

Edited by J. S. Ogilvie, Hon. Secretary of the League



Flowers, Leaves and Fruit of Western Australian Red-gum.

CONTENTS

	Page
Forrest Bill	... 3
Shipbuilding in Western Australia	... 4
Soldiers and Forestry	... 5
Notice to Readers	... 6
Red-gum Tapping	... 6
W.E.H.	
Wattle Bark in Natal	... 7
Australian Forest League	8
The Seasoning of Timber	12
Professor Tomlinson	
Estimating rate of Growth of Trees	... 14
C. E. Lane-Poole	
An Australian Forestry School	... 16
C. E. Lane-Poole	
National Forests of the United States	... 17
Agriculture v Forestry	... 18
Professor J. W. Paterson	
The Firewood Fiend	... 19
W. C. Thomas	
Forest Fires	... 21
W.E.H.	
Paper-making Materials in Western Australia	... 22
I. H. Bous	
Avenues of Honour	... 23
Portland's Shipbuilding Record	... 23
Mallet Bark	... 24
Trees, Rain and Rivers	... 25
W. Catton Grasby	
"The Pine Tree" (Verse)	26
W. Siebenhaar	

Perth:
Barclay & Sharland Ltd., Printers,
20 Queen St.

Single Copy - THREEPENCE

PLAISTOWE'S

are interested in EDIBLE GUMS

¶ In order to arrive at a Classification for use they are opening out as BUYERS OF AT LEAST FIVE TONS for Cash

*Supplies from as many districts
as possible will be of assistance*

Plaistowe & Co. Ltd., Manufacturers
PERTH

"Crownall" Leatherware Is the Best for HARD WEAR

If you want a Trunk, Suit Case or Travelling Bag that bears that hall-mark of Quality that easily distinguishes it from the fibre article see that you get a **"CROWNALL."** They stand a tremendous lot of knocking about and are cheapest in the end.

"Crownall" Saddles and Harness are equally good, and are purely local productions. Obtainable at all reputable Saddlers and Stores

Hugo Fischer Limited THE Leather People
..... PERTH

South-West Timber Hewers' Co-operative Society Ltd. Sawmillers Timber Merchants Exporters

Suppliers of all kinds of Timber, including Jarrah, Railway Sleepers, Piles, Poles and Bridge Timbers, Building Scantlings, Flooring Boards, etc.

**Jarrah Mills at Holyoake and Asquith
Timber Yards - Victoria Park East**

We Control and Operate 80,000 acres of Jarrah Forrests

Head Office: Prince's Buildings, Perth, W.A.

Robertson & Moffat's Successors

THE HOUSE OF QUALITY

Have a Large Assortment of

Diningroom Suites Bedroom Suites
Extension Tables Hall Stands

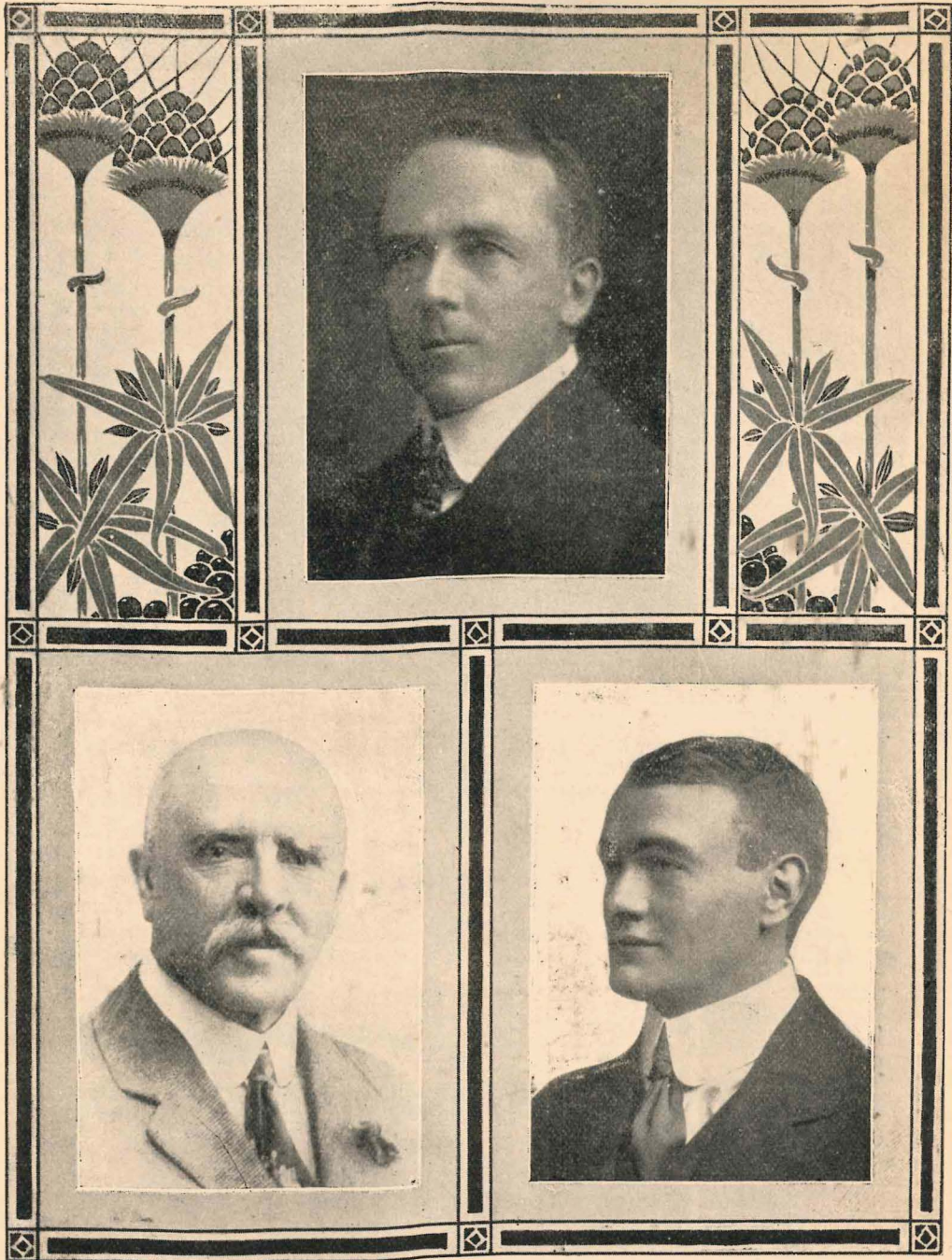
and all kinds of Furniture in

Jarrah, Shea-oak, Banksia

and other West Australian Timbers

The
Leading Furniture House

THE FRIENDS OF THE FORESTS



The Hon. R. T. Robinson, M.L.A., K.C., Minister for Woods and Forests (above)
Hon. Walter Kingsmill, M.L.C., President of the Australian Forest League (on left).
Mr. C. E. Lane-Poole, Conservator of Forests (on right).



JARRAH

THE OFFICIAL JOURNAL
of the
AUSTRALIAN FOREST LEAGUE
PERTH
WESTERN AUSTRALIA

Edited by J. S. Ogilvie, Hon. Secretary of the League.

Vol. 1

NOVEMBER, 1918

No. 3.

Jarrah

Subscription - 2s. Per Annum. Single Copy. 3d.

Correspondence and contributions on forestry matters are invited from members of the League and others interested in forestry and cognate subjects. "Jarrah" has no politics. It knows only forests and forestry, but it will gladly welcome the assistance of patriotic politicians in its propaganda. Questions on matters relating to forestry are invited and will be answered, and suggestions for increasing the usefulness of "Jarrah" will be carefully considered. No responsibility is accepted for opinions expressed or conclusions arrived at by contributors or correspondents.

All communications should be addressed to:

THE EDITOR, "JARRAH."

WEST AUSTRALIAN CHAMBERS,
ST. GEORGE'S TERRACE,
PERTH.

The Forest Bill.

IN the last issue of "Jarrah" reference was made to a Bill about to be introduced into Parliament for the better protection and management of our forests. The Bill has passed both Houses, and at time of writing the Assembly is considering certain reactionary amendments agreed to by the Legislative Council. In the course of its passage the Bill has undergone alterations so disastrous that what was intended as a protection has been turned into a potent

weapon of destruction. The framers of the Bill entered upon their task with the single-minded object of bringing into existence appropriate machinery for betterment, and to secure the adoption of methods of conversion which would put an end for ever to reckless and wasteful exploitation, and by so doing place the forests in such a position that they would remain for all time the basis of a great industry. These most laudable intentions have been wholly frustrated by the deliberate excision of the protective clauses, and by the inclusion of alleged amendments, the effect of which will be not only to nullify the purposes which the sponsors of the measure had in view, but also to hand the forests over to the tender mercies of some of their worst enemies. The sleeper-hewer is admittedly the most wasteful exploiter working in the forests. The Bill did not contemplate wiping him out, but it proposed to restrict and regulate his operations in a way that would reduce the mischief to a minimum. As amended, the Bill leaves the hewer practically free and unrestricted, and with greater liberty to destroy than he possessed before. Parliament has in this failed most lamentably in its duty to the community. Members would not, or could not, grasp the broad economic issues that were involved. They

refused to regard the matter from the standpoint of national welfare, and persistently looked at the question from the purely sectional and traditional viewpoint.

There is no greater menace to forest stability than fire. The Bill provided reasonable measures for dealing with and thwarting this ruthless enemy. The precautions contemplated were not nearly so stringent as those to be found not only in Forest Acts of other States of the Commonwealth, but in every Forest Act in every civilised country. Parliament, however, with reckless indifference to or culpable ignorance of world experience, and with no consideration for this State's financial welfare, emasculated the fire protection clauses to an extent which reduces them to impotence. The effect of all these calamitous amendments of a fair and equitable measure can be no other than paralysis of the administration of the forests. No forest policy can be laid down and adhered to when destructive agencies are at liberty unhindered to work their evil ways. Classification of the forest has been reduced to a farce, and working plans are useless, since the timber-hewer, operating at his own free will and absolutely without any kind of control in virgin as well as cut-over forest, may enter and in a short time render the finest forest country useless for milling purposes. Parliament in its treatment of the Forest Bill has signally failed to rise to the occasion, and has wilfully flouted its responsibilities to the country. The Legislature was asked to conserve a great national heritage, and it replied by providing effective means for the speedy destruction of that heritage. Under the old Land Act Regulations, which the Forest Bill is intended to supersede, there was some attempt to control reckless waste and wanton conversion, but even this slight measure of safeguard is now to be swept away, and the forests are to have less protection than they ever had at any period in the history of the State. The forests form the one visible and tangible item in the State's natural heritage, and upon them and their permanence the financial good name of Western Australia abroad has depended to a very considerable degree. Forgetting this, or careless of it if it were remembered, the duly appointed

guardians of the country's interests propose deliberately to offer the forests as sacrifice on the twin altars of political expediency and economic ignorance. The passage of the Forest Bill has furnished an amazing spectacle of legislative ineptitude. But in both Houses there are those who love the forests and who would foster them. These have remained true and faithful, and they fought valiantly to save the woodlands for the country and its people. In the Lower House the Minister for Woods and Forests, Mr. Robinson, did splendid work, and in the Upper House Mr. Kingsmill and Mr. Grieg pleaded eloquently and protested strongly against the destruction of the State's finest asset. But their efforts were fruitless against the leaden dead-weight of uninstructed opinion and prejudice. To those who fought so manfully and so disinterestedly "Jarrah" offers its sincerest thanks.

Shipbuilding in Western Australia.

