

NEW SOUTH WALES.

FORESTRY HANDBOOK.

PART II.

SOME OF THE PRINCIPAL COMMERCIAL
TREES OF NEW SOUTH WALES.

BY

J. H. MAIDEN, I.S.O., F.R.S., F.L.S.,

GOVERNMENT BOTANIST.

SYDNEY: WILLIAM APPEGATE GULLICK, GOVERNMENT PRINTER

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PREFACE.

THE list of trees submitted is imperfect, and the following explanation shows how and why it is so.

All the illustrations are based upon the illustrations contained in my *Forest Flora of New South Wales*, which is still in progress, and sixty parts (ten parts to a volume), dealing with individual trees,* and containing a number of Appendices treating of general forestry subjects, have now appeared.

Only a selection has been made, and if a further edition be called for, additional trees will be dealt with. In its incomplete state it is believed that it will form a handy volume, showing the state of our knowledge of certain trees in New South Wales, and perusal of it may lead to additions by forest officers and others.

Much of the information concerning abundance and distribution of individual species can only be amplified when a forest survey is undertaken.

In January, 1906, I published in the *Agricultural Gazette of New South Wales* a list of 521 trees indigenous to New South Wales, and additional ones have been discovered since then. So that the subject, in this richly-endowed State, is a sufficiently vast one. Some of the trees are, however, not of sufficient economic importance to be dealt with in this Handbook; on the other hand, there is a formidable array of exotic trees either introduced into New South Wales or considered desirable for experiment.

J.H.M.

* The complete list (contained in Parts 1-60), as also the New South Wales species dealt with in Parts 1-30 of my "Critical Revision of the Genus *Eucalyptus*," will be found at p. 15.

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Phases of Forestry.

THE good forester is a many-sided man, who keeps his eyes open in regard to various aspects of his living tree and other plant charges and their utilities, and matters which arise to the detriment of the same. Similar remarks may be made in regard to timber and other products. Some attempt has been made to draw attention to such questions in certain articles, as follows, which have appeared in my "Forest Flora of New South Wales." The number of the volume and the page is quoted in each case.

An accurate knowledge of trees and timbers is the very foundation of forestry, and yet how often do we find people engaged in one branch or other of the industry with only the most casual knowledge of the trees of this country. I have sometimes found it necessary to be almost apologetic in stating this truism, and suggesting that it would be desirable to bring about a different state of things.

1. "A Forest Survey wanted for New South Wales" (iv, 113).

On the principle that every business man takes stock of his goods.

2. "The Giant Trees of Australia" (ii, 161).

Gives particulars of the largest recorded trees of Australia, with especial reference to those of Victoria, and states that the largest trees in the world are *Sequoia Wellingtonia*, of California.

3. "The Vertical Growth of Trees" (iv, 123).

Given two nails driven into the same tree at different heights, will they become further apart as time goes on?

4. "Sand-drifts in Western New South Wales" (iv, 155).

"The Sand-drift Problem in New South Wales" (vi, 164).

I have expressed the opinion that the problem, which is dealt with at some length, is a forestry question rather than an engineering question, and should be dealt with by forestry officers.

5. "Note on the Relations between the Geological Formation and the Vegetation which grows upon it" (v, 138).

A resumé of the present state of our knowledge on a subject to which foresters are invited to contribute their experience.

6. "Forests considered in their Relation to Rainfall and the Conservation of Moisture" (vi, 95).

This article deals at some length with the subject that is often briefly referred to as "Forests and Rainfall." It is of paramount importance to the forester.

7. "Trees Carved by Aborigines" (iv, 13).

The aborigines are fast passing away, and many of the trees carved by them (in cemeteries, single graves, bora grounds) are disappearing, owing to the ravages of insects and fungi, bush fires, and cultivation undertaken by the white man. The forester can not only record and photograph these trees, but is competent to express an opinion as to the species of tree.

8. "Wood used by the Aborigines for the purpose of procuring Fire" (iv, 135).

A matter of ethnological interest only, but still not to be neglected.

9. "Aboriginal Methods of Procuring Water" (vi, 14).

From trees and vines. It is conceivable that, in some cases, the information thus obtained may be of real value to the traveller suffering from thirst. But whether such information is of direct practical application or not, any authenticated information concerning the aborigines should be cherished by us.

10. "Fish Poisons of the Australian Aborigines" (vi, 31).

Most of them are products of trees and shrubs.

11. "A Few Notes on Saponins" (Poisonous "Vegetable Soaps") (vi, 55).

These two papers may be taken together, for often the active principle in the pods, twigs, or bark of a tree, which causes the stupefaction or death of fish when they are thrown into the water, is a saponin.

12. "Timbers which cause Irritation of the Skin and Mucous Membrane" (v, 174).

This is a subject of which but little is known, since information in regard to such effects in Australian timbers has only been collected of recent years, and obviously we are only on the threshold of the subject. As in the case of herbaceous plants which cause irritation of the skin, it would appear that some people are immune to this kind of irritation, at all events for long periods.

13. "Enemies of Trees" (vi, 209).

Classified under the headings: Meteorological, Fires, Soil, Parasites, Animals, Miscellaneous. This subject, although of vast importance to the forester, has been little dwelt upon in Australia, and foresters are invited to record their experiences in regard to the causes which contribute to the decay of individual trees and of forest areas.

14. "Marine Wood-borers," by C. Hedley, F.L.S. (vi, 266).

The relative powers of resistance of certain timbers to wood-borers in salt water is very little known, or at least recorded, and Mr. Hedley's paper is of considerable importance.

15. "Birds and Animals as Aids to the Forester" (iv, 116).

A brief note on a subject which will have more importance as the attention of foresters and other nature students gets drawn to it.

16. "Twist in Australian Timber" (iv, 15).

A discussion of the question as to the extent to which winds and the sun, acting on the heads of living trees, are responsible for the twist observable, more or less, in timber.

17. "Walking-sticks and Umbrella-handles from New South Wales" (iv, 132).

Attention is drawn to the possibilities of a minor industry.

18. "Gum-leaves, sometimes edible, sometimes not" (see p. 27).

Attention is drawn to the contradictory statements in regard to the fodder-value of certain trees.

19. "On some Natural Grafts between Indigenous Trees" (vi, 79).

20. "Tree-planting for Shade and Ornament in New South Wales, with special reference to Municipal requirements" (vi, 290).

Timber a Necessity.

Timber is a necessity of life. We use it to cook our food, to put our food upon; we sit upon it. It is the main constituent of our furniture—whether a bare necessity or a luxury; it is of this material our houses are largely, sometimes almost entirely, built. Our newspapers, books, and writing materials are mainly composed of it. True, the hulls of ships are but little built of it nowadays, but ornamental and other timbers are used in increasing abundance in their fixtures. The amount of special timbers used for horse, electric, and steam carriages is simply enormous; and the list might be multiplied indefinitely.

We have many special requirements for timber in this State, and there are requirements of people in other countries that can probably be met by timbers of New South Wales.

Forest Wealth of State.

I have no desire to use the language of exaggeration, but I can safely say that New South Wales is one of the most richly-endowed countries in the world as regards its forest wealth. I am an old curator of a technological museum, and have been a persistent traveller in Australian forests. I should be sorry to say that our timber supplies are unlimited—far from it; but, with our small population, we have large areas of practically virgin forest; and, in many places, as the trees are cut out, numbers of young trees are coming forward and flourish without hindrance, thus ensuring the stability of the supply of many of our timbers.

With few exceptions, most of our trees cannot be artificially replanted on a large scale under present economic conditions; what is chiefly required is conservation—protection of the young growth from damage by animals, fires, &c., and, in certain cases, what is called “thinning,” which consists in destroying or weeding out sickly, malformed, or overcrowded saplings. Conservation should be our main standby.

Most of our valuable timbers are found in the coast and coast-mountain districts. A few, *e.g.*, the cypress pines of the western districts, and the ironbarks of Dubbo (and thence to the north-east), are found in the drier parts of the State.

Supply of Good Timbers not unlimited.

The demand for our timbers has been so active during the last few years, and fashion has set in largely for a very few species, that a word of caution is necessary. We have large quantities of excellent timber, there is no doubt of that, but not so much that we can afford to cut recklessly, and neglect conservation of young growths. We must not forget that the giant trees, the monarchs of our forests, which have yielded large quantities of high-class timber, are being rapidly cut out. They have been maturing their timber through the ages, practically uninterfered with by the aboriginal lord of the soil, and are no more to be replaced than can the nuggets which men can do nothing to produce; he simply reaps a harvest which he has not sown. The cutting out of the forest without replanting or conservation of young forest growths is simply living upon capital, and, continuing the metaphor, we should seriously ask ourselves if we are establishing an adequate sinking fund.

Supply of Seasoned Colonial Timbers true to Name.

As a consistent advocate for many years of the use of colonial timbers, I have become familiar with the oft-repeated objection, "What is the good of advocating the use of colonial timbers when we rarely can buy any already seasoned?" It is a fact that very few varieties of seasoned timbers are kept in stock by our timber merchants. Timber merchants are like other tradesmen in endeavouring to keep a stock of any article that will sell, but we cannot expect them to run their business on sentiment; in other words, to convert their timber yards into sample museums. Consequently, in the first place, we require to educate our own people in regard to the merits of our timbers, and then they will endeavour to use more of them. I think that, as regards the general public, a certain amount of sentiment would not be out of place in endeavouring to encourage the use of colonial timbers. I mean that, having satisfied himself that a certain colonial timber is suitable for a certain purpose, the Australian citizen might well put himself to a little trouble to cause his want to be supplied. New timbers of a new country have to work their way to public recognition, and it is often far easier to continue to use an old and well-tried timber than to use an Australian substitute, however meritorious.

Felling Timber at Proper Season.

It is a matter of regret that, in the Australian States, timber-trees are felled the whole year round. It is generally accepted as a fact that timber from trees full of sap is more prone to warp and split, and even to decay, than timber from trees at rest—*i.e.*, when the sap is down. No general rule can be laid down for all trees, all districts, and all seasons; but the simplest guide to the timber-getter is, where possible, to avoid cutting when the tree is seen to be bringing forth new leaves. It would not be possible, under the present conditions of the timber trade, to carry out this rule in its entirety, but sawmillers would find it to their advantage to pay some attention to the matter, as it would improve the quality of their timber. The period of rest is, of course, usually winter with most trees. Perhaps midwinter would not be the very best season for felling our trees; in Europe oak is felled just as the leaf-buds are bursting, the timber being then much more elastic than if felled in the depth of winter. Of course, our winters are far milder than those in Northern Europe, but we do not know that we may implicitly follow European practice. I have made these few remarks with the view to initiate a discussion on the best season for felling our trees. If the State were to establish timber depôts, it might exercise some control over the periods for felling timbers in the different districts. At the present time, timber-getters and sawmillers will admit readily enough that timber should not be cut all the year round; but with the present cut-it-while-you-wait system which obtains, a reserve stock of logs is not felled (say) in the winter, to be hauled subsequently; but as a log is required it is felled there and then. With a proper system of scientific forestry we ought to have a close season for timber, just as we have for game-birds.

The Telegraph Department, in brush-cutting its lines, finds it necessary to study the seasons, otherwise the last state of the job is worse than the first; but, generally speaking, those who cut our logs do not trouble about such refinements as that. It is also to be borne in mind that, in the same forest, different species may be in different states of development as regards rest.

Seasoning Depôts.

A large proportion of our timber consists of hardwood, which is cheap, and used for rough purposes. Such timber is cut at all seasons, sawn at all seasons, and it often finds its way to the consumer direct from the saw. It is not to be surprised at that such timber often warps and splits in a provoking degree. The wonder would be if it did not. The remedies for this state of things seem to be:—

1. The observance of proper seasons for the felling of timber.
2. The establishment of seasoning depôts.

No. 1 has already been touched upon. As regards the second, various Government Departments, such as Railways, Roads and Bridges, Harbours and Rivers, Government Architect, &c., use such large quantities of timber that it would be desirable if they could adopt concerted action to establish seasoning depôts in various parts of the State, and draw supplies as required. Private persons could supply timber (cut at the proper season) in the log or sawn, and this could be stored in the Government seasoning sheds, and drawn upon for public works as required. In this way the use of green timber could be reduced to a minimum, while the use of open sheds would enable the timber to be classified as regards kinds and qualities to a far more accurate extent than it is at present. To initiate and establish these reforms could not be done without expense, but I feel sure it would be wise expenditure, which would be recouped over and over again in the improved and more uniform quality of the timber. The example would, I feel sure, soon be followed by private enterprise. Let us now turn to the case of the private supplier and user.

I know something of the practical difficulties which beset a timber merchant in Sydney, for instance, in obtaining a supply of a certain timber growing in a forest (say) hundreds of miles away—procuring it both true to name and in a seasoned condition. I have often pondered over the matter, and have wondered whether, seeing that the State is the principal proprietor of forests, and that it has already a staff of forest officers, whether State depôts (under lease or otherwise) might not be established, where stocks of timber might be held, such timber having been felled at the proper time, seasoned for a suitable period, and branded with a mark which would guarantee its true name. To carry out this plan would necessarily require a State subsidy for a time, but I think that, under all the circumstances, a reasonable subsidy would be justifiably spent. In a few years I feel convinced that the advantage of seasonably felling, of seasoning, and of properly naming our timbers, would become so apparent that private enterprise would take the matter up, and the State could withdraw from what might, at first sight, appear interference with private enterprise. We are at the present time giving our producers object lessons in many ways, and I do not think that a little State guidance in regard to the utilisation of our forest wealth would be either illogical or undesirable. It is, of course, understood that in making the above crude suggestions I am only expressing my individual opinion.

I published such diffident remarks in the year 1904, and as one who has earnestly looked forward to a Forest Department with power behind it, such as we have at present, I feel sure that something will be done, if only to cause the brush timbers, many of which we believe to be useful, but which are at present swept away without adequate test, to have the best trial that can be given under the circumstances.

An Optimum for Australian Timbers.

I wrote the following note in "Australia To-day," of 1st November, 1911, p. 93:—"The stringybark (*Eucalyptus obliqua*) of Tasmania is used for wood-paving, and while Western Australians will not agree with the judgment of a Tasmanian expert that 'it is preferable to jarrah,' the statement is evidence of the local esteem in which it is held, and gives me an opportunity of reiterating the fact, of which abundant proof has come before me, that certain timbers are their best in particular States. . . . *E. obliqua* seems to attain its best development in Tasmania."

The Rev. J. W. Dwyer, of Temora, wrote to me: "*Re Eucalyptus Stuartiana*. I often heard from farmers at Bowna, near Albury, where it grows well on flats, that for fencing-posts it is pretty lasting if put into the same kind of ground in which it grows, but not elsewhere, which may account for the rosy report given by one of your correspondents."

Mr. William Hogarth, of Momba, Wilcannia, communicated to me nearly thirty years ago the following observation on the durability of timbers:—"In any locality, wherever the particular kind of tree predominates, that timber will last longest in the ground—for instance, the Mulga where Mulga predominates—that is, in dry situations, while in damp situations, where 'Box' predominates, the Mulga soon rots, and the Box lasts longer in the ground. Where Oak (*Casuarina*) predominates, Mulga and Box will rot sooner than Oak, and so on." Mr. Hogarth made these observations, having had many old fences to pull down on his run, and in putting up new ones he acts as much as possible keeping this in view. These conclusions have been combated by some gentlemen from Western New South Wales; to whom the author broached the subject. The matter is, however, worthy of ventilation.

The following was written to me in 1889 by Mr. W. Baeuerlen, then Collector for the Technological Museum:—"Mr. William Beach, of Delegate Saw-mills, tells me that any timber put in the ground as posts, &c., will last much longer if put in *upside down*, i.e., always the lower end of the post turned up. He says many years ago he put up a sapling fence, and in the usual way dug holes for the 'dog-logs.' Wet weather came on, when he thought, as the ground was soaked, he could get on quicker with his work if he could drive the 'dog-logs' into the ground without digging holes. In order to do so he naturally turned the 'dog-logs' upside down, as the thinner end would drive easier. The result was that the 'dog-logs' turned upside down lasted six or seven years longer than the ones put in in the usual way. Acting upon that experience when putting up a fence again, he put the posts of stringybark (*Euc. macrorrhyncha*) all upside down, with the result that after twenty-five years the posts are standing yet; to all appearance quite sound, while posts put in in the regular way at the same time have rotted away long ago."

Any man who can contribute any observation which will enable the life of one or more of our timbers to be extended is a benefactor to the country, just as is the man who makes "two blades of grass" (two trees) grow where formerly only one grew.

I have suggested that every species of tree has an "optimum" district—that is to say, a district in which that tree grows better than anywhere else; in other words, produces the most valuable product. We should endeavour to learn the optimum district for each species, in order that we may search for other districts offering similar conditions, and find standing timber, or cultivate the species under those conditions.

We know that certain plants vary exceedingly in regard to their product when grown in different districts, *e.g.*, champagne grapes and lavender, and we have much to learn in regard to variation in the timber of the same species of tree when grown in different districts.

For instance, *Eucalyptus obliqua*, to which I referred at the beginning of this article, yields a product which is deservedly esteemed in parts of Tasmania, but I have known the same timber condemned as being of very little value in a certain district of New South Wales.

I have known high words and sharp controversy to arise between officials of two Australian States in the discussion of the merits of a certain timber. Perhaps both were right, but they were certainly arguing about the same tree growing in a district which promoted its best development and one which certainly did not. We must, therefore, get away from the idea that a species as we know it is always very good or very bad. Both Jones and Brown may be right. The rose that we have imported from England at great cost because experts speak so highly of it may, in our garden, turn out a very disappointing thing.

I have touched lightly and very imperfectly on a subject which is obviously of very considerable importance to the Australian forester, many of whose data he will have to find out himself, for he certainly will not obtain them from books.

Classification.

The classification of the commercial timbers of New South Wales is still in the tentative stage.

The vast majority of our commercial timbers belong to the genus *Eucalyptus*, which itself belongs to the family *Myrtaceæ*, which includes such timbers as Turpentine and Brush-box, which, for want of a better name, I have grouped as myrtles. At this place I quote the following endeavours I have made during the last twenty years to work out a grouping of our commercial timbers. I invite attention to what I have written, as the subject must be discussed.

1. "Notes on the Commercial Timbers of New South Wales" (first edition, 1895). At page 6 was submitted a classification of—

- | | |
|------------------------------|----------------------------------|
| 1. Ironbarks. | 5. Cedar, Beech, and Pine. |
| 2. Pale Hardwoods. | 6. Silky Oak, She Oak, &c. |
| 3. Red Hardwoods. | 7. Black Bean, Myall, Blackwood. |
| 4. Turpentine and Brush-box. | 8. Miscellaneous Brush timbers. |

2. "New South Wales, the Mother Colony of the Australias," Government Printer, 1896 (see page 168). Here I amplified the previous classification a little.

3. In "The Forests of New South Wales," a lecture delivered before the Royal Society of New South Wales, and reported in the *Agricultural Gazette* for July, 1901, I propose the classification—

- | | |
|---------------|-------------------------------|
| Ironbarks. | Pale Hardwoods. |
| Boxes. | Red Hardwoods. |
| Stringybarks. | Turpentine and Brush-box, &c. |

4. "Forestry in New South Wales." University of Sydney Extension Lecture, reported in the *Agricultural Gazette* for December, 1905, page 1185.

In this lecture, at page 1193, I made new suggestions for classification. I suggested a new grouping of Blackbutt, Pale Box, and suggested that the name Jarrah should include a number of red timbers, including Grey Gums, Forest Mahogany, Woollybutt, Blue Gum, the Red Boxes and Red Gums.

Such a suggestion as this is worthy of consideration if the question of the reduction of the number of names for somewhat similar timbers on this continent is to be gone into.

The Wattles (*Acacia*) seem a sufficiently distinctive group.

The Pines include the Cypress Pines, and also the She or Brown Pine (*Podocarpus*), which has a very different fruit.

The Silky Oak is a name I propose for such trees as belong to the *Proteaceæ*, a family very largely developed in Australia.

Every Australian knows the She Oak (*Casuarina*); this is a natural group, and nearly all the members have timbers with an oak-like grain.

The Cedar group includes our well-known Australian Cedar (*Cedrela*) and other trees such as Rosewood, Red Bean, &c., which also belong to the family *Meliaceæ*.

Then we have the Australian Teak group (*Flindersia*), from the best-known member, Australian Teak (*F. australis*).

The inevitable "Miscellaneous" will for the purpose of the present edition of the present part include such dissimilar trees as our White Beech, Sassafras, Coachwood, Black Bean, Red Ash, Bolly Gum, and Rusty Fig.

As this Handbook deals in the future with a greater selection of timbers, the classification may be modified and improved; but I thought it well at the present stage to adopt a provisional classification before submitting one for official adoption.

In the classification of timbers, as in other phases of forestry in New South Wales, we are still in the pioneering stage, but as an old worker, with thirty-five years' work on the subject behind me, it is a great pleasure to see that, beginning with 1917, progress in forestry work in New South Wales will be made by leaps and bounds.

The following list of readily accessible illustrations of trees and shrubs of New South Wales forests will be handy for reference:—

Tree.	Vernacular Name.	Figured in—	
		Forest Flora N.S.W.	Crit. Rev. genus Euc. (N.S.W. species only).
		Part.	Part.
<i>Acacia adunca</i>	A wattle	46	...
<i>amoena</i>.....	.....	50	...
<i>aneura</i>	Mulga.....	26	...
<i>aulacocarpa</i>	Brush ironbark.....	27	...
<i>Baileyana</i>	Cootamundra wattle.....	31	...
<i>Bakeri</i>	Baker's wattle	29	...
<i>binervata</i>	Two-veined hickory.....	25	...
<i>brachybotrya</i>	A blue bush.....	53	...
<i>Burkittii</i>	Burkitt's wattle	59	...
<i>buxifolia</i>	Box-leaved wattle.....	44	...
<i>Cambagei</i>	Gidgee.....	32	...
<i>Cunninghamii</i>	Bastard myall or Kurracabah	36	...
<i>cyperophylla</i>	Red Mulga	60	...
<i>decora</i>	Western silver wattle	45	...
<i>decurrens</i>	Black, green and silver wattles	23	...
<i>doratoxylon</i>	Currawang	37	...
<i>Dorothea</i>	Dorothy's acacia	55	...
<i>elata</i>	Cedar wattle	22	...
<i>excelsa</i>	Ironwood	33	...
<i>fimbriata</i>	Fringed wattle	42	...
<i>floribunda</i>	Sally	57	...
<i>gladiiformis</i>	Sword wattle	52	...
<i>glaucescens</i>	Coast myall	38	...
<i>hakeoides</i>	Western black wattle	51	...
<i>harpophylla</i>	Brigalow	34	...
<i>homalophylla</i>	Yarran	35	...
<i>implexa</i>	A hickory	41	...
<i>longifolia</i>	Sydney golden wattle	56	...
<i>Maidenii</i>	Maiden's wattle	58	...
<i>melanoxylon</i>	Blackwood	15	...
<i>obtusata</i>.....	.....	47	...
<i>obtusata</i> , var. <i>Hamiltoni</i>	Hamilton's wattle	48	...
<i>pendula</i>	Weeping myall	16	...
<i>penninervis</i>	Mountain hickory	24	...
<i>prominens</i>	Prominent glanded wattle.....	43	...
<i>pycnantha</i>	Broad-leaved wattle	28	...
<i>rigens</i>	The Nealie	30	...
<i>rubida</i>	Red-leaved wattle.....	49	...
<i>salicina</i>	Cooba.....	39	...

Tree.	Vernacular Name.	Figured in—	
		Forest Flora N.S.W.	Crit. Rev. genus Enc. (N.S.W. species only).
		Part.	Part.
<i>Acacia undulifolia</i>	Wave-leaved wattle.....	54	...
<i>Ackama Muelleri</i>	A corkwood.....	55	...
<i>Albizia pruinosa</i>	Stinkwood	10	...
<i>Alphitonia excelsa</i>	Red ash	2	...
<i>Alstonia constricta</i>	A bitter bark	2	...
<i>Amoora nitidula</i>	Bog onion	28	...
<i>Angophora lanceolata</i>	Smooth-barked apple	11	...
<i>Aphananthe philippinensis</i>	Native elm	13	...
<i>Aracaria Cunninghamii</i>	Richmond River or hoop pine.....	35	...
<i>Atalaya hemiglauda</i>	Western whitewood	15	...
<i>Baloghia lucida</i>	Brush bloodwood	7	...
<i>Banksia cœmula</i>	A honeysuckle	33	...
<i>collina</i>	A honeysuckle	38	...
<i>ericifolia</i>	Heath-leaved honeysuckle	34	...
<i>integrifolia</i>	White honeysuckle.....	8	...
<i>latifolia</i>	Broad-leaved honeysuckle.....	37	...
<i>marginata</i>	Honeysuckle or warrock	36	...
<i>paludosa</i>	A honeysuckle	41	...
<i>serrata</i>	Red honeysuckle.....	32	...
<i>spinulosa</i>	A honeysuckle	39	...
<i>Barklya syringifolia</i>.....	.....	8	...
<i>Callicoma serratifolia</i>	Original black wattle.....	57	...
<i>Callitris calcarata</i>.....	.....	12	...
<i>columellaris</i>.....	.....	12	...
<i>cupressiformis</i>.....	.....	12	...
<i>Macleayana</i>	} Cypress pines.....	12	...
<i>Muelleri</i>.....	.....	12	...
<i>propinqua</i>.....	.....	12	...
<i>robusta</i>.....	.....	12	...
<i>verrucosa</i>.....	.....	12	...
<i>Castanospermum australe</i>	Black bean	7	...
<i>Casuarina Cunninghamiana</i>	River oak	15	...
<i>equisetifolia</i> , var. <i>incana</i>	Coast she-oak	48	...
<i>glauca</i>	Swamp oak.....	14	...
<i>inophloia</i>	Thready-barked oak	21	...
<i>lepidophloia</i>	Belah.....	13	...
<i>Luehmanni</i>	Bull oak	19	...
<i>stricta</i>	Drooping she-oak.....	17	...
<i>suberosa</i>	Black she-oak	18	...
<i>torulosa</i>	Forest oak.....	16	...
<i>Cedrela australis</i>	Red cedar	3	...
<i>Ceratopetalum apetalum</i>	Coach wood.....	6	...
<i>gummiferum</i>	Christmas-tree or bush.....	49	...
<i>Cinnamomum Oliveri</i>	Oliver's sassafras	42	...
<i>virens</i>	Native camphor laurel	43	...
<i>Cryptocarya australis</i>	Grey sassafras.....	31	...
<i>erythroxylois</i>	Red-wooded cryptocarya.....	26	...
<i>foetida</i>	Stinking cryptocarya	29	...
<i>glaucescens</i>	Brown beech.....	27	...
<i>Meissneri</i>.....	.....	34	...
<i>microneura</i>	The murrogun.....	28	...
<i>obovata</i>	A she-beech.....	3	...
<i>patentinervis</i>.....	.....	32	...
<i>triplinervis</i>	Three-veined cryptocarya.....	33	...
<i>Cupania anacardioides</i>	A cupania	5	...
<i>Doryphora sassafras</i>	N.S.W. sassafras.....	2	...

Tree.	Vernacular Name.	Figured in—	
		Forest Flora N.S.W.	Crit. Rev. genus Euc. (N.S.W. species only).
		Part.	Part.
<i>Dysoxylon Becklerianum</i>	Hairy dysoxylon	26	...
<i>Fraserianum</i>	Rosewood.....	23	...
<i>Muelleri</i>	Red Bean	27	...
<i>pachyphyllum</i>	Apple-tree of Lord Howe Is- land.	25	...
<i>rufum</i>	Bastard pencil cedar	24	...
<i>Embothrium Wickhami</i> , var. <i>pinnata</i>	A red silky oak.....	45	...
<i>Endiandra discolor</i>	Tick wood	39	...
<i>globosa</i>	The ball fruit.....	36	...
<i>Muelleri</i>.....	.....	37	...
<i>pubens</i>.....	.....	38	...
<i>Sieberi</i>	Cork wood or till	35	...
<i>virens</i>	A white apple	41	...
<i>Eucalyptus acaciæformis</i>	Black peppermint .....	...	22
<i>acacioides</i>	Green mallee.....	48	11
<i>acermioides</i>	White mahogany.....	32	9
<i>affinis</i>	An ironbark box.....	53	13
<i>aggregata</i>	Black gum .....	...	25
<i>amygdalina</i>	Peppermint	16	6
<i>Andrewsi</i>	Blackbutt or Peppermint (of New England).	21	7
<i>apiculata</i>.....	.....	...	9
<i>Baileyana</i>	Black stringybark.....	35	...
<i>Banksii</i>	Sir Joseph Banks' gum .....	...	24
<i>Bauerlemi</i>.....	.....	...	29
<i>Baueriana</i>	Blue box.....	57	13
<i>Baueriana</i> , var. <i>conica</i>	Fuzzy box	58	...
<i>Behriana</i> , var. <i>conica</i>	Broad-leaf Mallee.....	46	10
<i>Benthami</i>	Camden flooded gum .....	...	29
<i>bicolor</i>	Black or flooded box	44	11
<i>Boormanii</i>	A black box	45	10
<i>Bosistoana</i>	Bosisto's box	43	11
<i>botryoides</i>	Bangalay.....	...	23
<i>Caleyi</i>	Caley's ironbark	55	10
<i>calycogona</i>.....	.....	...	3
<i>capitellata</i>	Brown stringybark.....	28	8
<i>cinerea</i>	Silver-leaved stringybark .....	...	21
<i>Consideriana</i>	The yertchuk	36	10
<i>coriacea</i>	White or cabbage gum.....	15	5
<i>corymbosa</i>	Bloodwood	12	...
<i>crebra</i>	Narrow-leaved red ironbark ..	53	12
<i>Deanei</i>	Round-leaf blue gum.....	...	24
<i>dives</i>	Broad-leaved peppermint	19	7
<i>Dunnii</i>	Mæpherson Range white gum..	...	24
<i>elæophora</i>	Bundy.....	...	19
<i>eugenioides</i>	White stringybark	29	8
<i>fruticetorum</i>	Blue mallee	42	11
<i>gigantea</i>	A mountain ash or gum-topped stringybark.	51	20
<i>Gillii</i>	Gill's gum .....	...	15
<i>globulus</i>	Tasmanian blue gum .....	...	18
<i>goniocalyz</i>	Mountain gum.....	5	19
<i>Gunnii</i>	Cider gum.....	...	26
<i>hæmastoma</i>	White or scribbly gum	37	10
<i>hemiphloia</i>	White or grey box	6	11
<i>incrassata</i>	A Mallee .....	...	4
<i>Kirtoniana</i>.....	.....	...	29

Tree.	Vernacular Name.	Figured in—	
		Forest Flora N.S.W.	Crit. Rev. genus Euc. (N.S.W. species only).
		Part.	Part.
<i>Eucalyptus leucozydon</i>	South Australian blue gum ...	...	12
<i>longifolia</i>	Woolly butt	2	20
<i>Luehmanniana</i>	Luehmann's Gum	26	9
<i>Macarthuri</i>	Camden woolly butt .....	...	25
<i>macrorrhyncha</i>	Red stringybark	27	8
<i>maculata</i>	Spotted gum	7	...
<i>maculosa</i>	A white gum .....	...	27
<i>Maideni</i>	Maiden's gum .....	...	18
<i>melanophloia</i>	Silver-leaved ironbark	51	12
<i>melliodora</i>	Yellow-box	9	14
<i>microcorys</i>	Tallow-wood	38	9
<i>microtheca</i>	The coolabah	52	11
<i>Muelleriana</i>	Yellow stringybark	30	8
<i>nitens</i>	Silver-top gum .....	...	19
<i>numerosa</i>	River white gum	17	...
<i>obliqua</i>	Broad-leaved messmate	22	2
<i>ochrophloia</i>	Napunyah	50	11
<i>odorata</i>	Western peppermint	41	11
<i>oleosa</i>	Red mallee	60	15
<i>ovata</i>	A swamp gum .....	...	27
<i>paniculata</i>	White or grey ironbark	8	13
<i>parvifolia</i> .....	.....	...	25
<i>Perriniana</i>	Perrin's gum .....	...	26
<i>pilularis</i>	Blackbutt	31	1
<i>piperita</i>	Sydney peppermint	33	10
<i>Planchoniana</i>	Bastard tallow-wood	24	9
<i>polyanthemos</i>	Red box	59	13
<i>populifolia</i>	Bimble box	47	10
<i>præcox</i> .....	.....	...	27
<i>propinqua</i>	A grey gum .....	...	29
<i>pulverulenta</i> .....	.....	...	21
<i>punctata</i>	Grey gum	10	29
<i>quadrangulata</i>	A white box .....	...	24
<i>regnans</i>	Giant gum-tree	18	7
<i>resinifera</i>	Red mahogany	3	30
<i>robusta</i>	Swamp mahogany .....	...	23
<i>rubida</i>	Manna gum .....	...	26
<i>Rudderi</i>	Rudder's box .....	...	13
<i>saligna</i>	N.S.W. blue or flooded gum ...	4	23
<i>scoparia</i>	Wallangarra white gum .....	...	29
<i>siderophloia</i>	Broad-leaved ironbark	39	10
<i>sideroxydon</i>	Mugga : a red ironbark	13	12
<i>Sieberiana</i>	Yowut or mountain ash	34	10
<i>Smithii</i>	Gully gum .....	...	12
<i>squamosa</i> .....	.....	...	17
<i>stellulata</i>	Black Sally	14	5
<i>Stuartiana</i>	But But .....	...	24
<i>tereticornis</i>	Forest red gum	11	...
<i>Thozetiana</i>	Thozet's gum	49	...
<i>umbra</i> .....	.....	...	9
<i>uncinata</i>	Whipstick mallee .....	...	14
<i>viminalis</i>	Ribbon gum .....	...	28
<i>virgata</i>	A virgate-eucalypt	25	9
<i>vitellina</i> .....	.....	...	7
<i>vitrea</i>	White-top messmate	23	7
<i>Evo lia accedens</i> .....	.....	9	...

