 8″ × 4″ × 1″	About 13½ staves = 1 cubic foot.
432	Blackwood	2′ 8″ × 4″ × 1″	
298	Wattle	3′ 2″ × 5½″ × 1 1/16″	About 8 staves = 1 cubic foot.
256	Blackwood	3′ 2″ × 5½″ × 1 1/16″	
298	Wattle	4′ 0′ × 4½″ × 1″	About 8 staves = 1 cubic foot.
256	Blackwood	4′ 0″ × 4½″ × 1″	

Stringy-bark Palings.

308	palings	6′ × 6″	5 palings split from a billet 6″ × 2¼″ × 2″ at the end.
370	,,	5′ × 6″	
350	,,	6′ × 6″	split from a billet 6″ × 2¼″ × 1½″ at the end.
429	,,	6′ × 5″	

Shingles.

40 bundles of 96 each, 3840 shingles to a ton ; each bundle weighs ½ cwt.

Apple Cases.

Long Apple Case—

No. to a ton,			
768	top, bottom, and side palings	2′ 4″ × 7″ × 1/3″,	26 = 1 cubic foot.
665	ends and divisions	1′ 2″ × 7″ × 7/8″,	20 = 1 cubic foot.

Timber for 90 long apple cases weighs about a ton.
Timber for 145 half cases weighs about a ton.

Dump Apple Case—

No. to a ton.			
1221	side palings	1′ 8″ × 7″ × 1/3″,	38½ = 1 cubic foot.
895	top and bottom palings	1′ 8″ × 9½″ × 1/3″,	27 = 1 cubic foot.
460	ends	1′ 3″ × 9½″ × 7/8″,	14 = 1 cubic foot.

Timber for 100 dump apple cases weighs about a ton.

HOBART PRICES.

LOGS—Per 100 feet super.

Gum or Hardwood	3*s*. 9*d*. to 4*s*.
Blackwood	10*s*.
Huon Pine	14*s*.

PILES.

1*s*. to 2*s*. 6*d*. a foot run for small.
2*s*. 6*d*. to 4*s*. 6*d*. a foot run for large.

SCANTLINGS—Per 100 feet super.

Gum, Quartering	5*s*.
„ Large	7*s*. to 10*s*.
„ Bridge beams	10*s*. to 20*s*.

ONE-INCH BOARDS—Per 100 feet.

Gum.....	Green, 7*s*.; dry, 8*s*. 6*d*.
„ Tongued and grooved ...	11*s*.
„ Weatherboards, dressed	8*s*. 6*d*.
Huon Pine, 1-inch boards.....	25*s*.
Blackwood, „	25*s*.

SUNDRIES.

Gum, Cart shafts.....	3*s*. per pair.
„ Cart felloes	8*d*. each.
„ Spokes	10*s*. per 100.
„ Fence posts	40*s*. to 50*s*. per 100.
„ Fence rails	30*s*. per 100.
„ 5-ft. palings	7*s*. 6*d*. per 100.
„ 6-ft. palings	8*s*. 6*d*. per 100.
„ Sawn lathes	10*s*. per 1000.
„ Shingles.....	10*s*. 6*d*. per 1000.

STAVES.

Wattle staves, 2 ft. 8 ins.....	8*s*. per 100.
„ 4 ft.	10*s*. per 100.
Blackwood staves, 3 ft. 2 in. ...	12*s*. per 100.
Gum Top, called White Oak, 2 ft. 8 in.	8*s*. per 100.