IN the last issue of "Jarrah" reference was made to the hopeful fact that shipbuilding, an old art in this State, was to be revived, that a company had been formed for the purpose, and that orders for six vessels at an aggregate cost of something like £400,000 had been received from the Federal Government by the company. For a while matters seemed to be tending to a successful fruition, when a little cloud arose on the company's horizon, and this cloud continued to grow and became so threatening that the shareholders of the company came to the conclusion that it meant disaster for them, and at the beginning of November a meeting of shareholders was held, at which it was decided that the company should go into liquidation. The reason for the failure of the concern to proceed to active operations, according to speeches made at the meeting at which liquidation was decided upon, was given as labour troubles. These certainly have been annoying enough.

The first of them arose in connection with the proposed shipbuilding site alongside the railway bridge at Fremantle. This

site, as can be well understood, required levelling and other preparation before it could become suitable for a shipyard. Men were put on for the purpose of effecting this work, and within a few days they ceased operations, because they did not think the conditions and wages favourable enough. This was the first trouble which met the new company.

The Federal Government, in placing the contract for six vessels with the company, made it an essential condition that the Labour Unions interested in shipbuilding should be first consulted, and that their agreement should be secured to a set of working conditions and scale of wages drafted originally by the Federal Authorities, and now said to be in force in yards on the other side which are building ships on Federal account. The unions here took exception, it would appear, to certain of these conditions. A representative of the Federal Government visited this State in order to explain matters and to try to effect an adjustment. His efforts did not accomplish the desired end. Many conferences were held between representatives of the shipbuilding company and the unions interested here, with the hope of reaching a satisfactory conclusion. All these conferences proved abortive. The unions wanted something which the company did not feel inclined or able to give, and it seems that no middle course was discovered which would satisfy all parties. The company, therefore, abandoned all hope of being able to build ships in Western Australia, and, as has been said, decided to liquidate.

The mischief seems now to be irreparable, and it is useless to attempt to apportion blame or to point out that, if this or that course had been taken, or if one side had been more conciliatory or another had had more faith, this disastrous ending would have been averted. The fact remains that shipbuilding in this State, for the present at least, is to still continue a lost art. This is deplorable in many ways, and constitutes far and away the worst advertisement Western Australia has secured for many a long day. One cannot take up an American, a Canadian, or a British newspaper without coming across long accounts of the concrete results that have been achieved in

the matter of shipbuilding. In none of these countries has the tremendous effort made to repair the shipping wastage caused by the war escaped difficulty of one kind or another, but in every case it has been possible to arrange or surmount the difficulty, and in no instance have obstacles been allowed to convert a fair prospect into permanent disappointment and disaster.

In this matter no blame can be attached to the State Government. The Ministry gladly signified its faith in the State and in its ability to construct ships, and it willingly and cheerfully pledged itself to assist the company financially. But the Government was not a shareholder in the company. It had no voice in the management, therefore had no vote at the meeting which decided that the company should drop the business. It is pretty safe to assert that if the Government had had a voice in the conduct of affairs that voice would have been raised loudly against the abandonment of a proposition which promised to be of the greatest value to the community now and in the years to come.

Soldiers and Forestry.

In the beginning of this year a Committee was appointed by the Commonwealth Government to consider the question of the employment of returned soldiers on forestry work. The Committee dealt exhaustively with the subject and brought in a report containing certain recommendations. Copies of that report were sent to the Governments of all the States. One at least of the States—New South Wales—has taken the matter up. In the report of the Forestry Commission, New South Wales, for the year ending June, 1918, the following paragraph appears:—

“Employment of Returned Soldiers.—An arrangement was entered into with the Commonwealth Government for the employment on forest works of physically capable returned soldiers, the State Government undertaking to provide camp accommodation and utensils, to pay the award rates of pay, and to bear 75 per cent. of the cost, while the Commonwealth Government provided personal equipment and expense of transit, and bore 25 per cent. of the cost. Under this arrange-

ment, provision is being made for the employment of 200 returned soldiers in various parts of the State."

Under the scheme proposed by the Committee the Commonwealth was to bear almost the whole cost of the equipment of soldiers taking up work in the forests, the States being asked only to pay them for work done, a request which, of course, is quite reasonable, as such soldiers would be employed only upon work that would, if not immediately, certainly in the future, make handsome return for the money expended upon it.

So far as can be learned, Western Australia has as yet done nothing, the reason doubtless being that not sufficient legal machinery existed to enable the Government to employ this labour. The Forest Bill provides this machinery, and it can scarcely be doubted that the Minister for Forests and the Conservator will not long delay the employment of a considerable number of men in our forests. There is an abundance of work urgently in need of accomplishment in the forests of this State. There are something like one and a half million acres of cut-out country awaiting attention, and there are other directions in which the forests stand in need of attention. No better form of repatriation can be undertaken than that of forest work, either for the soldier or the community.

Notice to Readers.

The Committee of the Australian Forest League are very desirous that "Jarrah" should be a self-supporting publication, and they wish to return thanks to those Companies and Firms who have given support to this publication by advertising in its pages. By way of expressing some recognition of the public spirit of these advertisers, it is hoped that members of the League and others who read "Jarrah" and all lovers of forests will keep these advertisers in mind when making purchases of the goods they supply.

Redgum Tapping.

(By W.F.H.)

When the Western Australian Branch of the Commonwealth Advisory Council of Science and Industry first took up the question of the utilisation for tanning purposes of the kino which exudes from the redgum tree (euc. Calophylla), the methods of recovering the kino also came up for consideration. The two pictures on this page show two crude processes. It will be seen that an auger hole has been bored just under a "nigger head" on the butt of one of the trees, and the neck of a bottle has been inserted. The "nigger head" is a peculiar excrescence often seen on redgum trees, and, when first tapped, yields large quantities of gum. The first gum which flows down goes round the neck of the bottle and hardens, thus hermetically seal-



ing the bottle in the hole. The gum then flows into the bottle in a liquid state and remains liquid. This method of recovering it applies only to "nigger heads," but for smooth stemmed trees the method shown in the second picture, though also crude, is better. This method consists in putting a V-shaped groove vertically in the tree as shown. At the bottom the groove is "undercut" and a galvanised iron chute leads the gum which flows from the groove into the bottle. The bottle and chute are held in position by means of nails and thin wires, as is also the cover for the groove and bottle. This cover, which is shown hanging on the left of the groove, is used to keep rain, pieces of bark, and so on out of the groove and the bottle. The covers have a flange turned over at the top which is arranged to fit snugly under the bark at the top of the groove.



Wattle Bark in Natal.

In order to obtain a proper idea of the magnitude of the wattle-bark industry in Natal, it is advisable, first, to study the following table giving the quantity and value of the wattle-bark shipped from South Africa during the past five years:—

Year.	Amount. lb.	Value.
1911	111,205,265 ..	£289,557
1912	118,219,023 ..	£283,060
1913	145,717,738 ..	£309,328
1914	130,216,826 ..	£286,399
1915	89,661,464 ..	£195,244

Practically the whole of the bark was shipped from Durban (with the exception of a few tons from Delagoa Bay), and was almost entirely the product of Natal plantations. There is comparatively very little wattle bark used for tanning or other purposes within the Union, so that the above figures represent nearly the whole output of bark from this industry.

It will be seen that the exports during the past two years have seriously decreased, chiefly owing to the difficulty of obtaining shipping tonnage, so that it is safe to assume that the output, under normal conditions, at the present time would approximate to 150,000,000lb. per annum.

In Australia the wattle is highly popular, and wattle day is observed in all the States. In South Africa, where until a few years ago wattle was unknown, the sentimental aspect of the shrub has no place at all in the public mind, but its value as an article of commerce is highly appreciated. The time seems to have arrived when Australia might well unite sentiment and business. There are not many farms in Western Australia that have not some land suitable for wattle culture.—"Bulletin of the Imperial Institute."

Sometime the employer will see that it is not a bit more important to have a foundation under the machine a man operates than it is to have the foundation of a home under the man who operates it.

Let us have not only some patriotic speeches at association meetings but also some patriotic acts.

Australian Forest League. Annual Meeting.

The Annual Meeting of the Australian Forest League (Western Australian Branch) took place on the 26th September last in the Biological Lecture Room at the University, Perth. There was a large attendance of members, and the President, the Hon. Walter Kingsmill, M.L.C., occupied the chair. Apologies were read from the Hon. Minister for Forests and Professor Dakin, who were unavoidably prevented from being present. The adoption of the Report and Balance Sheet was moved by Mr. A. J. McNeil, Vice-President, and seconded by Mr. G. T. Poole.

In moving the adoption of the Annual Report and Balance Sheet, Mr. A. J. McNeil said that he had much pleasure in asking the meeting to adopt the Report and Balance Sheet. The League, though only a year old, had done remarkably good work, and was going to do very much better work in the future. The principal event of the year so far as the forests of the country were concerned had been the introduction of the Forest Bill now before Parliament. He welcomed that Bill as a measure likely to do a great deal of good. At the same time, he did not think that the claims of those who had used the forests should be forgotten. The sawmillers and cutters may not have always been perfectly wise in their actions, but, take them as a body, they had conferred very considerable benefits upon the State. They had built railways and tramlines that have been and will be of the very greatest value to the country, and the presence of the sawmillers in the bush had had a decidedly stimulating effect upon settlement all through the South-West. The chief object of the Forest Bill was to dedicate prime forest lands to timber for ever and ever. This, he held, was a most worthy object, and history was full of instances of disasters which have fallen upon countries that have utterly destroyed their forests, leaving nothing for the future. For the Bill we had to thank the Minister and Conservator of Forests, and if it went through, as he hoped it would, then we would have the satisfaction of knowing that the future of the timber industry of this State was safe. The Conservator would have plenty of country to work upon and plenty of country on which to spend the money with which the Bill would provide him. The royalties paid by sawmillers and others since the start of the timber industry in Western Australia had in the past been put into general revenue. About 12 months ago the Government signified its intention of increasing the royalties, giving as the reason that they were going to spend the extra money collected on forest work. The money, he was in a position to say, had never been spent for that purpose. It may be that the Government will try to get hold of some of the money which the Bill specifically says shall be spent on forest work, but he trusted

that the President of the League would see that nothing of that kind occurred, and that the money allocated to the forests was kept strictly to the purpose intended. There was need to conserve the present forests, and there was also great need for the expenditure of a few thousand pounds on planting trees that did not belong to Western Australia. The Conservator might be confidently left to attend to this. He was sorry that, when the Interstate Forestry Conference was held in Perth, he was away from home. He thought that these trained forest officers should be supported in their work, not only by proper legislative enactment, but by the public. He was of opinion that at these conferences the Forest League in the capital where the meeting was held should be invited through its officers to take a share in the deliberations. He was strongly in favour of such functions as Arbor Day, and he noticed that something was said in the Bill regarding this. It would be to the national good to celebrate such days by the planting of trees at schools and other selected places. He thought there was no reason why in the matter of timber production foreign trees might not be planted to an extent that with the native trees would make Western Australia independent of the foreigner. He mentioned the case of an acacia which until recently grew at one of Millars' mills and was cut down. The wood of this tree turned out to be extremely tough and eminently suited for axe handles, and he thought this case should be borne in mind when tree-planting became a practical proposition. He was glad to be able to state that there was every probability that a Forest Products' Laboratory would very soon be in full swing in this State. Such a laboratory would give an immense impetus to the timber industry, and by pointing out new methods of saving what formerly has been wasted, and of dealing with forest products, including raw timber, would become an economic agent of the highest importance in the State. He thanked the Minister and the Government and all those who had worked hard to get the laboratory here for their services. In conclusion, he expressed pleasure in seeing so many lovers of forests present, and he hoped that each and all of them would induce their friends to join the League. The usefulness of the League depended altogether upon the support the public gave it.