Tree.	Vernacular Name.	Figured in—	
		Forest Flora N.S.W.	Crit. Rev. genus Euc. (N.S.W. species only)
		Part	Part
<i>Ficus Henneana</i>	A deciduous fig	14	...
<i>rubiginosa</i>	A rusty fig	1	...
<i>Flindersia australis</i>	Native teak	17	...
<i>Bennettiana</i>	Crow's ash or bogum bogum	21	...
<i>collina</i>	The Hill Flindersia	22	...
<i>maculosa</i>	Leopard wood	10	...
<i>Oxleyana</i>	Yellow-wood	19	...
<i>Schottiana</i>	Cudgerie	18	...
<i>Fusanus acuminatus</i>	Quandong	4	...
<i>Geissois Bentharii</i>	Red carabeen	58	...
<i>Gmelina Leichhardtii</i>	White Beech	9	...
<i>Grevillea Hilliana</i>	White yiel yiel	43	...
<i>robusta</i>	Silky Oak	1	...
<i>striata</i>	Western beefwood	42	...
<i>Hakea dactyloides</i>	A hakea	48	...
<i>eriantha</i>	A hakea	47	...
<i>Fraseri</i>	Fraser's hakea	54	...
<i>Ivoryi</i>	Ivory's hakea	51	...
<i>leucoptera</i>	Needlewood	53	...
<i>lorea</i>	A western cork tree	49	...
<i>Macraeana</i>	Macrae's hakea	52	...
<i>saligna</i>	Willow-leaved hakea	46	...
<i>vittata</i>	A needlewood	55	...
<i>Heterodendron oleaefolium</i>	Western rosewood	13	...
<i>Hicksbeachia pinnatifolia</i>	Monkey nut	59	...
<i>Lagunaria Patersonii</i>	A white oak	5	...
<i>Litsaea dealbata</i> .....	.....	47	...
<i>hexanthus</i>	The Ugaulbie	46	...
<i>reticulata</i>	She-beech or bolly gum	45	...
<i>zeylanica</i> .....	.....	44	...
<i>Macadamia ternifolia</i>	Queensland nut	10	...
<i>Melaleuca leucadendron</i>	Broad-leaved tea-tree	4	...
<i>Melia Azedarach</i> , var. <i>australasica</i>	White cedar	25	...
<i>Orites excelsa</i>	Prickly ash or silky oak	57	...
<i>Owenia acidula</i>	Grue or colane	14	...
<i>cepiodora</i>	Onion wood	31	...
<i>Panax elegans</i>	Black pencil cedar	6	...
<i>Pittosporum phylliæoides</i>	Narrow-leaved pittosporum	1	...
<i>Podocarpus elata</i>	Brown or she-pine	4	...
<i>Polyosma Cunninghamii</i>	Feather-wood or yeralla	51	...
<i>Quintinia Sieberi</i>	Opossum wood	52	...
<i>Verdonii</i> .....	.....	53	...
<i>Rhodosphæra rhodanthema</i>	Yellow wood	8	...
<i>Schizomeria ovata</i>	White cherry	54	...
<i>Scolopia Brownii</i> .....	.....	11	...
<i>Sideroxylon australe</i>	Black apple	11	...
<i>Siphonodon australe</i>	Ivory wood	16	...
<i>Stenocarpus salignus</i>	A beefwood	6	...
<i>sinuatus</i>	Wheel tree	56	...
<i>Syncarpia laurifolia</i>	Turpentine tree	1	...
<i>Synoum glandulosum</i>	Bastard rosewood	29	...
<i>Telopea oreades</i>	Gippsland waratah	44	...
<i>speciosissima</i>	Waratah	58	...
<i>Tristania conferta</i>	Brush box	5	...
<i>Ventilago viminalis</i>	Supple Jack .....	...	...
<i>Weinmannia rubifolia</i>	Bramble-leaved weinmannia	59	...

The Ironbarks.

GENERAL REMARKS.

1. *Eucalyptus paniculata* (White or Grey Ironbark).
2. *Eucalyptus siderophloia* (Broad-leaved Ironbark).
3. *Eucalyptus sideroxylon* (Mugga; a Red Ironbark).

The Ironbarks form such a natural group that I think it will be best to give a preliminary account of them, and then a few notes on the species under present consideration.

We have six ironbarks, three of them of especial value. Timbers of this class are so important that it will be interesting to discriminate them. There is a good deal of confusion in regard to the local names given to ironbarks, and the names I suggest for the various species seem to me the least objectionable. At the same time, the names "Narrow-leaved Ironbark" and "Broad-leaved Ironbark" are too cumbersome for ordinary use, and certainly for persons outside the State. It is probable that ironbark for the export trade will go forward under two names only, viz., Grey Ironbark and Red Ironbark, the first being the White or Grey Ironbark, and the second including both the Narrow and Broad-leaved Ironbarks, the timbers of which closely resemble each other. The fourth ironbark, whose botanical name is *Eucalyptus sideroxylon*, is mainly an interior species, and will seldom, if ever, be exported. A fifth species, *Eucalyptus Galeyi*, is chiefly confined to New England. A sixth species, the Silver-leaved Ironbark (*Eucalyptus melanophloia*, occurs in the drier parts of the State. Perhaps timber will go forward under the single generic name of ironbark; if so, I wish to impress on friends at a distance that our various species of ironbark vary a good deal in colour, as a consignee may readily be confused if an ironbark be sent to him different in appearance to that to which he has been accustomed.

Table of Ironbarks.—The following table brings out the principal points of the four principal ironbark trees and ironbark timbers, and may help to elucidate them:—

	White or She Ironbark (<i>paniculata</i>).	Narrow-leaved Ironbark (<i>crebra</i>).	Broad-leaved Ironbark (<i>siderophloia</i>).	Red Ironbark (<i>sideroxylon</i>).
Colour (darkens with age).	Very pale; pink when fresh,	Medium ..	Medium; a little darker than preceding.	Very dark.
Strength of timber.	Best	Good	Good	Inferior.
Bark	Often pale- coloured, even grey. Furrows often anastomosing.	Very deeply fur- rowed, inferior in depth only (if at all) to <i>sideroxylon</i> .	Often of a flaky character.	Dark; deepest furrowed.
Leaves	Narrow and medium.	Very narrow ...	Very broad ...	Medium; foliage often sparse.
Flowers	White	White	White	Crimson; some- times creamy.
Fruits	Small	Very small ...	Rather large ...	Large.

How to tell Ironbark.—It is not very easy, in a few words, to give a definition of Ironbark. Of course, if the bark is available the thing is simple enough, for most of the barks are characteristically furrowed and rugged. To describe it we must take note of a variety of circumstances. It is heavy (almost the heaviest of our hardwoods). It is hard, as may be readily seen if it be touched with a plane, or a nail be driven (or attempted to be driven) into it. Its most characteristic property, however, is a certain "gumminess" in working, which is well brought out under the plane, and its horny texture. The result is that when planed, ironbark shows the appearance of more or less parallel striae, or lines of close textured wood, strongly resembling horn, while between these the wood has a more open grain, showing narrow pits which may be seen, even by the naked eye, to be filled by a substance of a resinous texture. In some specimens it is not easy, however, to make out these lines of horny-textured wood, but the resin pits appear to be always present. Ironbark is more or less curly in the grain, consequently it often gives trouble to plane to a perfectly smooth surface. If a blunt tool be used the ironbark tears in fairly regular blotches, while to get a perfectly smooth surface the wood often requires to be traversed with the plane, or even to be gone over with the steel scraper. Its hardness and weight often preclude it from use, perhaps an advantage, as otherwise the consumption of this timber would be inordinate.

I have obtained the following two paragraphs from a source I do not remember, and they may be inserted here. They refer to the identification of—

GREY IRONBARK (*E. paniculata*).

"As sawn timber, shows absolute freedom from concentric gum veins, but it may contain gum pockets of little magnitude; it is clean, and somewhat glossy, arrises are decidedly sharp—it generally takes on a light-brown colour after exposure. As hewn timber it is close, clean, and solid in appearance, with no gum veins or scabs. Heartwood, to the eye, appears equal in density to the true timber; and seasoning cracks are numerous, but of slight fracture and shallow penetration. A splinter bent between the fingers shows great resistance to fracture compared with Grey Gum or other timbers similar in appearance to Ironbark. Splinters do not snap with a clean fracture, but hang together on the compressed side.

"It is very hard to cut with a knife; when so cut, it shows various shades of colour from white to dark red, the intervening colours varying between grey and brown; but the horny, glossy texture of ironbark is identical through all shades.

RED IRONBARK (*E. siderophloia* and *E. crebra*).

"Two species—one, to which the remarks on Grey Ironbark apply in almost every particular, with perhaps the exception that the end cracks are more pronounced; the other, inferior in nature generally, is very short in grain, shorter even than Grey Gum; heartwood crumbles under a hammer blow. Both timbers are true to name (herein differing from "Grey" Ironbark), being uniformly red throughout. General appearance of both varieties (in girders) solid, glazed surface, of a rich dark-red colour."

Principal Uses.—Ironbark is the king of New South Wales hardwoods, in fact it is not excelled in any part of the continent for combined strength and durability. It is extensively used in bridge construction, for railway sleepers, for posts, for naves, spokes, shafts, and framing, by the waggon and carriage builder for large beams in building, particularly in stores for

heavy goods; in a word, wherever great strength is required. For such purposes as railway sleepers it will last an indefinite period, and in many cases has to be taken up, not because it shows signs of decay from exposure on the permanent-way, or disintegration, because of the vibration to which it has been subjected, but because holes have been made in the sleeper by the renewal of bolts and spikes. I have seen specimens of sleepers which have borne the heaviest traffic of the main line, near Sydney, for twenty-five years, and which are as sound as the day they were laid.

Eucalyptus paniculata, Sm.

WHITE OR GREY IRONBARK.

Botanical Name.—Eucalyptus, from two Greek words—*eu* (well), *kalypto* (I cover)—in allusion to the little cap, usually more or less conical, which well covers the unexpanded flower, and which is thrown off as the flower opens. *Paniculata*, Latin, the inflorescence being paniculate.

Vernacular Names.—This is usually called “White Ironbark,” by reason of the pale colour of its timber in comparison with others. For a similar reason it is often called “She Ironbark.” The term “She” in this connection does not imply inferiority of strength (as the term “She” does, as a rule in Australia, as applied to timbers), since this is the strongest of timber of the ironbarks; it refers to its paleness. It is also called “Grey Ironbark.” On the South Coast I have known it to be called “Red Ironbark,” because of its pale red colour. The fact is that Eucalypts vary in the colour of their timber just as they do in every other character.

Leaves.—This species is not an abundant yielder of oil, so that the ironbarks felled for timber are not likely to have their leafy tops utilised for distillation.

Timber.—*E. paniculata* is the ironbark usually called White or Grey Ironbark in the coast districts. It is, however, also called Red Ironbark in the Moruya and Wagonga districts and other places.

The best white ironbark is very pale, the hardest of ironbarks, and cuts almost like horn; some of the same species from the Moruya district is of a medium red colour, not unlike Sydney blue gum in tint. It is to white ironbark of good quality that all the encomiums which have been passed on ironbark may be attributed. At the same time, timber but little inferior may be produced by some of the other ironbarks.

Size.—Usually a tree of medium size, say 60 or 70 feet in height, with a diameter of 2 to 4 feet; it exceptionally attains a greater size.

Habitat.—It is chiefly found in New South Wales, extending practically along the whole of the coastal strip. I have obtained it almost from the Victorian border. It extends to southern Queensland.

It prefers ridges, often ironstone ridges, growing on dry, poor land, of very little use for any other purpose. Just as hard struggles in his younger days bring out what is best in a man—his grit and quality—so we find, as a rule scarcely admitting of exception, that timber grown under “hard” conditions is better than timber growing more luxuriously as regards soil and moisture.

EXPLANATION OF PLATE 30.

- a. Twig, showing buds, flowers, and fruits. The foliage is often pendulous.
- b. Cluster of fruits of the size often seen.
- c. Fruits of the smaller kind, by no means rare.



EUCALYPTUS PANICULATA, Sm. (White or Grey Ironbark.)

Eucalyptus siderophloia, Benth.

THE BROAD-LEAVED IRONBARK.

A "coarse" species, that is to say, having coarse fruits (as compared with the other Ironbarks, *paniculata* and *crebra*) and coarsely-furrowed bark. Altogether a very sturdy tree, reminding one, in this respect, of the British Oak.

There is a glaucous form (var. *glauca*, Deane and Maiden) which goes under the name of "Blue-leaf Ironbark" and "Broad-leaf Ironbark" in the Dubbo district.

Botanical Name.—*Siderophloia*, from two Greek words—*sideros* (iron), and *phloia* (bark)—in reference to the common Australian name for such trees.

Vernacular Names.—"Broad-leaved Ironbark." Perhaps this is the most distinctive name for this species, a characteristic by which it may be readily distinguished, particularly in young trees. It is often called "Red Ironbark," particularly from northern localities.

Flowers.—The buds are often, when young, of the "egg-in-egg-cup" shape—that is to say, the operculum is of noticeably less diameter than the calyx. (See figure.) The bud is commonly beaked.

Fruits.—The fruits have generally exsert valves (teeth, some people call them), which is usually quite sufficient to distinguish this from other Ironbarks.

Bark.—The ridges of bark common to all Ironbarks are flattest in this species—that is to say, in other Ironbarks they are sharper and more conical in section.

Timber.—Coming to the particular Ironbark of which we are speaking, the timber has the highest reputation for strength and durability, and is used for large beams in stores for heavy goods, railway sleepers, and other purposes where great strength is required. It is also used for dray poles. Its extreme hardness renders it difficult to work. It is largely used for spokes.

The Ironbark of the Clarence is not liked as compared with southern Ironbark, as it is inclined to split and shell.

Speaking of this Ironbark, chiefly from the Manning River district, the late Mr. Augustus Rudder wrote:—

The mature trees are generally pipy, and the colour of the wood is red. The timber of this Ironbark is strong, hard, dense, and heavy, but in lasting quality is not always reliable, as I have repeatedly seen it quite rotten after ten or fifteen years, but this is not usual. It is very plentiful in places, in the Clarence River district in particular, but in these parts the timber is of inferior quality, especially on the ridges, where the trees are stunted and badly grown. For railway sleepers this timber is fairly good, but is scarcely to be recommended in the round, as a rule, for bridge-work, as its central heartwood is not reliable, and it is very subject to the white ant, more so than any other hardwood I know of.

Size.—This is a large tree, attaining the height of 100 feet, with a diameter of 4 feet and more. Being a timber in such demand, most of the largest trees have long since been cut down in readily accessible places.

Habitat.—It occurs from the Clyde Mountain in the south, along the coast ranges to North Queensland. Westward it is found as far as Wellington and Dubbo, also at Mudgee. With *E. crebra* it is found from Dubbo to the North-Western line.

I shall be glad if correspondents will send me specimens from as many southern and western (New South Wales) localities as possible.

Mr. A. Murphy has collected it from Rockhampton, Queensland, and his specimens are precisely similar to the Sydney ones.

EXPLANATION OF PLATE 148.

- A. } Sucker-leaves from Smithfield, near Parramatta.
 B. }
 c. Twig in bud.
 d. Fruits from the same branch.
 e. Smaller fruits from Smithfield.

Eucalyptus sideroxylon, A. Cunn.

THE MUGGA; A RED IRONBARK.

Botanical Name.—*Sideroxylon*, from two Greek words—*sideros* (iron), *xylon* (wood)—in allusion to the hardness of the timber. It is an ironbark, and the timber of the one now under review is one of the softest of the Ironbarks.

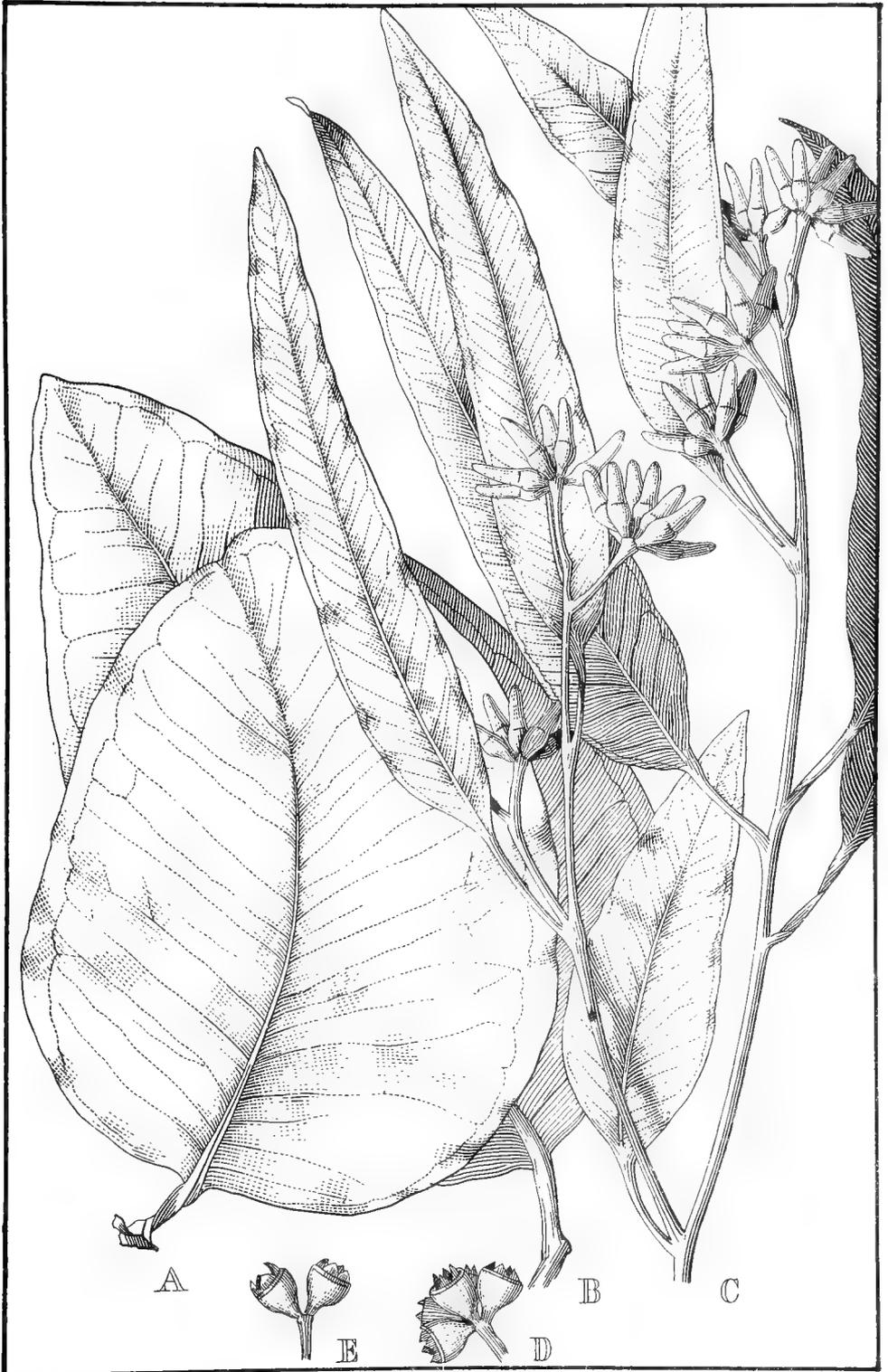
Vernacular Names.—Its aboriginal name is in very common use, and it is also known as “Red Ironbark” because of its timber, but the timbers of other Ironbarks (e.g., *siderophloia* and *crebra*) are also red. For obvious reasons it is also called “Red-flowering Ironbark.” Sometimes it is called “Black Ironbark,” because of the darkness of its bark. A very common name is “Fat Cake,” or “Fat-cake Ironbark,” because of the pulverulent look of the bark, interspersed as it is with blackish kino grains, the general appearance reminding one of a burnt greasy cake.

Flowers.—This is the New South Wales species of *Eucalyptus* which most frequently has red or rather pink or crimson flowers. Often, however, it has creamy white flowers.

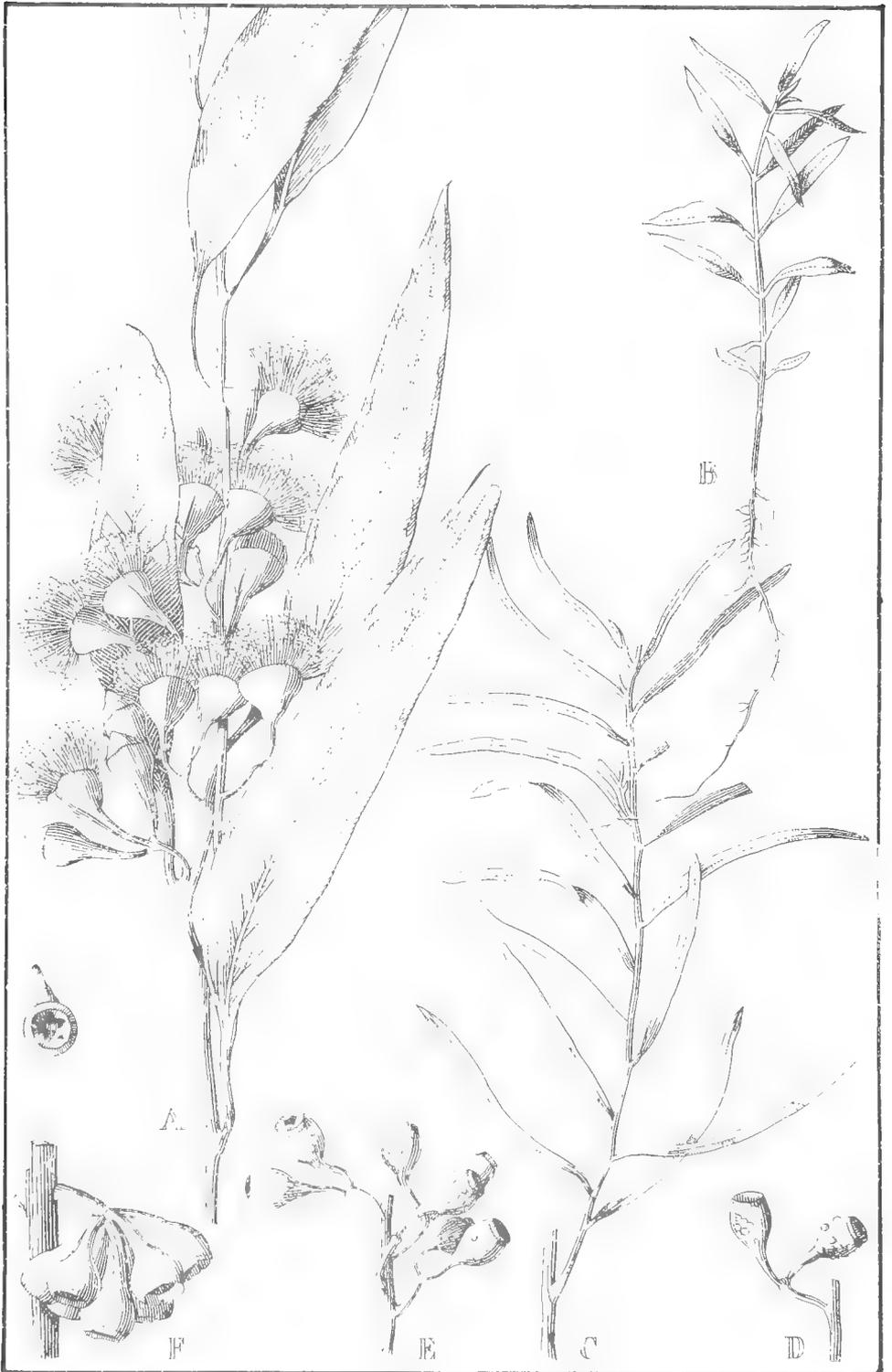
Fruit.—The shape will be noted from the figure. A point worthy of remark is that it has a round rim or ring round the mouth, as is often seen in the smaller fruit of the Yellow Box (*melliodora*). It also has warty excrescences such as are seen in *E. leucoxylon* (from Victoria and South Australia), in *E. maculata* (Spotted Gum), and a few others.

Bark.—The bark of this species has been referred to under “Vernacular Names.” The ultimate branchlets are smooth, while those of *E. crebra* (another Red Ironbark often associated with it) are rough.

Timber.—The wood of this is the deepest in colour, and also the softest and least valuable of the Ironbarks. The tree is often pipy and gnarled, but in many places it is a fine timber tree. Where one of the other Ironbarks is available, this Ironbark suffers by comparison; nevertheless, it is a useful timber, and is employed in public works for such purposes as railway sleepers and posts, where long lengths are unnecessary. Frequently good lengths cannot be obtained, and if they could the tensile strength of this timber is not equal to that of the best Ironbark.



EUCALYPTUS SIDEROPHLOIA, Benth. (Broad-leaved Red Ironbark.)



EUCALYPTUS SIDEROXYLON, A Cunn. (The Mugga: A Red Ironbark.)

Exudations.—Its bark contains large quantities of kino, which also permeates the wood.

Mr. Forester Allan, writing to me, says:

I obtained the gum from the ironbark by boiling the bark and straining the liquor, after which I reduced it to a thick consistency. Large quantities can be obtained by this process at little cost.

It will probably be found useful for tanning purposes.

Size.—It attains a height of 100 feet and a diameter of 4 feet, though usually it is much smaller. Foresters Postlethwaite, of Grenfell, and Marriott, of Dubbo, both quote the height as 100 feet and the diameter as 2 feet. Forester Martin, formerly of Dubbo, gave the height as 40 to 60 feet, and the diameter as 18 inches to 3 feet.

Habitat.—It is confined to New South Wales and Victoria and to tracts of country in Queensland adjoining New South Wales. In New South Wales it occurs in the bush between Parramatta and Liverpool, in paddocks at South Creek, and in the neighbourhood of Richmond, and again beyond the Blue Mountains, near Mudgee and Wellington, and elsewhere, being widely diffused over the auriferous districts of the western and south-western interior. It is rare in the southern part of the State, becoming more plentiful on the ranges near Moruya; getting more plentiful further north. It is usually found on poor, sterile ranges, and is usually unaccompanied (except in the Dubbo district) by any other species of Ironbark.

This Ironbark is commonest in the Central Division of New South Wales, and its "curving boundary" to the west (as far as I know it) is a line roughly drawn through Holbrook (near the Murray), Wagga Wagga, Hillston, Nymagee, Cobar, Dubbo, Narrabri, Warialda, Inverell, and thence to the Darling Downs in Queensland. I shall be glad if correspondents will favour me with any localities west of this boundary.

In spite of the reckless extravagance with which this timber has been cut, it is by no means scarce, especially in some localities, a few miles from the coast. While it is a very slow-growing tree, there is some consolation in the fact that it usually grows in barren, rocky country unsuitable for agriculture, and therefore wholesale clearings are not made as in the case with many other timbers. At the same time it does not readily reforest.

EXPLANATION OF PLATE 49.

- A. An original specimen in flower collected by Allan Cunningham.
- B. Seedling raised from seed collected at Stuart Town, N.S.W.
- C. Natural seedling from Condobolin, N.S.W.
- D. Fruits from Condobolin Hill (whence the preceding seedling was obtained). Observe the warts frequently seen on the fruits of this species.
- E. Fruits from Cootamundra to Grenfell.
- F. Fruits from Cabramatta, near Sydney.

Red Gum Series.

1. *Eucalyptus tereticornis* (Forest Red Gum).
2. *Eucalyptus bicolor* (Black or Flooded Box).
3. *Eucalyptus microtheca* (Coolabah).
4. *Eucalyptus saligna* (N.S.W. Blue Gum).
5. *Eucalyptus resinifera* (Red Mahogany).
6. *Eucalyptus punctata* (Grey Gum).
7. *Eucalyptus longifolia* (Woolly Butt).

Eucalyptus tereticornis, Sm.

THE FOREST RED GUM.

Botanical Name.—*Tereticornis*, Latin—*teres*, *teretis* (long and round), taper as a tree or pillar; *cornu* (a horn), referring to the shape of the operculum.

Vernacular Names.—"Forest Red Gum." This tree is very closely related to the Murray Red Gum, which is always found near watercourses or on alluvial country. The species is, with important exceptions indicated, usually found in open forest country, hence I recommend the adoption of the prefix "Forest" to Red Gum, the name by which it is very commonly known, with the view to save confusion. It sometimes also goes under the names of Blue and Grey Gums, and even others, but these names are best reserved for other trees.

Varieties.—According to some this species has a number of varieties; according to the more modern view it has in the past included a number of distinct species. The matter is gone into in Parts xxxi and xxxii of my "Critical Revision of the Genus *Eucalyptus*."

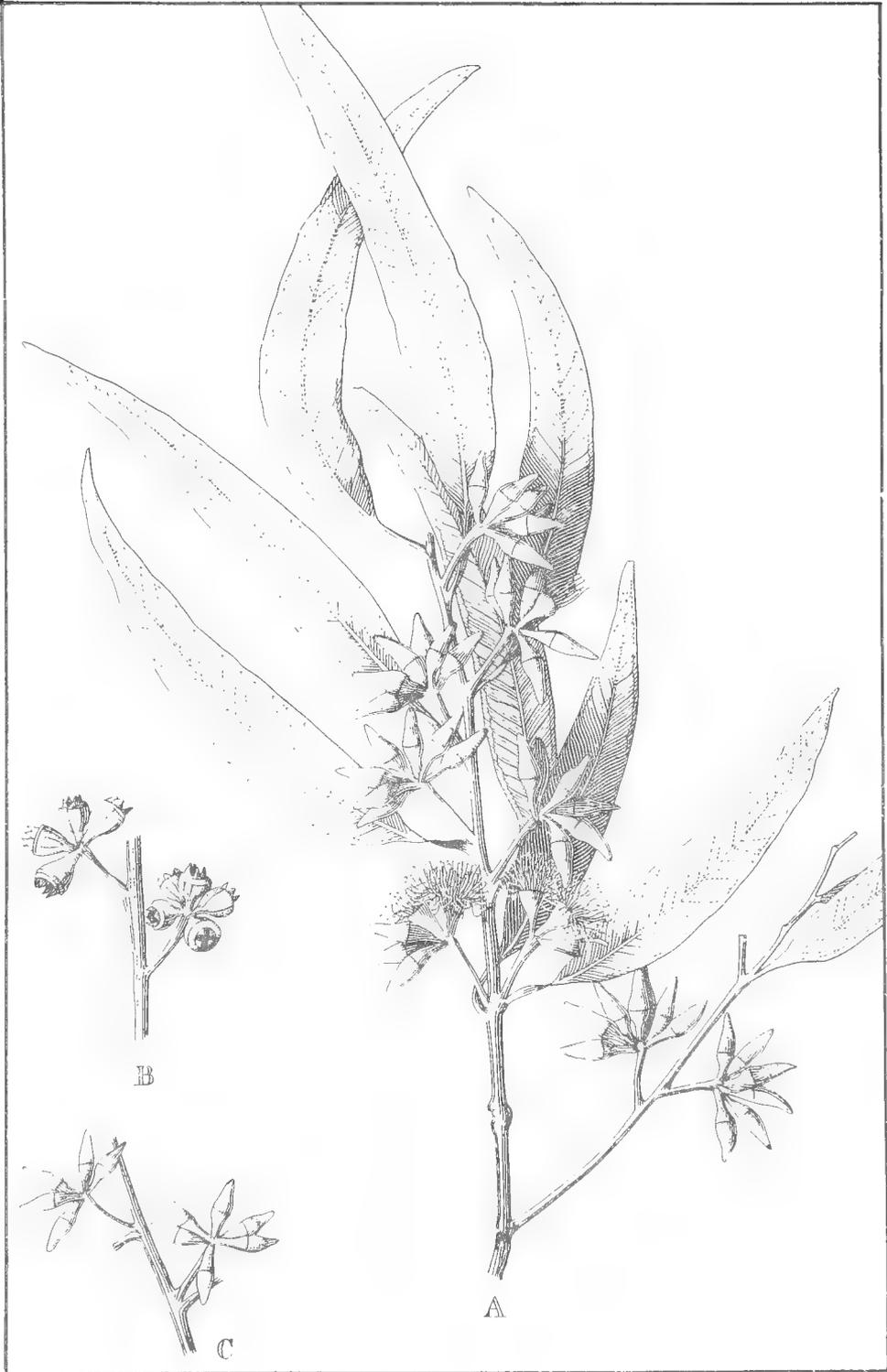
Timber.—Of a deep red colour, hard and inlocked in the grain, heavy and durable. Apt to warp in seasoning, and, in common with many of its congeners, it is very hard to work up when dry. It has some tendency to shell off, which limits its use for such purposes as flooring and decking. It is much esteemed for fence-posts and any underground work, its great durability for this purpose having been long established. Used also for naves and felloes of wheels, and for general building purposes. Its merits and defects are much the same as those of Murray Red Gum, and I draw attention to it as a meritorious timber for wood-blocks. It is a valuable timber for railway sleepers.

Size.—Say, up to 100 or 120 feet high, with a diameter of 3 or 4 feet.

Habitat.—It is chiefly confined to the coastal districts and to the eastern slopes of the tablelands. It is a very abundant species. I give a few illustrative localities.

Victoria.—Gippsland.

New South Wales.—Eden to Moruya, Shoalhaven River, Crookwell, north to Sydney and Parramatta. Very near the normal on the Mudgee line; common along the North Coast.



EUCALYPTUS TERETICORNIS, Sm. (Forest Red Gum.)

Queensland.—Common on coast, at least as far north as Rockhampton; the Herbert River; and the Northumberland Islands. Leichhardt called some specimens “Scaly Gum.”

Papua.—It is one of the few Eucalypts that extend to this dependency.

EXPLANATION OF PLATE 41.

- A. Twig of the normal species.
- B. Fruits of the same.
- C. Buds.

Eucalyptus bicolor, A. Cunn.

BLACK OR FLOODED BOX.

Botanical Name.—*Bicolor*, a Latin word, signifying two-coloured, in allusion to the fact that pinkish or even crimson flowers are often found on this tree intermixed with the greatly preponderating white ones.

Vernacular Names.—“Black Box,” or “Flooded Box,” are common names, the former owing to the colour of the bark and the latter to the nature of the country the tree commonly frequents. For the same reason it is called “River Box.” It is also called “Drooping Box,” from its habit.

The late Forest-ranger Kidston, a most experienced man, called it “Coolabah” of the Lachlan (several other trees go by this name). It is also used on the Diamantina in Western Queensland. The same name is in use on the Bogan. He also called it “Swamp White Box,” because of the often greyish or whitish appearance of the bark. It is sometimes also called “White—or Grey Box.”

It is an abundant and well-known tree, and can be recognised without difficulty after a little practice. The names I recommend for this tree are as good as any.

Aboriginal Names.—The “Goborro” of the aborigines of western New South Wales, according to Sir Thomas Mitchell.

As has been already stated, the name Coolabah (which is of aboriginal origin) is applied to these trees in the Lachlan district. It is also in use about Murrumbidgee (Dubbo district). Dr. T. L. Bancroft tells me that the same name is in use for the same tree on the Diamantina in Western Queensland. It also bears the same name on the Mulligan River.