LIST OF TASMANIAN

Local Name.	Family.	Species.	Length and diameter of trunk.
BEECH or MYRTLE	Corylaceæ	Fagus cunninghamii	40 ft. × 2 ft. to 4 ft.
BIRCH	Sapindeæ	Dodonæa viscosa	3 ft. × 6 in.
BLACK WATTLE	Leguminosæ	Acacia decurrens	12 ft. × 1 ft. 6 in.
BLACKWOOD	„	„ melanoxylon	30 ft. × 2 ft. to 4 ft.
BOOBYALLA	Myoporaceæ	Myoporum insulare	3 ft. × 6 in.
	Leguminosæ	Acacia longifolia	4 ft. × 8 in.
BOX, NATIVE	Pittosporeæ	Bursaria spinosa	6 ft. × 1 ft. 6 in.
DOGWOOD	Rhamneæ	Pomaderris apetala	10 ft. × 10 in.
GUM, BLUE	Myrtaceæ	Eucalyptus globulus	120 ft. × 2 ft. to 6 ft.
„ CIDER	„	„ gunnii	20 ft. × 2 ft.
„ IRONBARK	„	„ sieberiana	40 ft. × 4 ft
„ MUELLER'S	„	„ muelleri	80 ft. × 3 ft.
„ PEPPERMINT	„	„ amygdalina	100 ft. × 3 ft. to 6 ft.
„ RED	„	„ stuartiana ? / „ acervula	60 ft. × 3 ft.
„ STRINGY BARK	„	„ obliqua	120 ft. × 3 ft. to 6 ft.
„ TOPPED STRINGY BARK	„	„ hæmastoma ? / „ amygdalina var.	100 ft. × 3 ft. to 4 ft.
„ SWAMP	„	„ regnans	100 ft. × 3f. to 8ft.
„ WEEPING	„	„ coriacea / „ pauciflora	10 ft. × 2 ft.
„ WHITE	„	„ viminalis	80 ft. × 3 ft. to 6 ft.
HE-OAK	Casuarineæ	Casuarineæ suberosa	4 ft. × 1 ft.
HOLLY or COFFEE PLANT	Rubiaceæ	Coprosma hirtella	3 ft. × 6 in.
HONEYSUCKLE	Proteaceæ	Banksia marginata	6 ft. × 1 ft. to 2 ft.
HORIZONTAL	Saxifrageæ	Anodopetalum biglandulosum	12 ft. × 10 in.
IRONWOOD	Oleaceæ	Notelæa ligustrina	12 ft. × 1 ft. 6 in.
LABURNUM	Leguminosæ	Goodia latifolia	3 ft. × 6 in.
LANCEWOOD	Rutaceæ	Eriostemon squameus	20 ft. × 8 in.
LAUREL, NATIVE	Saxifrageæ	Anopterus glandulosus	3 ft. × 6 in.
LEATHER-WOOD	„	Eucryphia billardieri	10 ft. × 1 ft.
MINT-TREE	Labiatæ	Prostanthera lasianthes	3 ft. × 6 in.
MUSK	Compositæ	Olearia argophylla	6 ft. × 1 ft. 6 in.
NATIVE CHERRY	Santaleæ	Exocarpus cupressiformis	6 ft. × 1 ft.
NATIVE CURRANT	Rubiaceæ	Coprosma microphylla	3 ft. × 6 in.
	Epacrideæ	Lupcopogon richei	
	Santaleæ	Leptomeria billardieri	
„ PEAR	Proteaceæ	Hakea acicularis	
„ PEPPER	Magnolieæ	Drimys aromatica	6 ft. × 1 ft.
PINE, CELERY-TOP	Coniferæ	Phyllocladus rhomboidalis	25 ft. × 1 ft. to 3 ft.
„ HUON	„	Dacrydium franklinii	30 ft. × 2 ft. to 6 ft.
„ KING WILLIAM	„	Athrotaxis sleginoides	30 ft. × 1 ft. to 6 ft.
„ OYSTER BAY	„	Frenela rhomboidea	10 ft. × 6 in. to 1 ft.
PINKWOOD or ROSEWOOD	Euphorbiaceæ	Beyera viscosa	12 ft. × 1 ft.
PRICKLY MIMOSA	Leguminosæ	Acacia diffusa	4 ft. × 6 in.
SASSAFRAS	Monimiaceæ	Atherosperma moschata	15 ft × 1 ft. to 3 ft.
SCENTWOOD	Apocyneæ	Alyxia buxifolia	3 ft. × 3 in. to 6 in.
SHE-OAK	Casuarineæ	Casuarina quadrivalvis	6 ft. × 1 ft. 6 in.
SILVER WATTLE	Leguminosæ	Acacia dealbata	12 ft. × 1 ft. 6 in.
TEA-TREE	Myrtaceæ	Leptospermum lanigerum	10 ft. × 6 in.
„	„	Kunzea corifolia	10 ft. × 6 in.
„	„	Melaleuca gibbosa	10 ft. × 6 in.
„	„	„ squarosa	10 ft. × 1 ft.
„	„	„ ericæfolia	20 ft. × 2 ft.
WARATAH	Proteaceæ	Telopea truncata	3 ft. × 6 in.
WHITE WARATAH	„	Agastachys odorata	3 ft. × 6 in.
WHITEWOOD / TALLOW-WOOD	Pittosporeæ	Pittosporum bicolor	6 ft. × 1 ft.