It was moved by the Hon. J. A. Greig, M.L.C., that Messrs. G. T. Poole and T. J. Breen be and hereby are appointed members of Committee in room of Dr. Stoward and Mr. E. A. Mann, resigned. The motion was seconded by Professor Ross and carried unanimously.

The President then delivered his Annual Presidential Address. Mr. Kingsmill said:—

I have the honor and the responsibility—I feel them both deeply—of addressing a few remarks to you which are dignified, I think unjustly, by the name of an Annual Address. Before I do so, I should like to take this op-

portunity to thank the Members of the League for having paid me the honor of electing me as their President, and that, too, in my absence. With regard to this Annual Address, the first thought that comes into my mind is how to deal with so vast a subject embracing as it does so many branches, in a time commensurate with the wishes and desires of my audience, and I feel that the magnitude of my task in condensing into a few minutes—for I intend to speak for only a few minutes—all that could be said on this subject is almost appalling.

With regard to Forest Leagues, we have in this State or in Australia no monopoly of these Leagues. In every country where forestry has formed the subject of discussion and consideration, and we as part of the British Empire are amongst the last to fall into line, forest leagues have been formed and are now in existence for the purpose of aiding and helping in the work which Forestry Departments and those in authority have to carry out in this direction. In Europe, in America, in Asia—I refer now to Japan—and in India, forest leagues exist and are doing good work. It is worthy of note that, in Japan, an Act was passed, in 1907 I think, which rendered it compulsory for all holders of any sort of license to be members of forest leagues. Our own Australian League, of which we are an affiliated branch, started in 1911. This branch has had a sort of double life, by which I do not mean to imply anything unpleasant. It started some years back and did very good work indeed. While we cannot altogether claim that the Forestry Bill has emanated from our Forest League, it is true that the objects of the Bill and objects of the League coincide. But we can claim that the League, which started, existed more or less precariously for a year or two and then faded into a state of suspended animation, impressed on the Government of the day the necessity for, firstly, the appointment of a Conservator, and, secondly, the removal of the control of forestry from the Lands Department, which from its very essentials was inimical to the Forest Department, to the control of another Minister. These two things, at all events, the former League can congratulate itself upon. The League has also taken a step which has proved, I am glad to say, surprisingly successful in issuing the little publication which most of you have seen. When I say surprisingly successful, I look upon it more or less sordidly, from the financial standpoint. That publication, we hope, will be self-supporting. When Mr. Russell Grimwade, who was here the other day, learned that this publication was practically self-supporting, he was agreeably surprised. It may be taken as a matter of some little credit to our League that we have done so well in this direction.

I must thank the Vice-President for the way he has spoken in this matter, is a most important one in the history of Western Australia, because the question is being decided with regard to our forests whether we are to

stand still—and this means to go back—or whether we are to go forward. I thank Mr. McNeil all the more because it might reasonably have been expected that he, representing as he does very large interests with regard to the exploitation of timber areas, might have felt himself, though not rightly I think, aggrieved at some of the conditions contained in the Bill. After all, when you wish to go ahead from an imperfect state of forestry to a perfect state, there must be restrictions placed on the holders of permits and licenses and concessions at present in existence, which might prove somewhat irksome to them and to which they might be expected to object. Therefore, I honestly thank Mr. McNeil for the generous attitude which he has taken up in this connection. Let me say that I do not think it is in the minds of the Government—I speak thus far as one without authority—I am sure it is not in the minds of the League, that any injustice should be done to the holders of present rights, but we have to remember that for the future—and we have to deal almost entirely with the future, remembering that we are holders only in trust of this great asset—we have to see that this asset is used to the best advantage, and I am sure that if any hardship is done to anybody it will be done in as fair and equitable a way as possible, and, for one, I do not think any great hardship will ensue.

Britain's attitude in the past with regard to forestry has been a peculiar one. England has always been a sort of spendthrift among Nations. I can imagine Britannia sitting on her island throne and, when the matter of a few sticks of timber was in question, saying: "What matter these little things? My sons will get me more forests." Her sons, again scattered through various countries, say, "What matter these little things. Hew, burn, and be merry, for to-morrow we'll take up another country." That has been her attitude, and it has formed an incentive which has gone far towards the creation of the greatest Empire the world has ever known, or is ever likely to know. But it behoves us now, all of us, more especially when through the stress of circumstances the necessity for being self-supporting is brought home to us, to see that no asset is neglected, that the prudence which has been displayed by other countries in this connection should be emulated by us, and that in the future we should endeavor to do everything that lies in our power to develop and husband our own resources.

It is a strange thing that we are endeavoring to do to-day what France did somewhere about 1670. It is an interesting fact to note—from the forester's point of view perhaps it is a somewhat humiliating fact—that we are so many, not years but centuries behind in tackling this subject, which history shows us was undertaken in France about 1670, when the first forest laws were introduced.

In India, which was the first part of the British Empire to deal with forestry, and which to date has been the most successful, a Forestry

Department was formed in 1864, in South Africa in 1883, in the United States of America, which we are proud to be able to think of as closely allied to us, in 1876. Regarding our arch-enemy of to-day, I am unable to state exactly the date she started forestry, but it is a peculiar thing, and it is one of the matters that makes that arch-enemy to-day so hard to beat, that she has paid particular attention to the matters I am speaking of, that we have to go to her as an exemplar in the art and the science of forestry. This is no idle fad that we of the Forest League in Western Australia are pursuing. If we look at it in the proper light we gain an impressive lesson. Germany has of the whole of her territory 26 per cent. covered with forests, some privately owned, but principally State forests. She has about 35 million acres under forests and receives therefrom a gross revenue of £21,000,000 sterling. Of that £21,000,000, after paying about £5,000,000 annually for forest expenses, she reaps a net revenue of £16,000,000 per annum. The capital value of the German forests may therefore be taken at about £400,000,000. Whether due to the forests or not, as some authorities say it was, Germany entered this war with a national debt of £270,000,000 as against our national debt at the beginning of the war of very nearly £700,000,000. These are figures which may well give us a good deal of thought. Of course, the German forests, as in the case of any other forests, were not raised in a day, but when we see of what national importance forests may become, does it not give us something to work to, does it not give us an assurance that we are not following, as I have already said, the idle fads of enthusiasts, but that we are really concerned with something that means a very great deal to this country and ourselves, and which it would be economically criminal to neglect?

With regard to the forests of France, which is the other great European example, her percentage of area is very much less and has been decreasing, and during the period of war unfortunately a great deal of it is wiped out. Her percentage of forest area is only 18 per cent., but it is to us extremely instructive, because the forests of France are almost entirely devoted to the cultivation of hardwoods. When people talk of forestry they very often are apt to talk only of the cultivation and conservation of softwood forests. But we find that France has made a complete success of the cultivation and conservation of her oak forests, and that is a cheering item for us to think of, because we have, as Mr. McNeil has pointed out, the greatest untouched area of hardwood forests in Australia. We have done, fortunately for us, less to ruin and destroy our forests than any of the other States, and, that being so, it is a cheering thing to find that France is doing as much as she is with her hardwood forests. I have said that, if any movement is to be successful, it must have the interest of, and win to its favor, the public mind. Now, in France and Belgium they have

a very inexpensive and lucrative way of doing this, by what are known as suburban forests. The two greatest suburban forests are those at Compiègne and Fontainebleau. These two forests are not run alone as a luxury, they are run as a revenue-producing concern, and you will no doubt be surprised to know that the net return, after paying all the forestry expenses, the expenses of silviculture, afforestation, and conservation and all sorts of improvements, is no less than £1 per acre per annum. I know plenty of farmers in this country who would be very satisfied indeed if they could get £1 per acre per annum by wheat growing, and when we find that this is the result of the conservation of hardwood forests it gives us again something to think about.

Of course, we must realise that these things are not for us, in our generation, but we have to remember, as I have already said, that we have to consider not alone the immediate present. We have to hand over to those who come after us this State of ours not only in as good a condition as we received it, but, we hope, in a better and constantly improving condition, and that being so is there any further doubt of the utility of a League such as this, whose very existence is to strengthen the hands of the people who wish to carry out this good work?

There is on the table a work that has been alluded to in the circular which accompanied your notices of this meeting. This is "A Discussion of Australian Forestry, with Special Reference to Forestry in Western Australia," by Mr. D. E. Hutchins. I have had the privilege of knowing Mr. Hutchins practically ever since he came to Australia. I have read his book with much interest. It is a book which causes the ears of those who have been interested in public affairs for any length of time to tingle. He makes attacks on those in authority for the neglect of Australian foresters which have brought him, I understand, a good deal of unpopularity in certain circles in Australia. In fact, in one State, I might say, his work is looked upon almost as a "proscribed book." He is a man who, I suppose, is the forester with the most wide experience in Australia to-day, an experience which, acquired in France, was continued in India, was amplified in Africa, and now is being finished in Australia. That being so, we are bound to take notice of what he says. This is a wonderful work. I was wondering how long it took to write, because the amount of research contained in it is absolutely marvellous. The amount of information contained in it is also wonderful. The warnings it holds out are worth reading, and he paints two pictures, the Australia of the future under good forestry and the Australia of the future under neglected forestry. He says that, with a reasonable degree of skill and assiduity in carrying out our duties to the State by encouraging our foresters, we may be able, after reaching the full stage of development, to derive from them no less a revenue than £12,000,000. That is for the whole of Australia; we, of course,

would have our proportionate share. At an annual expenditure of £4,000,000, he says that those actually working in and on the forests will amount to 25,000 souls, which means, I suppose, over 100,000 dependent on the forests. I think his estimate in this direction must be a good deal under the mark, because it is a fact that, in these German forests I have alluded to, a population of 5,000,000 people gain their living from and through forestry, 1½ million of whom are directly working in the German forests, and 3½ million of whom are directly dependent on them. On the other hand, he says: Neglect your forests and in thirty years you will lose—that is, you will not have made—no less a sum than £588,000,000. It is worth thinking about when you get facts such as this put before you by a man who proves to the satisfaction of any reasonable person that what he says is true. We are faced with the problem: Which road are we to take? I do not think there need be any hesitation in our answer.

Well, now, there are other objects, of course, which I will not have sufficient time to fully deal with. There are one or two objects, however, to which I must allude. I cannot help thinking that in this State of vast distances, of huge vacant spaces, the Forestry Department and this Forest League may do something towards putting these vacant spaces to some proper and legitimate use. I am perfectly certain that there can be found some way of utilising these lands to a far greater extent than they are at present, and I say that this League and the Woods and Forests Department are the proper persons to start investigations and to start other people investigating in that direction. I feel sure there is an admirable field of work there, and that we can do a very great deal to improve that country, so that we can make, if not the "wilderness to blossom like the rose," at least we can make some much better use of it than is being made at present.

One of the things that has caused me and caused everybody who takes an interest in this State a great deal of regret is the waste of a great amount of our milling produce, and in this regard I rejoice with Mr. McNeil that the first Forest Products' Laboratory which will be erected in Australia will be in Western Australia. I look upon this as a decided step forward, and I think it has been a very graceful act on the part of the Federal Government that this Forest Products' Laboratory should come here. Although amongst the last of the States as regards population, still when forestry is mentioned we can proudly take our place with the best of them.