Leaves.—Mr. F. B. Guthrie, in *Agricultural Gazette, N.S.W.*, October, 1899, has analysed these leaves under the name of “Booligal,” with the following result:—

Water.	Ash.	Fibre.	Ether extract (oil, &c.).	Albuminoids.	Carbo-hydrates.	Nutrient value.	Albuminoid ratio.	Tannin (oak bark).
16·07	4·13	9·05	7·24	6·75	56·76	80	1·11	5·6

Gum-leaves sometimes edible, sometimes not. I have for many years made inquiries in regard to the fodder-value of our native vegetation. It is very easy to say whether certain plants are edible or not, but in regard to some of our trees and shrubs it is simply impossible to reconcile the statements concerning them. From the same district one receives the same species of plant in two different parcels, with the label that stock eat the

one and reject the other. The plants are not even in a different stage of growth; they simply are identical in every respect. If they were sent at different times by different people one might solemnly record them as edible or the reverse, and the information, without qualification, would be misleading.

The fact of the matter is, there are two factors—the plant and the animal. The plant may vary and be edible in one district or at a particular season of the year, or particular sheep, cattle, or horses may be fond of this particular plant, while others may reject it. In other words, all plants of the same species may not be edible, and all animals of the same kind may not show partiality to the same plants.

Animals have their idiosyncrasies just as men have, liking one kind of food and disliking another. If we could but persuade some Australian animals that certain plants are so nutritious and palatable if they would only take our advice, what a different place Australia would be! Much depends on the district in which an animal is bred; much depends on habits of feeding he has recently formed—in other words, as regards foods an animal may be bred from infancy in the midst of certain food, and use of it may be quite natural to him, or through necessity he may have become educated to it. In either case he will eat similar food in another district or reject dissimilar.

If the flock or herd be of mixed origin (in the above sense), when they come to a new locality some of the animals will eat a certain plant, while others will reject it.

I published a note on Edible and Non-edible Red Gum-leaves (*Eucalyptus rostrata*) in the *Agricultural Gazette* for June, 1899, p. 496. I got specimens from Moulamein, absolutely identical as far as I could see, with the labels from the same gentleman that sheep were fond of one and rejected the other.

Then from Marra Creek, *viâ* Nyngan, I have received several specimens of twigs of "Box, Drooping Box, or Coolabah" (*Eucalyptus bicolor*, A. Cunn.), *i.e.*, the tree now figured and described, with the following notes:—(1) Sheep will not eat; (2) sheep very fond of this; (5) sheep will eat; (6) sheep fond of this; (8) sheep will not eat. The twigs are all from the same species, though doubtless from different trees, and were collected by an esteemed correspondent of the Department (Mr. Grigg).

From Warena Run, Castlereagh River district, I have received specimens of "Bimble Box" (*Eucalyptus populifolia*, Hook. f.) from the same gentleman. They appear to be absolutely identical, yet (1) is labelled, "Stock will eat"; (2) "Stock will eat, but do not care too much for it"; (3) "Stock will not eat."

Discussing the matter with Mr. R. H. Cambage, that gentleman gave me the following example with regard to one of the She-oaks (*Casuarina*) of the interior.

An old resident mentioned that a man had brought a team of bullocks a distance of over 100 miles, and when camping inquired from my informant what trees were good for feed. On being told that the Belah (*Casuarina lepidophloia*) was one of the best in this locality, he thereupon cut down a number of branches, only to find his bullocks reject them. He therefore went further afield, and some time afterwards returned to say his bullocks had had a great blow-out on Bull-oak (*Casuarina Luchmanni*). When telling me of this, my informant appeared amused at the recollection, for it seemed to him that these travelling bullocks must have a queer palate to prefer Bull-oak to Belah, but the driver explained that they were used to the former in their native district.



EUCALYPTUS BICOLOR, A. Cunn. (Black or Flooded Box.)

I would cordially invite correspondence on the very interesting subject I have brought before my readers. In deciding what are fodder-plants, it should be remembered that during droughts stock will eat almost anything, but plants that animals only eat as a last resource should not be accounted fodder-plants. Of course it is quite possible that collectors have mixed their specimens, and that stock really eat or reject different species. The matter should be cleared up.

Seed.—This is one of the few species of *Eucalyptus* whose seed, after grinding on stones, yielded food for the blacks.

Timber.—Mr. R. J. Dalton, of Wanaaring, says:

Box Trees.—There are several varieties of Box; some are good for all kinds of work, while others, especially a kind which we call Swamp or Black Box, is very indifferent, not even being good for firewood. This is *Eucalyptus bicolor*.

The aborigines used to make narrow shields of it.

It does not appear to be a favourite timber. While used for fencing, it is not a favourite, because of its hardness, interlocked and crooked character, making it difficult to obtain either posts or rails. It is, however, very durable.

Size.—A spreading tree of medium size, with a trunk diameter of 2 or 3 feet; the trunk is, however, not long.

Habitat.—It seems to be confined to South Australia, Victoria, New South Wales, and Queensland.

From St. Vincent's Gulf and the Murray River and its lower tributaries, through Eastern Australia, and particularly its eastern tracts to Carpentaria, at least as far as the Flinders and Gilbert Rivers, but reaching also, in some places, the coast tracts. (Mueller, in *Eucalyptographia*.)

This reference to "coast tracks" applies, as regards Eastern Australia, to Queensland solely. *E. bicolor* is a dry country species, and in Central and Northern Queensland many western New South Wales species approach the coast. It prefers rich flats, which are liable to occasional submergence.

"A Box, low straggling tree, something like *E. melliodora* (Yellow Box) in habit. The leaves have, however, generally a bluish tint. Tree, 2 feet 6 inches in diameter, perfectly sound, with fine hard red timber, and very little sapwood. Kerang, also Bumbang, near Euston, N.S.W." (J. Blackburne.)

New South Wales is the State in which it is the most abundant.

In my "Critical Revision of the genus *Eucalyptus*," Part XI, I have given the localities in considerable detail, and my readers are referred to them.

It is common in the Riverina. It is abundant on the Lachlan, Darling, and Paroo, thence more northerly into an extensive area of Queensland.

Scone is the most eastern New South Wales locality so far recorded. It is what we call a "dry country" species.

It is one of the most widely diffused of the Eucalypts, and I do not doubt that more careful search will very greatly extend its recorded range.

EXPLANATION OF PLATE 164.

A. Juvenile leaves.

B. Flowering twig with immature fruits.

C. Mature fruits.

Eucalyptus microtheca, F.v.M.

THE COOLABAH.

Botanical Name.—*Microtheca*, from two Greek words, *micros* (small), and *theke* (something to put anything else in)—hence, in botany (amongst other technical meanings), a capsule—hence, a small fruit, for this species has one of the smallest of all *Eucalyptus* fruits.

Vernacular Name.—This is the true Coolabah of the aborigines, variously spelt Coolybah, Coolibar, Coolybar. The name has been persistently though erroneously attached to at least two other trees—*Eucalyptus bicolor*, A. Cunn., the Black or Flooded Box, and one at least of the so-called Apples (*Angophora*).

“Flooded Box,” Gulf of Carpentaria. “White Gum,” in Western Australia, where its bark sometimes looks as if it had been whitewashed.

Leaves.—The leaves of this tree are commonly glaucous, or at least pale-coloured, and the venation well marked.

Fruits.—The very small fruits with exerted valves are usually quite sufficient to distinguish this species.

Bark.—The bark of this tree, as we in New South Wales know it, is rough and persistent, more or less fibrous and even scaly on the trunk, with usually smooth bark on the limbs.

Mueller, however, described the tree (type from the Northern Territory) as “with a dirty brownish-white bark, full of wrinkles and cracks, persistent on the trunk, deciduous on the upper branches, leaving them ashy white.”

Bentham (B.Fl. iii, 223) quotes Oldfield, as regards the Murchison River, W.A., “who remarks on the variability of the bark, but there appears to be some confusion in his notes.” There may be no confusion.

Western Australian trees are so different, as regards the bark, to New South Wales and Queensland (not far north) trees that, familiar as I am with the latter, I did not recognise *E. microtheca* (a White Gum) in the Murchison district, W.A., when I first saw it, and had to examine the twigs. Here is an instance in which there is a great variation in the bark in the same species (over an interval of, say, 2,000 miles), and we are reminded that examination of the bark, a most useful character, must be conducted with caution. The amount of rough bark on the trunk varies within wide limits; sometimes it is almost absent. It is a matter of degree.

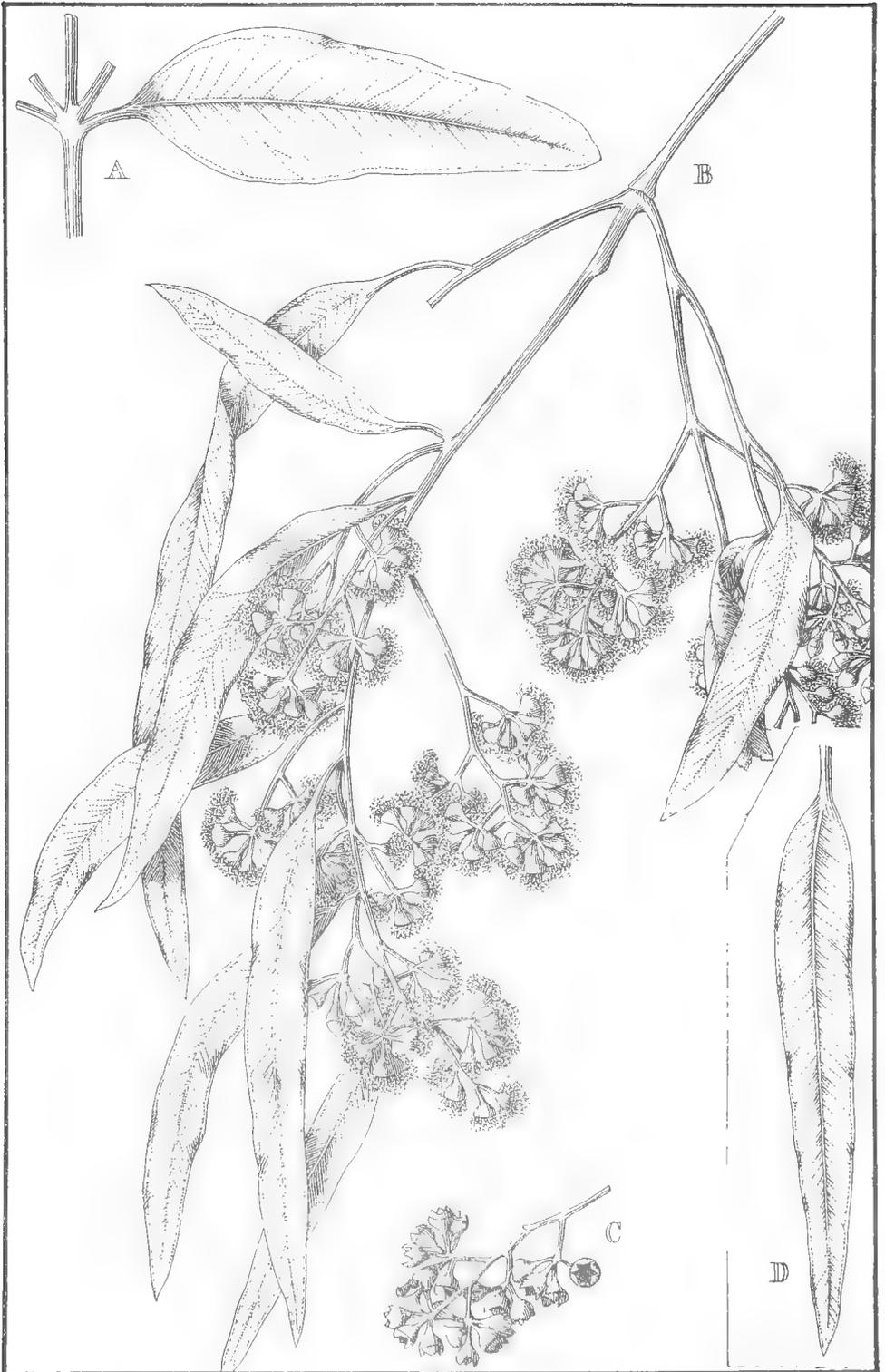
Roth refers to the barks as used by the Queensland aborigines in the following terms, but it contains nothing of a poisonous nature, and the results are obtained through the astringent principle. There is no active principle, which is contained in this bark which is not contained in the bark of very many other *Eucalypts*; its use is simply a matter of local convenience by the blacks:—

In the North-west Central districts, especially in large water-holes, I have often watched the process (of fish-poisoning, or rather stupefying.—J.H.M.).

The whole camp may co-operate, and will start throwing the leafy boughs and branches in first thing of a morning. During the day the water becomes darker and darker and strongly smelling, until by the following morning at sunrise, when it is almost black, the fish all lie panting at the surface, and are easily caught. (*N.Q. Ethnography*, Bull. No. 3, Roth.)

The inside bark is beaten up and used as a poultice for snake-bites, heated. Cloncurry, &c. (E. Palmer.)

Timber.—This wood is reddish-brown or reddish, and hard, heavy, and elastic. Mons. Thozet speaks of it with figure not unlike walnut, but darker,



EUCALYPTUS MICROTHECA, F.v.M. (Coolabah.)

heavier, and closer grained. Its grain is interlocked, and therefore it is difficult to split. It is useful in building and for fencing purposes, being a generally useful timber, durable, though not of outstanding merit. It is almost impossible to split. "Piles made of the young trees have been used with advantage for the construction of the Great Northern Railway of Queensland." (Thozet.)

Size.—It is a spreading and medium-sized tree. Mueller ("Forest Resources of Western Australia") says it exceptionally attains a height of 150 feet. I have never seen nor have heard of properly authenticated trees of this height. It is usually about 50 or 60 feet, or even less, in height, with a diameter of 3 feet, and exceptionally up to 80 feet, with a diameter of 4 feet.

Habitat.—It is found in the drier parts of Australia in all the mainland States except Victoria. It usually occurs on the banks of rivers, or in depressions liable to flooding.

NEW SOUTH WALES.

This is the "Dwarf Box" of Forest Department (N.S.W.) Exhibition Catalogues of a few years back, where it is labelled: "*E. brachypoda*; timber not much used or valued. Open plains, Lachlan, Darling, and towards the Barrier Range."

The late K. H. Bennett sent this species from Ivanhoe, *via* Hay, under the native name of "Tangoon," with the note that "this is our largest tree, often attaining a height of 70 to 80 feet, with a diameter of 4 feet."

We have it from the banks of the Bogan, near Coolabah (J.H.M. and J. L. Boorman), and on flats near the Darling River, *e.g.*, Bourke, &c. The leaves vary in width, *i.e.* (with same length), varying on the same tree from $\frac{3}{8}$ inch to $\frac{3}{4}$ inch broad.

Angledool, north of Walgett, near the Queensland border (Newcomen); Burren Junction (J. L. Boorman); Boggabilla (H. M. R. Rupp); Tibbooburra, in the extreme north-west of the State (O. E. Couch).

While usually a small gnarled tree on the flats near the Namoi, it sometimes occurs as a tree of considerable size. Bark rough and persistent, scaly; a pretty tree, with rather dense and drooping foliage. Banks of Namoi at Narrabri (H. Deane and others). "Coolibah or Swamp Box," Narrabri. Leaves 7 inches long and up to 1 inch broad, and glaucous. (Forester McGee.)

"Coolibah, about 30 feet, nearly always leaning and crooked, resembling Box, but bark shaggier; grows in black-soil flooded country." (Forest-guard J. Hay, Boolcarrol, through E. H. F. Swain, District Forester.)

"Coolibah, tree of 20 feet, crooked, low branching; foliage glaucous, limbs clean, rough bark on butt." Mungindi (E. H. F. Swain).

This is the Coolabah whose suckers are, under the provisions of the Crown Lands Act of 1889, declared to be "scrub" in a *Gazette* notice of November, 1904. (District-surveyor Arch. Lockhard, Moree.)

Howell, near Inverell (E. C. Andrews).

EXPLANATION OF PLATE 195.

- A. Juvenile leaf, Bourke.
- B. Flowering twig, narrow leaf, from Boolcarrol.
- C. Fruits, from Coolabah, Bogan River.
- D. Broad mature leaf, from Moree District. (All from New South Wales.)

Eucalyptus saligna, Sm.*

THE N.S.W. BLUE OR FLOODED GUM.

Botanical Name.—*Saligna*, Latin, signifying pertaining to a willow, in allusion to the leaves and habit of the tree, but the name is not a happy one, as the foliage is very seldom willow-like.

Vernacular Names.—"Sydney Blue Gum." This timber requires some distinctive designation to prevent its confusion with the pale-coloured Blue Gum of Tasmania and Victoria. I have elsewhere called it New South Wales Blue Gum by way of distinction, but, as this is such a ponderous name, that of "Sydney Blue Gum" may be more acceptable; often also called "Flooded Gum."

In the South Coast district sometimes it is called "Woolly Butt," because of its confusion with the true Woolly Butt, the two trees resembling each other a good deal in this particular district. I draw attention to the matter in this connection, because, in this district at least, our Blue Gum is inferior in durability to the true Woolly Butt (*E. longifolia*), so much so that it is there rarely used for posts and other underground work. In the same district the latter is also called "Redwood."

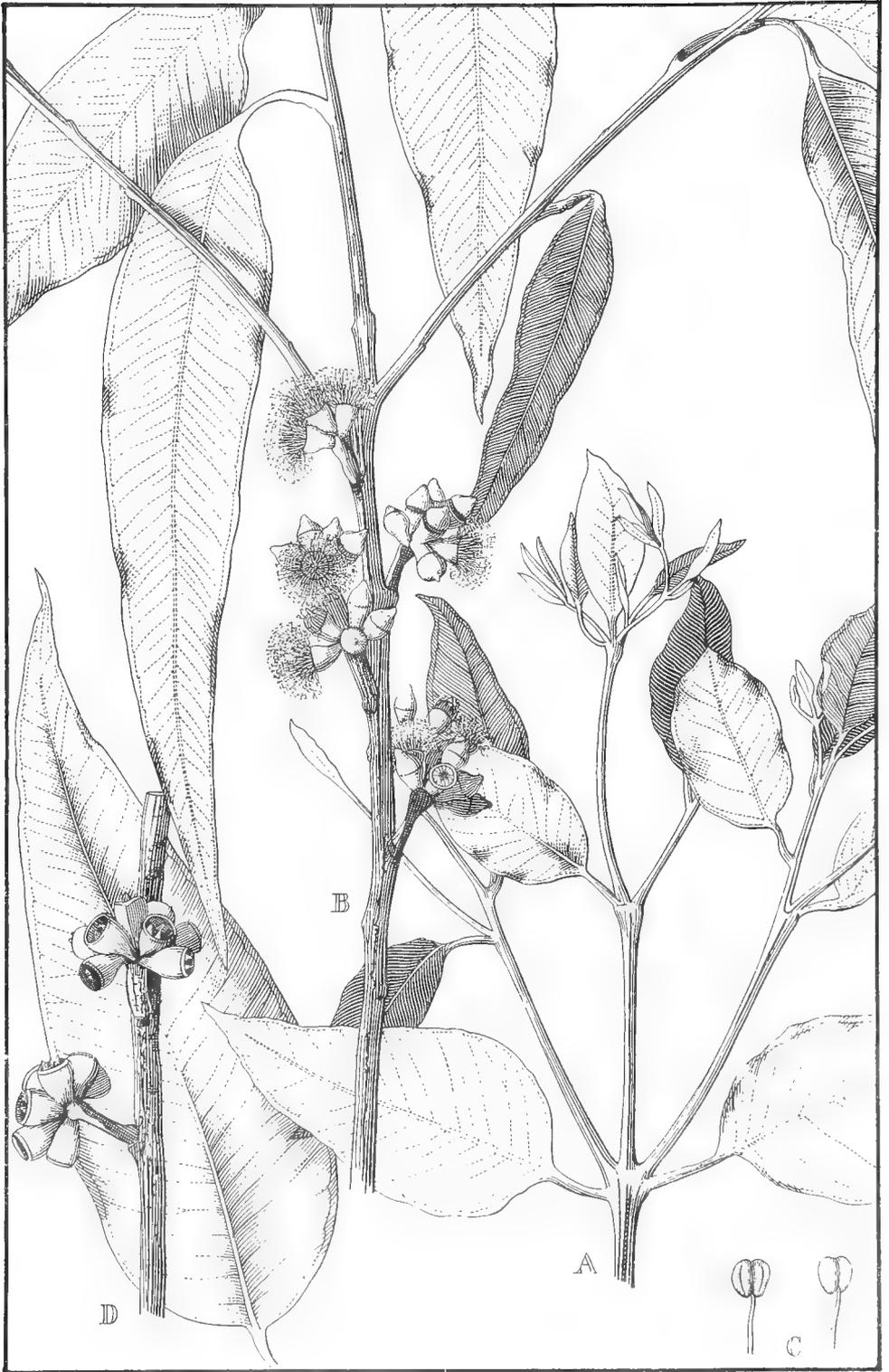
Fruit.—The shape of the fruit of the Blue Gum will, it is hoped, be clear from the drawing. As a guide it may be remarked that, as a very general rule, there is a narrow space between the valves and the rim of the fruit wide enough for one to insert the thickness of the finger-nail or a penknife blade. If this little point be grasped it will be found to be useful. The fruit with which that of the Blue Gum is most likely to be confused is the Bangalay or Bastard Mahogany (*Eucalyptus botryoides*), and I would suggest that persons interested gather the fruits of the two trees, and compare them for themselves. There is no absolute line of separation between Sydney Blue Gum and Bangalay. The Gosford-Newcastle district is a convenient one to test this statement, which seems strange at first sight.

Variety.—There is a variety known as var. *pallidivalvis*. Baker and Smith, often known as "Flooded Gum," though not exclusively so.

Bark.—The Blue Gum is a smooth-barked tree, but it has more or less fibrous bark near the butt. Sometimes the fibrous bark is almost as absent as in the case of a White Gum, while in the case of some South Coast trees it extends so far up the trunk as to make the confusion between this species and *Eucalyptus longifolia* (the Woolly Butt) excusable. "Some trees smooth and whitish, others are rough-barked for a considerable height, occasionally to 40 feet." (A. R. Crawford.)

Timber.—One of the best hardwoods of the State, usually of a pale red colour, straight in the grain, comparatively easy to work, and, therefore, a favourite with carpenters. The timber is of a lower specific gravity than that of most Eucalypts, being not very close-grained. It is largely used by shipwrights and wheelwrights, and is a very useful hardwood. It is extensively used for building purposes, ships' planks, &c., and is the most widely used of our timbers for felloes of wheels. Although this timber varies a

* There is an allied species, *E. Deanei* Maiden, with "round" leaves (by comparison), and inferior timber, which has not yet been figured in the "Forest Flora."



EUCALYPTUS SALIGNA, Sm. (Blue or Flooded Gum.)

good deal in quality, much of it, and particularly that found in the northern parts of the State, is very durable, and has been used for wood blocks with much success. I confidently recommend sound, mature Sydney Blue Gum for this important purpose.

The late Rev. Dr. Woolls informed me that a coffin made of it was found to be in a sound state after fifty years.

In the Nelligen (Clyde River) district, where it is known as Redwood, it is used by wheelwrights chiefly for felloes, and the local saw-millers often go long distances for it. It is a favourable timber for inside work. On the South Coast this tree strongly resembles the Woolly Butt in the trunk, and the trees are hence often confused, local residents calling both *Eucalyptus saligna* and *longifolia* "Woolly Butt" with delightful impartiality; but Woolly Butt for *E. saligna* is wrong, and is, I repeat, the result of confusion. On the South Coast the Redwood (of course not to be confused with Californian Redwood, so extensively used in this State), is not much used for posts or underground work, as it is not considered at all durable.

Timber hard, not heavy, colour red, that from the smooth trees straighter in the grain than that from the rough-butted tree, whose timber is darker, curled, and interlocked, resembling the wood *Euc. tereticornis*. If it were not for its weight it would be a handsome furniture wood. Above ground it will last a lifetime, but as posts it can only be depended on for from ten to fifteen years. I have found both dry rot and white ants in it. The dwelling-house at my place, 4 miles distant from here, is built chiefly of this timber, and I find that many of the boards and some of the rafters are quite riddled by a minute borer. (A. R. Crawford, referring to New England slopes (Moona Plains, Walcha) timber.)

Size.—Up to 150 feet high and more, and a diameter of 3 or 4 feet, though exceptionally attaining a much greater size.

Habitat.—Confined to New South Wales and Queensland, and essentially a coastal and coastal-ranges tree. It does not extend further south, at least in workable sizes, than Currawang, a few miles south of Nelligen, on the Clyde River. I should be glad to hear from correspondents as to its extreme southern limit. North of this it is extensively diffused throughout the coastal districts of New South Wales, while it is fairly plentiful in Southern Queensland.

It is the tree which gives the name to so many New South Wales localities which rejoice in the name of Blue Gum Flat—an indication of the alluvial soil it prefers.

Mr. A. R. Crawford, of Moona Plains, wrote to me as follows in February, 1896, in regard to its distribution in New England:—

This species is found in heads of creeks on the eastern slopes, usually smooth and white in appearance, like the Flooded Gum of the low country. I have never seen the wood of trees grown there. On the tablelands it is found in the gullies, running into ranges, and also on ridgy ground.

EXPLANATION OF PLATE 13.

- A. Twig of young foliage.
2. Twig in flower.
- c. Front and back view of anthers.
- d. Twig bearing fruits.

Eucalyptus resinifera, Sm.

THE RED MAHOGANY.

There are several forms of this species, viz. :—

(A.) Normal, or small-fruited form.

(B.) Large-fruited forms, showing transit between it and *E. pellita*, F.v.M.

Botanical Name.—*Resinifera*, from two Latin words, signifying “resin-bearing.” As a matter of fact, the present species is by no means a free yielder of “resin” (kino).

Vernacular Names.—This is the timber called Mahogany, because it reminded the early settlers of the Central American wood, which is, however, of much less weight than our timber. Our timber-getters and saw-millers as often as not call it simply “Mahogany,” but, in view of the better known Mahogany so largely used in the northern hemisphere, it would only lead to confusion if our timber were exported without some qualifying adjective. I would, therefore, express the hope that it would be consistently called, by way of distinction (at all events in the export trade), “Red Mahogany,” a term which is, of course, very largely applied in the State to this timber. “Forest Mahogany” is a term often used. This timber is often simply known as Mahogany. In Queensland it is often called “Jimmy Low,” after the late Mr. James Low, of Maroochie River, a locality for some of the finest specimens in that State.

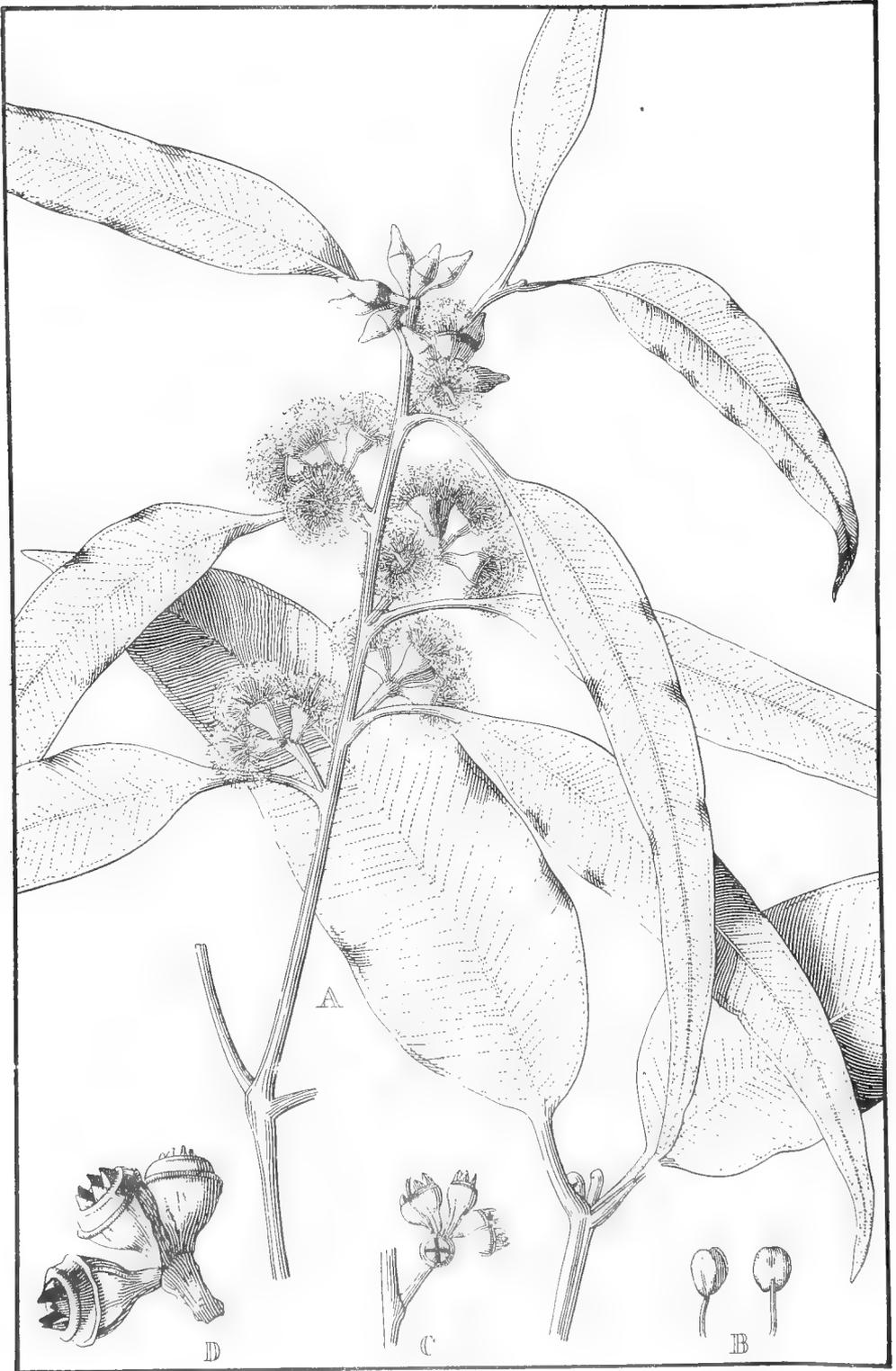
Fruit.—The fruits vary much in size and to some extent in sculpture.

Bark.—Of a flaky-fibrous character, intermediate between those barks, known in Australia as Stringybark and Bloodwood.

Timber.—Of a rich red colour. Very durable, and becoming very hard with age, even as hard or harder than Ironbark, and a nail cannot be driven into it without splitting it. Used for knees at Laurieton. No good for knees in sweaty situations (Mr. Kenny, Cundletown). Especially hard to cut with pit saw. Used for posts and rails. Yet Mr. Breckenridge, at Failford, says that the timber was not considered of much account in the Cape Hawke district until the demand for wood-blocks set in.

Its principal uses are for general building purposes and for fencing, as it is a very durable timber. It is an excellent timber for wood-paving, but while not depreciating its value in this direction for a moment, I would point out there is just a little danger of our forgetting the merits of other valuable paving timbers. Red mahogany is often sold as jarrah, which it closely resembles, and for which I believe it is a perfect substitute. But there are fashions and fads in paving blocks, as in many other things, and European users of our hardwoods should be reminded that we have a number of other meritorious timbers to offer them. It is of a handsome colour, and works up well. It may be recommended for large turned work, and for heavy furniture. It is useful for weather-boards (very few are now made because of galvanised iron). It makes the best of shingles; it does not discolour paint, which remains intact until it peels off, and, as it does not affect the water, it should be used when slabbing for wells is required. It looks very well as skirting boards and banister rails, &c., and lasts well in the ground.

This is one of the most valuable hardwoods of the State. It is a grand furniture wood where its weight is not against it. Visiting furniture



EUCALYPTUS RESINIFERA, Sm. (The Red Mahogany.)

experts have been more taken with this timber, as a rule, than with any other Australian hardwood. There is a future before Red Mahogany. It is one of the most durable timbers we have, being greatly resistant to damp and the attacks of white ants. Mr. Hill, speaking of Queensland timber many years ago, states that it is used for piles, and it is said to resist the action of cobra. We want further evidence in the direction. It burns with difficulty, and is hence preferred for fencing. It is used for ships' knees, shingles, posts, and general building purposes. Rafters of this wood were removed in 1852 from St. John's Church, Parramatta (erected in 1798), and were found to be in perfect condition. It is an even-grained timber, which works easily, and hence is one of the favourite hardwoods of carpenters. The notes on Ironbark tree (*E. resinifera*) in Laslett's work on timbers do not belong to *E. resinifera* at all, but probably to *E. siderophloia*. Professor Warren made determinations of the specific gravities of two specimens of this timber, which, in 1887, weighed 75.06 and 72.23 lb. per cubic foot respectively. Three years later they weighed 62.21 and 62.23 lb. per cubic foot respectively.

"In a green state the timber is not specially hard, but when seasoned becomes so. The timber is specially suitable for shingles, as it does not discolour or damage the water and lasts well." (The late Mr. Augustus Rudder.)

Size.—From 2 feet to 5 feet in diameter, with a height of 100 feet and more.

Habitat.—It is confined to Eastern New South Wales and Queensland. So far as this State is concerned, it is chiefly a tree of the North Coast districts. Nevertheless, it occurs sparingly as far south as Conjola, near Milton, and northerly as far as North Queensland.

It was formerly common around Sydney, and even now it is found in a number of suburbs, *e.g.*, Burwood, Homebush, Hornsby, Hurstville, Sutherland, George's River, &c. Westerly it occurs as far as the Kurrajong; also Springwood, on the Blue Mountains.

Northerly it will be found on the Hawkesbury River, Morrisset, Bulladelah, Port Macquarie, and so on to the Clarence and Tweed. In Queensland it is to be found at Eight-mile Plain and Maroochie.

On the Blue Mountains it is common near the 38-mile post (road) on Lapstone Hill, near Springwood, Faulconbridge, &c., and was not noticed past Linden by Mr. Cambage and myself. It is not rare, and has a stringy bark with rich, dark, coarse, umbrageous foliage. It is a handsome species. On the Blue Mountains the buds may have almost hemispherical or longer opercula, but still shorter than the common coast form.

A large-fruited form may be found at Conjola in the south, Currawang Creek (near Nelligen), Otford (near National Park), Manly (north of Sydney), Wyong, Bungwall, Timbarra (near Tenterfield), and other localities. It insensibly runs into the coastal Queensland *E. pellita*, F.v.M.