TIMBER TREES.—(A. O. Green.)

Strength. $S=\frac{LW}{4bd^2}$	Specific Gravity. Well seasoned.	Well seasoned samples weight per cubic ft.	Remarks as to use, &c.
		lbs.	
2712-2804	·62-·85	39-54	General carpentry, cooper's work, furniture, 2 varieties, red and white. Plentiful.
..	..	..	Turnery, inlaying, &c. Common.
2050	·9	56	Ornamental wood, with variety of colours. Common.
2300-2744	·616	37-40	A handsome joiner's and cabinet-maker's wood. Common.
..	..	..	Tough, suitable for wooden hoops, &c. Common on coast.
..	·837	52	Turners. Engraving blocks, &c. Common.
..	·744	46	Mathematical instruments, cabinet and turner's work. Common in [north.
2000-3500	·84-1·09	52-68	Buildings, railways, bridges, furniture, &c. Plentiful.
2400	·700	44	Inside work.
2400	·896	55-60	Buildings, railways, bridges, furniture, &c. Plentiful.
3200	1·001	63	,, ,, ,, ,, ,,
2600	·75-1·039	46-65	,, ,, ,, ,, ,,
2260	1·052	66	,, ,, ,, ,, ,,
1800-3600	·77-1·05	48-66	Most durable, suitable for all purposes. Plentiful.
1500-2400	·776-·8	48-51	Suitable for carpenters, joiners, house fittings, floors, &c. Plentiful.
1400-3000	·776-·85	48-54	Plentiful. Very strong wood for nside w ork.
..	..	..	Common. Capentry and fencing.
1646 / 1788	·7-.76	44-48	For carpenters, joiners, house fittings, floors, &c. Plentiful.
..	·863	54	Cabinet-maker's and ornamental work; bold figure. Common.
..	·675	42	Cabinet-maker's and ornamental work. Common.
..	·700	44	A tough elastic wood for implements, tools, &c. Common.
3000	·875	58	Pulleys and bearing blocks, similar to *lignum vitæ*. Common N.E.
..	..	..	Turnery and inlaying.
..	·801	50	Turnery and Implements. Common.
..	..	..	Ornamental work. [Coast.
3200	·7	42-44	A light, tough, and elastic wood for implements, &c. Common West
..	..	..	Ornamental work.
..	·675	42	Handsome wood, for joiner's and cabinet-work. Common.
..	·790	49	A-red brown wood for cabinet-work. Common.
..	·739	46	Turnery and tools; handsome grain. Common.
..	..	..	Turnery, &c.
..	..	..	Common North and West.
2300	·65-·7	41-44	A dense, strong pine: general carpentry. Common N. and W.
1218	·529	33	Durable pine, often handsomely figured. Common W. Coast.
1019	·336-·385	21-24	Extremely light, strong, straight-grained. Common W. Coast.
..	·625	39	A strong pine for framing, poles, &c.; very durable. Local, East
..	·75	47	Tools, turnery, &c. [Coast.
..	..	..	Ornamental and implements. [mon.
..	·652	41	Plain, light-coloured, good for carving if felled in the winter. Com-
..	..	..	A sweet-scented wood for sachets, &c. Local, North Coast.
..	·663	41	A handsome, ornamental wood for cabinet-work. Common.
..	·775	48-49	Straight-grained, elastic wood, of general utility. Common.
..	·801	50	A tough wood for implements, tools, &c. Common.
..	..	..	,, ,, ,, ,,
..	..	..	,, ,, ,, ,,
..	..	..	,, ,, ,, ,,
..	·750	47	,, ,, ,, ,,
..	..	..	Turnery and inlaying.
..	·652	41	,,
..	·801	50	Engravers, &c.