Now I have but little more to say. The thanks of this League are due to very many persons indeed. I propose to particularise a few of them, but in picking out those whom I do I do not by any means wish to exclude very many others whom I do not mention. I want to express, on behalf of the League, our thanks amongst others to the representatives of the King in Australia. The Governor-Gen-

eral has been of very great assistance to forestry throughout Australia, and has been very kind indeed to this League. Our own State Governor has taken the keenest interest in these matters. In the Hon. Minister for Woods and Forests we have a gentleman who has tackled this matter with a great deal of interest and a great deal of energy, and I feel impelled to thank him for the direct assistance he has given to this League and for the great assistance which he has given to Australian forestry generally and Western Australia forestry in particular.

Now I come to a subject with which I feel a certain amount of diffidence in dealing. That is when I mention the name of Mr. C. E. Lane-Poole. I feel diffidence because my remarks may be influenced to too great an extent, though I do not think so, by my personal friendship for that gentleman. In thanking him for the many kindnesses he has done for this League, I cannot help thanking also the Hon. Mr. Collier, who appointed him to his present office. Having been present in an unofficial capacity at the Forestry Conference which was held here last year, I could not but be impressed by the quality of our Conservator of Forests, and most of all by the deference which was paid him by the other foresters of Australia. I think he is a man we should be proud to have amongst us. Personally, I am rejoiced beyond measure to see him in charge of the forests of Western Australia.

I have already said something about my friend on my left, the Hon. Secretary. Now, Mr. Ogilvie is a master of what I can only describe as organised enthusiasm. Enthusiasm is good, organised enthusiasm is the best brand of the article you can get, and Mr. Ogilvie has it in a marked degree. I have very great pleasure in thanking Mr. Ogilvie, whose services are absolutely invaluable.

Mr. Catton Grasby has been extremely kind, also, in allowing us to use his office for the meetings of the League, and those meetings have not been few. Professor Dakin, who is away at Beverley investigating an important subject to this State, the disease amongst sheep in that locality, has been good enough to give his active support to this League, and also to obtain for us the use of this his lecture room for our meeting this evening. I should like to thank very much indeed those ladies and gentlemen who have been good enough to contribute, in a purely honorary capacity I need hardly mention, articles for our little periodical.

Now, ladies and gentlemen, that concludes my remarks, with the exception that in my opinion the future of the world belongs to those Nations who best apply, as Mr. McNeil has put it, science to the utilities of daily life. That is a thing we are only beginning to realise at this late day. But, if we are to take our place and keep that place with any credit to ourselves and our Nation, we must make the utmost use of science as science is being used in other countries. Applied science is the secret of success, and I hope the members

of the League, not only as members of the League but also as private citizens, will set themselves to support those people who are working up the knowledge we have in this connection. By so doing this League can be just as patriotic, can carry out the wishes of the Empire to just as great an extent, as any other way I can think of.

A vote of thanks was moved by the Hon. H. P. Colebatch, Colonial Secretary, to Professor Dakin and the authorities of the University for their kindness in allowing the League to use the Biological Lecture Room for the Annual Meeting.

A vote of thanks to the President concluded the proceedings.

The Seasoning of Timber.

Kiln Drying.

(A/Professor Alfred Tomlinson, M.Sc.,
Assoc. M.I.C.E., M.C.I.)

WITHIN recent years considerable interest has been awakened in the timber industry in connection with artificial methods of seasoning timber. The West Australian aspect of this interest is largely due to the untiring efforts of Mr. Lane-Poole, the Conservator of Forests, who realised that the old methods were unsatisfactory and inadequate, and that research and investigation were imperative.

The hard, tough wood of the Eucalypts present, it is believed, an unusual range of possibilities. Undoubtedly progress and development in the past have been retarded owing to the comparative failure to successfully season them. Seasoning, as is well known, refers to certain processes designed to remove water from timber in order to *cure* the wood and prevent decay and subsequent working and shrinkage. It is certainly remarkable that our local hardwoods are used and exported when green, when uncured and consequently quite untrustworthy, while imported timbers, generally softwoods, are almost invariably seasoned and cured and in a reliable condition.

However, until recently proper methods of seasoning received little commercial attention, and very large losses, especially among woods that are difficult to dry, were the result. The losses which have hitherto occurred in drying timber through checking or cracking, warping, honeycombing,

staining and rotting are much greater than one would suppose, and the importance of right methods is apparent. It would be hardly correct to state at the present time that this loss will be entirely eliminated by proper kiln-drying, but it is safe to say that it will be greatly reduced. It is believed that Jarrah, and other hardwoods, can be cured (i.e., prevented from warping and checking, and thoroughly dried) by the artificial method used in the experimental kilns at the Engineering Department, University, Crawley, and at Millars' Nash Street Timber Yard.

The W.A. native timbers suitable for construction contain when freshly cut from, say, 50 per cent. to 250 per cent. moisture, reckoned on the dry weight, and a moisture content of over 15 per cent. renders wood unsuitable for most purposes. The moisture content of the so-called "thoroughly seasoned" local timber is seldom under 25 per cent., but with the artificial kiln process it is easy to reduce to 5 per cent.

It is believed that, unless special precautions are taken, natural seasoning of hardwoods in W.A. must produce unsatisfactory results. The climatic conditions obtaining in this State militate against the proper control of "yard" seasoning operations. Under existing conditions a hard, impervious skin is formed on the surface of the timber, and this prevents the inner wood from drying. By carefully storing and shielding the timber from the sun and wind and arranging for the surrounding air to be always moist—approximating to conditions which are under proper control in the kilns at Crawley—moderately successful results may be obtained after a considerable period of time. It is noticed that the operation, however, is more or less of a haphazard nature. One of the problems in drying is to prevent the moisture from evaporating from the surface of the timber faster than it is brought to the surface from the interior. Otherwise the outside becomes drier than the inside, and the resulting unequal shrinkage causes the surface to open up in checks or cracks.

Drying, then, must commence at the heart of the piece of wood and work outwards, the moisture being removed from the surface just as fast as it exudes from

the pores of the wood, and obviously the humidity of the surrounding air will be the controlling factor. It is evident, therefore, that reliability alone can be obtained, in hardwood timbers, by the definitely controlled artificial methods of seasoning.

It must be recognised that drying wood is not merely a matter of evaporating moisture, as is the case when drying, say, fabrics. The physical behaviour of wood under heat treatment is very complex. Only shrinkage effects, however, will be mentioned, for they are the most important. Observation on pieces of timber shows that shrinkage in the tangential direction is much greater than in the radial direction. This, together with the invariable presence of blemishes and irregularities in the arrangement of wood elements and distribution of moisture content, adds to the problem, which obviously is to dry without distortion rather than simply to dry.

The Eucalypt hardwoods have a very complicated structure, and this, together with their excessive moisture content, renders the operation of drying difficult compared with the relatively simpler structured coniferous woods.

For a kiln to give satisfactory results, it is necessary that the *three* fundamental important conditions, viz., Humidity, Circulation, and Temperature, should be under proper control. If any one of these conditions is faulty, bad results must be expected. It is seen that considerable research work will be necessary in order to determine the working values of these conditions for the treatment of the varying species of timber. The investigations on Jarrah are not yet complete, although it is known that this timber can be properly seasoned or cured.

Humidity is of prime importance. As before stated, it is necessary that the surface of the wood should not dry more rapidly than the moisture transfuses from the centre to the surface, otherwise checking and a diminished rate of drying will ensue.

Circulation, of course, is necessary for drying to take place at all. The evaporation of moisture requires heat, and this must be supplied by the circulating air. Again, it is necessary that the moving air come in contact with every portion of the timber to be dried. If the air stagnates when in con-

tact with the timber the temperature will drop and the humidity rise to a condition of saturation, so that drying cannot take place and the timber will rot. The proportioning of the kiln as well as the arrangement or piling of the timber to be dried is thus seen to be of extreme importance. Experiments here have demonstrated that inclined piling gives the best results, for it assists circulation in a natural manner.

The *Temperature* depends upon the species and condition of the timber. Obviously it is advantageous to have as high a temperature as possible, both for economy of operation and speed of drying, but the physical properties of the timber will govern this. Many species, including Jarrah, cannot be dried satisfactorily at high temperatures on account of their peculiar behaviour.

In choosing a kiln the three fundamental conditions mentioned above must be given the first consideration. There are dozens of different makes of dry kilns on the market which fulfil more or less the fundamental requirements. It is believed, however, that only the kiln based on the *Tiemann principle directly controls what is considered to be the most important of the conditions, namely, the humidity. The experimental kilns at University, Crawley, and Millars' Nash Street Yard were designed to control the three fundamental conditions of Humidity, Circulation, and Temperature, using the Tiemann principle.

In subsequent articles the construction and working routine of these kilns and accessories will be described, together with the details of the various operations and the results of investigations achieved to date.

* H. D. Tiemann: United States Forest Service.

The Great Northern Paper Co. has leased the New Royal Hotel in Bangor, Me., and will establish there a school for woods camp cooks and a hospital for the company's employees. Under the new Government food regulations special instruction is necessary for the camp cooks, and it has been decided to school them all here instead of separately at the camps.—"American Lumberman."

Estimation of the Rate of Growth of Trees by Stem Analysis.

(By C. E. Lane-Poole, Conservator of Forests, Western Australia.)

IT is an unfortunate fact that the bulk of Australian eucalypts do not lend themselves to this system of estimation. There are exceptions, of which mountain ash (*euc. Delegatensis*) of New South Wales is one*, but, in most cases, eucalypts do not appear to have any distinct period of rest during the year, with the result that there are no well-defined annual rings.

The stem analysis system will, however, be of interest to readers of "Jarrah," showing as it does the way a tree grows in height, diameter, and volume. The tree that has been taken as an example of this system is the common Monterey Pine (*pinus insignis*), which has been planted so widely throughout the South-Western Division of the State. If one of these trees is cleanly felled close to the ground, it is possible at once to arrive at the age of the tree by counting the annual rings on the surface of the stump. Every year the tree increases its girth, and owing to the fact that there is a distinct difference between the spring and autumn wood, a clearly defined annual ring is found. If the log is again cross-cut higher up the bole and the rings on the new section exposed are counted, it will be found that the number of rings is less than at the butt. It is clear that the tree has taken a certain number of years to reach this height. Thus, if the butt section shows 35 rings and the section at 60ft. shows 18 rings, it is clear that it has taken the tree 17 years to grow a height of 60 feet. If the log is cross-cut at definite intervals from the base to the top and the rings on each section thus obtained are counted, then it is possible by setting out the age (number of rings) against the height (measured from the butt) of each section to construct a curve which will graphically represent the rate of growth in height.

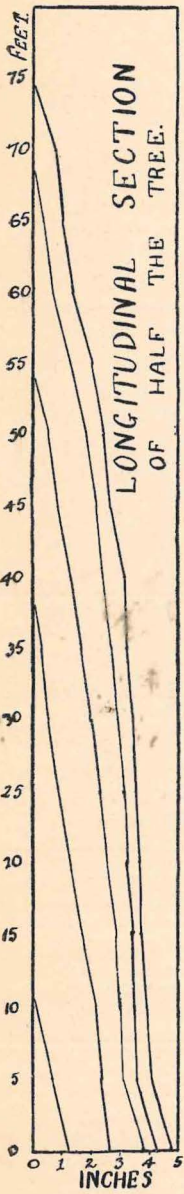
* Karri in its early years up to about 24 shows annual rings, but after that time it is very difficult to distinguish them.

Table I. shows the "ring count," while Graph No. 1 shows the development in height of the tree.