It is said that the tree prefers hard and gravelly ridges.

EXPLANATION OF PLATE 11.

- A. Twig with mature leaves, buds, and flowers, also juvenile leaves.
- B. Anther, front and back view.
- C. Normal or small fruits.
- D. Large fruits (transit to *E. pellita*, F.v.M.).

Eucalyptus punctata, DC.

A GREY GUM.

Botanical Name.—*Punctata*, Latin (dotted). In the original description it is stated, "Dots on the under surface of the leaves blackish." These blackish dots are almost invariably present; often the aid of a lens is required to see them properly. They are, however, not characteristic for *punctata*, being often present in *E. resinifera* and other species.

Vernacular Names.—"Grey Gum" or "Leather Jacket." Botanists are often blamed for not giving one common name, and one name only, to one particular species of *Eucalyptus*, and when it is suggested that there are difficulties in the way, such a suggestion is attributed to perverseness. I am afraid the millenium will have arrived before the reform hinted at can be carried out. The present species is a good one for illustrating one of the reasons why the "one species one common name" dictum cannot be realised. More than one other species is known as Grey Gum, for example, *E. propinqua* and *E. tereticornis*. Then why another Grey Gum? Suppose we call *E. tereticornis* Red Gum (a name by which it is frequently known) instead of Grey Gum; then there will be more or less confusion between it and its brother, *E. rostrata*, the Red Gum *par excellence*. Or, to come back to the subject of our present Grey Gum, suppose we suppress Grey Gum, having assigned that designation to *E. propinqua*, then there remains the next best and most used name for it, which is Leather-jacket. But consider the number of other trees which have a vested interest in the name of Leather-jacket, which have indeed more claim to the name, because of greater appropriateness and use by a larger number of people, and we at once see that if we appropriate the name for *E. punctata* we shall be as far off our "one species one name" as ever. The fact of the matter is, that so long as people are so obstinate as to please themselves in the matter of names, and so long as the same object presented to different individuals is seen by them in different aspects, so long will this name difficulty continue. The Grey Gum people will not give up their name simply to please the Red Gum people, and so on. The former say: "Our name is the more suitable; we look at the bark—see how grey it is." The latter say: "But look how red the timber is." It is of no use to blow up the botanist. He does not give the local names. The people at large do that, and who can control them? The chief reason why we give "botanical names" is in order to obtain a definiteness not obtained by vernaculars. Some of our species have at least eight or ten common names.

The term Grey Gum is applied to *punctata* because of the dull grey appearance of the bark. The bark has a roughish appearance, in contradistinction to a smooth and even shiny one, possessed by so many of our gums. It has smooth, white patches in places, caused by the outer layer of bark falling off. These white patches in their turn become grey, and the process of exfoliation of the bark is repeated until probably the whole of the bark on the trunk is shed at one time or another. Although rather difficult to properly describe, the bark of the Grey Gum is so characteristic that, when once pointed out, it could not be confused with the bark of any other hardwood tree.

It is called "Black Box" at Capertee, owing to the darkness of the bark, and Mr. Forester Sim, of the same place, says it is also called "Slaty Gum." The smooth bark is sometimes of a yellow ochre or pale brown colour, hence it might then be appropriately called "Brown-barked Gum."



EUCALYPTUS PUNCTATA, DC. (A Grey Gum.)

Bark.—It belongs to the smooth-barked group of gum-trees, and yet as compared with the silky smoothness of the White Gum (*hæmastoma*), or of the Blue Gum (*saligna*), its bark is raspy to the touch. As a whole, its trunk may be said to have a dirty appearance, often inclining to a yellowish or brownish cast. Large pieces of thin, dark-coloured outer bark give it a blotched appearance. I have already alluded to this in speaking of “Vernacular names.”

Timber.—It is so much like Ironbark in appearance that it is difficult to discriminate between the two timbers. That will be the best guide to its appearance. An expert would usually detect the substitution for Ironbark (if he suspected any substitution), by noting that a chip of Grey Gum is more brittle than that of Ironbark; it also cuts less horny. Nevertheless, the two timbers are wonderfully alike, and for many purposes Grey Gum is an efficient substitute for Ironbark, for it is remarkably durable. Its inferior strength, as compared with Ironbark, precludes its use as girders of any length, and when substituted for Ironbark in sleepers the bolts and spikes work loose in them. I would encourage its use in every possible way for wood-blocks. The chief objectors to its use at the present time are the saw-millers themselves, as the logs often contain gum-scabs or gum-veins. At present, where unblemished timber is insisted upon for wood-blocks, a saw-miller cannot afford to cut up Grey Gum (although it frequently turns out unblemished), because of the risk of having it condemned. I will speak on this subject in connection with Bloodwood, and would emphasise the opinion that wood-blocks should not be condemned because they contain a few gum-scabs or veins. Such excess of care practically leads to great waste of really valuable timber. It is recommended for paving-blocks, as already stated. It is in high repute for posts, having excellent records when employed in this very trying situation. I have seen it used for felloes and for shingles. It is very largely used as an Ironbark substitute for railway sleepers, &c., which fact is in itself testimony to its excellence.

Size.—A tree of large size, although not of the largest. Its height may be given as, say, 60 to 80 feet, with a diameter of 2 or 3 feet.

Habitat.—It appears to be confined to New South Wales. It is found in the coast districts and main dividing range and spurs. Conjola, near Milton, appears to be the most southerly locality recorded. In the north it has been collected as far as Lismore. In the west it occurs near the Jenolan Caves, at Capertee, and Rylstone.

EXPLANATION OF PLATE 37.

- A. Juvenile leaf.
- B. Flower-bearing twig.
- C. Fruits.
- D. Fruits of variety *grandiflora*, Deane and Maiden.

Eucalyptus longifolia, Link.

THE WOOLLY BUTT.

Botanical Name.—*Longifolia*, of course means long-leaved, and the leaves of this tree are frequently very long, especially as Rev. Dr. Woolls has pointed out, when young and growing near water. But they have not the longest leaves, by any means. For example, those of *E. globulus* and *E. goniocalyx* may be much longer.

Vernacular Name.—"Woolly Butt": The bark is of a dirty grey, brittle, fibrous character, and was thought to be of woolly texture. It often resembles box bark a good deal.

The name "Woolly Butt" is, of course, descriptive of the bark, but it is not a perfectly happy one. I have frequently seen trees with barks not more woolly than that of the "Blackbutt." It has this advantage, however, that the term "Woolly Butt" is, so far as I know, never applied to any other gum-tree, although there is another native tree growing in the northern part of this State, to which I have also heard the name applied. I allude to the "Brush" or "Scrub Box" (*Tristania conferta*).

This tree often goes by the names of "Peppermint" and "Redwood", in the South Coast district, the latter name being used for obvious reasons, and the former because the bark resembles that of another Eucalyptus tree, known as "Peppermint," both in texture and being persistent to the ultimate branches.

The use of these names on the South Coast is not a little puzzling. "Woolly Butt" is the common name in the Sydney district, but "Peppermint" or "Redwood" is in most general use from, say, Shoalhaven to Moruya, while "Woolly Butt" is most commonly in use from Moruya to Victoria. At the same time, I have heard the three names used indiscriminately over a large area of the South Coast. It affords an excellent practical reason why botanical names should be used for timber trees wherever possible. Confusion in names of timbers leads to trade disputes and uncertainties and accusations of bad faith in many ways.

Fruit.—This species can readily be determined from its fruit, which are usually in threes. They are the largest fruits of any of the Eastern Australian species, and the shape is characteristic. Their size, and the sculpture of the rim, vary somewhat.

Bark.—The bark is persistent or partially deciduous, and has a greyish appearance; the young trees being very much like the box-tree (*E. hemiphloia* or *Bosistoana*).

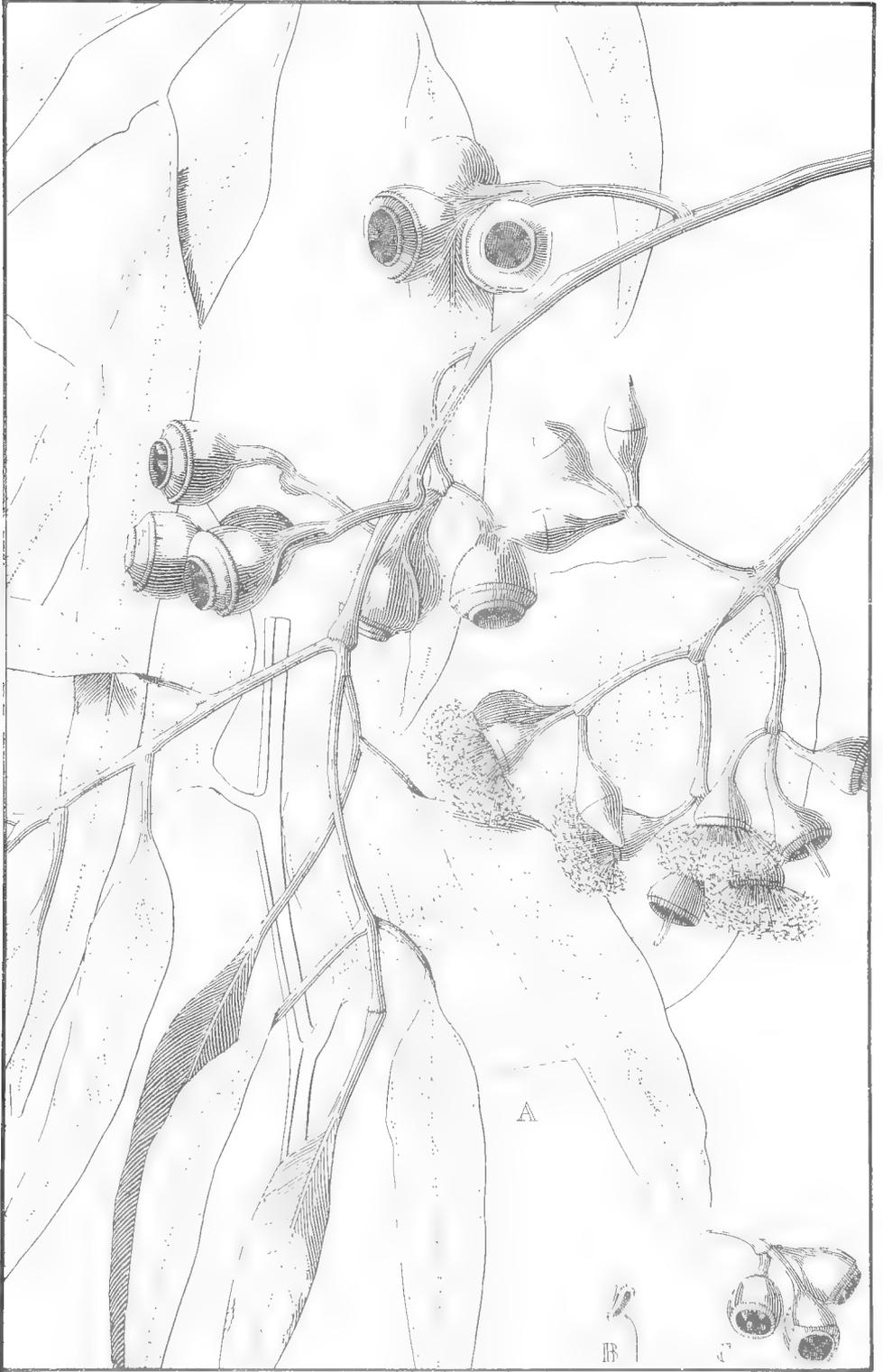
Timber.—Dark red, of a wavy grain, rather heavy, and not unlike red ironbark in general appearance, for which more valuable timber it is sometimes substituted. It is a very durable timber, but deficient in strength and elasticity, particularly near the heart. Many of the trees are also faulty, and hence it is not a favourite with saw-millers.

I look upon it as a really valuable timber for wood-paving. It is not our best timber for the purpose, but it is of proved value under very trying circumstances as regards exposure. Like red mahogany and others of our timbers, it belongs to the jarrah class. Although it has been passed off as ironbark sleepers and even girders, it is an inferior timber to ironbark on account of its comparative brittleness, a defect which would not in any way affect its usefulness for wood-blocking.

It is used principally for fencing-posts, for which purpose it is well adapted. I have known posts that were thirty years in wet marshy land which, when taken out, were quite fresh looking, showing no sign of decay. It is a splendidly durable timber for wet ground.

In 1892 Mr. C. J. Cullen wrote to me:

There is a fence on my brother's land at Jamberoo that was erected in 1851, and is consequently over fifty years in existence—post and rails of woollybutt, and a portion of it still in a good state of preservation, likely to



EUCALYPTUS LONGIFOLIA, Link. (The Woolly Butt.)

last for many years. Much, of course, depends on the state of the timber, where it is cut down, and the time of the year when this is done. The timber of the fence referred to was taken from a sound, healthy tree that had not begun to decay, and it was cut down in the winter. As a rule fences last longer on moist or swampy ground.

In many parts it is used for house blocks, as white ants do not like it, nor is it liable to dry rot.

It was formerly largely palmed off as red ironbark, but while inferior to that timber on account of its comparatively brittle nature, its durability in and on the ground will always commend it to those willing to employ our native timbers on their merits.

Size.—It is a large forest tree. Mr. Andrew Murphy says that at Wyong it “grows very large—8 or 9 feet in diameter—and a great height.” The late Mr. Forester Benson, of Bega, says: “I have seen trees fully 180 feet in height and 5 feet in circumference.” Mr. Forester Allen, of Moruya, gives the height of the trees at from 80 to 150 feet, with a diameter of 2-5 feet.

Habitat.—It is chiefly a New South Wales species, and belongs chiefly to the coastal and southern half of the State. It just extends into Gippsland. It is very plentiful on the coast, especially in the county of Dampier, N.S.W.

The most northerly locality known to me is Raymond Terrace, north of the Hunter River. Mr. A. Murphy, of Woy Woy, knows of only three places where it occurs in his district, viz., 3 miles from Gosford, also 2 miles from Wyong, and near Wyee. In the western suburbs of Sydney, *e.g.*, Strathfield, Homebush, Drutt Town, and thence coastwards, it is common enough, but it is most developed along the south coast, into Victoria.

The following notes of specific localities will be useful:—

NEW SOUTH WALES.

Ashfield, Strathfield, Homebush to Liverpool-road, very abundant; Bankstown, Cabramatta, Parramatta, Penrith (N.B.—The western range is at present unknown), Appin, Wollongong, Picton, Nowra (with unusually narrow leaves), Bateman's Bay, Moruya, Bega, Bowning (with smaller fruits), Wolumla, Twofold Bay; on the Timbilica River. The best specimens on clay flats; it rarely occurs on ridges, and rarely more than 5 miles from the coast.

EXPLANATION OF PLATE 5.

Twigs showing adult foliage and buds, flowers, and fruit:—

- A. Sucker-foliage.
- B. Anther.
- C. A small-fruited form.

Note that the fruits are usually in threes.

Anomalous Group.

1. *Eucalyptus microcorys* (Tallow-wood).
2. *Eucalyptus maculata* (Spotted Gum).
3. *Eucalyptus corymbosa* (Bloodwood).

Tallow-wood, Spotted Gum, and Bloodwood are sufficiently distinct from each other and from all others to be kept in a group of anomalous timbers.

Eucalyptus microcorys, F.V.M.

THE TALLOW-WOOD.

Botanical Name.—*Microcorys*, from two Greek words signifying “a little-helmet,” in allusion to the comparative smallness of the cap (*operculum*) of the bud.

Vernacular Names.—Tallow-wood is the name by which the timber and tree are universally known in New South Wales, owing to the greasy nature of the former. This is taken advantage of in using it for ball-room flooring. In Queensland it goes more or less under the names of “Peppermint,” “Turpentine,” and “Red Stringybark,” names which in New South Wales are appropriated to different trees. The two former names are in allusion to the oil contained in its leaves, the last in allusion to the colour of its bark, and not because of the colour of its wood, as is Red Stringybark in New South Wales.

Bark.—The bark (often of a “corrugated” appearance) is sub-fibrous, of loose, and even woolly, texture. In colour it is of a sort of brick or rusty red, and is persistent even to the smallest branches.

“It has a corrugated, somewhat fibrous or stringy bark, which is always riddled with the ‘roads’ of white ants into within $\frac{1}{4}$ of an inch of the sap-wood.” (Forester W. P. Pope, late of Murwillumbah.)

Timber.—Its colour is usually yellowish-brown or yellowish (sometimes, e.g., at Camden Haven, much of the timber has a pink tinge), and like many other timbers darkens with age. One of the least liable to shrink of all our hardwoods. It is heavy, strong, and durable. It may be planed and turned with great satisfaction. It is not easily split, the greasy substance contained in it making it a tedious matter to get the wedge to “draw.” I would express the opinion that, after Ironbark, Tallow-wood is the most valuable of our hardwoods.

It is used for flooring, particularly in ball-rooms. For this latter purpose it is selected on account of its greasy nature. It is excellent for decking, hand-railing, girders, and some other parts of bridges. A favourite for building work generally, and it does not burn readily, which, in buildings, is, of course, a recommendation. It is, perhaps, the most valuable wood in New South Wales for paving blocks. It makes admirable posts and rails, lasting an indefinite period either above or below ground, but difficult to split for these purposes, as already remarked. White Mahogany is not infrequently substituted for Tallow-wood. Both are good timbers, and can stand on their own merits. The substitution can be readily detected by any man with a fair knowledge of colonial timbers.

Inferior only to Brush Box for hewn trolley wheels for timber (Kempsey). Used for knees (Laurieton). An engineer, who has laid down very large areas of wood-blocking, prefers this timber to all others for the purpose.

Tallow-wood timber is yellow in colour, with a peculiar greasy feel—is used generally for public works, building of bridges and culverts, also for house building, slabs, posts, and sawn stuff generally, but not flooring boards. Tallow-wood is considered to be very durable, and stands well in exposed places. White Mahogany is often passed off for Tallow-wood. It has been said against Tallow-wood that it does not hold nails well. (Forester John Martin, late of Gosford.)

I know of no timber that suffers so little, naturally, after being cut down, even if left for many years; especially in moist shady places the duramen under the sap and bark is still found as fresh as in the growing trees. The charcoal from Tallow-wood is considered one of the best for the smithy. (Late Forester A. Rudder, Booral.)

It is the only timber we have of a greasy nature; and it has the effect, when being worked, of cleaning and keeping clean tools such as saws, &c., which have got gummed in working other timbers. It is fairly durable in fresh water. It is generally preferred to Blackbutt for the same uses it is put to. (Forester G. R. Brown, late of Port Macquarie.)

The timber is very lasting both in and out of the ground, and is very valuable for bridge decking, posts and rails, but is rather hard for splitting. It is also cut for mill timber, but many trees are faulty, especially those that have bumps growing out of the barrel. (Forester W. F. Crowley, late of Casino.)

The "roads" of white ants to within $\frac{1}{4}$ of an inch of the sapwood are a great drawback to the value of the timber. It appears to suit white ants exactly. There is generally a huge nest of them in the head; it seems to be the first timber they attack. (Forester W. P. Pope, late of Murwillumbah.)

Exudation.—The "gum" or "kino" from the Tallow-wood is one of the most interesting of such substances. I do not think it is of such medicinal value as those from most other Eucalypts, but it is of considerable scientific interest. In bulk it looks remarkably like a parcel of uncut garnets. Owing to its friability, the bright fractures become dulled with very little friction; the colour of the powder is orange-brown.

Size.—Mr. George S. Hill, of Wingham, quotes the size of a Tallow-wood:—Girth (3 feet from surface), 26 feet. It was growing 1,800 to 2,000 feet above sea-level on Bulga Mountain, head of Ellenborough River, and he adds that he hears that the Tallow-woods are much larger some distance beyond this.

It is a tree of exceptionally large size, up to 25 feet in circumference by 180 to 200 feet in height. (Of twenty-five trees I measured at 4 feet from the ground the average circumference proved to be 17 feet 2 inches). (Late Forester A. Rudder, Booral.)

A Tallow-wood tree in the forest near Lansdowne River we measured by tape, and found to be 30 feet 4 inches in girth at 3 feet from the ground, and 27 feet 3 inches at 6 feet. We estimated its height at 150 feet. This tree is, to outward appearance, sound, though the heart has probably gone.

We noted some logs from the mountain lying at the wharf on the Lansdowne River. Following are their measurements:—A Tallow-wood, at 14 feet from the ground, was 13 feet 8 inches in girth. From this one tree 106 running feet of log were cut up at the mill. A second Tallow-wood was 13 feet in girth at 12 feet from the ground, and had an 11-inch pipe; 118 running feet of log were cut from this tree ready for the mill.

There were twenty Tallow-wood logs of varying lengths lying on the wharf, and we do not doubt that there were 2,000 feet of timber in each log

(clear of pipe). From sap to heart the timber was of one uniform bright yellow colour. In a word, the Tallow-wood we saw here was, without exception, the largest and finest we have seen in the State.

The Tallow-wood is the chief glory of this magnificent forest. A monster fell a few hundred yards from our party, and the noise of falling was like the roar of a park of artillery. We took the following dimensions of this prostrate giant—15 feet of stump had been left. It was 62 feet more to the first fork, and its girth was 27 feet 4 inches at 3 feet from the ground. A log was 14 feet 2 inches in girth in the centre, and 8,820 feet was calculated in this log. Many trees will give 12,000 or 14,000 feet of timber each. We came across a fine tree 65 feet to the first branch. (Maiden and de Coque, in 1895.)

Habitat.—It is confined to New South Wales and Queensland, and does not usually extend more than 20 or 30 miles inland.

The most southerly locality is Cooranbong, 26 miles south of Newcastle. It again occurs at Port Stephens, and thence along the coast ranges until Queensland is reached. In Queensland it is plentiful on most of the coastal ranges and other ridgy country. There is a large quantity of handy size and excellent quality on Fraser's Island.

While usually very yellow—almost canary-yellow—when freshly sawn, there is a good deal of Tallow-wood of a reddish cast on the northern rivers; and so intermixed is it with the yellow kind that in some places it would be difficult to fill a large order for Tallow-wood of one tint only.

The only place in my district in which Tallow-wood is to be found is an area about 4,000 acres in the neighbourhood of Cooranbong, 26 miles south of Newcastle. I believe that Tallow-wood crops up again at Port Stephens, so that there is a gap between the two places (Cooranbong and Port Stephens) where Tallow-wood does not grow, and why it should be found only about Cooranbong is more than I can tell. The Tallow-wood here grows in patches—is not plentiful. Appears to like sheltered, well-drained localities, such as banks of creeks, heads of gullies, and spurs of ranges—soil sandy loam enriched with leaf mould. (Forester John Martin, late of Gosford.)

It occurs, more or less, all through this district, excepting on its higher elevations on its north-western parts, but is now most prevailing between Bullahdelah and Cooboolook, and in the southern parts of the parish of Alfred, commencing about 14 miles in a northerly direction from Dungog.

The best and largest timber is usually found in undulating scrubby forest country.

In localities mentioned it is in considerable quantity, but in most places, near to mills, it is getting relatively scarce since it is a favourite, as it cuts and turns out well. It fetches a higher price than most other timbers. (Late Forester A. Rudder, Booral.)

It extends from about 8 miles south of the Macleay River to about Johns River, a distance of about 45 miles, and backwards about 10 miles.

In abundance about next to Blackbutt, and an average of two per acre, averaging from 20 to 25 feet to first branch. (Forester G. R. Brown, late of Port Macquarie.)

It grows pretty well all over this district, but is now rather scarce in the vicinity of water carriage, but plentiful further back. (Forester H. R. Huxham, late of Grafton.)

It is found plentifully scattered all over the flat country in the county of Richmond. It is also growing in a few places in the counties of Rous, Drake, and Buller. (Forester W. F. Crowley, late of Casino.)

It is to be found in all stages of growth (up to 10 feet girth) on the eastern falls of Glen Innes and Tenterfield Districts in fair quantities. (Late Forester E. J. Deverell, of Glen Innes.)



EUCALYPTUS MICROCORYS, F.v.M. (Tallow Wood.)

The tree flourishes on the eastern slopes of the tableland, also close to the black brushes below, where the soil seems particularly suitable for its production, doing best where well drained, the land being stony, with quantities of decayed vegetable on the surface and rather stiff soil underneath. On Forest Reserve 1,662, county of Clarke, there is a large quantity growing, some of which was cut in 1892 by men who had been bridge-building all over the colony, who informed me that this particular lot was the best quality they had come across. This is produced on the high land about 2,400 feet above sea-level. It is distributed over a large area of the more open country under the falls, but does not reach the size it does where better protected and the soil is richer. (Late Forester R. L. Siddins, of Armidale.)

It is found all along the eastern slopes of the New England tableland in fair quantity and good quality. It prefers a somewhat heavy soil. It is hardly ever found on granite formation, that is, where the soil is light and sandy. (Forest Guard N. Stewart, Glen Innes.)

Tallow-wood, with the exception of the Common Box, grows more abundantly in this district than perhaps any other Eucalypt. It is found uniformly distributed through all forest land at about four trees to the acre. Other hardwoods are generally in patches, or favour certain spurs, but one never goes many yards in forest land without finding several of these trees. (Forester W. P. Pope, late of Murwillumbah.)

EXPLANATION OF PLATE 144.

- a. Juvenile leaf.
- b. Flowering twig.
- c. Fruit from Booral.
- d. Fruit from Woolgoolga, showing slightly exerted valves.

Eucalyptus maculata, Hook.

THE SPOTTED GUM.

Botanical Name.—*Maculata*, Latin ("spotted"), in allusion to the bark.

Vernacular Name.—Its almost universal name is "Spotted Gum." Occasionally one hears the name "Mottled Gum," which has the same meaning.

Leaves.—Elastic threads in Eucalyptus.

I was so much interested with the nature and behaviour of a leaf of *Eucalyptus citriodora*, which I picked yesterday, that I send you the specimen I dealt with, which I have mounted on the paper. When I broke the leaf, which was about 3 inches long, across the midrib, I found that there was an attachment, as of a thread or filament, at each of the outside edges of the leaf. On drawing apart the two broken pieces of the leaf these two threads still held on, and I slowly drew them out, when, besides stretching out like a thread of india-rubber, they gradually separated or unravelled from the edges of the leaf, both at the stalk end and at the tip of the leaf. The threads were so elastic that I drew them out to the length of $6\frac{1}{2}$ and $7\frac{1}{4}$ inches respectively before they broke, and they then curled up like a piece of india-rubber cord when the strain is taken off, and they now, after twenty-four hours, retain their elasticity. (*Gardeners' Chronicle*, 7th February, 1903, p. 92.)

To which I replied:

There is a small quantity of Caoutchouc in the leaves of (at least) the members of the *Corymbosæ* section of the genus. It is particularly observable in the widely-distributed *E. corymbosa*, Sm. (Bloodwood). It is a common thing to see small boys pull apart the young leaves of that species, and a thin membrane, mainly consisting of Caoutchouc, is at once obtained. (23/5/03.)

The quantity of caoutchouc in Eucalyptus leaves has not been ascertained, so far as I am aware, but it is not likely ever to be a commercial source of that article. Mr. H. G. Smith has published a paper on this substance in *Eucalyptus corymbosa* and some species of *Angophora* in *Proc. Roy. Soc., N.S.W.*, XL ii. 133 (1908).

Fruit.—Note the shape of the fruit, which is often like a small form of the Bloodwood (*E. corymbosa*). Note the tubercular prominences which are often seen on the fruit.

Timber.—Following are extracts from a Report on Spotted Gum, drawn up by Messrs. G. S. Cowdery, J. V. de Coque, and the author, a Committee appointed by the Minister for Mines and Agriculture to investigate it. The full report will be found in the *Agricultural Gazette* for April, 1896:—

Spotted Gum is a timber in regard to whose merits or demerits there exists very strongly-formed opinions, which are, in some cases, we are afraid, rather the result of tradition than of personal observation and experience.

That Spotted Gum timber has been used in the past to a considerable extent in paving the streets of Sydney is beyond doubt. We have taken the precaution to secure and carefully examine a considerable number of blocks from various parts of the city, not only of Spotted Gum, but also (for purposes of comparison as regards durability) other hardwoods used for a similar purpose. We have devoted a considerable amount of time to the diagnosis of these different timbers, which has helped us considerably in arriving at a unanimous opinion. We recognise that there are conflicting interests involved in the Spotted Gum question. But the fact must be borne in mind that if the export trade of hardwoods, particularly for wood-blocking purposes, shall acquire, and continue to maintain, the dimensions we believe to be in store for it, we shall require all our suitable hardwoods for shipment, and we think that there will not only be lucrative employment for existing sawmills, but also for fresh ones in new forests in different parts of the State.

We have no hesitation in stating that Spotted Gum, subject to certain conditions which we shall enumerate, compares favourably with the other timbers we have examined, and we recommend its use for wood-blocking in Sydney, as well as for export, but subject to strict supervision as regards quality.

TIMBERS MISTAKEN FOR SPOTTED GUM.

To add to the inherent difficulty of the subject, some of our correspondents are under the impression that the Spotted Gum of New South Wales (and Queensland) is identical with that of Victoria. The Spotted Gum of New South Wales (*Eucalyptus maculata*) does not extend to Victoria, and the Victorian Spotted Gum, whose botanical name is *Eucalyptus goniocalyx* is an inferior timber to it.

Another correspondent alludes to a bastard Spotted Gum at Orange, which is a most inferior timber; we know of others in the Mudgee and Queanbeyan districts, both nearly worthless timbers, and any impression that they were varieties of the true Spotted Gum would be injurious to the reputation of that timber.

Mr. Forester MacDonald has seen the Smooth-barked Apple (*Angophora lanceolata*), which somewhat resembles the Spotted Gum in bark, cut up for Spotted Gum. *Angophora* timber is very inferior, and, if passed as Spotted Gum, would undoubtedly prejudicially affect opinion in regard to the merits of that timber. A certain amount of discrepancy in regard to reports is also to be accounted for by wrong diagnosis of timbers. Blackbutt, Stringybark, and even White Gum, of coarse, wavy grain, have all been sent to us as Spotted Gum, to which they bear a superficial resemblance more or less strong.

SPECIFIC USES TO WHICH SPOTTED GUM HAS BEEN PUT.

Our correspondents have used Spotted Gum for railway fencing, hammer and axe handles, way-levers, shipbuilding, paving-blocks, sleepers, decking and deck guards for bridges and wharfs, girders in bridge and flood openings, house

carpentry, door-frames, sills and joists, buggy and dray shafts, and other portions of the bodies of vehicles, wheelwrighting, farm implements, boat timbers, tip waggons, railway buildings, railway and other bridges (laminated arches of railway bridges, sheeting, wings, wales and decking, hand-railing, braces, ballast guards, walings, girders).

Spotted Gum is largely replacing American Hickory in the coach factories along the coast for waggons, buggies, sulkies, &c., and large orders are being filled for coach factories in Sydney and elsewhere, care being taken to cut the timber free from sap, heart, and gum-veins.

USES FOR WHICH SPOTTED GUM IS RECOMMENDED BY OUR CORRESPONDENTS.

There is no difference of opinion as to its value for inside work for coach-builders' purposes, and for such purposes as levers and handles, and rods for artesian bores, where great strength and elasticity are required.

In coachbuilding in this State, Spotted Gum has largely superseded Hickory, as already stated, and although not quite so elastic and strong as the best Hickory, is a very good substitute and cheaper.

Providing timber is matured and free from sap, no more suitable timber can be used for railway waggon building in Europe. Its strength and elasticity make it excellent for the purpose, particularly as railway engineers at home object to Ironbark owing to its excessive weight. They constantly ask for suitable hardwoods of less weight. The objection to the use of Blackbutt for the purpose is the presence of concentric gum-veins and its more fissile nature generally. The Hawkesbury and Singleton Spotted Gum are excellent as regards freedom from gum-veins. We have also seen Spotted Gum from the South Coast comparatively free from the same.

As regards outside work, its value for fence-rails is indisputable, while it bears a good reputation for deck-planking, as already spoken of in allusion to its durability.

SPOTTED GUM PARTICULARLY CONSIDERED WITH RESPECT TO ITS FITNESS OR OTHERWISE FOR PAVING.

Hardly any situation affords so severe a test of the durability of a timber as paving. A wood pavement is constantly watered and in contact with decaying vegetable matter. It is, therefore, desirable that the blocks should be as well-seasoned as practicable, in order to reduce the liability of fungus growths to attack the tissues of the wood. On the other hand, we must guard against over-seasoning, which would result in the blocks absorbing an inordinate proportion of water, which would cause them to swell, to the destruction of the pavement, and perhaps the causing of injuries to buildings, tram-lines, &c.

Spotted Gum (like other hardwoods) is, when cut at the mills, immediately loaded into vessels. When landed in Sydney, the lengths are cut at once into blocks, and if at once placed in the streets, are as free to decay through the sap being unable to escape as are all other hardwoods.

The balance of evidence is strongly in favour of the use of Spotted Gum for planking and decking, but as regards paving-blocks we have very little information in these replies.

Mr. Gustave Fischer, Mr. R. W. Richards, and Mr. Moir, who have used it in the Sydney streets, are not in favour of it. Mr. Richards, in a report* to the Forest Department, under date 31st October, 1893, states, page 2: "The wearing surfaces of the blocks of Spotted Gum from King-street were thickly impregnated with gravel and extraneous matter, causing an irregularity of surface, the sides of the block in section showing a quick intention to split, the top edges of wearing surfaces were frayed over on each side for about one quarter of an inch in plan and section. Spotted Gum is a treacherous timber to deal with, inasmuch as if the tree is not fully matured, the blocks therefrom, painted with tar, laid in the work, enclosed air-tight, prevent the sap from escaping, and its fermentation sets up 'dry-rot.' This has occurred in

* "Wood Pavements in Sydney, 1880-1893. Facp., Sydney, n.d. (1894).

many instances, and as one block is attacked, dry-rot spreads throughout those adjacent. A sample block showing this decay is forwarded herewith." Again, page 10: "My experience of Spotted Gum leads me to advise that the use of this wood be discontinued."

The same gentleman has also courteously replied to our schedule of questions (Appendix A†), in which he still holds to his adverse opinion. So strong a condemnation, coming from such an important source, requires our careful consideration. We find, however, after examining over 200 wood-blocks, which were recently removed from various streets in Sydney, about 150 of which were presented (labelled as to class) to the Department of Forests, by the City Surveyor, that the names given on the labels are in some instances incorrect.