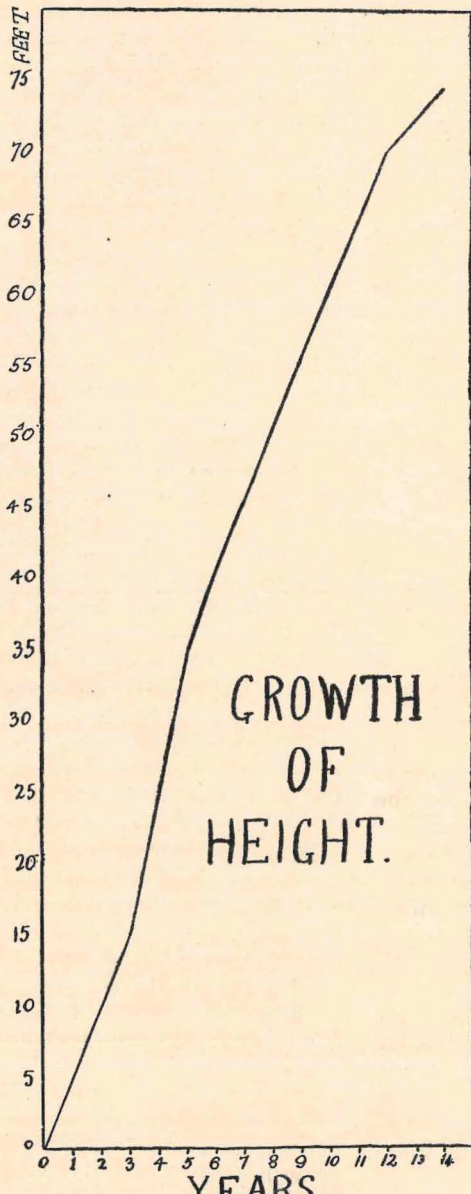
Coming now to the growth in diameter, it is clear that a measurement of the diameter of each ring on each section would yield the rate of growth in diameter at all ages and at all heights at which the sections have been cut. In practice it is found that differences occur in the growth from year to year which are due to various factors which govern the general growth of the tree, and it is desirable to estimate the growth over a given short period of years rather than over single years. These periods vary from 3 to 5 years. In the example that is now being considered three years has been taken. The procedure is to mark the rings corresponding to the period chosen, every third ring in this case, and to measure the diameter. As it is often the case that the rings are not concentric, the mean diameter is taken, that is to say, the mean of two diameters at right angles to each other. These measurements will give the diameter of the tree at periods of 3, 6, 9, and 12 years at all heights (see Table II.), and from these figures may be drawn a section of the tree showing the growth in diameter and shape of the tree all the way up the bole (see graphic representation of half-tree). In drawing such a section, it is customary to exaggerate the horizontal scale and reduce the vertical scale, thus making the variations in diameter growth more pronounced. Also the curve may be drawn showing the diameter growth at any given height. To foresters the increment in diameter at a given height is of great importance. The height chosen is usually 4ft. 3in. measured from the ground, and this is called breast height, being the height at which it is most convenient to put a tape round a standing tree to girth it. The diameter or circumference at breast height is commonly abbreviated to D.B.H. or C.B.H. The curve showing the growth of the D.B.H. (see Graph No. 3) forms the basis of all calculations as to timber yields of forests.

Having mathematically arrived at and graphically represented the rate of growth in height and diameter, it is not a very difficult matter to calculate the rate of growth

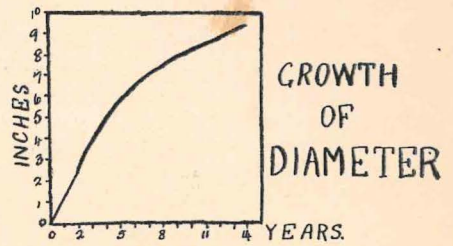
PINUS INSIGNIS AT HAMEL



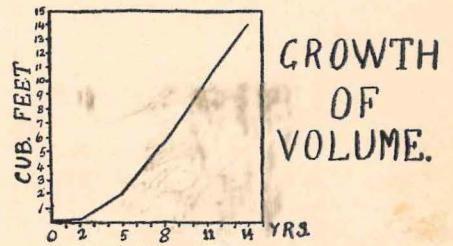
No. 1.



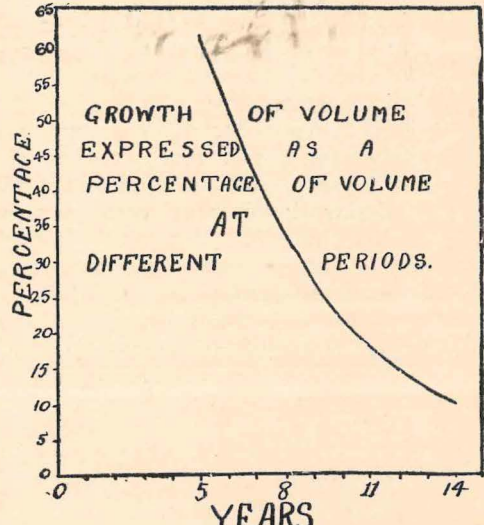
No. 2



No. 3.



No. 4.



No. 5.

in volume of the tree. It is clear that the height and diameter of the tree at periods of 3 years are known and the diameter at similar periods of each section is known. It is therefore merely a matter of working out the volume at these periods from each section and adding them up. Tables III. and IV. show how this is done. A curve can then be drawn showing the mean periodical increment in volume.

There is one more figure that is required to complete the data regarding the growth of our tree, and that is the rate of growth in volume compared with the volume of the tree at that particular time. It is clear that, as we have taken the mean periodical growth in volume, the figure that will be obtained is always the mean figure for the period dealt with. It is usual to express this as a percentage of the volume. Thus, if V is the volume of the tree at the beginning of the period and v is the volume at the end of the same period (which we will call P) then $\frac{V - v}{P}$ is equal to the mean

annual increment in volume, and the mean volume during that period is $\frac{V + v}{2}$.

Therefore, the periodical rate of growth in volume compared with the volume of the tree during the period is $2 \times \frac{V - v}{P \cdot \frac{V + v}{2}}$.

This is usually expressed as a percentage. Graph 5 shows how this figure starts relatively high, and decreases as the tree grows.

The study of stem analysis forms part of the work of the Forest Apprentices at Hamel State Nursery, and the tables and graphs that appear on page 15 are the work of Apprentice W. A. Ross.

An Australian Forestry School.

(By C. E. Lane-Poolc, Conservator of Forests, West Australia.)

ONE of the great difficulties that confronts every Forestry Department of the Commonwealth is the lack of trained foresters. It is only of recent years that the value of the forests as a national asset has been realised. In the early pioneering days the forests were regarded as serious drawbacks to settlement and progress, and

the people were encouraged to destroy timber. The period of forest destruction is drawing to a close, and, while it cannot yet be said that we have reached the age of construction, each State is aiming at that goal. With the exception of Tasmania each State has laid down a forest policy and placed on the Statute Book legislative enactments calculated to protect the policy and to render it as little as possible subject to the ever-changing whims of political parties. During the period of destruction we have been passing through, Governments have been content to collect royalty and officers of the Forest Department have been little more than tax collectors. Even where certain restrictions have been placed on the operations of the timber-cutter, where girth limits have been fixed and the cutting of immature timber forbidden, the large timber corporations work on so extensive a scale that it has been impossible for the forester to exercise any real control over the cutting, nor has he been able to initiate any sylvicultural work, as he has been fully occupied in collecting revenue or inspecting timber for export. For this work advanced education is not required, and since there was at the time no definite forest policy, no attempt was made to give the forestry officer's opportunities to obtain a higher training in forestry.

The time has now come when working plans must be laid for the treatment and regeneration of the cut-out areas and for the control of operations on any fresh saw-milling permits that may be granted. The working plans require careful laying out, and can only be undertaken by trained foresters with a thorough knowledge of sylviculture and forest management, and before these two main branches of forest training can be taught the forester must have a sound grounding in the sciences. Sound legislation alone will not protect our forests. We must have a trained Australian Forest Service to administer the Acts in each State. It was Monsieur Mathey, Conservator of Forests, Dijon, France, at the Forestry Conference held in Perth last year, who likened the heads of the Forest Departments of each State to generals without officers, and his last words of advice before leaving Western Australia were: "Establish an Australian Forestry School to train your

officers." The number of trained foresters in the Commonwealth is so small that, unless steps are taken to train more men, it will be difficult for the Forest Departments to carry on their work at all efficiently. Certain of the other States are attempting something to remedy matters. Victoria has a school for training working foresters at Creswick. South Australia has a forestry school attached to the University of Adelaide. New South Wales has founded a forestry school at Narrara, near Gosford, but, owing to the war, has not been able to secure the services of a Director.

There is grave danger that Australia may make the same mistake that has been made in England and America. Both countries founded numerous forestry schools when one good school would have amply sufficed for each. The United Kingdom has schools at Oxford, Cambridge, the Forest of Dean, Cirencester, Edinburgh, Newcastle, and Dublin, while in the United States there are so many schools of forestry that it would take too long to enumerate them. The multiplication of forestry schools in these two countries has not led to the best forestry training. France, on the other hand, has only one school for professional foresters, and this is the famous *École Nationale des Eaux et Forêts* at Nancy. By concentrating the teaching of forestry in one school France obtains excellent results. Sixteen students destined for the State Service are admitted annually to Nancy, and in addition certain foreign students are also trained there. It is an interesting fact that all the officers of the Indian Forest Service were in the early days trained at Nancy, and India owes her wonderful department to these men, whose training enabled them to lay the foundation of the Indian Forestry Service as we see it to-day.

A forestry school in each Australian State would mean six second-rate schools, while by concentrating on one it would be possible to establish a school second to none in the Empire. Such an institution would serve not only Australia but, in all probability, other British Dominions in the Southern Hemisphere. The Union of South Africa from Cape Point to the Limpopo River relies on Australian Eucalypts for

her constructive forestry, and there is no doubt that for South Africa the training given at an Australian Forestry School would be preferable to any other. New Zealand also will doubtless welcome the close proximity of the first-rate forest school. The work of an Australian Forestry School would not be confined to the training of foresters. Attached to it would be a Research Institute, where the many problems that must be solved before the silviculture of each type of forest can be fully understood would be initiated. Another of its functions which cannot be overlooked would be to act as a centre of forest knowledge, and by means of journals, bulletins, and pamphlets to radiate that knowledge throughout the Commonwealth, thus awakening the public to a true conception of the value of the national forests and the meaning of forestry. Soon the men who have fought for the Empire will be returning to Australia, and the time is ripe to establish a forestry school, so that those who wish to embark on the finest profession in the world, instead of learning their forestry in the oak, beech, and pine forests of other lands, may obtain the necessary training in their own country among their own eucalypts, acacias, and sheoaks.

"The National Forests of the United States."

There are 160,000,000 National forests in America under the control of the Forest Service, of a total area of 160,193,996 acres. To these must be added those of Alaska, with an acreage of 26,748,850 acres and of Porto Rica 65,950 acres, giving a total area reserved and controlled by the Forest Service of 187,006,796. Within some of these forests what are known as "National Monuments" are specially dedicated for the preservation of objects of historic or scientific interest. These "National Monuments" have a total area of 1,424,940 acres. Within the forests there are also certain National Game Preserves, and these also are dedicated specially by Acts of Congress for the protection of wild animals. These dedicated areas amount to 2,000,000 acres, the greater part of the area being in Arizona.

Agriculture v. Forestry.

(By Prof. John W. Paterson, B.Sc.,
Ph.D., University of W.A.)

TO most people the title of this short article will seem a legitimate one. In the public mind there has developed an impression that here we have two competing interests, that the promotion of a vigorous forest policy is antagonistic to our farming prosperity, that agriculture and forestry should be viewed as separate and distinct industries.