In some instances we find a badly-worn block labelled "Spotted Gum," which on examination proves to be some other timber; and, again, some blocks which have worn well are Spotted Gum, although labelled otherwise. In other words, a general statement, whether of praise or condemnation, founded on data such as this, must be unreliable.

We further observe that in an official report by the City Surveyor to the Under Secretary for Mines and Agriculture, the rate of wear per annum in the Sydney streets, of Spotted Gum and other timbers is calculated to very small fractions of an inch, and certain conclusions are based upon or left to be inferred from figures thus obtained. We are of opinion that, owing to the conditions under which the city paving-blocks were laid, the tests are of little value. To begin with, it is almost impossible to obtain blocks exactly 6 inches deep. This is recognised from the fact that it is usual to allow contractors a variation of $\frac{1}{16}$ of an inch when cutting, allowance being made for the set of teeth of the saw, and other circumstances it would be difficult to control. After the blocks are laid, the wear for some time will depend on the merits of the top-dressing (which varies under climatic conditions), and the position of the blocks in the carriage-way, whether they are near the centre of the roadway where the traffic is heaviest, or near the kerbs, where it is likely to be less.

We are, therefore, of opinion that tests which do not fulfil accurately all and similar conditions are of little value.

THE ADVANTAGES AND DISADVANTAGES TO THE USE OF SPOTTED GUM CONSIDERED.

(a) *Advantages.*

The advantages stated by several persons are—

1. Durability.
2. Strength, toughness, and elasticity.
3. Capacity for bending.
4. Lightness.
5. Easy working.
6. Evenness of quality.
7. Large sizes readily obtainable.
8. Comparative freedom from pipe.

1. Durability.

It has a life of over thirty years in the Singleton railway bridge. A similar life is stated for slabs in barns and slab-houses on the Berry Estate.

For bridge decking the life is given variously up to thirteen, fifteen, and sixteen years. Another correspondent states its life as six and ten years in "bridge and culvert work."

The life of joists is given at twenty years, and of girders at twenty-five years. We were informed of a girder twenty-six years in a bridge, and still quite sound. (Dingo Creek, Belbowrie, near Wingham.) The life of rails of a shock-and-log fence is given at thirty-five years. Several witnesses give the life of rails at twenty years, others thirty years, other "fences" (? rails) at forty and more. One correspondent gives the lives of "posts" at forty years.

Shingles are stated to last thirty years. Turning to shipbuilding, the planking, beams, &c., of a pilot steamer, after nineteen years' wear, were stated to be "as sound as ever." At the London Exhibition of 1862 a piece of timber

† Not reproduced.

was shown from the hull of the steamer "William the Fourth," and properly certified. With the exception of some slight charring on the mere surface of the timber in the immediate vicinity of the boilers, the entire fabric of this vessel is as substantial and sound as when she was built in the year 1830 (thirty-one years' wear). If the above statements as to the life of Spotted Gum be examined (and reference to the evidence will show that other instances of long life of the timber can be quoted), no doubt can remain that, under the circumstances alluded to, Spotted Gum is a very durable timber; in fact, that it is one of the most durable of our timbers for the purposes stated.

2. Strength, Toughness, and Elasticity.

We have already dealt with this in speaking of the fitness of Spotted Gum for coachbuilders' purposes, &c.

3. Capacity for Bending.

This is readily admitted, and advantage is taken of this property, which Spotted Gum possesses in a high degree, by the coachbuilder.

4. Lightness.

This is also a great advantage for light vehicles. Throughout the western district the coachbuilders purchase, at great expense, for cartage and railway freight, Spotted Gum for buggy and waggon building, no other available timber having the same elasticity and toughness.

5. Easy Working.

It gives a clean face, takes paint readily, and when at all seasoned before putting in work does not warp or twist, particularly in buggy shafts and poles.

6. Evenness of Quality.

This is an important question, all timber showing large gum-veins (or discoloured in appearance), or carrying any sap whatever, should be rejected. Timber must be cut from fully-matured trees, absolutely free from heart or heart-shakes and sap. Shipments should be uniform in colour, from one district if possible, and as free from veins as possible. For home railway waggon sizes, it should be specially selected. We feel confident if this is done it will at once command the attention of English engineers.

7. Large Sizes readily obtainable.

This is borne out by the heights and girths given by various correspondents in reply to question 19.

8. Comparative freedom from pipe.

This is more particularly applicable to southern Spotted Gum, and we do not know that it can be altogether considered to be an advantage. Freedom from pipe means presence of heart, inferior timber in regard to which special care is, or should be, taken to remove.

We do not recommend it for square girders, as it shells in square sizes under sun exposure.

(b) *Disadvantages (as stated by various correspondents).*

1. Liability to warp and twist.
2. Inclination to split.
3. Liability to attack by white ants.
4. Great thickness of worthless sapwood.
5. Presence of gum-veins.

1. Liability to Warp and Twist (irregular shrinking).

If the timber is cut when the sap is down, and allowed to season without exposure to the sun, it shrinks evenly, but if exposed to sun, and cut full of sap in small sizes, free of heart it twists from the heart out,—that is to say, it curves, with the heart side on the circumference.

Opinions are nearly equally divided, but the balance of opinion is in favour of Spotted Gum not shrinking more than colonial hardwoods usually do.

2. Inclination to split.

It does not split any more than Blackbutt, and not as much as Sydney Blue Gum (*E. saligna*). We think that increased attention should be given to the proper period for felling Spotted Gum, *i.e.*, it should not be cut when the sap is up.

3. Liability to attack by White Ants.

Diversity of opinion exists in regard to this, but we are of opinion the durability of Spotted Gum is equal to that of the average colonial timbers as regards white ants, and superior to that of Ironbark and Blackbutt, to which they are very partial.

4. Great thickness of worthless Sapwood.

The sapwood of Spotted Gum decays most rapidly of all the sapwoods of the best timbers, and perhaps even of those of all hardwoods whatsoever. It is utterly worthless, and has contributed a good deal to the prejudice which exists in some quarters in regard to Spotted Gum. The sapwood should be removed with the greatest care. The sapwood readily crumbles to a fine powder through the operations of the larvæ of a small beetle (*Lyctus brunneus*), but these insects confine their attention to the sapwood. Because of the similarity of the sap to the other part of the timber, and because of the worthlessness of the former, the inspection of Spotted Gum demands especial care on the part of the inspector of timber.

We consider that it is especially unsuited for telegraph poles and piles, inasmuch as saplings of the size required for such purposes carry an inordinate proportion of sapwood, which is of a peculiarly perishable nature.

Spotted Gum should be cut from mature trees, and should be free from sap and heart-wood. It also should be well seasoned.

5. Presence of Gum-veins.

The timber is often deteriorated by the presence of gum-veins, and we recommend the timber to be "as free of gum-veins as can be procured."

Minimum Girth for Felling.

The regulations of the Forest Department preclude the cutting of Spotted Gum trees less than 6 feet in girth, measured 5 feet from the ground.

In our opinion this regulation concerning minimum girth should be strictly enforced, and, if possible, should be extended to 7 ft. 6 in.

Size.—The Spotted Gum is not usually more than 60 to 100 feet high, and with a stem diameter of more than 4 feet. Larger trees are, however, not phenomenal.

Mr. M. Ryan, of Little Mill, Cullendulla, writes to the *Evening News*, 18th June, 1895:—

About $1\frac{1}{2}$ miles from my residence there stands, in Casey's Gully, an enormous Spotted Gum, said to be largest on the South Coast. Those who have compared it with one on Mr. Higgins's selection, 14 miles distant, give the palm to that in Casey's Gully. Its circumference at the base is 44 ft. 1 in.; about 5 feet from the ground it measures 40 ft. 3 in. It scarcely tapers from that to the first limb, which projects at a height of 75 feet. The tree is about 100 feet high.

Another South Coast tree (Bateman's Bay) was examined by Mr. Forester Allan. It was 90 to 100 feet to the first limb, girth at 5 feet, 25 feet, and even up to 18 feet at first limb. The average was 21 feet for whole barrel.

Habitat.—Until a few years ago the Spotted Gum was believed to be confined to New South Wales and Queensland. Mr. A. W. Howitt, however, received a specimen from Mr. J. H. King, showing that it occurs on the eastern slope of a spur from the Tarra Mountain, on the track from Buchan to Orbost, Gippsland, Victoria, and about 15 miles from the former place, where it forms a small compact colony of a few acres in extent.



EUCALYPTUS MACULATA, Hk. (The Spotted Gum.)

In New South Wales it is found along the coast and coastal ranges. The most western locality known to me is Pogy, a wild district a few miles from Merriwa. There is also some on the Mudgee-Cassilis road. It prefers ridges and poor country, and is commonly found with Ironbark. It extends into Queensland, and is common in the south, but its northern limit is not defined. It probably merges into the lemon-scented form, which, according to Bailey, is found about Gladstone, Rockhampton, Springsure, Herberton, and Port Denison. The late Rev. J. E. Tenison-Woods says this is found right up to the waters of the Gulf of Carpentaria.

Following are localities handy to Sydney:—Liverpool to Campbelltown. At 3 miles from the former town there is much Spotted Gum, and thence on to the Bringelly-road. On another road leading out of Liverpool there is plenty of Spotted Gum before Bonnyrigg is reached, *i.e.*, on the Badgery's Creek road there is plenty up to 6 or 7 miles.

EXPLANATION OF PLATE 27.

- A. Sucker or juvenile foliage.
- B. Twig, bearing flowers.
- C. Fruits.

Eucalyptus corymbosa, Sm.

THE BLOODWOOD.

Botanical Name.—*Corymbosa*, from the Greek *korumbus*, or Latin *corymbus*, a summit. Hence the term *corymb*, in botany, where the stalks of the individual flowers are gradually elongated, so that the flowers are brought approximately to the same level (or top, or summit). The inflorescence of the Bloodwood (see Plate) is not a perfect corymb.

Vernacular Name.—This tree is, perhaps, as fortunate in its vernacular name as any of the Eucalypts. It exudes abundance of kino (popularly known as "gum"—hence "gum-tree"), and, when freshly exuded, this has all the appearance of a stream of blood. So freely does it flow, and so like blood is it, that sometimes the appearance of the ground at the foot of one of the trees is quite startling. It is one of the few eucalypts that enjoys but one vernacular name. At the same time there are some other Bloodwoods in various parts of the Australian States.

Leaves.—The fine parallel venation of the leaves should be observed, for it is characteristic. If the very young leaves be pulled asunder it will be noticed that they are drawn into fine glutinous threads, which are largely composed of caoutchouc or indiarubber.

Flowers.—White or creamy in colour. This tree flowers at a very early age, and very profusely. It is in consequence much visited by parrots, and bees and other insects. As far as beetles are concerned, the trees about Sydney flower too late in the season for the flower-haunting beetles, but a number of the fossorial wasps (*Scolias* and *Thynnus*) are very fond of this tree, and so also are a few of the late beetles.—(W. W. Froggatt.)

Fruit.—The urn-shaped fruit is noticeable. The shape of the fruit in this species is referred to at page 51.

Seeds of this species from the Port Jackson district are plump, with solid angles, and with little or no wing. As one proceeds northwards the seeds flatten and become more winged. By the time Rockhampton, Queensland,

is reached, the seeds are very flat, and resemble *Casuarina* seeds. The timbers are red, and appear to be like that of the common bloodwood in each case. *Eucalyptus* seeds are worthy of fuller investigation.

Bark.—The scaly appearance of this bark is characteristic, and should be noticed. It covers the whole of the trunk, and extends to the tips of the smallest branches. It is of a reddish-brown colour, and is often blotched with blood-like stains of kino.

The late Dr. Joseph Bancroft stated that charcoal was made from Bloodwood bark by the aborigines of Moreton Bay, and used by them as an antiseptic application to wounds. This particular species was chosen, I imagine, from the scaly nature of the bark, which facilitated charcoal-making.

Timber.—It owes its name because of the large quantity of blood-like fluid (gum or kino) which exudes from the tree, and which, when indurated, forms the gum-veins so common in this timber.

It is liable to shell concentrically, the spaces thus formed being often filled with the red astringent substance known as "gum." It is one of the most durable of all Australian timbers. It does not split at the ends when exposed to the sun, as many of our timbers do. It is valuable for such purposes as require a durable timber. For posts in the ground, and for use in culverts, it is all but imperishable. The great drawback to this timber is its liability to gum-veins, but in spite of this I look upon much of the prejudice against Bloodwood as unreasonable. It would be unacceptable for export, as we have abundance of better timbers, but I certainly think it ought to be used more than it is where readily available. Where not too defective, I should look upon it as an ideal timber for wood-paving. By too defective I refer to cases where the timber shells too much; but the presence of gum-veins of moderate width, in timbers such as this and Grey Gum, I would not look upon as an important defect in wood-blocks, as this astringent "gum" tends to preserve the block rather than injure it. I have seen timber rejected for wood-blocks because of gum-scabs and gum-veins, which would, of course, be inadmissible in a furniture wood, for instance, but which would in no way be detrimental to a wood-pavement. The scrupulous care which is insisted upon in some contracts to reject wood-blocks because of gum-veins, sometimes degenerates into mere faddism, and it is only possible to select so severely, because at present we have an enormous timber supply to fall back upon. I would, therefore, recommend the framing of wood-block contracts in such a way as to allow the inspecting officer some latitude in dealing with timber containing gum-veins.

Used for posts, naves, &c., also for small culverts. I would like to see it used increasingly for such work as this; it would economise ironbark. It is very resistant to white ant. The old wharf at Port Macquarie is laid without piles, with Bloodwood stringers and Bloodwood bed, which have been down forty years, and are now perfectly sound. (Written in 1895.)

It is stated to be the most durable timber in the Cape Hawke district. When it shells, it is of course useless, but when it is solid when it is felled the sun never opens it out. In fact, Mr. Breckenridge, a man of very great experience in timber, says that no timber stands the sun better.

Mr. Forester Rudder says of it:—

It is not apt to warp, or rend in seasoning, and is excellent for fence-posts and sleepers, and wherever round timber is required for use in culverts and



EUCALYPTUS CORYMBOSA, Sm. (The Bloodwood.)

bridges and for ballast logs, and for ground work generally, is in my opinion, not to be surpassed, as it is as lasting, and not so combustible, or subject to the white ant, as ironbark. For fuel in furnaces it generates more heat than any wood I know.

Mr. District Forester Rotton, of Nowra, reports:—

As it seasons it reduces in weight, probably more than the wood of any other tree of the Eucalypt family. Though soft when green it is not an easy timber to work, and does not present a neat finish owing to the numerous running rings and gum-vessels it contains. It is not an uncommon occurrence for a piece of this wood of the length of a railway sleeper when squared to open out from end to end as soon as the gum in the ring dries up. It is this defect that renders the wood useless for railway sleepers. The rings develop as the tree grows older. Bloodwood of young growth may be used as rafters and corner-posts of rough buildings, and will last for many years.

Again, there is the Bloodwood of this district, in my opinion equal to Ironbark for railway sleepers. I have asked the Commissioners to give it a trial alongside Ironbark, and see which had longest life. They refuse, but do not say why. I have had it in the ground over twenty years, and still good Ironbark is getting scarce, and the Bloodwood of this district is a good substitute. I have taken great interest in the timbers of this and the Clarence district for the last twenty-five years, so am not writing about what I do not understand.

There is no doubt our timber should be a better asset for New South Wales than it is. The waste at the present time is enormous.—(W. T. Pullen, Woolgoolga.)

Exudations.—The kino¹ or red “gum,” which exudes from this tree, has already been briefly referred to. When freshly exuded it has a distinct smell, which appears to be characteristic, and is soon recognised. It is something of a vinous odour. Much of the kino exuded becomes entangled in the scaly porous bark, but one frequently comes across quite a store of the substance through tapping the communication with the reservoir which has collected behind the bark, or between the concentric circles of the wood. The passage gets choked up with indurated kino, but picking off the substance often causes the stream to flow afresh.

It is the most brilliant in appearance of all the kinos. It is exceedingly friable, and it is highly astringent. The blacks used to chiefly employ this kino for tanning the skins of animals. Their *modus operandi* was to skin the animal, put in the “gum” and some water, tie up, and shake the skin “bottle” until the tanning was complete. Fishermen frequently use the bark (with its entangled kino) for tanning their nets.

Size.—Usually a tree of medium size, *i.e.*, with a height of say 60 feet and a stem diameter of 2 feet or 2 feet 6 inches. Speaking of the east slopes of New England, Mr. A. R. Crawford writes to me: “I saw a *Eucalyptus corymbosa* of 4 feet in diameter, height (approx.), of 80 feet to first limb. Another of 4 feet, and height 70 feet.”

Distribution.—It extends all along the coast from the Bega district northwards to Queensland. It is also found on the coast ranges, where it attains a greater magnitude than in the coast country. It is only found on the eastern slopes of the high tablelands. It is very widely diffused in Queensland, extending to the northernmost part of that State, and is abundant withal.

EXPLANATION OF PLATE 45.

- a. Twig, bearing flowers.
- b. Fruits, urn or urceolate in shape. Not quite ripe, but well showing the constricted shape. (A and B from Sydney district.)

Stringybarks.

1. *Eucalyptus macrorrhyncha* (Red Stringybark).
2. *Eucalyptus capitellata* (Brown Stringybark).
3. *Eucalyptus eugenioides* (White Stringybark).

Eucalyptus macrorrhyncha, F.v.M.

RED STRINGYBARK.

Botanical Name.—*Macrorrhyncha*, from two Greek words, *makros*, long, and *rrynchos*, a beak, in allusion to the long, beaked flower-bud.

Vernacular Names.—It is usually known as "Stringybark" merely, but by comparison with *E. eugenioides* as "Red Stringybark." According to Howitt, it is known as "Mountain Stringybark" in Gippsland, a name to which in this State the other Stringybarks have also some claim. It is the common Stringybark of the north-eastern districts of Victoria, and appears to be quite absent from the coast districts of New South Wales.

Fruits.—The fruit has usually a sharp rim, but in northern and western New South Wales specimens this is not always the case, the rim being often rounded and even domed.

Timber.—Hard, and mostly tinged with a deeper red-brownish coloration, but occurs also paler coloured; it is durable, and easily fissile into fence-rails, shingles, and palings, and is very useful for all purposes for which rough split timber is required above ground; it is also sawn into weatherboards and scantlings, and furnishes a fair fuel. This timber seems not to be different from that of *E. capitellata*. It is the common Goldfields Stringybark, and its timber is brown. A sample from the Monaro, New South Wales, is an excellent furniture wood, being light, strong, and close-grained, and capable of a good polish. It is, however, chiefly used for fencing and wheelwrights' work in southern New South Wales.

Here are two reports by experts on timber of ascertained botanical origin.

"The common Stringybark of Central and North-eastern Victoria is of less value as a timber tree than other Stringybarks.—(A. W. Howitt.)

"Red Stringybark. *E. macrorrhyncha*. A good and durable timber, as may be seen from the examination of the fences in the district, which are nearly all of this timber, and some of them very old."—(Henry Deane, reporting on the timbers of the Glen Innes to Tenterfield railway line, N.S.W., 1885.)

Size.—A large tree.

Habitat.—*E. macrorrhyncha* is found in Victoria (where the type came from), South Australia, New South Wales, and southern Queensland.

NEW SOUTH WALES.

In this State it is found along the Dividing Range and Tableland from south to north. It goes down the western slopes, and on the spurs of the main range, and on the isolated ranges some distance into the interior. The most westerly localities actually recorded are the Harvey and Warrumbungle Ranges.

Southern Localities.—Quidong, near Bombala (W. Baeuerlen); Bombala to Delegate (J.H.M.); Tantawanglo Mountain, Cathcart, Montgomery's Mill (H. Deane); Gungahleen (Goldsbrough, Mort, & Co.), with thick, short leaves and strongly marked venation; Tumut (W. W. Froggatt); Gundagai (H. Deane); Barber's Creek (H. J. Rumsey); Bowral to Wombeyan Caves, 1 mile east (J.H.M. and R. H. Cambage); Cootamundra to Grenfell (District Forester Arthur Osborne); Weddin, near Young (J.H.M.); Bore-nore, near Forbes (H. Deane), with fruits similar to those from Cootamundra, &c.

Western Localities.—Hassan's Walls, Bowenfels (J.H.M.); Capertee and Sunny Corner, with remarkably angular rim to fruits (J.H.M. and J. L. Boorman); Rylstone (R. T. Baker); Mudgee (W. Woolls). Fruits rather smaller than the type.

A coarse *grandiflora* form, with the fruits $\frac{3}{4}$ -inch in diameter, the rim very prominent and urceolate in shape, was collected by R. T. Baker at Mount Vincent, also at Rylstone.

Perth, found only in the ranges around Apsley; small stunted trees used for props in the mines adjacent (J. L. Boorman).

"Red Stringybark," buds swollen like those of *E. stellulata*, Canoblas, Orange; ditto (A. W. Howitt); Ophir, Orange (R. H. Cambage); Wellington (A. Murphy).

Near top of Mount Bulaway, Warrumbungle Ranges, at 3,000 feet (W. Forsyth). The angularity of the rim in these fruits is nearly obliterated, and the pedicels are very short. The opercula are pointed, but far less sharp than those of normal *macrorrhyncha* usually are. That this tree is a strong connecting link between *E. capitellata* and *E. macrorrhyncha* is unquestionable. A form with normal fruits is also found in the Warrumbungle Ranges (W. Forsyth).

Minore, near Dubbo, perhaps the most westerly locality in this herbarium (J. L. Boorman.) Buds less angular than the type.

The Meadows, Dubbo district; used for fencing purposes and charcoal (Assistant Forester A. R. Samuels). The buds remarkably like those of *E. rostrata*, so much so, that a word of caution is necessary. This is not an unusual thing in western forms, but the anthers and the venation of the leaves are very different.

Northern Localities.—But it is as we travel north, farthest away from the home of the type, that the aberrant forms become most plentiful. The doming of the rim is usually a very good guide in this species, but sometimes this character is not well defined, and the rim must then be interpreted with caution. *E. macrorrhyncha* runs into *E. Muelleriana*, the "Yellow Stringybark" or "Blackbutt," without any doubt.

In New England the tendency of the leaves is to become smaller and more coriaceous, and the buds to become less to more angular* than the type, the operculum shorter, and the fruit more pear-shaped. The rim is not sharp, and the domed portion is narrow. At the same time there are considerable

*In the more exposed situations the mutual compression causes the buds to be bluntly angular and compressed just like *E. capitellata* of the coast.

differences in the shapes and sizes of the fruits in these northern forms. Following are some specimens in the National Herbarium:—

Tingha (R. H. Cambage); Howell, near Tingha (J.H.M. and J. L. Boorman); Mount Seaview (J.H.M.); Bluff River, near Tenterfield, also Glen Innes (H. Deane); Tent Hill, west of Deepwater (E. C. Andrews); Emmaville (J. L. Boorman, E. C. Andrews).

QUEENSLAND.

Stanthorpe (F. M. Bailey).

EXPLANATION OF PLATE 102.

- A. Juvenile leaves (from Bombala, N.S.W.).
 B. Flowering branch (from Weddin, N.S.W.).
 C. Fruits (from Mount Esk, Bowan Park, near Cudal, N.S.W.).

Eucalyptus capitellata, Sm.

THE BROWN STRINGYBARK.

Botanical Name.—*Capitellata*, Latin, “a little head” or the “top of plants.” In botany, capitellate, signifying that the flowers are without individual stalklets, and so form themselves into a head. This will be seen from the drawing.

Vernacular Names.—As a very general rule, this tree is known merely as Stringybark. “Red Stringybark” is a name sometimes applied to this species in this State, in allusion to the darker colour of the wood as compared with that of *E. engenioides*. It also goes under the name of “Broad-leaved Stringybark.” It is the “Mountain Stringybark” of Victoria (A. W. Howitt). J. E. Smith (following White) called it “Brown Gum-tree.” Messrs. Baker and Smith have suggested the name “Brown Stringybark” for this species, and the name is as good as any.

Bark.—Often very thick and fibrous, a typical Stringybark, the rough bark sometimes extending to all but the smallest branches. Sometimes the trees have a thinner, more sub-fibrous bark, with the upper portion of the trunk and limbs smooth.

Timber.—Brown or reddish-brown when fresh, drying to a paler colour. A good timber for splitting, and hence much used for posts, rails, buildings (formerly for shingles), and fuel. It is tough, strong, and durable.

Size.—A medium-sized tree as a rule, say 50 feet high, with a diameter of 2 feet to 2 feet 6 inches.

Range.—This species is confined to New South Wales, Victoria, and South Australia.

NEW SOUTH WALES.

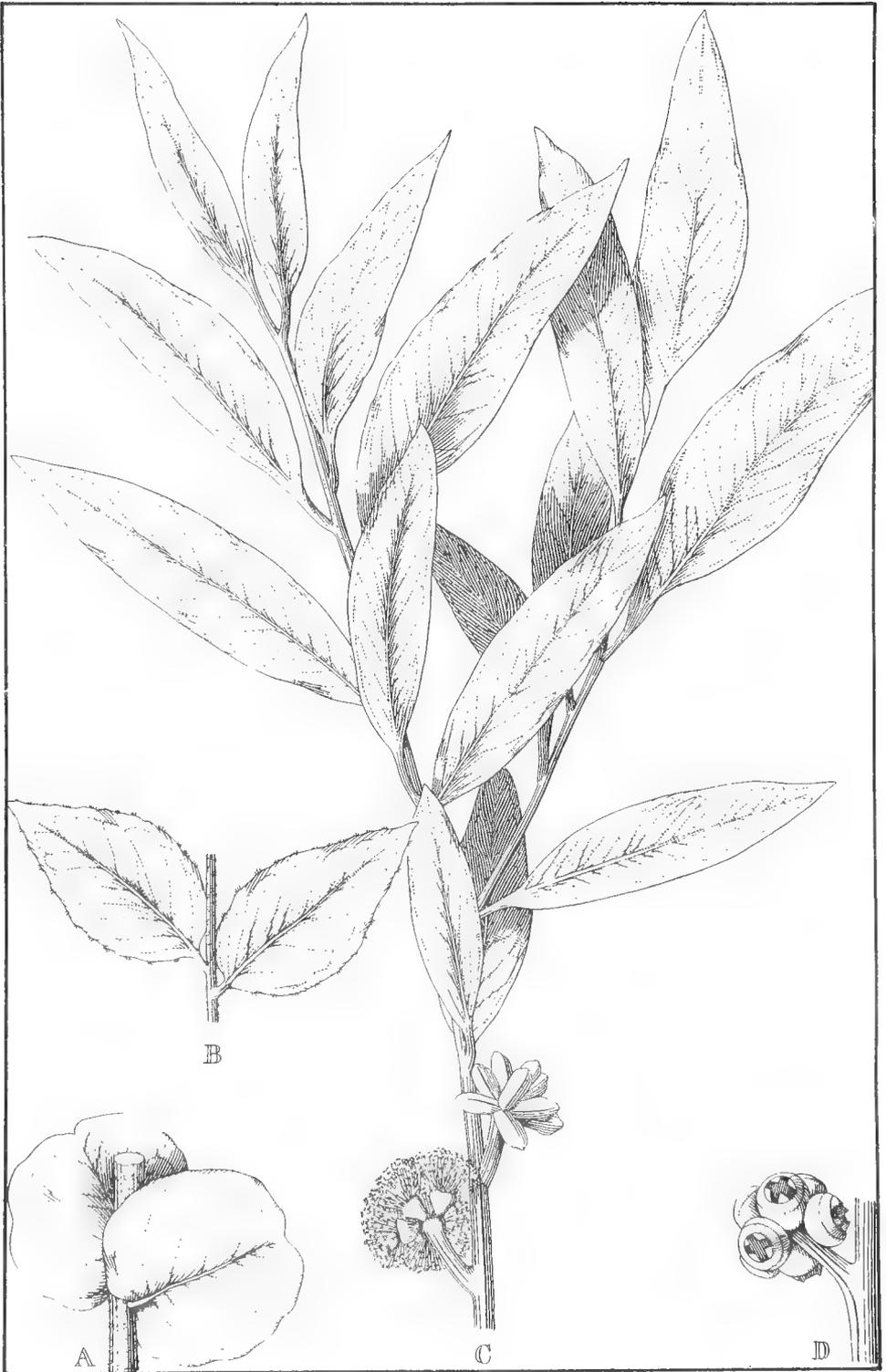
The type came from Port Jackson. Around Sydney it appears to be almost (perhaps entirely) confined to the sandstone.

It occurs south, west, and north of Sydney, usually on poor rocky country.

Northern Localities.—The most northerly locality from which we have it is the Round Mountain, Guy Fawkes Range, 4,250 feet above the sea, and



EUCALYPTUS MACRORRHYNCHA. F.v.M. (Red Stringybark.)



EUCALYPTUS CAPITELLATA, Sm. (The Brown Stringybark.)

about 50 miles east of Armidale, on the Grafton Road. Buds as compressed as it is possible for them to be. Fruits large and hemispherical. It also occurs at New Apsley Falls, Walcha, near Swamp Oak, Walcha, and 14 miles east of Deepwater, at 4,000 feet.

Southern Localities.—*E. capitellata*, in its strictly typical form, is found for a considerable distance along the coast. Following are some definite localities:—

Bowral to Wombeyan. At Hilltop, near Mittagong, there is a variety locally known as “Blue-leaf Stringybark.” It is so called because the leaves, especially in the sunlight, are observed to have a bluish cast, and this bluish appearance (especially noticeable in the young leaves) is largely retained on drying for the herbarium. The tops of the trees can be readily noticed amongst the other foliage from a neighbouring eminence.

I look upon this as one of the forms intermediate between *E. eugenioides* and *E. capitellata*. On account of the juvenile leaves, and of the fruits, I believe it to be nearer the latter than the former. The silvery or bluish cast of some Eucalyptus trees as they grow in the forest merits further inquiry. It is probable that several species present this appearance, perhaps at some seasons, and in some localities, more than others. I have noticed typical *E. eugenioides* in the Blue Mountains, with a “silver top.”

“White Stringybark.”—Tall trees, white bark, good timber, leaves bluish tint, easily distinguished from “red” in the bush by the more robust growth. Nye’s Hill, Wingello, 8/99 (J. L. Boorman). The fruits are as small as those of *E. eugenioides*, but compressed like those of *E. capitellata*. They precisely resemble those of the Hilltop Blue-leaf Stringybark just referred to. The “bluish tint” of the leaves is also similar. Buds stellate, and strongly resembling those of *E. eugenioides* when young; coarse and angular, like those of *E. capitellata*, when more mature.

Clyde Mountain specimens precisely resemble those from the Blue Mountains, to be referred to presently.

Western Localities.—Then we turn to a form which may provisionally be referred to as the Blue Mountains form of the species, because it is so readily studied there, but it also occurs coastwards and southwards.

It is not a perfect Stringybark, as compared, *e.g.*, with *macrorrhyncha*, which is more fibrous. The more fibrous bark is yellowish; close to the wood it is white. Has clean limbs, at times slightly ribbony.

We have collected this form from Woodford to Cox’s River (Bowenfels) and the Jenolan Caves, and also at Mount Wilson. Further localities to connect with the coast will be looked for. The most westerly locality from which it has been obtained is Mudgee, where it is called “Silver-top” (which points to a bluish cast), according to Mr. R. T. Baker, who collected it; also Coricudgy Mount (R. T. Baker, October, 1897).

EXPLANATION OF PLATE 106.

- A. Juvenile leaves from Middle Harbour, Port Jackson. Notice their almost orbicular shape and stellate (star-shaped) hairs.
- B. Sucker leaves from Blackheath, Blue Mountains. Notice their comparatively great width and stellate hairs.
- C. Flowering branch. Note the angular or compressed buds.
- D. Fruits from Port Jackson, where the type came from.

Eucalyptus eugenioides, Sieb.

A WHITE STRINGYBARK.

Botanical Name.—*Eugenioides*, from two words, *Eugenia*, a genus of Myrtaceous plants, and a Greek word, *oidos*, like, indicating that the foliage reminded the describer of that of a *Eugenia*.

Vernacular Names.—It is usually known simply as “Stringybark.” It is often known as “White Stringybark” in this State, and also in Victoria (A. W. Howitt), but the timber is often reddish, and hence it bears the name of “Red Stringybark” also. In those cases *E. capitellata*, from the same district, usually bears the name of “White Stringybark.”

Later on, specific instances will be given where the colour of the timber is not white; but on the whole this species appears to have paler timber than the generality of the Stringybarks, and so the name “White Stringybark” is as good as any.

The Stringybarks afford an excellent instance of the way in which timber-trees refuse to be marshalled into well-defined groups, as we would like them to do. It would save all persons concerned a great deal of trouble if they would show less evidence of variation.

Bark.—The bark of the Stringybarks is proverbially excellent for roof-coverings for sheds, temporary houses, and the like. Often enough it covers houses (even the walls) for anything but temporary purposes, lasting more than a generation with care.

Timber.—When freshly cut usually dark brown, but drying to a pale warm brown, and even whiter. In some districts, however, the timber is distinctly red, even redder than the local *E. capitellata* timber.

The timber of this species is good for building purposes, being strong and durable and not particularly liable to warp. It is often considered, as at Mudgee, superior to “Red Stringybark” (*E. macrorrhyncha*).

Following is an extract from the Catalogue of the Queensland Forestry Museum, 1904.

Red stringybark (*Eucalyptus eugenioides*). Plentiful in southern coastal districts.

A large tree, having a fibrous or stringy bark. Wood of a bright-red colour, short-grained, and not capable of bearing a very heavy strain. It is not so hard as other hardwoods, consequently fairly easy to work. Fencing-rails, flooring-boards, railway sleepers, street-blocking, and general building purposes.

With reference to the normal species, Mr. H. A. Lowe, of Mudgee, N.S.W., a well-informed correspondent, writes under date 10th February, 1898:—

I have a post and rail fence of this timber which has been erected for fifty-two years, and the greater part of the fence is still in first-rate order.

A brickmaker pronounces Stringybark timber to be the best for burning bricks, as it does not give out too much heat.

Size.—A medium-sized and even large tree. Trees 60-80 feet are not uncommon.

Habitat.—It appears to be confined to eastern Victoria, New South Wales, from south to north, on the Dividing Range and its spurs, and east of them, and to southern Queensland.

NEW SOUTH WALES.

Southern Localities.—Twofold Bay (J.H.M.); Wyndham and Bemboka (A. W. Howitt); Conjola, near Milton, with very long opercula (W. Heron); south of Nowra, from Jervis Bay (J.H.M.); Shoalhaven River, also Diggers' Creek (W. Forsyth and A. A. Hamilton), with filiform pedicels; Kangaloon (J. L. Bruce); Barber's Creek (H. J. Rumsey); Wingello (J. L. Boorman), medium trees, detected by short leaves and absence of glaucous tint. "Red Stringybark," in contradistinction to "White Stringybark" (*E. capitellata*), a reversal of this nomenclature being more common in other parts of New South Wales. A second collector (A. Murphy) confirms Mr. Boorman's report of the local nomenclature.

The Peaks, Burragorang (R. H. Cambage); Kangaroo Valley and Bowral to Bullio (J.H.M. and R. H. Cambage).

Hill Top, with specially marked white-dotted fruits and elongated opercula (J.H.M.).

Sydney district, common on the Wianamatta Shale, but also found on sandstone. Following are some Sydney district localities:—Homebush (J.H.M.); Concord Park (R. H. Cambage); Bankstown and Cabramatta (J. L. Boorman); Hurstville (R. H. Cambage), the valves sunk; La Perouse (W. W. Froggatt); Peat's-road (H. Deane); Newport (R. H. Cambage).

Western Localities.—To the foot of the Blue Mountains from Sydney, it is rather common. It is the commonest Stringybark on the Blue Mountains, occurring all over the range, and at all heights. Compared with the other rather common Blue Mountain Stringybark (*E. capitellata*), the timber is redder (!). The juvenile foliage is narrower, and not glaucous, like that of *E. capitellata*. The fruits of *E. eugenioides* on the Blue Mountains are not often exsert; instances to the contrary are Springwood (H. Deane); Mount Wilson (Jesse Gregson), with inner bark very yellow.

Jenolan Caves (W. F. Blakely).

At Capertee (J. L. Boorman) and Mudgee (District Forester C. Marriott) it is known as "White Stringybark."

E. eugenioides does not appear to go further west than Jenolan Caves and Mudgee.

Northern Localities.—Most of the northern specimens have the rims red and prominent, and the valves slightly exsert.

"Good timber, cut for sleepers. Yellow inner bark, between the rough and the inner bark; the fibrous portion very tough." Wyee (A. Murphy).

"Stringybark, free splitting; bark between sap and outside, yellow." St. Alban's district, Hawkesbury River (A. Murphy).

Wallsend (W. W. Froggatt, J. L. Boorman); Booral (A. Rudder).

"Stringybark, height about 60 feet, diameter 18 inches, mould over shale." Near Underbank, Upper Williams River (A. Rudder, G. 10).

Pokolbin, No. 1,486 (R. H. Cambage).

Stewart's Brook. Rim of fruit red and pronounced (J.H.M.); Moggrani Mountain, Gloucester (J.H.M.); Upper Hastings River (J.H.M.); Macleay River (Forester W. Macdonald).

Murrurundi (J.H.M. and J. L. Boorman). Valves slightly exsert, rim broadish, hemispherical, slightly depressed, with short filiform pedicels, connecting with the "Bastard Stringybark" of Penrith.

Collaroy (J.H.M. and J. L. Boorman), showing white dots and a slight ribbing of the fruits.

Near Cemetery, Tingha (R. H. Cambage); with fruits a little more sub-cylindrical and perhaps a little more domed than the type. Specimens from the same locality with nearly pilular fruits and very narrow juvenile foliage.

Near 11-mile post, Inverell to Tingha (R. H. Cambage). Form with even narrower leaves than the type.

Tingha to Guyra, 19 miles from the latter place (J.H.M. and J. L. Boorman). Juvenile leaves intermediate. Mature leaves broadish. Fruits (from same tree) flat-rimmed, domed; valves exsert and sunk; hemispherical and inclined to be sub-cylindrical.

Fruits in heads, slightly constricted, valves sunk. Tent Hill (E. C. Andrews).

Small fruits in heads, valves not exsert, Styx River (A. W. Howitt). I have other specimens from the same locality, showing close affinity to *E. Muelleriana*.

Walcha (J. F. Campbell). Fruits rather exsert, and rim inclined to be domed. Shows affinity to *E. macrorrhyncha*. Ascending New England from Port Macquarie, this species was first observed about Yarrowitch. Thence it was not uncommon in the Tia district, where it is known as "Red Stringybark," and used for timbering the mines at Tia, and also locally for flooring-boards. This species shows a double operculum (J.H.M.).

Tenterfield to Sandy Flat (J.H.M.). Fruits very similar to those of Sydney, e.g., Concord Park (believed to be typical), hemispherical, and somewhat exserted valves. Buds very compressed, almost like *capitellata*.

Drake to Richmond River (A. Hagman); Drake (E. C. Andrews), with rim of fruit rather sharp and valves exsert (transit to *E. Muelleriana*).

Foot of Mount Lindsay (W. Forsyth); Moonambah, Richmond River (W. Baeuerlen); valves slightly exsert.

EXPLANATION OF PLATE 110.

- a. Juvenile leaves, drawn from Sieber's type. Note their narrowness, their toothed margins, and stellate hairs.
- b. Twig with buds.
- c. Fruits.



EUCALYPTUS EUGENIOIDES, Sieb. (A White Stringybark.)

Blackbutt Series.

1. *Eucalyptus pilularis* (The True Blackbutt).
2. *Eucalyptus Muelleriana* (Yellow Stringybark).
3. *Eucalyptus acmenioides* (White Mahogany).
4. *Eucalyptus goniocalyx* (Mountain Gum).
5. *Eucalyptus Sieberiana* (Yowut or Mountain Ash).
6. *Eucalyptus obliqua* (Broad-leaved Messmate).

Eucalyptus pilularis, Sm.

THE BLACKBUTT.

Botanical Name.—*pilularis*, from the Latin *pilula*, a little ball or round knob, in allusion to the shape of the fruit.

Vernacular Names.—It is the tree which most usually goes under the name of "Blackbutt," and sometimes by way of distinction, for it attains enormous size, as will be seen presently, the "Great Blackbutt." It is a stately, shapely tree, and perhaps the best known of all the genus to Sydney residents, as it is so abundant. It belongs to the group of eucalypts called "half-barked," because its rough outer bark is confined to the trunk of the tree, the branches being smooth and white. From the latter circumstance it shares with some other species the designation of "White-top." The outer bark of this tree is fibrous and closely matted, forming, if I may make the comparison, a sort of middle link between such fibrous-barked trees as the Stringybarks and such smooth ones as our White Gum. I do not know that the term "black," as applied to the butt, is particularly appropriate; the word "grey" would be better, though exception could be taken to this adjective also.

Leaves.—Note the pale underside of the leaf.

Bark.—Has fibrous bark on the butt, while the branches are smooth, like those of a gum.

Timber.—Pale-coloured, more or less fissile, though sometimes quite interlocked in grain. It is a strong, durable, thoroughly safe, and well-trying timber. It is usually readily diagnosed by the presence of narrow, concentric gum-veins, but sometimes these gum-veins are nearly or wholly absent. As a rule they are too narrow to cause deterioration. Sometimes, particularly on the Northern Rivers, it is free from gum-veins, and then presents considerable similarity to Tallow-wood (*E. microcorys*), for which it is occasionally substituted. It occasionally, though rarely, shows pin-holes.

It is one of the best hardwoods we have for house and ship building. It is useful for bridge-planking, though inferior to Tallow-wood for that purpose. It has been tested for many years for blocks for wood-paving, with most satisfactory results; in fact, it is one of the best timbers we have for the purpose, both as regards wear and durability. It takes tar well.

After Ironbark I would place this timber second only to Tallow-wood, amongst our hardwoods, for general purposes. Of late years it has been used for railway sleepers, and it has been exported to Europe for sides and head-stocks for railway waggons as an experiment.

Size.—It is one of the largest of our eucalypts, and giant trees have been recorded over the greater portion of the area in which it abounds.

A tree at Bulli was measured by me in 1891, with the following results:—Girth at ground, measuring from buttress to buttress, 57 ft. 6 in.; the girth at 3 feet from the ground was 45 feet; and at 6 feet above the ground, 40 feet. The taper was then very gradual for about 90 feet (estimated), where the head is broken off. There are ten principal buttresses of an average diameter of over 2 feet, but they practically cease to flute the trunk at a height of 10 to 15 feet. This is, probably, the identical tree measured by the late Sir William Macarthur in 1861 at “Bullai, Illawarra, still in full vigour, and with no external symptoms of decay, 41 feet in circumference, with the bole of immense height.” Mr. A. G. Hamilton speaks of “Bulli Blackbutt, 22 yards in circumference at ground, and at stump height would be not much less, as it does not taper much.” One at Gosford was measured 156 feet high, and 23 feet in circumference at a height of 6 feet.

Habitat.—Extending into Queensland on the north, and to Two-fold Bay, New South Wales, on the south, from the coast up the slopes and spurs of the Dividing Range to the Table-land, but apparently not found more than 100 miles from the coast, and scarcely crossing on to the western slope in any place.

This species attains its greatest development in New South Wales. The type came from Port Jackson, and it is the coastal form of the species, as a rule.

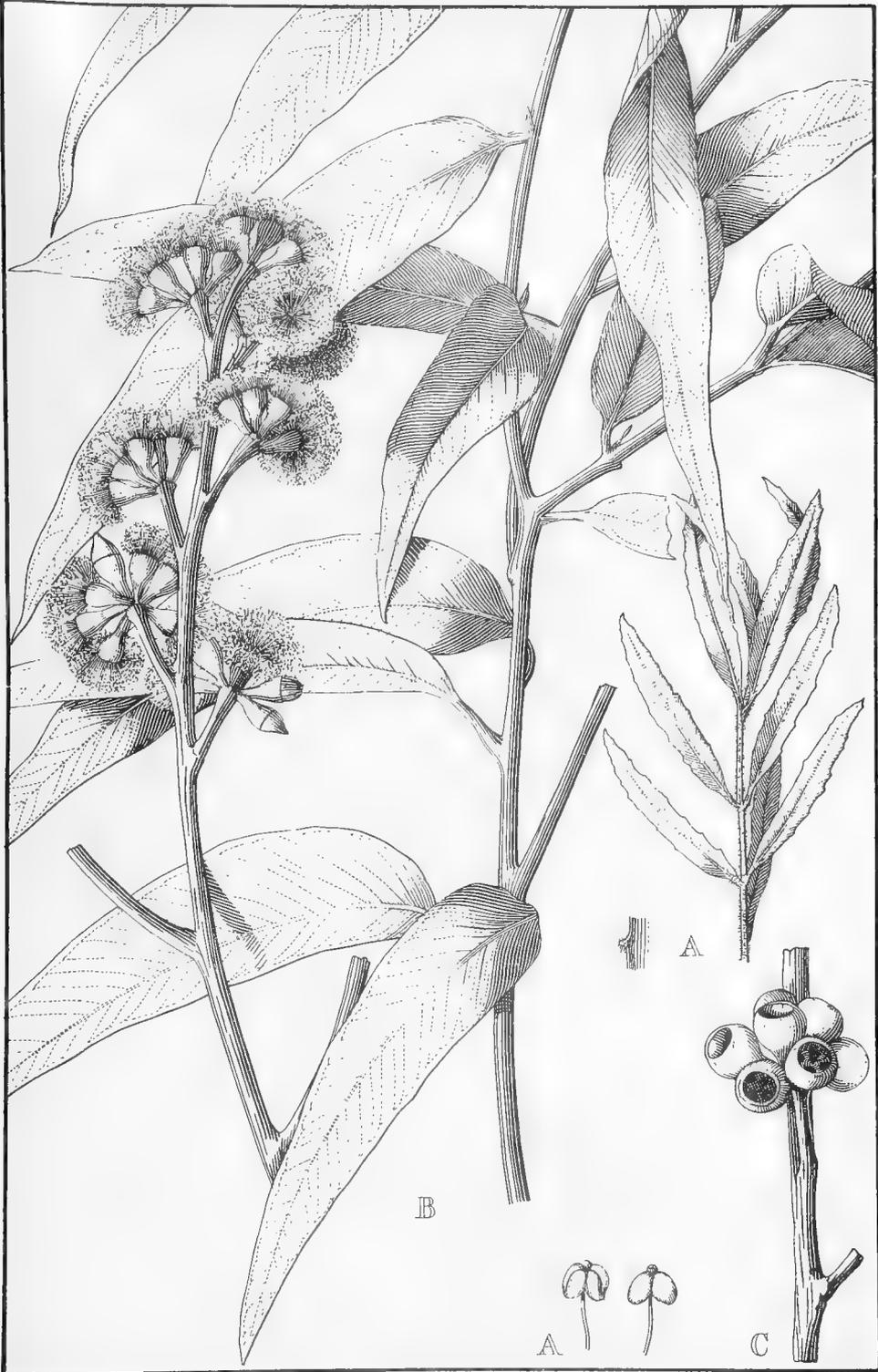
I have not seen it from Victoria, but should not be surprised to find it in north-eastern Gippsland.

Propagation.—It is well known that the Blackbutt reproduces itself more freely and more rapidly than most other hardwoods, so much so that when a large one is felled, a dense growth of seedlings, growing into straight saplings, is the usual consequence. It, however, reproduces itself most abundantly upon rich moist flats, which is the description of land in greatest demand for agricultural pursuits, so that it will, no doubt, be necessary in future to revoke portions of the most easily accessible and richest land in the blackbutt forests in the interests of selectors and for encouragement of agriculture. Wherever practicable, I would recommend the retention of Blackbutt forest reserves, even although the mature timber may have been removed therefrom, and also the proclamation of additional Blackbutt reserves in suitable localities not likely to be required for settlement, and, at the same time, the preservation and conservation of other useful species of hardwoods, which are not so abundant as Blackbutt.

EXPLANATION OF PLATE 116.

Typical form from Port Jackson.

1. Young shoot, portion of a seedling. Note the dentate margin, and tufts of hairs; also anthers.
2. Flowering twig, the buds with pointed opercula.
3. The fruits are nearly globular (pilular).



EUCALYPTUS PILULARIS, Sm. (Typical form from Port Jackson.)

Eucalyptus Muelleriana, Howitt.

THE YELLOW STRINGYBARK.

Botanical Name.—*Muelleriana*, in honour of the late Baron von Mueller, Government Botanist of Victoria.

Vernacular Names.—Called "Yellow Stringybark" in Gippsland, because the bark is very yellow when freshly cut; the timber is also yellowish. Occasionally it goes by the same name in coastal New South Wales.

At one time I hoped that this yellowness (where evidence of its presence is available) might be a useful diagnostic character. It is certainly useful sometimes, but it breaks down in that it is observable in *E. eugenioides* and other species. The presence of this colouring matter in various trees is worthy of investigation by the chemist, as it may be of some aid to diagnosis not clearly understood at present.

At Wingello, in the Goulburn district, it goes by the name of "White Mahogany," but it must not be confused with the true White Mahogany, *E. acmenioides*; in the coast districts it is sometimes called "Blackbutt," like *E. pilularis*, to which it is closely related.

Sometimes in Northern New South Wales, it goes under the name of "Mountain Stringybark," and in other localities simply "Stringybark," and also "Messmate."

Bark.—More or less fibrous on the trunk. Sometimes the branches are quite smooth, at others covered, more or less, with fibrous bark. The texture of the rough bark also varies, sometimes it is rather compact, like that of the common Blackbutt; in other trees it is densely fibrous, and well worthy of the name of Stringybark.

Timber.—It is a valuable fissile timber, to all intents and purposes identical with Blackbutt; that will be its best description.

In New South Wales it is valued for building purposes, being used for flooring and weatherboards, &c. Timber-getters describe it as "a very clean timber."

The timber of this tree is usually darker in tint than *E. piperita*. It is fissile, free from gum veins or shakes, clear in the grain, and enjoying a great reputation for durability. It is used for fencing and sawing, and, according to Mr. Macalpine, of Yarraville, who has lived for forty years in South Gippsland, fences are still standing with posts split from this eucalypt, which have been from thirty to forty years in the ground. I have, myself, observed posts of this timber standing in fences at Woodside since 1859. The local name of this tree is "Yellow Stringybark."—(Howitt, *Trans. Roy. Soc. Vict.*, 1890.)

The late Mr. Clement Hodgkinson, a Commissioner of the Melbourne Harbour Trust, interested himself in ascertaining the value of the timber of the Yellow Stringybark, and there is no doubt that it is one of the best Victorian timbers. Following are extracts from Mr. Hodgkinson's report to the Harbour Trust, of the 17th January, 1891:—

The Inspector-General of Public Works having (on the 6th December last, in reply to a letter from me to him on the 23rd November) informed me that the piles of the Welshpool Jetty were driven during 1859, and that, after the recent burning of that jetty it was repaired, "the stumps of the piles were found to be in such excellent preservation that they were not withdrawn, but short pieces were spliced on," my colleagues and myself were able to obtain specific and reliable evidence to the effect that these piles were Yellow Stringybark, cut during August, 1859, and driven during that year. We carefully

scrutinised these old piles when the tide was low, and found them to be perfectly sound, uninjured by sea-worms, and having the appearance of clean, well-seasoned timber, in excellent condition, notwithstanding that these piles had been in sea water more than thirty-one years.

With reference to the wharf at Port Albert, the Inspector-General of Public Works, in his letter to me, already alluded to, stated that "Yellow Stringybark and Gum are in use in the wharf and approaches to Port Albert. It is reported that, whereas the Gum is fast decaying, the Stringybark remains sound." My colleagues and self, after examination of the Port Albert Wharf, now corroborate this statement; the Yellow Stringybark used in the construction of this wharf is quite sound.

We also inspected many old posts and rails, beams, planks, weatherboards, &c., of this kind of Eucalyptus, and we all noticed that it seemed less liable to warp than any other kinds of Eucalyptus, a fact mentioned in one of my previous reports on Yellow Stringybark. As, in addition to the specially important quality of great durability in the sea water, Yellow Stringybark has a specific strength very much greater than that of Red Gum and than that of Jarrah (as shown in the tabulated results of my tests of Yellow Stringybark, inserted in my report of 5th July, 1890), my colleagues and myself have arrived at the conclusion that this species of Eucalyptus may be used for piles and other purposes in the Melbourne harbour works.

Size.—A large tree. Trees 60 feet high, with a trunk diameter of 3 feet, are not uncommon.

Habitat.—It is found in South Australia, Victoria, and New South Wales.

In Victoria, it has an extensive range in the western half of Gippsland. It also occurs in the Grampians and other localities nearer to South Australia.

In South Australia it is found in the Mount Lofty Range.

It is, however, most developed in New South Wales, extending from south to north, and I do not doubt that it occurs in Queensland, although it has not been formally recorded from that State.

Thus in New South Wales we have it from Twofold Bay, near Nelligen, the Goulburn district, Milton, and Mount Kembla.

Western localities are Kanimbla Valley and the Rylstone district.

Going north, we have it on the Liverpool Range and eastern New England as far as Tenterfield. It is very widely diffused in the northern districts and presents a good deal of variation there.

It occurs in broken country generally, preferring the taluses of the hills in moderately good soil. It does not like exposed situations.

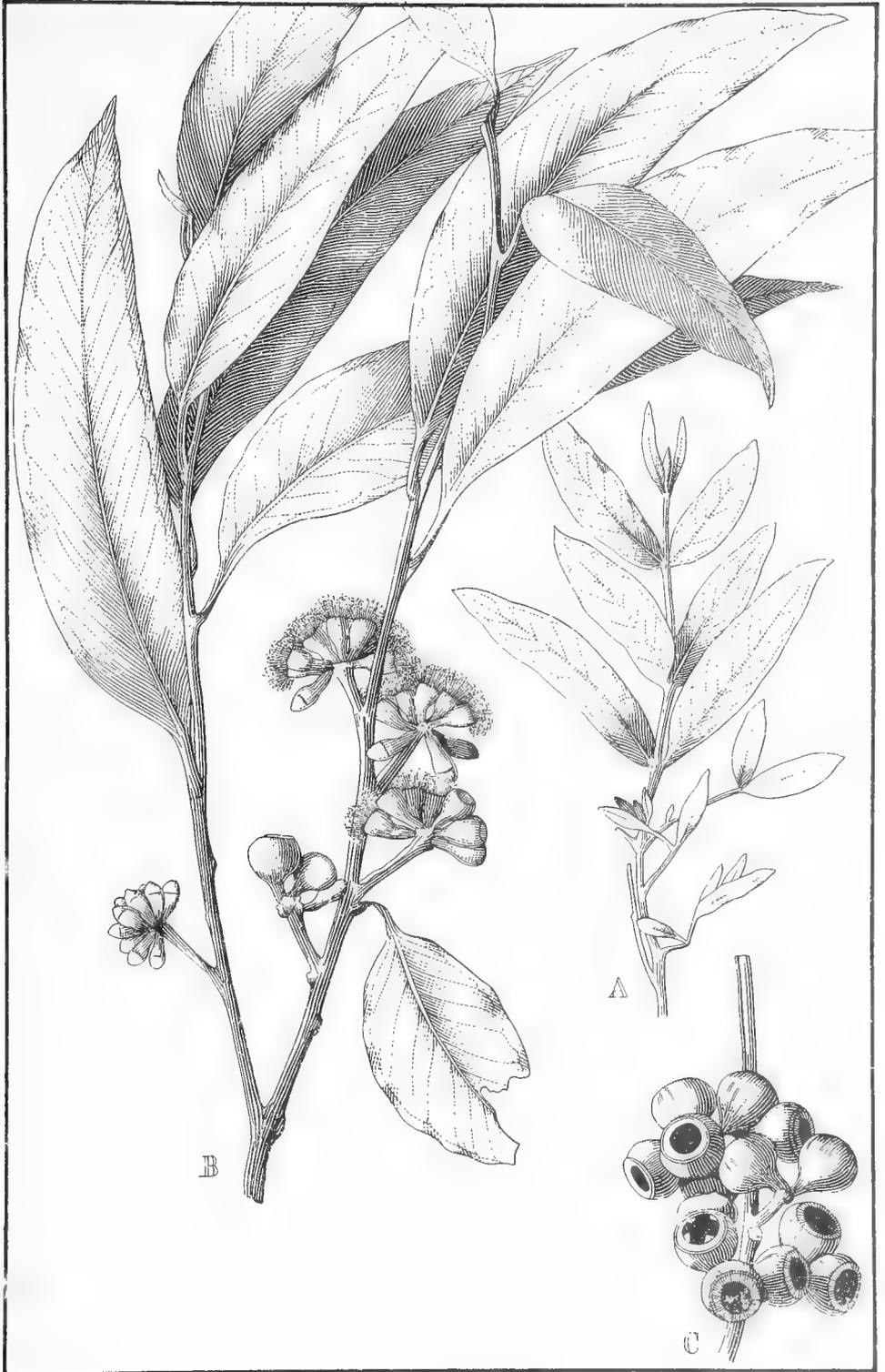
EXPLANATION OF PLATE 113.

1. Seedling.
2. Flowering twig. Note the clavate (club-shaped or rounded) buds.
3. Twig-bearing fruits. Note their nearly spherical shape and marked rims.

Eucalyptus acmenioides, Schauer.

THE WHITE MAHOGANY.

Botanical Name.—*Acmenioides*, from two words—*Acmena* and the Greek, *oides* (like). Our common Lilly Pilly, *Eugenia Smithii*, was once known as *Acmena*, and the leaves of *E. acmenioides* reminded Schauer of those of *Eugenia Smithii* (*Acmena*).



EUCALYPTUS MUELLERIANA, Howitt. (The Yellow Stringybark.)

Vernacular Names.—"White Mahogany." This tree has a pale-coloured timber, which bears no resemblance to the mahogany of commerce or to the Red or Forest Mahogany of New South Wales. It gets its name because of its pale colour, and because the bark of the tree was thought to resemble that of the Red Mahogany. The name is in universal use in the State, and cannot now be disturbed.

It is stated to be known as "Stringybark" at Rockingham Bay, Queensland, while "Broad-leaved Box" (a bad name, and likely to lead to confusion) is also quoted for this species.

Timber.—To say that it resembles Tallow-wood a good deal, but that it is paler in colour, that it is not greasy, and harder than the better-known timber, will perhaps give a good idea of it. It is one of the most durable timbers in New South Wales. I know of posts of it in different parts of the State quite sound after the vicissitudes of more than half a century. Its chief drawback is some tendency to shell off. Users of it have even gone so far as to assure me that it is far more durable than Ironbark or Box. It is a tough, strong, useful timber. I believe it will be found an excellent timber for wood-blocks, but I would discourage exportation of it at present except under close supervision, as I have known Stringybark substituted for it, perhaps through inadvertence. Its hardness is a drawback, and the trees are sometimes unsound; but it is so good a timber that I would invite our timber men to give more attention to it in future. It is one of those timbers which is not so well known as it should be, because it has been constantly confused with others. It is excellent for posts, piles, girders, &c., and is useful for general building purposes. It would be desirable to thoroughly test it for the decking of bridges.

Mr. R. T. Baker says that it promises well for golf club heads, being hard and close-grained, and not too heavy.

Is White Mahogany Durable?

Doubt has been cast on the durability of White Mahogany. For example, Mr. J. V. de Coque has published the following statement:—

This timber bears no resemblance in colour to the Red Mahogany, but is remarkably like the light-coloured Tallow-wood; in fact, it takes an experienced eye to detect any difference in the two timbers. It is often substituted for Tallow-wood, and unfortunately is not equal to it in durability or value. Unlike Tallow-wood, it shrinks a good deal in seasoning, and is much more open in grain. For general purposes it should only rank as a third-class hardwood, and when called upon to stand exposure should be avoided.

The late Augustus Rudder (one of the best of New South Wales foresters) wrote:

In brushy places this tree attains to a considerable size up to 5 feet in diameter, but in the open it is usually smaller. It is one of our Stringybarks, and is fairly plentiful along the Northern Coast country. The wood of this tree is hard, and very close in the grain, but splits easily, and is very similar in appearance to that of Tallow-wood. The principal defects of this timber are a tendency to rings and pin-holes. For lasting in the ground, as far as I know, it has no equal. I have seen fence-posts of it quite sound after being in use for over fifty years.

When on a trip along the central North Coast districts some years ago, I published the note—

Occurs from about Booral to Gloucester, and then along the coast at least as far as Kempsey. Irregularly distributed with Stringybark (*E. cuginoides*,

Sieb.) on the ridges. Not often cut in the saw-mills, because it is heavy and hard to saw, perhaps also because it is often faulty. It is very durable timber, and is used for posts and rails, and also for palings. It is very durable in the ground, lasting longer than Red Mahogany. Mr. Forester Macdonald told me of round posts in the ground near Kempsey quite sound after thirty years. It is stated to gum the saw.

The following letter was written to me by Mr. C. J. Cullen, of Kincumber, some years ago:—

There is on my land at Kincumber the remains of an old fence that I am credibly informed was erected fifty-five years ago (*i.e.* 1837), and although most of it has succumbed to wear and tear and bush fires, many of the posts and rails remaining are still quite sound. I am not sure how many kinds of timber were used, but can identify some of the posts as "White Mahogany," a timber that, I believe, under favourable circumstances would last 100 years, in the ground or out of it. The tree has a rough bark of a yellowish-brown or ginger colour, and the wood is a pale yellow. It is excellent for any purpose in building except for sawn boards, as it chafes (*sic*) into concentric rings. It will do, however, for piles, girders, or sleepers, and will last double the time that Ironbark, Box, or Turpentine will.

In the Kincumber (Gosford) district White Mahogany is a well-known timber, and the balance of evidence available to me shows that it is durable. At the same time there is no doubt that we can have inferior White Mahogany, just as we can have inferior kinds of other timbers.

The Official Catalogue of the Queensland Forestry Museum, 1904, says:

A large tree, with a fibrous persistent bark; wood of a light-brown colour, close grained, fairly hard, and very durable.

Used for all kinds of building purposes, and for fencing posts and rails.

Size.—It attains the dignity of a large tree, with a height of 100 feet, and a trunk diameter of 5 feet; but its usual size is much less.

Habitat.—It is confined to Eastern New South Wales and Queensland. Its southernmost locality known to me is the Port Jackson district; its most northern is Rockhampton, Queensland, occurring in coastal districts and tablelands. Westerly I have it from Drake, near Tenterfield; but its range is worthy of further investigation.

I do not doubt that a good deal of country reported to be Stringybark is really White Mahogany of one form or another. Both trees like the same situations—well-drained, sterile hills and mountain sides.

EXPLANATION OF PLATE 120.

- A. Juvenile leaves.
- B. Flowering branch.
- C. Fruits (Gosford District).
- D. Smaller fruits from Brisbane.
- E. Buds.

Eucalyptus gonicalyx, F.v.M.

THE MOUNTAIN GUM.

Botanical Name.—*Gonicalyx*, from two Greek words—*gonio* (an angle), and *karpos* (a fruit), in reference to the raised edge on the fruit.

Vernacular Names.—This is the common "Spotted Gum" of Victoria (the common "Spotted Gum" of New South Wales is *E. maculata*), and the "Mountain Gum" of New South Wales.



EUCALYPTUS ACMENIOIDES, Schauer. (White Mahogany.)

Leaves.—In exceptional cases, other gum-trees have even longer leaves; but some of the present species I received from the southern part of this State almost measured 17 inches without the stalk.

Fruit.—The angularity—to which it owes its specific name—may be noted. It is more evident on some trees than on others.

Bark.—At Hassan's Walls, Mount Victoria, N.S.W., has "box" bark up to the first fork and beyond.

Timber.—Mueller describes the Victorian wood as—

Hard and tough, usually free from kino veins. It varies from a pale yellowish to a brownish colour, is exceedingly durable, and lasts longer underground, not warping, and on account of the interwoven woody fibres is almost as difficult to split as *E. rostrata*. It is much esteemed by wheelwrights, particularly for spokes, for ship and boat building, for railway sleepers, and when not used for better purposes, it is sought for fuel. According to Mr. Boyle, the rough-barked variety* from low, dry, and stony ranges, supplies a timber which wheelwrights consider equal to ironbark, with the advantage of its not being so weighty; the taller mountain variety, with smoother bark, is more used for planks, piles, and general building purposes—the timber also in this instance being more durable than that from wet forest valleys. This wood resembles, in many respects, that of *E. globulus*.

Habitat.—It is confined to Gippsland (Victoria) and New South Wales.

New South Wales.—With us, *E. gonicalyx* is usually known as Mountain Gum; I have also heard it called Blue Gum, Ribbon Gum, and other names. It is usually found in gullies—bottoms or sides—and prefers good soil. It attains a diameter of 6 feet, and with 80 feet or 90 feet of barrel. Its timber has been passed both for Tallow-wood (*E. microcorys*) and Box (*E. hemiphloia*), but it more closely resembles the former. It is very hard when dry, and nails do not readily drive in it; hence it is not so well liked for building purposes as some softer but inferior timbers. It stands well in the ground.

While not of equal merit to Ironbark, Tallow-wood, and other first-class timbers of the State, it is undoubtedly of considerable value, and deserves an honourable place amongst the timbers of the second-class.

In New South Wales it is sometimes known as "Yellow Gum," owing to the yellowish cast of the foliage (especially when young), of the bark, and of the timber (particularly when fresh). There are several so-called "Yellow Gums" in New South Wales, but they must not be confused with the "Yellow Box" or "Yellow Jacket" (*E. melliodora*).

In New South Wales it occurs in the South Coast districts, and also in the Coast and Main Range, and its spurs at least as far north and west as the Blue Mountains. We require further investigation to determine its northern boundary. Following are some localities in this State represented in the National Herbarium, Sydney:—

SOUTH.

"Mountain Gum."—Cathcart and Tantawanglo Mountain (H. Deane and J. H. Maiden).

"Ribbon Gum."—Candelo (A. Rudder); Cooma District (W. Hutchinson); Twofold Bay (Lockhart Morton).

"Grey Gum."—Benandra (J. S. Allan); West Dapto (R. H. Cambage); Braidwood (J. S. Allan).

"Yellow Gum."—Wingello (A. Murphy, J. H. Maiden, J. L. Boorman); Hill Top, a few miles north of Mittagong (J. H. Maiden).

**E. elaeophora*, F. v. M.

Following is a note on this timber, written by Mr. Forester J. S. Allan in 1892:—

It is found growing along the coast range, on the eastern and western fall of the Irish Corner and Sugar Loaf Mountains, within Forest Reserve No. 166, county of St. Vincent. The timber is the best procurable in the Braidwood district, and is used locally for bridge-planking, girders, dray-shafts, poles, and for house-building; grows on high elevations in open forest country, usually sound.

When the heartwood is cut out it is a durable timber, fine grained, and free from gum-veins. I know several culverts that have been decked with the above timber over nine years, and the planks that were free from heart I find are sound yet. The timber is equal to the "Spotted Gum" of the coast districts. But there is an easily worked timber known as Ribbon Gum (*Eucalyptus Gunnii*), the timber of which is worthless. It resembles the other in colour, and has been very often substituted for "Mountain Gum." The true Mountain Gum, *E. goniocalyx*, is well suited for bridge-building, but requires care to prevent the worthless timber referred to above from being substituted in its place. For bridge work the trees should be felled when the sap is down; it will last many years longer.

In the Wingello district, *E. goniocalyx* is known as Yellow Gum, and following are some notes that Mr. Crawford of that place obligingly gave me:—

Six feet in diameter, up to 80 or 90 feet of barrel. Found also at Bundanoon; usually occurs in gullies—bottoms or on sides. Fond of good soil. The timber has been passed for Tallow-wood and Box, but it is more like Tallow-wood. It is very hard when dry.

Yellow Gum as posts has lasted over thirty years. Mr. Crawford has re-used some which have been in the ground for this long period. It dries rather hard, and nails do not readily drive in it; hence it is not so well liked for building as the local White Mahogany (*E. Muelleriana*) and White Stringybark (*E. eugenioides*).

WEST.

Head of Valley of Waters, Wentworth Falls (W. Forsyth); Mount Victoria, also Kanimbla Valley, Lowther, and Hassan's Walls (J. H. Maiden); Mount Wilson (Jesse Gregson). The fruits smaller than usual, with almost spreading orifice; the valves well exerted; long footstalk. Jenolan Caves (J. H. Maiden and W. F. Blakely).

A common tree in many of the valleys of the Blue Mountains, at least from Lawson to Bowenfels; but never continues right up on to the tableland proper. Besides the valleys, it is often found on the taluses of the hills. (R. H. Cambage and J.H.M.).

EXPLANATION OF PLATE 19.