This is a mistake. Agriculture in its widest sense includes four great branches, each of which is immediately concerned with the growth of crops. These comprise (1) farming in the ordinary sense where crops are harvested from large areas or paddocks, cultivated usually by horse labour; (2) horticulture, where crops are harvested from small areas or gardens intensively cultivated, usually by hand labour; (3) forestry where crops are harvested from large areas which have received little or no cultivation at all, and (4) the pastoral industry—similar to (3), but the crops harvested by grazing stock. The difference between these four branches of agriculture is only a difference in method; in each case the object is to stimulate and reap to best advantage the fruits of the Earth.

Nature prefers variety. Western Australia possesses a wide range of soils and climate, and those very differences render it impossible to devote all our energies to any one branch of the great agricultural industry. Different districts and locations possess their own peculiar adaptabilities. These are gradually becoming understood, and there has been rapid increase in the four main branches of agriculture during the present century. The area under cultivated crops, for example, has increased about 700 per cent., and the number of grazing stock has doubled.

But in the development of our agriculture in its widest sense, Nature must be respected. One cannot successfully force those matters. It would be unwise to erect a replica of, say, Boans' Emporium in a

centre like Darlington, and it would be unwise to incur expenditure in costly cropping operations where the soil and climate are unsuitable. Western Australia contains much valuable cropping land, as its wheat averages show. Over the long term of 45 years it shows a better average than either Victoria or South Australia. But it is a very large State. It contains not far short of 1 million square miles, and much of this land is not only unsuitable for cultivation, but even affords only sparse grazing for stock. In this respect it is only necessary to refer to the coastal hills, many of the sand plains and all the dry parts of the State.

Much of the inferior land referred to shows, however, a surprising faculty for growing trees. The chief reason is probably to be found in the very modest demands which timber makes upon the soil for its support. While ordinary farm crops must obtain mineral constituents from the soil equal to from 3 to 6 per cent. of their dry substance by weight, timber requires only about one-eighth of that amount. And not only are the total mineral requirements of trees low, but their requirements for the highly important constituents—phosphoric acid and potash—are even lower in proportion.

Forestry is a branch of the larger agriculture. On the individual farm the farmer follows the course of cropping best suited to his individual fields, the working facilities at his disposal, and the demands of the market. So it will eventually be on the large farm of Western Australia. Here on this farm forest crops must occupy an important place. A principal reason for this is the relative poverty of much of our lands, and the very limited demands made by forest crops on the manurial constituents of the soil.

But if forestry is to take full advantage of its opportunities it must know how to market its products. For the first-class forests of the S.W. corner the problem will be solved in part by the excellent reputation of its hard-wood timbers, assisted, we may believe, by an active propaganda in the markets of the world. But not less than to the commercial agent must our forests look for assistance to the work of

the scientist. The economical use of timber waste, distillation products from wood, paper pulp, tannins, resins, gums, seasoning, and preservation of timber, minor products—these are some of the more important subjects awaiting investigation. The wheat farmer could not grow wheat until science provided him with fertiliser; the tree farmer can grow trees, but in many cases he cannot market them until the scientist points the way.

Investigation in forestry matters is full of hopeful possibilities. It offers the chance of marketing not only much of the present waste from the mills, but, what is of still greater importance, it suggests an opportunity of marketing minor forest growths in a form for which there is a demand. The best jarrah and karri forests are relatively restricted in size, but the area carrying other timbers, in addition to black-boy, zamia, and other growths, is almost inexhaustible. What can we sell from those areas? What products can we extract?

It is difficult to forecast future developments. An ideal system might involve the use of travelling plants in the forest from which the crude products would be forwarded to a central refinery. The importance of discovering methods of exploiting such areas lies not only in earning net revenue (the works, of course, should show a credit balance) but in increasing employment for labour and the circulation of money within the State. Such problems will obviously be of paramount importance in the years succeeding the war.

From its inception, the W.A. Committee of the Advisory Council of Science and Industry has worked whole-heartedly for the establishment of a Forest Products' Laboratory in our midst. Its main object has been to find some way of utilising our waste forest areas. In situations where one kind of agriculture cannot succeed, it is necessary to try another. Far-reaching developments of the kind under review naturally proceed slowly. Nevertheless, the recent visit of Dr. Gellatly, Chairman of the Federal Bureau of Science and Industry, and the arrangements made by him for establishing a laboratory in this State will meet with general approval. For the success of one branch of agriculture must

redound to the success of the others, and in no uncertain manner to the common weal.

The Firewood Fiend.

(By W. C. Thomas.)

THE people of this State have at last approached the region of common sense with regard to its forest wealth, and when by expert leadership, such as is now in evidence, they have been led deeper into the question, and they understand its various phases, and how their own lives, pleasure, and comfort generally depend so much upon forest preservation and propagation instead of destruction, they will begin to guard their forest possessions with as much enthusiasm as until now they have been indifferent.

The idealist is sometimes regarded as a crank—if not worse, and, yet, to what a state of dreariness we would drift if we had not the idealist amongst us to point out the beauty of this or that gift of nature, and urge its reservation for our own enjoyment and others to follow us! The vandal seems always to be abroad, and it is well that we have some restricting laws upon his depredations. It is good, too, to know that these laws are going to be stricter, for then we may justly hope that we shall soon or late develop a forest consciousness that will become a blessing to the individual and the State.

The vandal has too long been a law unto himself, and I have in mind that most aggressive of vandals—the firewood gatherer, whether he be the man cutting down trees at contract rates, or the householder who, to curtail his domestic expenditure, appropriates—to put it delicately—what does not belong to him—the tree on his neighbour's block. All around Perth and suburbs are blocks of land that once carried admirable trees—coastal tuart, whitegum, banksia, and others, and considerable vegetation that was too useful to be exposed to the ruthless elements and ultimately destroyed, as is its invariable fate once the large protecting trees are gone. But the man with the firewood craze, and without

the abiding appreciation of a stately example of forest growth except as regards its cubical contents and whether it will fill his firewood shed or no, has gone about his nefarious work in a very thorough fashion, and where some of our bushlands around the city once carried a fair number of trees they are daily becoming dreary, sandy wastes of ever-diminishing value from the point of view of the picturesque. The desolation of the coastal hills on our North beaches is too well known to need telling again. There are other tragic examples. Fifteen years ago or so there was a hill somewhere out westward from Monger's Lake that carried quite a respectable forest of banksia and whitegum. The hill is about all that is left; almost all the banksia and gum have gone—cut down and carted away and burnt this long time in contiguous stoves, and now the children of those who so gleefully burnt it up because it saved them a few shillings, who go gathering wildflowers around the lakes have to struggle over loose earth that begins to drift with the winds, and have little or no shelter from the trying rays of the sun. Truly, our sins come home to us! I can recall entering that little banksia forest for the first time—when there were few houses out that way, and there were still plenty of large trees on neighboring blocks to "appropriate." It was a delightful spot. The trees grew closely together, and in the flowering season the banksias' yellow-cones made one think of golden fairy lamps dropped upon their branches. There were crowds of bees making pleasant music. There were honey-eaters and warblers in plenty flitting and gliding among the pleasant trees, and hosts of wildflowers and blossoming shrubs—Nature everywhere in a joyous mood. All that has changed—because the firewood fiend loved none of it, and thought only of cheap wood!

Another typical instance of the deprecations of the firewood-cutter may be cited in West Leederville, and what is true there is doubtless true elsewhere. This hill not many years ago carried a great number of large trees, including many of the coastal tuart, as well as jarrah, and what looked very like blackbutt. As settlement proceeded these trees, many of them very beau-

tiful in appearance, gradually fell to the firewood gatherer's axe. The earlier cottagers apparently had no scruples either about taking trees that belonged to someone else—as long as that person was well out of sight and unaware of it. An instance came under my notice where there were several fine trees on a block when it was purchased, but before the block could be fenced the trees had been felled and the owner was left with the doubtful compensation of the tree tops and stumps. Two or three of the trees were so placed that by very little scheming they could have been worked into the general lay-out of the block and thus been preserved as useful break-winds and ornaments. One immediate result of their removal was that before the block could be grassed the wind had gouged out several deep, unsightly holes which cost the owner much money to have refilled before he could proceed with his plans. How many people have had the same experience? Doubtless many, and many more will repeat it until our forest laws are strict enough to prevent such thieving, for it deserves no less a name.

Alongside the railway station at West Leederville are still several vacant blocks of an area of land that less than 20 years ago was adorned with some of the largest and best-grown trees to be found between the ranges and the sea. I fear the majority of the owners of these blocks must have been absentees, or they would never have countenanced the slaughter of such valuable assets. It was once proposed by the Leederville Council to make a reserve of the area. It was a bad day for the trees the idea never went further. To-day there are but two or three of the great host left—wretched, mangled, twisted boles, with a few pathetic living branches, of all that array of beautiful trees, and they are standing because axes failed to bring them down!

The vandal spreads out his area of destruction, and we begin to find him encroaching upon the beautiful hillsides of the ranges—those delightful haunts that were surely given us by a kind Providence to mitigate the tortures of summer! Some people only see in a tree so much firewood or an obstruction to some outlook, and so we

get this senseless destruction, and apparently without let or hindrance. I heard recently of a person wanting the Road Board to clean away several trees from the road that skirted a block because it was alleged they interfered with the growth of some fruit trees. The question of whether the road trees were in the way of traffic, or afforded a passing and grateful shade, or helped in a general scheme of pleasant scenery did not appear to be worth a thought. Let us hope that Road Board knew its business well enough not to be led into useless slaughter by such selfish pleadings.

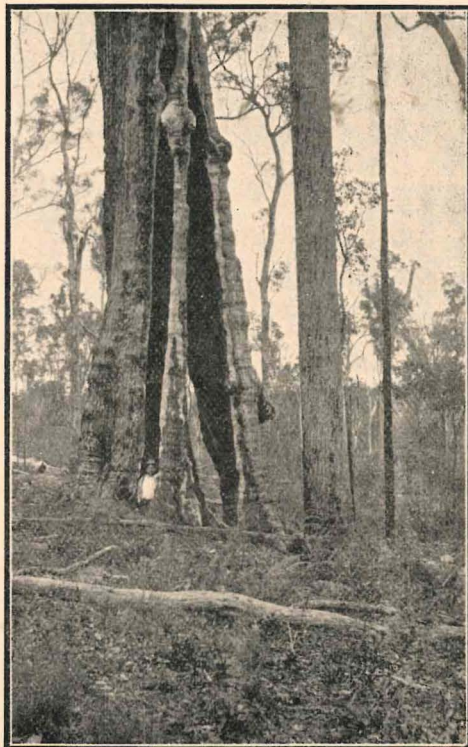
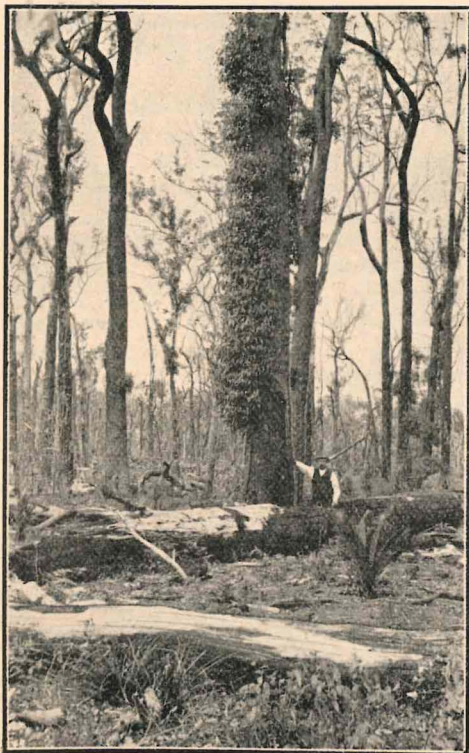
Forest Fires.

(By W.F.H.)

It is doubtful whether forest fires can be totally prevented. The point is a debatable one, for even those very wise people, members of Parliament, seem to disagree on the subject (vide Parliamentary debates

on the Forest Bill). If it is possible to prevent these too frequent timber destroying calamities, then adequate measures must be taken without delay. The two reproductions of photographs on this page tell their own tale, and they give flat contradiction to a belief prevalent in many quarters in Western Australia that, while forest fires may do a lot of damage in pine woods, they are comparatively harmless amongst our eucalypts.

In the first of these reproductions it will be seen that an old burning log has at some time or other fallen alongside and close to a branching young tree. The big log has scorched a large patch of bark on the standing tree, and next year, when the fire came round, it charred the growing timber and destroyed the tree. The damage in subsequent years has been increased until the whole tree was involved. On the destroyed part of the growing tree a "greedy" growth of young shoots has sprouted. This in due time will form gum pockets, and from a saw-milling point of view the tree



is useless. Such a tree as is pictured is by no means an isolated case. At the forest spot depicted and for half a mile round every tree has been scorched to its top-most twigs. A contributing cause to the excessive damage at this spot was the large quantity of waste branches from felled trees which had been left by hewers.

In the second picture the tree shown has evidently been charred and hollowed by many successive fires following the first bad scorching. This tree measures 48ft. around at the ground line and 37ft. 6in. at breast height. The inside measurement, that is the measurement of the burnt hole, is roughly 14ft. x 12ft., and a horse and rider could easily pass through the tree. There has not been a heavy fire in that locality for some years, so the younger trees in the neighborhood of the destroyed giant show no signs of fire.

Paper - Making Materials in Western Australia.

(By I. H. Boas, M.Sc., A.I.C.)

THE possibility of making paper in Australia has for a long while been under consideration, and the position created by the war has brought about such a shortage that the matter will have to be taken beyond the stage of preliminary enquiries. The Tasmanian Government took the very practical step of inviting Mr. Surface, a well-known paper-making expert, to test their hardwoods on the spot. Mr. Surface's report was, however, unfavourable. He found that the hardwoods tested gave a low yield of pulp, and, although this would be suitable for making certain types of paper, the cost per ton made it unlikely that it would be a commercially sound venture. His recommendation that softwoods be planted to provide a supply of suitable timber is of no use to meet the position that now exists, and seems likely to persist for many years. The ultimate fibres of the hardwoods are generally speaking too short for making paper; but apparently the most important point is not the length of the fibre, which is usually stressed, but

the ratio of the diameter to the length. This ratio determines the felting quality of the pulp. Moreover, the shape of the fibres plays a part in the felting. Fibres with tapered ends seem to felt much more satisfactorily than those of even diameter.

During the visit of M. Mathey, Conservator of Forests, Dijon, to Perth in 1917, he raised the question of the utilisation of immature hardwoods for pulp-making. The researches at the School of Paper Making at Grenoble indicated that the young eucalypts gave encouraging results. Mr. G. C. MacNaughton, of the F.P.L., Wisconsin, has also shown that young trees have an advantage for pulpmaking in yield, colour, and strength. An investigation was consequently begun in the laboratories of the Perth Technical School into the utilisation of karri from 8 years old and upwards. The soda method of pulping was used, as the bisulphite appears to give an unsuitable pulp with the hardwoods. For 8-year-old trees the yield of pulp is high compared with timbers used commercially on a large scale, the consumption of soda is very moderate, and the amount of bleaching powder used to prepare a brilliant white is remarkably low. With increasing age the yield drops and the consumption of chemicals increases; but it appears as if it will be possible to use karri up to 15 years. Beyond that it is doubtful whether it will pay to go. There is, however, a large area of karri of about 8 years old available in Western Australia, and if this is cut in an 8-year cycle it will yield sufficient paper for Australia's needs. This, of course, does not include the highest-grade stationery, but only printing papers.

The ratio of diameter to length of fibre is satisfactory, and the fibres taper towards both ends and felt very well. The shortness of fibre, however, necessitates the admixture of a proportion of longer fibred material for giving strength to the paper. An examination is proceeding of various local materials, and of these a grass (*Gahnia Decomposita*) growing abundantly in the same district as the karri offers what seems a suitable blending material. It is long in fibre and is easily pulped and bleached, and paper made from a mixture of karri and *gahnia* is dead white and tough.

It is proposed to extend the search for other blending materials and also to have large scale trials made to test the commercial possibilities of the timber. If these trials confirm the results obtained in laboratory tests, the conditions in Western Australia seem to be ideal. There is a plentiful supply of water and of the blending grass in the neighbourhood of the karri forests. Fuel is abundant and cheap, and chemicals necessary can be carried by sea to the neighbourhood of the mills. It would be possible, under these circumstances, to have both paper and pulp mills in the same neighbourhood, although modern practice has been to keep them apart, because it is difficult to find suitable conditions for both industries in one spot.

Avenues of Honour.

In the last issue of "Jarrah" something was said about a proposal to commemorate our brave dead by planting trees or Avenues of Honour. The King's Park Board has already taken active steps in the matter; so, we understand, have several municipalities in the Southern part of the State, and we now learn with gratification that the subject has been seriously taken up by the Perth Roads Board. In October last a public meeting was held and preliminary arrangements made for the planting of an Avenue of Honour in the Maylands District. It is earnestly to be hoped that other boards and public bodies will follow the good examples already set. There is no more appropriate form in which the services of those who have lost their lives in the defence of their country could be more fittingly expressed.

On the same subject, Mr. E. Wilson, of Wooroloo, throws out some suggestions, which seem deserving of consideration. "Jarrah" will be glad to hear further opinions and suggestions from members of the League. Mr. Wilson says:—

"The article in the last issue of 'Jarrah,' 'Pine Planting,' an arresting object-lesson, is well worthy of being more widely known, and I would suggest, as a way to bring the matter of both beautiful and profitable trees more closely to the atten-

tion of those to whom it would be a thing of beauty and a commercial asset, that we (the subscribers and members of our Forest League) start a movement, that will really be an enlargement of the idea of the King's Park Board's Honor Avenue, to get every town and village in the State to create an Honour Avenue of its own, either by changing the name of a suitable road or creating a new road, or utilising their recreation reserves, and on a given day next year to plant Honour Avenues all over the State. We might also at the same time plant one in memory of our late statesman, Lord Forrest. These avenues, as well as serving to keep the memory green of our brave sons, would be of great educative value to all landowners, as to the kind of tree that is likely to grow best in their respective districts."

Portland's Shipbuilding Record.

The history of shipbuilding in Portland, Ore., for the past thirty months is one of remarkable achievement (says "Pioneer Western Lumberman"). Almost unknown as a shipbuilding centre in 1916, the city to-day occupies a pre-eminent position as a producer of both wood and steel vessels. Shortly after the war was declared a few scattering contracts were placed with Portland constructors. So splendid was the Portland record that more and more contracts became available, with the result that to-day four immense plants are building steel vessels; while in the district seventeen yards are building ships of wood.

On July 11th, according to statistics compiled by the Portland Chamber of Commerce, Oregon has produced twenty-six steel cargo vessels and ninety-six wooden ships had been launched. Ships on the ways, under construction and awaiting launching, numbered ninety-four, of which eleven are steel ships. Unfulfilled contracts on hand in the Portland district totalled the immense sum of 200,000,000 dollars.—"Timberman and Ironmaster."

Have you ever felt that you had let your generosity run away with you, and that you had given more than you ought? Neither have we. It can't be done.

Let us build not only cantonments for the soldiers, but contentments for the family.

MALLET BARK.

German Keeness and Foresight —A Lesson and a Warning.

THE history of the mallet bark industry in Western Australia is fairly well known. After the war there will be some mallet bark export trade, but it will be many years before the business assumes the proportion that it did a decade or less ago. The first official record of export is in 1903, when bark to the value of £859 was exported. The next year the trade jumped to £32,876, and in 1905 it reached highwater mark at £154,087, since when it has continuously dropped, until in 1913 the value of the export was put at £6,127. From 1903 to 1913 inclusive the total value of mallet exported was £864,880. The cause of the drop, of course, was unwise exploitation. Regulations were made restricting the cutting of trees below a certain diameter, but these regulations were made too late, and were more honoured in the breach than in the observance.

Most of the mallet leaving Western Australia went to Germany, and some curious sidelights on the business are derived from the study of a paper read by Dr. Johannes Passler on 25th April, 1905, in Frankfort, before the General Meeting of the Central Association of General Leather Industry. One has no difficulty in gathering from this lecture that Dr. Passler is a skilled leather chemist attached to the Investigations Branch of the Technological Museum in Berlin. He does not appear to have visited Western Australia himself, but he mentions frequently the results of investigations by Dr. Diels, who spent some 18 months looking round the Commonwealth. It is gathered from Dr. Passler's paper that the earliest samples of mallet bark (he calls it malletto bark) arriving in Germany were received with grave suspicion. The mallet bark exudes under certain conditions a gum heavily charged with tannin, and this gum adheres to the dry surfaces of the bark and hardens, but in course of transit a good deal of it is found in the form of dust at the bottom of the bags containing the bark.

This dust was regarded with serious doubts by the German importers, who seemed to think it was an entirely foreign substance introduced by the West Australian exporter for the sinister purpose of concealing the true nature of the bark by mixing with it the tannin-charged kino of some other tree. When the German importers were convinced that everything was right and in order they took to the bark heartily. Dr. Passler's investigations led him to form the very highest opinion of the qualities of mallet bark. He writes:—

"It is safe to take the average of this tannin material as about 42 per cent., with an average of 14.5 of water. The average composition of mallet bark is about as follows:—

	p. cent.	p. cent.
Tanning substances	42.	variation 35-52
Non-tanning	7.	variation 5-10
Non-soluble	36.5	
Water	14.5	
	100	

"Thus it is seen that we have in mallet bark a tanning agent which, in regard to tanning property, equals those hitherto known as the richest in tanning substances."

Then he goes on to say that at the price paid for mallet bark it is the best and cheapest thing of the kind on the German market. He goes on to say:—

"A great advantage in the case of mallet bark lies in the fact that the tannic substances are easily dissolved in water of ordinary temperature."

In further trials of the bark at various temperatures he got the following results:—

	Temperature of Solvent Waters.				
	20c.	40c.	60c.	80c.	100c. (boiling)
Tanning substances	39.	40.6	42.7	42.3	43.7
Non-tanning	9.3	9.3	8.9	7.3	7.7
Insoluble	37.2	35.6	33.9	35.9	34.1
Water	14.5	14.5	14.5	14.5	14.5
	100.	100.	100.	100.	100.

"In order to thoroughly test mallet bark with reference to practical use as tanning agent, and in order to ascertain whether it imbues the leather with any special characteristics, several tanning trials with whole hides have been carried on at the tannery attached to the institute. The tanning process occupied in all 38 days. After tanning, the skins were well washed and prepared in the usual manner for brown calfskins. The greasing was done with a mixture of whole oil, tallow, and Degras. The leather is throughout of normal quality, the colour light and regular; the leather shows a fine and regular grain, a smooth, fleshy side, and is very tough, the cut even and close and smooth; unfavourable qualities

have not been observed in the leather. The result can therefore be qualified as thoroughly satisfactory."