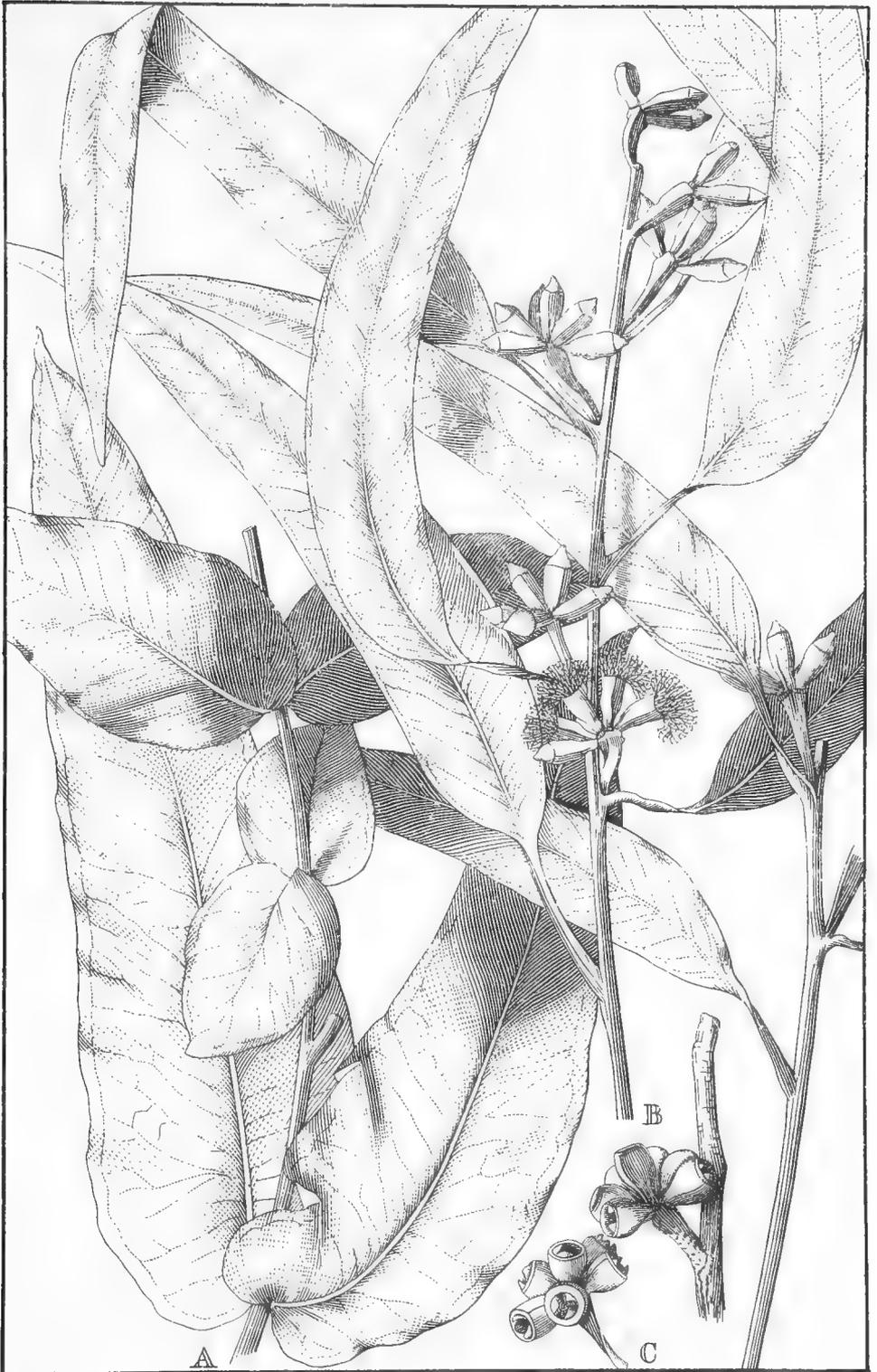
- A. Juvenile leaves.
- B. Flowering twig.
- C. Fruits, showing angularity (from Blue Mountains).

Eucalyptus Sieberiana, F.v.M.

YOWUT OR MOUNTAIN ASH.

Botanical Name.—*Sieberiana*, in honor of Franz Wilhelm Sieber, of Prague, Bohemia, a botanical collector, who spent seven months in New South Wales in 1823, making collections, which were sold in numbered sets.

Vernacular Names.—"Mountain Ash" is its usual name. It attains its



EUCALYPTUS GONICALYX, F.v.M. (Mountain Gum.)

greatest luxuriance in mountain districts, and its timber is thought to resemble ash. Sometimes called "Black Ash," but this name should be reserved for *E. stellulata*. It is sometimes called "White-topped Ironbark" in Tasmania, where there are no true Ironbarks. It has been also called "Blackbutt," but that name should be reserved for *E. pilularis*. It has been called "Messmate" or "Stringybark" at the Dromedary, N.S.W., but the use of such names for this species is to be deprecated. Dr. A. W. Howitt said it was also known in South-eastern New South Wales as "Silver-top" and "Bastard Ironbark."

Bark.—In young trees the bark often somewhat resembles "Stringybark" when viewed from a little distance. Hence the tree has been sometimes called Stringybark, with a qualifying adjective. In older trees the bark becomes denser, darker coloured, more furrowed and rugged in character. The casual observer might be excused if he took the tree for an "Ironbark," but a closer examination would show the bark to be neither dense nor tough enough. The small branches are smooth.

The smooth bark of saplings appears always to be glaucous.

Mr. W. Bacuerlen, many years ago, sent me the following note from Braidwood in regard to this tree, referred to by him as "White Ironbark":—

Sawyers here tell me that, after gently burning this bark, they use the black remainder as an ink or marking to strike their lines in squaring timber. For this purpose they simply mix the black substance, left after charring, with a small quantity of water, so as to obtain a thick syrupy substance, through which they draw their marking line; when striking the line, this substance gives a clean, well-defined line without burr or wings; in striking, the substance does not "fly" off the line, as they say is the case when they use the bark of the Red Ironbark, or any of the other Gums.

The bark of the Red Ironbark (*sidocoryllon*), they say, leaves a more gritty or harsh substance after charring, which does not answer their purpose.

Timber.—Pale-coloured and fissile; very suitable for inside work, but not durable when not protected from the weather. It seems to be a favourite food of white ants. It is also often pipy, and for these two reasons it is disliked by timber-getters.

Following are the earliest notes I can get of this timber:—

"Mountain Ash" (Illawarra). "Willow or White Top" (Berrima). Height, 50-120 feet. Diameter, 24-48 inches. Much valued for rough purposes in districts where the better sorts of timber are not produced. This species usually occupies rough, rocky sites, and seems to form a link between the division of Ironbarks and that of the Gums.

With very dark-coloured, rugged outer bark on the trunk, and smooth white bark on the branches. Timber very hard, tough, and durable, much prized for poles and shafts of drays. (Macarthur, London Exhibition, 1862.)

Used for waggon-rails, shafts, poles, and other work connected with carriage-building. (F. R. Marriott, Mudgee.)

Used by wheelwrights for spokes and naves of wheels. (*General Report, Sydney Exh.*, 1879.)

Mr. Allen Ransome tested samples of this timber sent from New South Wales to the Colonial and Indian Exhibition. From the specimen submitted spokes were turned, casks made, and boards planed. "In all cases it proved an easy wood to work."

The following is evidence as to the durability underground of this timber.

The timber used in the Long Tunnel Mine (a damp mine), Walhalla, Gippsland, consists chiefly of *E. Sieberiana*, *E. capitellata*, *E. obliqua*, *E. amygdalina*, and *E. viminalis*. The first of these, *E. Sieberiana*, is by far the best; it lasts many years. (Tisdall, *Proc. R.S. Victoria*, 1887, p. 43.)

Ironbark (Tasmania). This timber grows principally on the north-east coast of Tasmania, and is equal in quality to the Ironbark* found on the Australian continent, and does not grow so tall or so large as the Gum, but has a small heart, and is very durable in or out of the ground. It makes splendid piles or medium-sized timber. The principal place for shipment would be from George's Bay, this being the most central place for it. (John Bradley.)

It is used in Tasmania for sleepers, amongst other uses.

Mr. R. A. Crawford, Moona Plains, Walcha, N.S.W., wrote to me in 1896:—

The best all-round timber in this district; of course it varies according to locality. I have seen the timber on the ranges on the west side of the creek last more than twice the time of timber from the other, same species and split the same season. I know an old building roofed with shingles of this wood, still in use; it was built early in the fifties. It is, of course, getting leaky, but at 35 years old or more the roof was quite sound; the slabs might yet go into a new building; rafters also sound. The fence of a paddock erected about 1855 or '56 being badly damaged by fire last winter was taken down, and most of the rails were again used with fresh posts. This and *capitellata* both very lasting woods; best we have for posts except *corymbosa*.

Habitat.—Tasmania, Victoria, and New South Wales. In New South Wales chiefly in the coastal districts and coast ranges, at least as far north as the eastern slopes of New England.

The species loves high, rocky, stony mountain ranges on poor barren ground, and never takes to grassy localities.

EXPLANATION OF PLATE 128.

- A. Juvenile leaves.
- B. Flowering twig.
- C. Flower buds.
- D. Back and front views of anthers.
- E. Fruits.

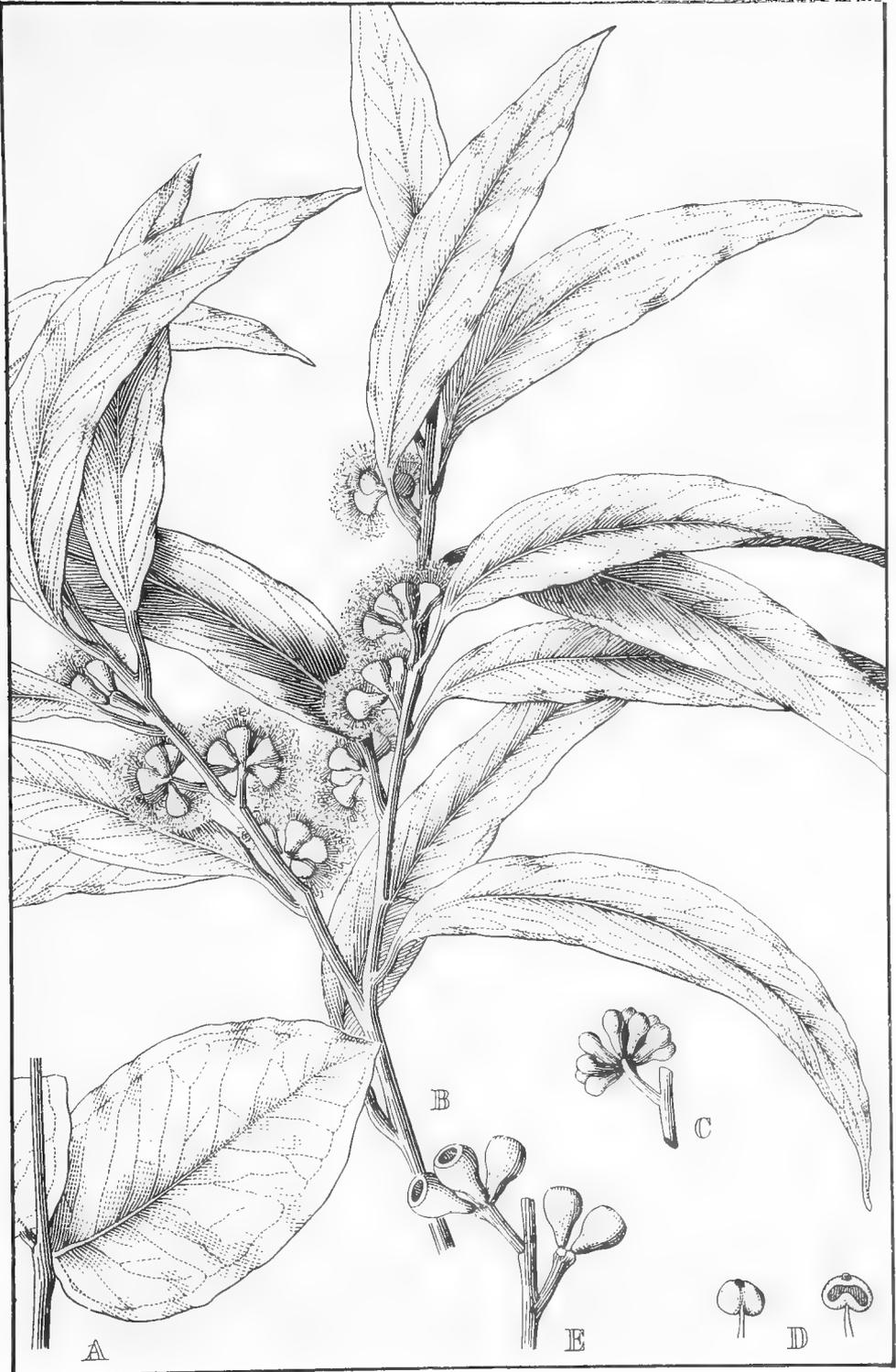
Eucalyptus obliqua, L'Hérit.

THE BROAD-LEAVED MESSMATE.

This is the first species of *Eucalyptus* known to science, it having been originally collected by David Nelson, assistant botanist on Cook's Third Voyage, 1776-9, and described by L'Héritier in 1788. At the time of its collection, and for long afterwards, Tasmania was looked upon as part of Australia; moreover, like other early species, it was badly described, and the specimens themselves were imperfect, and not easily accessible. The result was that it was not recognised, until the sixties, that *E. obliqua* is the common Tasmanian Stringybark.

Botanical Name.—*Obliqua*, Latin (oblique). It is a coarse-foliaged tree, by which characteristic alone it can usually be distinguished from those species with which it is usually associated, or with which it is likely to be confused. Its strikingly oblique, unsymmetrical leaves have, no doubt, given origin to its name. Obliquity is a character of nearly all *Eucalyptus* leaves, but in the species under consideration, and in *E. capitellata*, it is particularly observable.

*This is undoubtedly exaggerated.



EUCALYPTUS SIEBERIANA, F.v.M. (Mountain Ash.)

Vernacular Names.—It is usually known as “Stringybark” in Tasmania and South Australia, and to a less extent in Victoria; in the last State, however, it is usually known as “Messmate,” because it is associated or mess-mates with other Stringybarks and fibrous-barked Eucalypts. The same name is in use in Southern New South Wales, as, for instance, at Sugarloaf Mountain, Braidwood, and at Tantawango Mountain, near Cathcart. Apparently this is the most widely-used name for it in New South Wales, and the term “Stringybark” does not seem to be usually applied to it in this State. It has been sold in recent years as Tasmanian Oak.

Because it is usually rough-barked to the ends of the branches, it sometimes goes by the name of “Woolly-topped Messmate” in the Braidwood district (Monga, &c.). Other names are “Bastard Stringybark,” “Woolly Butt,” or “Woolly Bark,” and White Stringybark,” all in use in New England, New South Wales.

Bark.—Rough-barked to the ends of the branches; the bark of the trunk and branches is decidedly fibrous, but the fibres are not so clean and tenacious as those of the true Stringybarks, and the bark is not so suitable for roofing.

Timber.—That from New South Wales localities is a rather inferior, coarse, open-grained, porous wood, liable to shrink and warp. It is not esteemed for public works in New South Wales. Its open nature may be, at least in part, a consequence of rapid growth, for which, according to several authorities, *E. obliqua* has the reputation.

It has been used in the Braidwood and Cooma districts for many years for building purposes. In Victoria and Tasmania it is largely used, and a recent official publication of the latter State says: “It is our most valuable wood.” In considering the value of this observation, it should, of course, be borne in mind that neither of these States possess a series of excellent timbers such as New South Wales can boast of. At the same time it is quite possible that Tasmanian and Victorian grown timbers of this species are superior to that grown in New South Wales. Howitt, a leading Victorian authority, groups it as a “second-class timber,” adding that—

Although a fairly durable and useful timber, it has generally the fault of being more or less full of gum-veins, and is thus unsuitable for many purposes.

Another authority says:

Although of an inferior class, it is used for a great variety of building purposes, notwithstanding some liability to warp or twist. . . . Supplies a good deal of second-class sawn timber in the market. (Mueller, in *Cat. Tech. Mus.*, Melbourne.)

As this work seeks to impartially report on the qualities of the products of the various species, in whatever State they are produced, some lengthy statements in regard to Tasmanian-grown timber are given at this place.

Following is a report by Mr. Allan Ransome, of London, on a Tasmanian sample (see *Kew Bulletin*, May, 1889):—

A very strong, tough wood, with a straight grain, in appearance somewhat resembling American Ash. From its great strength and toughness it is well adapted for carriage, cart, and waggon building, wheel-work, and agricultural machinery, as well as for the framing of railway carriages and trucks. It is also a valuable wood for the stronger description of building constructions, and would make excellent railway sleepers. From the peculiar strength of the fibre of the grain, it will not maintain a good surface, as, even when perfectly dry, the grain rises, so as to render it impossible to polish it successfully.

An official report says:

Stringybark can be obtained in patches all over Tasmania, but is most abundant in the south; like the Blue Gum (*E. globulus*) it can be got of any reasonable length or size. It is of quicker growth than the gum, and is of a lighter and milder nature generally. The timber is much used in Tasmania, and in the adjacent colonies for house-building, &c. To ensure durability, the wood requires fair seasoning. The different varieties are:—Gum-top Stringybark, Brown and White Stringybark (the brown being the older growth). The White Stringybark makes good palings and shingles.

Another official report says:

Eucalyptus obliqua (Stringybark) is our most valuable wood. It differs from and is better than the Stringybark of Australia. The timber is light-coloured, and varies considerably from a brown wood, resembling oak, to a much lighter-coloured wood, resembling ash; and because of the great variety of its uses and its abundance, is more valuable, economically, than Blue Gum. The bark might be made a source of income, as it is suitable for the manufacture of paper.

The timber, as I have already hinted, appears to be more valued in Tasmania than on the mainland; the utilisation of its bark as a paper-making material is not likely to have any commercial importance, whatever future may lie before the timber in this direction.

The following account of *E. obliqua* timber is taken from Mr. A. O. Green's pamphlet on "Tasmanian Timbers" (1902). It and the Blue Gum (*E. globulus*) are the two most valuable timbers of Tasmania, hence the comparison by Mr. Green and by the author already quoted:—

Stringybark trees are very much more widely distributed through the island than the Blue Gum (*E. globulus*), growing over large tracts of poor, hilly country. They attain to an immense size—up to 300* feet in height, and from 2 to 10 feet in diameter. The wood is, on the whole, of a lighter colour than Blue Gum, and varies from a pale straw to a reddish-brown. In appearance Brown Stringybark is somewhat like oak, and it would be a difficult matter for most people to distinguish a picture-frame made of Stringybark from one made of oak. The timber varies considerably, according to the situation and soil in which the tree grows. In appearance it is freer than Blue Gum, but lacks the purplish tint, and is more subject to gum-veins. It is the most general timber for all sorts of constructive work in Tasmania. It makes excellent piles, especially for fresh water, but is not considered quite so good as Blue Gum for salt water, being more subject to the attacks of the terebo. It is also used for shipbuilding, the construction of wharfs and bridges, and for railway sleepers, for the dado, flooring, and fitting of houses, and for furniture; it is also an excellent wheelwrights' wood. When polished it very much resembles oak, but has a more sparkling grain; it has a very pretty effect when used for a ballroom floor, or for wainscoting.

Besides being sawn for almost every purpose, Stringybark is split into fence rails, palings, and shingles. It is certain that if this wood and the Blue Gum, properly prepared, were exported to London, a ready sale would be found for it, for the construction of carts and vans. It would very well take the place of English oak and ash used for this purpose, which are every year becoming scarcer. In an International Exhibition a Stringybark sleeper was shown, by the Tasmanian Government, that had been twenty-five years under traffic. The usual life of this timber, in bridges, is from twenty to twenty-five years; sleepers average about fourteen years; and none of the Government railway buildings, some of which were built twenty-seven years ago, chiefly of this timber, have yet been renewed.

Size.—It attains the dignity of a large tree. So far as I know, it attains its greatest development in Tasmania. In the first part of the letters of Quaker Missionary Backhouse there are some measurements of large

* This may be so, but I like particulars of all trees whose measurements are reported to approach 300 feet.

stringybark trees (*Eucalyptus obliqua*) on the Emu River. I content myself with quoting three. The first was 45 feet in circumference, and the supposed height 180 feet; the top broken. The second was 55 feet in circumference; supposed to be upwards of 200 feet high. He measured, near Hampshire Hills, two trees that had been felled for splitting into rails, each 180 feet long.

Habitat.—It is found in Tasmania, South Australia, Victoria, and New South Wales.

NEW SOUTH WALES.

It extends from south to north of the State. Its northernmost limit is a matter for further investigation, but it extends nearly to the Queensland border. It is found growing in company with *E. gonicalyx* and other species on the Irish Corner Mountain, Reidsdale, Sugarloaf Mountain, and around Monga, both on the eastern and western fall of those mountains. The trees are fairly abundant, and are to be found growing to a height of from 100 to 150 feet, with a girth of from 6 to 10 feet. In New England (Yarrowitch) it is associated with *E. viminalis*.

Howitt makes the statement, as regards Gippsland, that "it appears to be essentially a littoral form, but ascends the mountains, &c." The first part of this statement does not appear to hold true in New South Wales. The tree grows right on the top of the ranges with us, and never in the littoral lands, as far as observed. It frequents situations where it can be reached and enveloped in the sea-fogs; in this remote sense alone can the word "littoral" be applied to trees with us. On the Tantawanglo Mountain it grows abundantly, in company with "Cut-tail" and other Eucalypts, at a height of about 3,000 feet above the sea. At Reidsdale it occurs at an elevation of from 2,000 to 2,500 feet, and in New England nearly 4,000 feet.

Southern.—Tantawanglo Mountain (H. Deane and J.H.M.); "Messmate," Candelo (A. Rudder); "Tororago" (? Tarago), Twofold Bay, S.E. Australia, No. 266, S. Mossman. In Herb. Cant. ex herb. Lemann. Doubtless Tarago, *viâ* Braidwood, on an old route to Twofold Bay.

"Woolly-topped Messmate," Irish Corner Mountain, Reidsdale, Sugarloaf Mountain, and around Monga (Forester J. S. Allan).

"Broad-leaf Messmate," Wingello (J.H.M. and J. L. Boorman). Mr. Boorman's note on another occasion is:—"Large trees, wood of a yellowish colour. Fibrous bark to tips of branches. Inner bark pale yellow, leaves large."

"White Mahogany," Wingello (A. Murphy), but not to be confused with either *E. Muelleriana* or *E. acmenioides*.

Northern.—Three miles past Myrtle Scrub (near Yarrowitch, Hastings River to Walcha), one comes across a handsome forest, in basalt country, consisting mainly of a smooth-barked Eucalypt (*viminalis*), and a rough-barked one (*obliqua*). The discovery of the latter species in this part of the State was quite unexpected, and extends its northern range very considerably. The trees were over 100 feet high, and their trunks 3 feet and more in diameter, so that the trees are fine specimens, and not the depauperate forms of mere outliers or pickets. One of my travelling companions (Mr. J. F. Campbell, L.S., of Walcha) stated that this belt of country extended for 30 miles in a general direction of north and south, roughly following the county boundary, and he believed that this species occurred over the greater portion of that county. Mr. Nivison, of Yarrowitch, states it occurs at

least as far north as the Clarence River, and also in Callaghan's Swamp. It would be interesting now to collect the species at points intermediate between Braidwood and New England. In the latter district it is sometimes known as "Messmate" and "Bastard Stringybark." At Yarrowitch it is known as "White Stringybark," and has been used for building purposes e.g., verandah floors; but it lacks durability in the ground. The sucker-foliage is very coarse. I have leaves 6 x 5 inches. (Maiden, 1898.) Upper Williams River (A. Rudder).

Woolooma Mountain, parish of Chalmers, county of Durham, land district of Scone.—(H. L. White.)

The following letter to me is interesting, not only because it brings the recorded localities of the species some miles to the west, but because it embodies other experiences of a well-known observer:—

The Eucalypt mentioned by you (*E. obliqua*) is abundant here. In this country it is found on poor stony ranges chiefly. It attains a great size, up to 8 or 9 feet or even more in diameter; such trees are usually short-stemmed. It is said it will not last as posts, but I have never been given satisfactory proof as to its unfitness. A mile or two of fence is erected; the posts are mixed, probably split from three or four different kinds of stringybark. Then twelve or fifteen years later, who can say which is the best? Certainly not the average bushman. It is often, I know, too short to run into rails. I have seen trees that you could not run into 7-foot posts even if struck 6 inches thick. I split a tree of this species 85 feet in length of barrel by 2 feet in diameter; it flowered here last season in January, the trees being great masses of bloom, very noticeable, although distant on the ranges from 1 to 2 miles. It is known here as Woolly-butt, Woolly-bark, or White Stringybark.—(A. R. Crawford, Moona Plains, Waichea.)

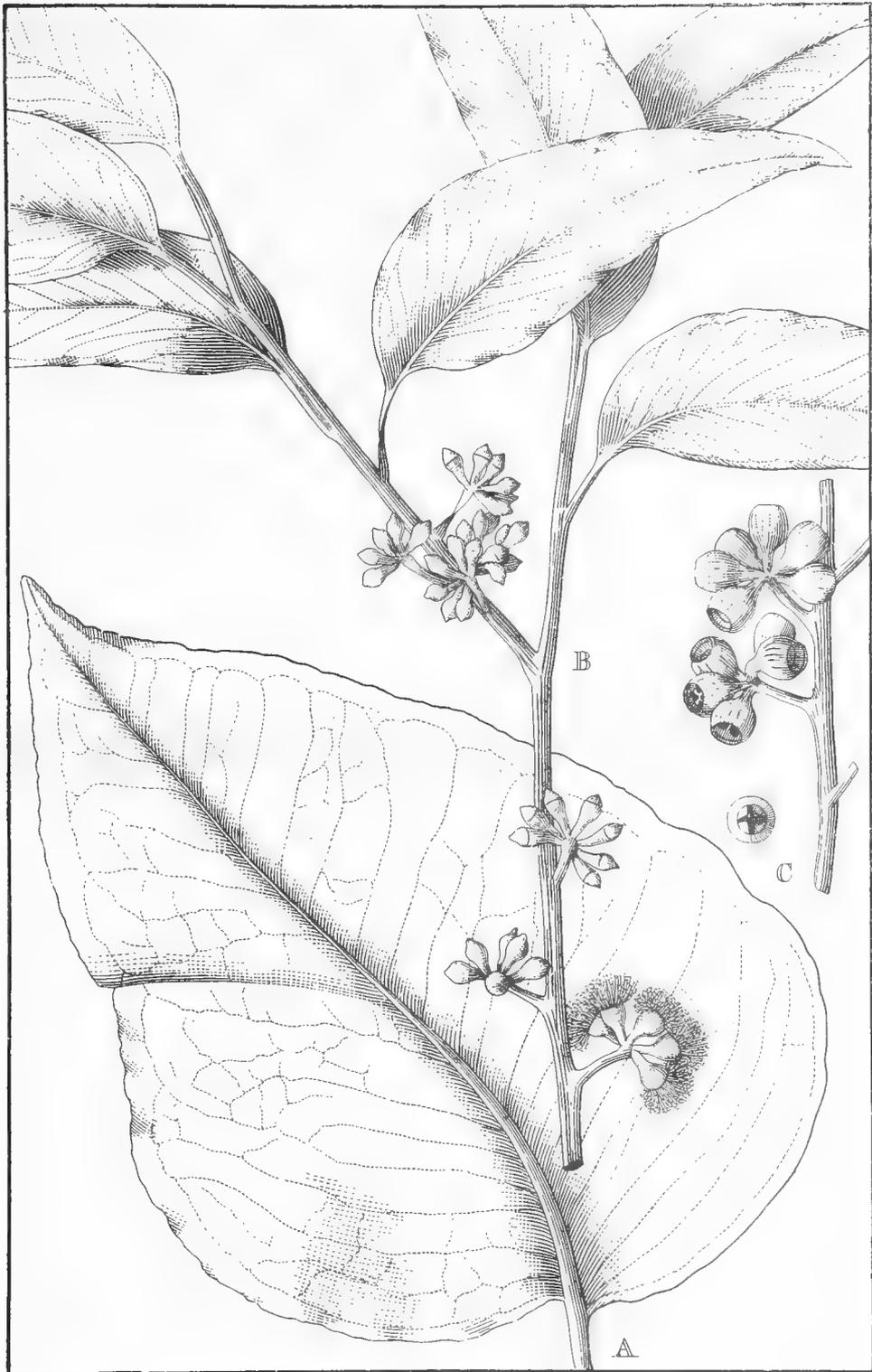
I have a specimen collected by Leichhardt, in 1843, at the head of the Gwydir. It is in leaf only, but there is no doubt as to its identity.

Mr. W. Baeuerlen has collected it at Mount Mackenzie, near Tenterfield. This is near the Queensland border, and it may be expected to be found about Stanthorpe, in the latter State.

EXPLANATION OF PLATE 83.

- a. Leaf in the intermediate stage, i.e., not the youngest form, but yet not fully mature. Note its great width, and its obliquity.
- b. Twig showing buds and flowers.
- c. Fruits.

[All drawn from New South Wales specimens,—near Yarrowitch, New England.]



EUCALYPTUS OBLIQUA, L'Herit. (The Broad-leaved Messmate.)

Pale Boxes.

1. *Eucalyptus hemiphloia* (White or Grey Box).
2. *Eucalyptus Bosistoana* (South Coast Box).
3. *Eucalyptus melliodora* (Yellow Box).
4. *Eucalyptus populifolia* (Bimble Box).

Eucalyptus hemiphloia, F.v.M.

THE WHITE OR GREY BOX.

Botanical Name.—*Hemiphloia*, from two Greek words—*hemi*, half, and *phloia*, bark—half-barked.

Vernacular Names.—It is called Grey Box because of its tough, inlocked character, which reminded the early settlers of Turkey Box. Here, however, the resemblance ceases, as our Box is a coarser-grained, duller-looking timber, while in Australia it often goes by the name of "Box," the adjectives "Grey" or "White" being used to distinguish it from Red Box, Brush Box, &c.

Synonym.—Some of the synonyms of this species are referred to below. I recognise two varieties, viz.:—

1. var. *albens*, F.v.M. The large-fruited glaucous (whitish) form. *E. albens*, Miq. The name of *E. albens* arose only from a misprint of *E. pallens*, and was first promulgated without any diagnosis (*Eucalyptographia* under *E. hemiphloia*). *E. pallens*, F.v.M., non DC., is a synonym.

2. var. *microcarpa*, Maiden. The small-fruited form common in the drier parts of the State.

Flowers.—This species is one of the most profuse flowerers of the Eucalypts. The *Agricultural Gazette* for February, 1893, contains a useful paper on "Plants Visited by Bees." It is very condensed, and the native plants are not separated from the introduced ones. Botanical names are not given, and it would be desirable to compile a list of our native plants stated by responsible bee-keepers to be useful bee-plants. The above-quoted paper says:—"It is worthy of remark that the flora of Australia possesses honey-producing trees, shrubs, and plants of a high standard of excellence, the honey produced by bees in the near neighbourhood of the forest being of the finest quality, and having few (if any) faults." The value of the Box-tree (*Eucalyptus hemiphloia*) for honey has passed into a proverb. See *E. melliodora*.

Fruit.—In *Eucalyptus* the fruit is of considerable importance for purposes of diagnosis. In *E. hemiphloia* the fruit varies considerably in size; but it is always subcylindrical, smooth, and never has the valves exerted.

Bark.—This species obtains its name from its bark, although this is a character that can only be employed with caution. This trunk is more or less covered with a matted, sub-fibrous bark that is generally known as "box" bark. The branches are smooth, with a little ribbony bark at the junction of the fibrous and smooth portion.

Timber.—Its characteristics are its toughness, hardness, cross-grained, non-fissile character, and its great strength. It is a pale hardwood, of a very pale brown. It is used for the naves of wheels and heavy framing, and for the cogs of wheels, large screws, mauls, handles, shafts, poles of drays, &c., which require a tough wood for their manufacture. In Victoria it is in high repute for railway sleepers, and in that State and our own for piles, girders, &c. It can be recommended with confidence to railway-carriage builders and others who require a strong durable timber for framing, &c. While usually sound in the coast districts, in the interior a great drawback to this tree is its tendency to become hollow at a comparatively early age. It is certainly a valuable timber, one of the best of our hardwoods. It forms an excellent fuel.

Size.—It varies a good deal in size. I have seen it 60 to 80 feet in height, and even higher, with a stem-diameter of 3 or 4 feet, but it is not one of our largest Eucalypts.

Habitat.—In one form or another it is found over a large area of this State, from the coast-line away into the dry west. It also occurs in Queensland, Victoria, and South Australia. In the two last States the predominating form is variety *albens*. The variety *albens*, the White Box *par excellence*, is in New South Wales mainly developed in a longitudinal strip of country on the western slope of the Dividing Range. Roughly, the western boundary would run through Corowa, Wagga Wagga, Temora, Parkes, Dubbo, and thence northerly to the Queensland border. Its eastern boundary would run through, say, Tumut, Burrowa, Cowra, Orange; then easterly to Rylstone, Singleton, Muswellbrook, and then northerly. The typical form is found east of this.

Acacia Creek, Macpherson Range (W. Dunn) is an additional northern locality.

EXPLANATION OF PLATE 22.

Flowering twig of the typical form.
Fruits.

Eucalyptus Bosistoana, F.v.M.

Bosisto's Box.