Later on he says:—

"The manufacturers of tanning extracts have taken and utilised the mallet bark as soon as it appeared in the German mart to produce extracts for tanning purposes, that is regular ones, which are produced with the assistance of heat, and 'cold soluble ones,' which can be thinned (weakened) by the simple addition of cold water. We have repeatedly had occasion to test mallet bark extracts at our institute. Their density varied between 22 to 24 per cent. Be, corresponding to an admixture of from 59-55 per cent. water. The tanning matter varied from 30 to 36 per cent., which is lower in these extracts than in mallet bark of average strength. All samples of extracts either contained no insolubles or only a fraction of one per cent. of insoluble matter. The leather tanned with these extracts all showed a little darker colour than those tanned with bouillon extracted from bark."

"All this points to the fact that in mallet bark we have a tanning agent which, owing to its qualities, deserves the highest consideration, and which may be expected to obtain a permanent footing in our industry. In some branches it has already established itself for regular use, which proves that the trial stage in these branches have been passed and have produced satisfactory results. Now the question arises whether the demand which is bound to increase can be met permanently and in satisfactory qualities, even if the restrictions imposed by the W.A. Government are observed strictly, after the first reckless exploitation of this bark, and even if provision is made for afforestation of denuded districts."

It is interesting to note that the German investigator seems to have anticipated what has happened in Western Australia. The tree was recklessly cut out, and the German saw that his country could not depend upon a steady future supply of the bark. Nor does he seem to have thought that the Government of Western Australia was to be relied upon to take the necessary measures for preserving mallet and for putting the industry there upon a permanent footing. So he goes on to discuss the question of acclimatising mallet in German colonies. He accordingly passes the whole of Germany's foreign possessions under review. Hereroland (German South-West Africa) he thinks an eminently suitable place for the cultivation of the tree, and certain portions of Togoland he thinks would do remarkably well, and he points to the success which has attended the acclimatisation of other eucalypts in South Africa as evidence that the Australian eucalypt is not averse to

translation to foreign soil. German New Guinea and Samoa and the other former German possessions in the Pacific he considers to be quite unsuitable places for cultivating mallet, and he concludes a highly informative paper by urging upon the German Colonial Office the advisability of taking immediate steps for procuring mallet seeds.

Dr. Passler's lecture is of interest as showing the thoroughness with which Australia had been searched by the Germans for materials such as they wanted. But, so far as growing mallet in German Colonies is concerned, there is available no information. It is possible, of course, that the German Colonial Office acted on the suggestion of the lecturer and that mallet is now growing sturdily in several of what were formerly German possessions in Africa. The events of recent weeks, however, seem to indicate that even if mallet has been grown in Hereroland and elsewhere the German is not likely to be the one who will profit exclusively from the fact.

Trees, Rain, and Rivers.

(By *W. Catton Grasby, F.L.S.*)

MEMBERS of the Forest League and other lovers of trees must use every argument possible to secure the preservation of Nature's forests, and to urge settlers to plant trees and more trees. At the same time, it is necessary to be particularly careful not to use an argument, however plausible, which is not thoroughly sound. There are not a few enthusiasts who urge the preservation of existing forests and the planting of new forests, under the impression that trees induce increased rainfall, or that forests bring rain. One would not question so pretty an argument if there was any sound evidence which would support its correctness. The fact, however, is that rain brings forests, and forests do not produce rain. I have devoted attention to this subject for a good many years, and, although I would like to believe otherwise, it is necessary to say that I have not been able to find any definite evidence to show that the destruction

of forests has had any appreciable effect upon the amount of rainfall of a country or a section of a country, and until there is such evidence it is not wise to argue that trees should be planted in order to produce rain.

It must be clearly understood that I am talking about the production of rain, and not about the influence which forests are undoubtedly proved to have on what becomes of the rain after it falls. It therefore comes to this, that it is useless planting trees where there is not sufficient rainfall for them to be established; but where there is sufficient rainfall to have produced natural forests, or where there is sufficient rain to enable us to establish forests, too great attention cannot be paid to the protection of existing forests and the planting of fresh areas, because forests and belts of trees exercise a many-sided influence tending to the betterment of a country or district as the abode of man.

Writing on this subject some years ago, Mr. Mellish, F.R.G.S., President of the Royal Meteorological Society, said:—

“It has often been maintained that forests increase the rainfall of a locality, and that reduced rainfall and desiccation of a district have resulted from the clearing of its woods, but very little direct evidence in favour of this is forthcoming. Records showing that the rain recorded at stations within a forest area differs from that at other stations a short distance outside the forest prove nothing, as the variation may be due to other topographical causes, while the retardation of the velocity of the wind in passing among the trees may influence the amount of rain caught by the gauge. Where a forest area has been cleared, no information is available as to what the normal rainfall was before the removal of the trees, and re-forestation is such a slow process that we may have long to wait before rainfall returns are available for a forest area, the rainfall of which was known before the trees were planted.

(To be Continued.)

The Pine-Tree.

(Perth Gardens.)

What sylvan pontiff do our eyes exalt,
The vista closes: all beyond is green,
Pine-green intense, up to heavens' blue
vault.
What envoy from Dodona? Age, I ween,
So nobly borne, that through long years has
seen
Brave lives succumb before Time's rude
assault,
With wondrous changes mellowed every
fault,
Until his eminence bore such priestly mien.
Yet here a stranger! dreams perchance his soul
Of those far shores whither young knights
fared forth
A brief while since to dare th' unconquered
North?
Does he, too, mourn them—when the death-
bells toll—
The youths that lately in his shadow played,
And who now asleep, near to his kindred
laid?

W. SIEBENHAAR.



Spanish Influenza.

It is not possible for every householder to protect the family by means of a steam disinfecting plant. It, however is possible to destroy germs of disease by the liberal sprinkling of

Faulding's Eucalyptus Oil

This precautionary method of rendering infectious or contagious matter innocuous has led to the widespread employment of

Faulding's Eucalyptus Oil and Solyptol

Obtain Supplies. Make every effort to keep your homes free from Influenza

Procurable from all Chemists, Department Stores and Grocers.

Wholesale only from

F. H. FAULDING & CO., 313 Murray Street, PERTH And at London
Adelaide, Sydney

PORT & CO. LIMITED

Sawmillers & Timber Merchants.

Timber Yards, Joinery Works, Saw Moulding, laning and Turning Works

MAYLANDS

**Customers Assisted to Build. Fruit and other Case Material direct
from the Bush Mill.**

We make a specialty of Settlers' Houses cut ready for erection, on trucks, Maylands. Buildings of any description cut out or erected in any part of the State. Galvanised Iron, Ironmongery Lime, Cement, and all Builders' Requisites at lowest prices, and forwarded with despatch.

Phone A 1443.

Jarrah Mills: Pindalup, (Pinjarra-Murradong Railway)

CHARCOAL—We are now burning Retort Charcoal, and can supply in any quantity at lowest rates.

MILLARS' TIMBER AND TRADING COMPANY LIMITED

HEAD OFFICE: SAINT GEORGE'S HOUSE, PERTH

CABLES: "SAWMILLS, PERTH."
TELEGRAMS: "MILLARS' TIMBER, PERTH."

TELEPHONE LINES:
Nos. A4141 to A4145

**The Principal Jarrah and Karri Timber Merchants
in Western Australia**

Enquiries Solicited for

**Jarrah or Karri Beams, Logs, Poles, Scantlings,
Paving Blocks, Sleepers, Posts,
Pickets, etc., etc.**

BRANCHES IN ALL PRINCIPAL TOWNS.

LOCAL YARDS — Perth, Suburban and Country Yards — Specialise in
High-class Joinery. Jarrah Cottages Cut Out. Jarrah Roofing (patented).
Jarrah Tanks. Troughing. **SUPPORT LOCAL INDUSTRY.**

Large Stocks Scantlings, Floorings, Weatherboards, Linings, Posts, Pickets,
Builders' Hardware, Cement, Plaster, Lime and every requirement for the
Builders' Trade.

AN ESTABLISHED INDUSTRY IN WESTERN AUSTRALIA

The blending and packing of

"ROYAL SEAL" TEAS

calls for your continued assistance.

=====
Specially blended, high grade, fragrant, excellent value.
=====

Each packet contains a coupon.

All stores stock it.

Packed and blended by

J. & W. BATEMAN

Wholesale Distributors

Your Requirements in

JARRAH

from rough scantlings to furniture planks, and however large, can be promptly and satisfactorily filled by

BUNNING BROS. LTD.

who operate five Sawmills at centres convenient either for local or export trade.

We also cut

WANDOO

tough as steel and practically indestructible. Enquiries solicited.

Head Office:
49 to 61 CHARLES ST., PERTH.

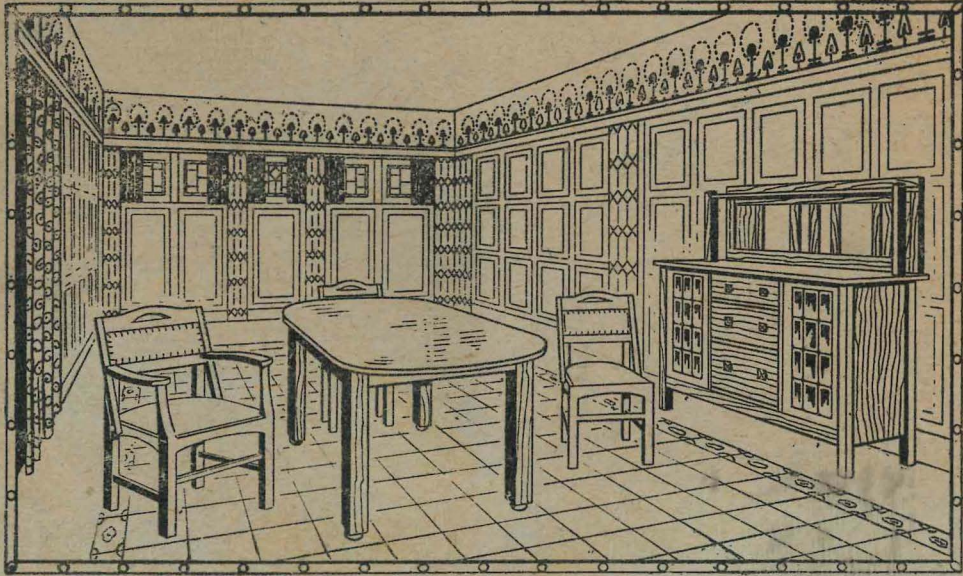
Branches at
FREMANTLE and BUNBURY

George Wills & Co. Ltd.

General Merchants, Importers
and Shipping Agents

Perth and Fremantle

Sandover
Quality



“MISSION” DINING-ROOM

In Jarrah, £27 5s. complete

Comprising Sideboard, Table, 4 Dining Chairs, and 2 Carvers

“Mission” Furniture derives its name from its similarity to the Furniture in old Spanish Missions, but the inspiration for its design is also taken from the England of Puritan days, but the austerity of this period is eliminated. It is in every way most suited to modern homes, being beautiful, dignified, essentially serviceable and comfortable.

In this suite every detail of workmanship has been subjected to the strictest supervision, the timber has been properly seasoned, and although inexpensive it carries our guarantee of quality.

Dwellers in Western Australia will appreciate it for two reasons—because it is made from one of the most beautiful

of our local timbers, and because it is a product of local industry.

The pieces can be purchased separately if desired

Table	-	£4	10	0
Sideboard	-	11	10	0
Dining Chairs	1	15	0	each
Carvers	-	2	2	6 „

Made entirely in our West Perth Factory by White Labour.

Wm. SANDOVER & Co

Factory: Newcastle Street, West Perth

Showrooms: Hay Street, Perth