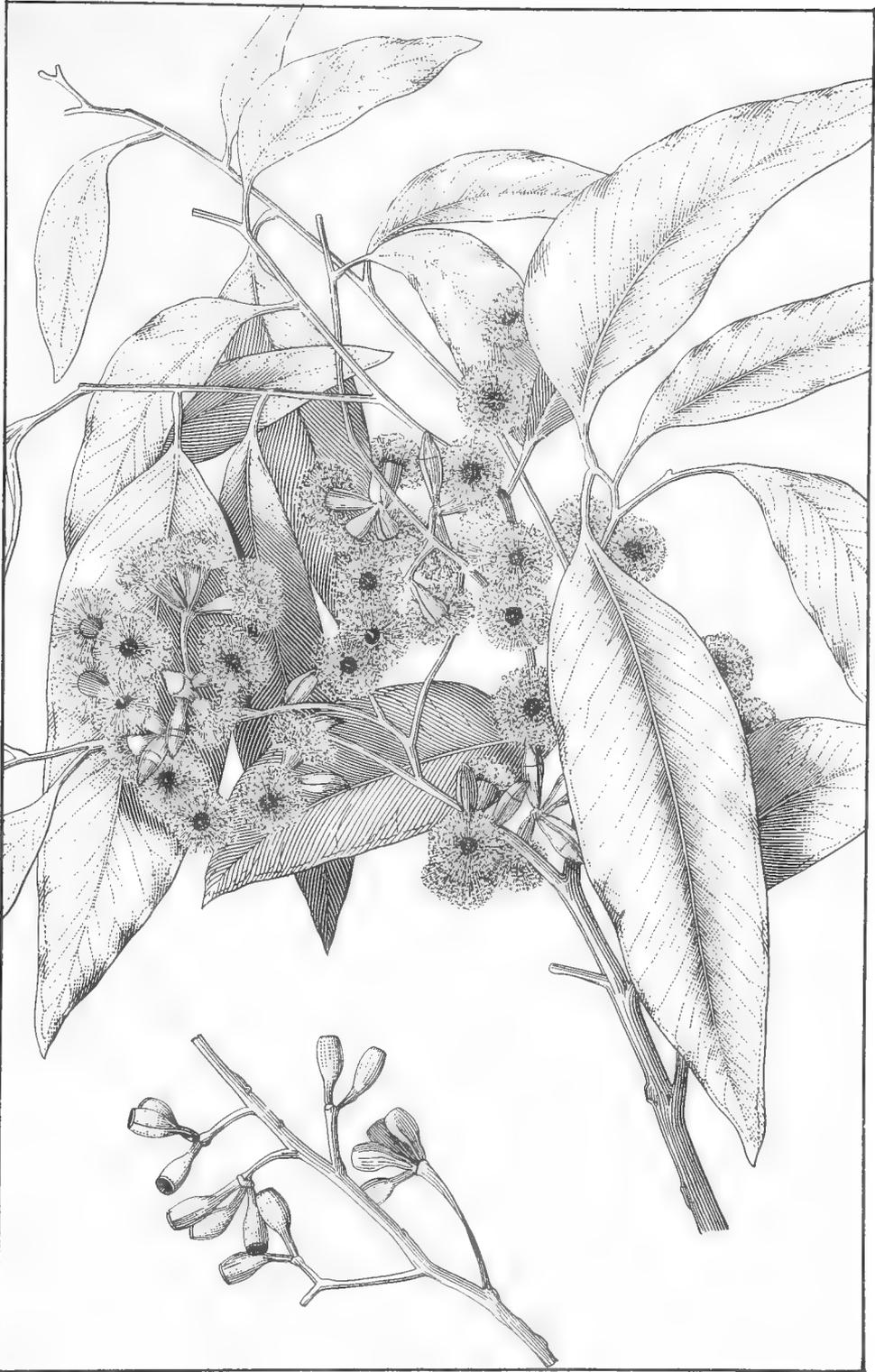
Botanical Name.—*Bosistoana*. in honor of the late Joseph Bosisto, M.L.A., of Richmond, Melbourne, a pioneer of the Eucalyptus oil industry.

Vernacular Names.—"Red Box." It goes most commonly under this name in the South Coast and Monaro, in reference to its pinkish colour when fresh.

"Of late it has received the local name of 'Grey Box' from the splitters and saw-millers." (A. W. Howitt, speaking of Gippsland.) "Yellow Box" of the County of Cumberland, N.S.W. (see this page and also p. 76). "Bastard Box" of the County of Cumberland, N.S.W. It is called "Bastard Box" from a belief amongst some timber men that it is a tree of which the true Yellow Box (*melliodora*) is one of the parents.

Timber.—

E. Bosistoana.—This tree has in many respects a superficial resemblance to *E. melliodora*, with which it was for a long time locally confounded in Gippsland.



EUCALYPTUS HEMIPHLOIA, F.v.M. (The White or Grey Box.)

The difference between *E. Bosistoana* and *E. melliodora* was long apparent to me, from a careful comparison of the trees growing in the Mitchell River district, and especially from distinctions which have been apparent to the timber men there. The wood of this Eucalypt is much browner in colour than that of *E. melliodora*, and while the timber of the latter can very rarely be split into posts or rails, that of the former, although it is difficult to split "on the quarter," is, when once the log is opened, "backed off" with great ease. The principal differences upon which a rapid diagnosis may be made lie in the greatly superior height of *E. Bosistoana*, in its freer growth, the rhytiphloious (fibrous) bark, the smooth upper portion of the stem and limbs, and the somewhat larger fruit, with a narrow, compressed rim, and more deeply sunk orifice. Finally the outer stamens are all provided with fertile anthers, while those of *E. melliodora* are anantherous.

The timber of this tree is most durable, and is one of the most serviceable of the Eucalypts of Victoria, especially for work which is exposed to damp.—(A. W. Howitt.)

In the above passage, where *E. Bosistoana* occurs, there is *E. odorata* in the original, as Mueller made that species very comprehensive, and afterwards carved *E. Bosistoana* out of it.

Mr. Howitt subsequently wrote to me: "The greatest care should be taken to preserve this timber, for the reason that where works of construction require great durability and strength combined with length of material, there is no Victorian Eucalypt to compare with this."

"Red Box abounds in this district, and I am assured by persons who are competent to judge, equal, if not superior, to Ironbark for strength and durability. Recommended to be tested for sleepers and bridge-building." (The late Forest Ranger Benson, Wagonga, N.S.W., writing in 1893.)

I have a specimen of the same timber, called "Grey Box," from the Muckindary Bridge, Bombala, N.S.W., part of a pile nineteen years in the ground. It is quite sound, but has split badly.

The following notes concerning the same timber I obtained verbally from Mr. A. R. Crawford, of Wingello, N.S.W.:—

"A splendid timber, no faults of any kind. Good for wheelwrighting, shafts, and all frame work."

Mr. Crawford further says that it is the best Box he has ever worked, and he has worked that of Hill Top, Orange, &c.

It will be observed that all these witnesses uniformly speak most highly of this timber.

It is a brown timber, drying paler. It is hard, and without gum veins. The tree has good clean stems and smooth branches.

Size.—This tree grows to 200 feet, or in exceptional cases to perhaps 250 feet in height. (A. W. Howitt, *loc. cit.*)

Habitat.—So far as we know at present, it is confined to eastern New South Wales, from the Parramatta district, and the Illawarra and the southern tableland, in the north as far as North Gippsland (Bairnsdale district), Victoria, in the south.

NEW SOUTH WALES.

"Stony Ranges called Mountain Hut Range, near Eden, Twofold Bay" (Oldfield.)

Bega district; also "Red, Grey, White Box," Cobargo (J. S. Allan); Mt. Dromedary (Miss Bate); "Grey Box," Nooroona (A. Langley); abounds in Wagonga district (F. R. Benson); "Grey Box" (J. V. de Coque); and

“Red Box” (J. S. Allen), both in the Moruya district; Lower Araluen (J.H.M.); Milton; also “Yellow Box,” West Dapto (R. H. Cambage); “Box” or “White Box” of Razorback, 4 miles from Wingello (J.H.M. and J. L. Boorman); Marulan (A. Murphy); Bullio to Wombeyan (R. H. Cambage and J.H.M.).

Cabramatta district, county of Cumberland, occurring between Bankstown and the Cabramatta Railway Station, and also thence to Bringelly and Cabramatta (now Rossmore).

EXPLANATION OF PLATE 160.

- A. Juvenile leaf.
- B. Twig, in bud, Bankstown and Cabramatta, a few miles south of Sydney.
- C. Buds, from Cabramatta.
- D. Anther, from Cabramatta.
- E. Fruit, from Cabramatta.
- F. Unripe fruit, showing rim, from Wingello.
- G. Fruit with exerted valves, from Bega, N.S.W.

Eucalyptus melliodora, A. Cunn.

THE YELLOW BOX.

Botanical Name.—*Melliodora*—*mel*, *mellis*, honey, *odora*, of a sweet or pleasant smell.

Vernacular Names.—The commonest “Yellow Box” of New South Wales and Victoria. “Yellow Jacket” of the interior, the inner bark being of a yellowish colour. In the Merriwa and Cassilis district it is as often called Yellow Gum as Yellow Jacket (see “Bark”). It is sometimes called “Honey-scented Gum,” owing to the perfume of its flowers.

Flowers.—This tree, like all of the Boxes, is an esteemed honey-yielder.

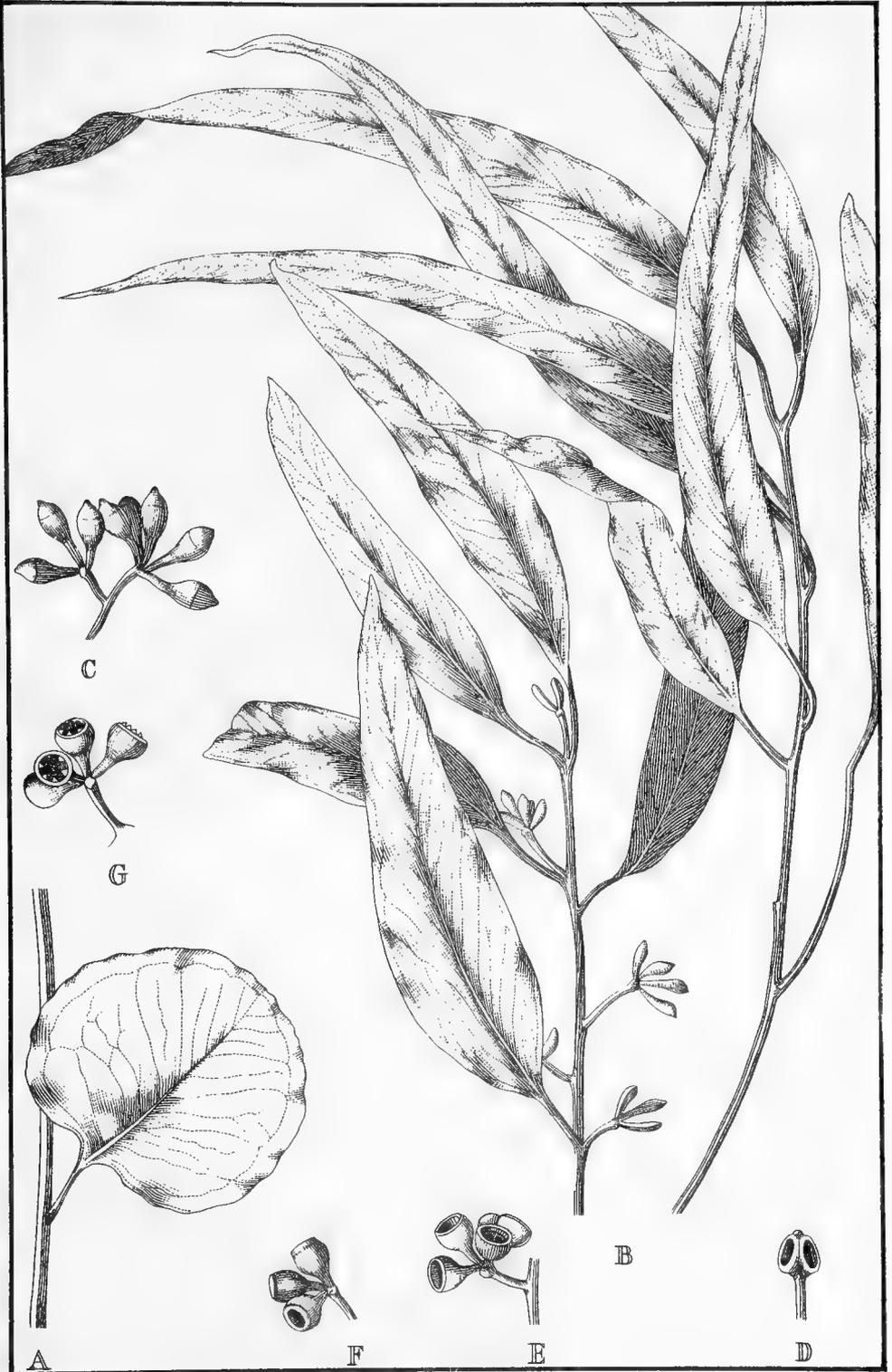
I send, by post, a sample of the great honey-producer, locally known as Yellow Box, and consisting of flowering blossoms and seeds, and wish to have same identified with a view to having this timber preserved on Forest Reserve No. 27,767 of 2,500 acres, as well as on new goldfield reserve of about 5,000 acres, as I am aware that this species of tree will produce more value in honey than the grass under them in wool. In fact, there are about 70 acres of this timber on my land, and some seasons I get more value in honey than if I had it cropped with good wheat at a fair price.—(James Brogan, of Attunga.)

Fruit.—The fruits are small and nearly hemispherical, and have a characteristic narrow band or rim, which usually encircles the slightly constricted orifice, and which is well seen on a side view of the fruit. The rim is similar in appearance to that observed in *E. sideroxylon* under similar circumstances. The fruit of the former species is, of course, much smaller.

Bark.—This tree has a characteristic inner bark, which is often as yellow as the proverbial guinea.

It is sometimes the case that it is difficult to discriminate this species from *E. Bosistoana*, another “Yellow Box,” but a knife or axe will settle the question at once, the inner bark of *E. Bosistoana* being white.

In most parts of the country it has a sub-fibrous or “box” bark on the trunk or for a considerable distance up the butt, and smooth and even ribbon above it. Following are some notes made on the spot:—Bark flaky,



EUCALYPTUS BOSISTOANA, F.v.M. (Bosisto's Box.)

ribbony, more like a cross between *E. tereticornis* and a Box than a true Box (Merriwa Creek). Many trees in the Merriwa and Cassilis districts have, more than is usual, the appearance of a Gum than a Box.

In the Gulgong district, often with a considerable amount of clean stem.

Timber.—This is sometimes a remarkably gnarled, twisted tree.

The timber is pale-coloured, not white, but pale yellow, seasoning to a pale brown. It is remarkably interlocked, tough, hard, heavy, and durable. In the south I have rarely heard the timber spoken of other than in terms of unqualified praise. In the north I have heard a few disparaging remarks, and two well-known experts say:—

Not liked as posts in Liverpool Plains and Mudgee district. People will not accept it for posts for wire fences or for any other purposes if they can help it.—(Jesse Gregson and J. D. Cox.)

Another northern opinion says:—

As a useful timber it nearly lasts in the ground twice as long as Box, and should be very valuable for mining purposes, as nearly every tree about would make lengths that would be long enough for this purpose. I wish to have it saved from the ring-barker.—(James Brogan, Attunga.)

Following are some additional northern opinions, or, rather, opinions on the timber as it is found in the north.

Wood is very good for fencing material, but for saw-milling and building purposes it is, in my opinion, inferior to *E. hemiphloia*, Grey Box.—(W. Dunn, Acacia Creek, Macpherson Range.)

Yellow Box, *E. melliodora*, a very hard and durable timber, but has not been used on account, no doubt, of the difficulty of working it.—(Henry Deane, speaking of Glen Innes to Tenterfield trees.)

It is said to be durable both in water and under the ground. The opinion of some Candelo (South Coast) people differs, however, on this point. A correspondent says:—"It is here considered the best timber all round, but does not, as far as I can learn, last long in the ground." There are many instances of such contradictory statements in regard to our native timbers, showing how much room there is for independent inquiry.

In many parts of the country it is much esteemed for posts, being looked upon as almost imperishable in the ground. It is excellent for culverts. It is often pipy, particular in the dry west, but it is without doubt one of the most valuable trees the State produces.

It is often found with White or Grey Box (*hemiphloia*), in which case it is preferred to the latter, which is so hard and so difficult to split or square. This is the practical objection workmen have to it.

Mr. Deane says that much of this timber was used for posts and rails near Cudal on the Forbes line.

Size.—It is commonly 60 to 80 feet high, with a trunk diameter of 1 to 2 feet, but is not one of our largest trees.

Habitat.—The Yellow Box occurs in Victoria, New South Wales, and Queensland. As regards Victoria, Howitt says that it grows in a scattered manner over almost the whole of the State, lowlands and highlands alike, but nowhere exclusively as a forest.

The same observation can be made as regards New South Wales. It is found from south to north, in the mountainous country and tablelands, far away into the Riverina, and into country very dry, though not the driest.

and away north-east and north to New England, even to Tenterfield. While I have not collected it in Queensland, I should be surprised if it does not grow in the country around Stanthorpe and the drier country to the west. If our country friends desire to assist scientific investigations, I would point out to them that of the vast majority of our plants we do not know the range, so that if they were to send twigs (or in the case of small plants, whole plants) our knowledge would rapidly increase.

The Yellow Box likes good soil.

In the Kanimbla Valley; also in a paddock on Jack White's Creek, half a mile from Hassan's Walls. It is, of course, common on granite country, and in the localities cited it is either on granite or where the detritus from the sandstone ridges is not thick.—(R. H. Cambage and J.H.M., speaking of the Blue Mountain trees.)

The quantity is very limited, in this district, its habitat is on low lands with light sandy subsoil and about stockyards.—(W. Duun, Acacia Creek, Macpherson Range.)

Propagation.—From seed, which is readily procurable.

A few trees that I planted during the winter of 1895 are now (1902) beginning to bloom. When planted they were mere twigs, and were removed into the holes in a spadeful of soil taken with them.—(J. Brogan.)

This is a highly ornamental and shade tree, usually of a drooping habit. It stands a fair amount of cold, while it is very drought-resistant. It will indeed flourish over large areas of country in this State, and those who desire to cultivate Eucalypts should remember that this is one of the most desirable species.

EXPLANATION OF PLATE 35.

- a. Young or sucker leaves.
- b. Twig, with buds and flowers.
- c. Fruits.

(All the above from a specimen from Rocky Hall, Eden to Bombala.—J.H.M.)

- d. Fruits (from Wagga Wagga.—J.H.M.).

Eucalyptus populifolia, Hook.

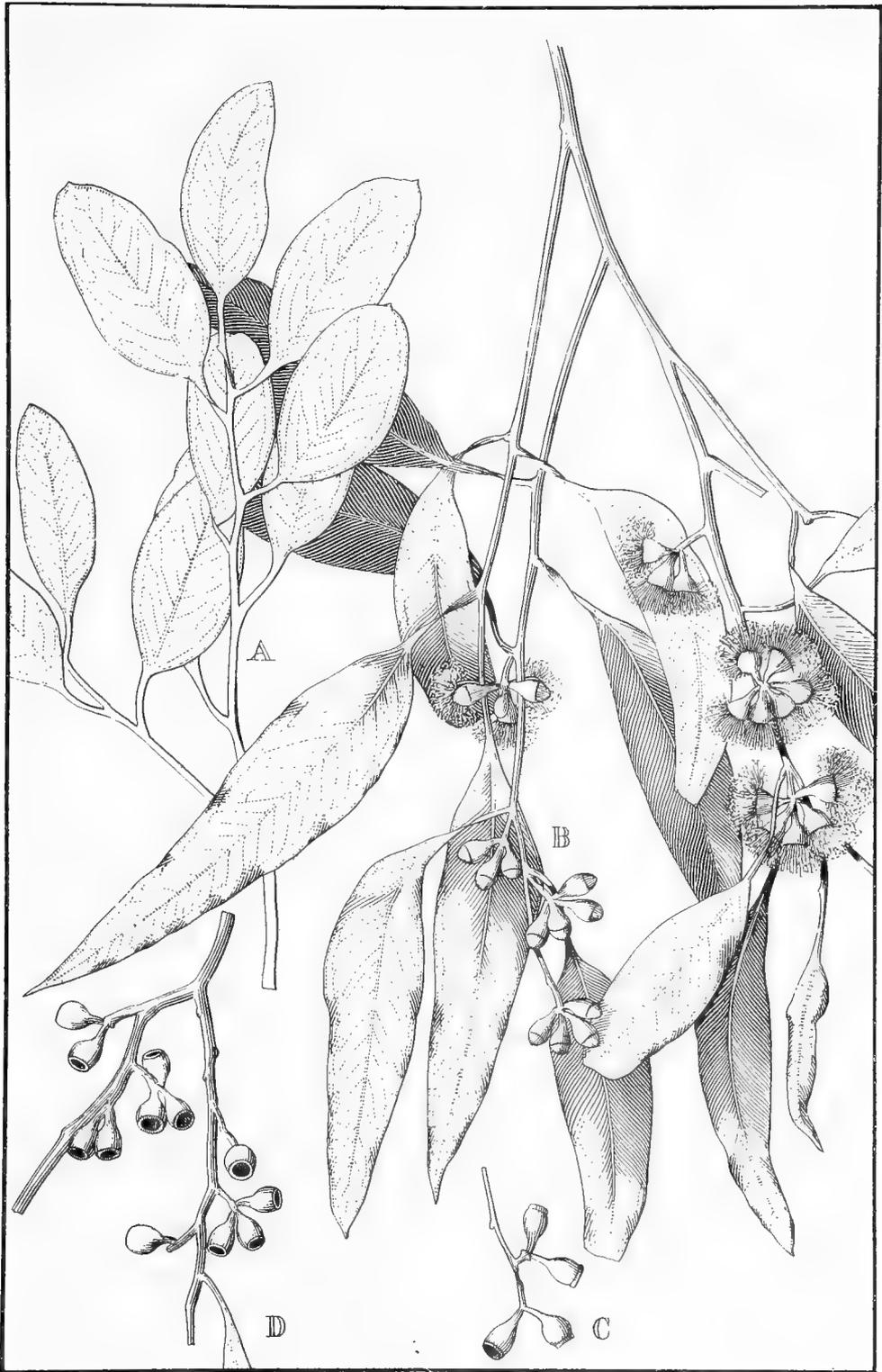
THE BIMBLE BOX.

Botanical Name.—*Populifolia*, from two Latin words—*populus* (poplar), and *folia* (leaves).

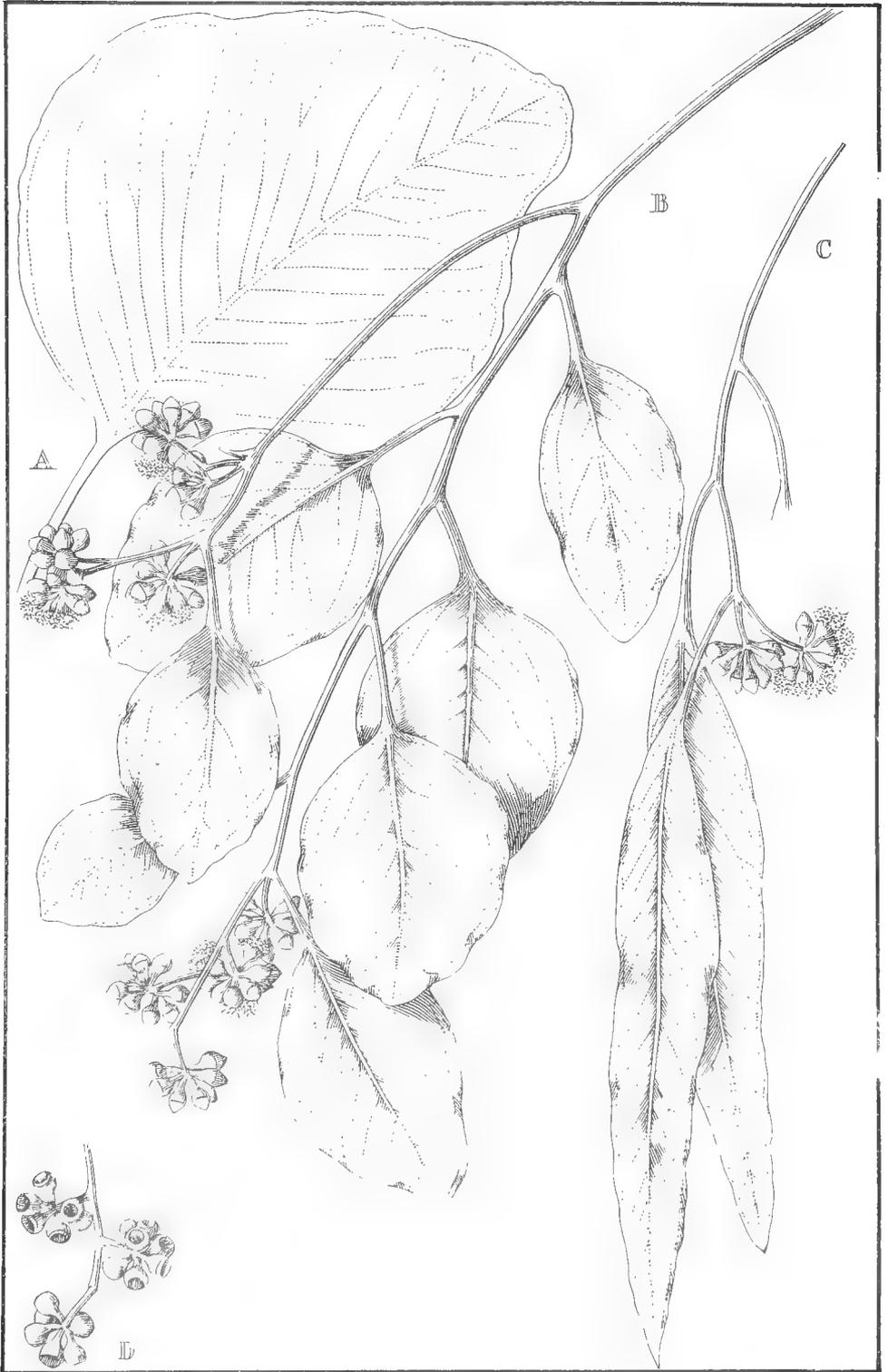
Vernacular Name.—It is commonly known as Bimbil (derived from the aboriginal name); the spelling used to be Bembil; Bibble is a corruption of it.

Sometimes the names "Poplar-leaved Box," "Glossy or Shiny-leaved Box" are used. It is also called "Round-leaved Box" and "White Box," and Mr. R. H. Cambage quotes the name "Minty Box" as having been given to him west of Wyalong, but he did not see the trees. Perhaps some of my readers might say if they have ever heard of the name as applied to this tree.

Aboriginal Names.—"Bembil" is an aboriginal name, from which the common vernacular name has sprung.



EUCALYPTUS MELLIODORA, A. Cunn. (The Yellow Box.)



EUCALYPTUS POPULIFOLIA, Hook. F. (The Bimble Box.)

Leaves.—In its typical form the leaf is very readily recognised, since it is shiny, and in shape like that of the common Poplar. But there are many gradations in length and width of leaf—indeed it is sometimes quite narrow.

The leaves of this tree are sometimes reported as edible by stock, and sometimes not, and at the present time we cannot reconcile the two statements. All that we can certainly say is that the leaves are not edible as a rule. See page 27.

Timber.—The appearance of the timber has already been described, and it is one of the least valuable of those of the Eucalypts.

In the Bogan district it is reputed as the very best fencing timber (Eucalyptus) in the district, but useful for nothing else, as it is always hollow.

A white timber, and a useless, dwarfish tree; not one tree in a hundred fit for anything.

There is scarcely a Bimbil box in my district that has not been ringbarked. The timber is only used for rough fencing in the back country, where it is impossible to get anything else.— (Forest-Ranger Taylor, Wagga Wagga.)

Mr. Taylor's specimens were collected at Warrii.

Speaking of the Lower Lachlan: "The timber is very hard and durable, and, like the gum, is difficult to split. Water is obtained from its roots. Although not very plentiful, it is widely distributed." (K. H. Bennett in *litt.*)

Tendency to Sucker.—Mr. R. H. Cambage writes: "It usually produces a large number of seedlings after the land has been ringbarked, and in this respect is a considerable source of annoyance to the landowner."

Mr. C. J. McMaster, Chairman of the Western Land Board, says: "This is a most difficult tree to get rid of. When ringbarked, seedlings grow so thickly as to render the ground worthless for grazing purposes. It is considered one of the greatest pests in the west country."

Size.—It is not one of our largest trees, but trees 60-80 feet in height, with a diameter of 2 feet 6 inches to 3 feet, are not rare.

Habitat.—It seems to be confined to New South Wales and Queensland. It does not appear to have been recorded from South Australia, but in view of certain New South Wales localities which approach the South Australian border, I should not be surprised to hear of its occurrence in the latter State.

It is a dry-country or interior species, occurring in great abundance in western New South Wales, western and northern Queensland, approaching the Gulf of Carpentaria, but it has not been recorded from the Northern Territory yet.

EXPLANATION OF PLATE 176.

- A. Juvenile leaf from Bogan Gate, N.S.W.
- B. Flowering twig from Mt. Boppy, N.S.W.
- C. Narrow-leaved form from Coolabah, N.S.W.
- D. Fruits from Coolabah, N.S.W.

Myrtles.

1. *Angophora lanceolata* (Smooth Barked Apple).
2. *Tristania conferta* (Brush Box).
3. *Melaleuca leucadendron* (Broad-leaved Tea-tree).
4. *Syncarpia laurifolia* (Turpentine).

Angophora lanceolata, Cav.

THE SMOOTH-BARKED APPLE.

Botanical Name.—It is from two Greek words signifying “vessel bearing” in allusion to the fruits; but its meaning does not imply anything particularly characteristic, as it would be equally appropriate if applied to those of the Eucalypts. The specific name *lanceolata* is in allusion to the shape of the leaves, but these vary in width somewhat.

Vernacular Names.—Sydney workmen know it best by the name of Red Gum; but, as this name has been appropriated, over vast areas, by a different tree (*Eucalyptus rostrata*), it may be well to leave the latter in undisputed possession, reserving for *A. lanceolata* the appropriate designation of the “Smooth-barked Apple-tree,” the only objection to which is its length. The smooth bark is not perfectly white in colour, but of a uniform yellowish-red tint; hence two of its names, “Orange Gum” and “Rusty Gum.” Hardly at any period of the year will you see one of these trees unstained with kino, which frequently exudes in considerable quantity, and every bit shows up on the pale-coloured, smooth bark. These stains being of an orange or rusty colour, have intensified the appropriateness of the designations just alluded to. Because it is common on the Blue Mountains, it sometimes goes by the name of “Mountain Apple-tree,” but as often as not it is simply called “Apple.”

Flowers.—Note the delicate petals in these flowers. The closely allied Eucalypts have no petals.

Mr. Cambage pointed out to me that there is indiarubber in *Angophora lanceolata* leaves, which I confirmed. It is common enough in the closely-related “*Corymbosæ*” section of the genus *Eucalyptus*.

Timber.—As might have been expected with such a free yielder of kino, the timber of this tree is liable to gum-veins; in fact, it is difficult to get a piece of any size from them. Nevertheless it is a useful timber, strong and heavy, and used for naves of wheels, flooring-boards, slabs, rough buildings, and fuel.

The plant tissue of this tree possesses a wonderful power of accommodating its shape, or rather the direction of its growth, to the rocky ground on which it is usually found. Thus we find the base of the tree often flattened out, and following the course of obstacles, reminding one of a gigantic candle placed on a surface sufficiently warm to soften the wax or fat, which then, by the weight of the candle, moulds itself into shapes determined by the obstacles it encounters. The comparison is a homely one, and it is only intended to refer to the plastic appearance, not, of course, the result of heat in any way in the case of the tree.



ANGOPHORA LANCEOLATA, Cav. (Smooth-barked Apple.)

The "plastic" appearance of the trunk has been referred to. I would also like to draw attention to the fact that the branches of this tree display considerable tendency to fuse together when brought into contact (making natural grafts, see "Forest Flora of New South Wales," Part LIV), some of the combinations taking on a looping or anastomosing character, sometimes of a grotesque appearance. I am indebted for photographs exhibiting such phenomena to Mr. J. B. Henson, engineer of the Newcastle Water Supply, and the Hon. J. B. Nash, M.D., M.L.C., both of whom obtained their subjects in the Newcastle district, and to Mr. Keith Harris, whose pictures came from Hazelbrook, Blue Mountains.

Exudations.—This tree is a free yielder of kino. It dries readily on exposure, so that the aperture is soon blocked up with the indurated substance. If this be picked off, the wound begins to flow afresh, and thus a considerable quantity may be collected. This kino bears a strong resemblance to that of a few gum-tree kinos. It is of a reddish-brown colour, and when quite dry is very friable, readily powdering between the fingers. It possesses a sourish, unpleasant smell, not easily described, which is strongest when the kino is quite new, and the proximity of an Apple-tree can thus be frequently determined by the smell alone. For reasons which need not be gone into now, Apple-tree kino does not precisely fill the requirements of the British Pharmacopœia as regards kino; nevertheless it is a valuable astringent remedy, frequently available in the bush when more elegant preparations are not obtainable.

Size.—Up to 50 or 60 feet, with a diameter of 2 or 3 feet. On the Narrabri sand-hills its height is 40 to 50 feet, and diameter 1 to 2 feet. Mr. Boorman and I measured, on Milson Island, Hawkesbury River, a tree 18 feet 6 inches in circumference at 4 feet from the ground.

Habitat.—This tree is found in the coast districts and mountain ranges, and extends a considerable distance into the interior. The most southerly locality known to me is the ranges around Nerrigundah, near the Victorian border (J. S. Allan), while it extends to the Rockhampton district in Queensland. I have collected it on sandy ridges near Narrabri, N.S.W. It is very abundant in the coast districts and in the Blue Mountains, occurring at least as far west as Mt. Tomah. The two Cunninghams found it north of Bathurst, which would connect with the Narrabri locality. Mr. Forest Guard W. Dunn records it from the highlands between Acacia Creek and Wilson's Downfall.

This tree is usually considered a sign of poor soil, and it is marvellous to observe how a giant tree often flourishes upon what appears to be almost bare rock, and one wonders both how such a bulky plant can obtain nourishment and how the roots can spread sufficiently to secure the necessary hold. At the same time the tree does not object to improved surroundings, and I have observed it and Turpentine (*Syncarpia laurifolia*, usually a sign of good soil) growing happily together to a fair size, and in some instances the two growing as closely together as if they had sprung from the same stock.

EXPLANATION OF PLATE 43.

- A. Flower looked at from above—(a) Stamens, (b) Petal, (c) Sepal, (d) Stigma.
- B. Flower looked at from below—(a) Calyx, (b) Petal, (c) Stamens.
- C. Vertical section through the flower—(a) Calyx, (b) Stamens, (c) Stigma, (d) Ovary.
- D. Cluster of fruits.
- E. Vertical section through the fruit.
- F. Transverse section through the fruit.

Tristania conferta, R.Br.

THE BRUSH BOX.

Botanical Name.—*Tristania*, after M. Tristan, a French botanist. Don (probably following Sir. J. E. Smith) has a fanciful derivation from the Greek, *treis, stao*, signifying to stand in threes, in allusion to a supposed disposition of the flowers and leaves. *Conferta*, from the Latin, denoting "close together," the leaves being crowded together on the twigs.

Vernacular Names.—Usually known as "Box" of one sort or another—"Brush Box," "Scrub Box," "White Box," "Bastard Box," "Brisbane Box." It must not be confused with any of the species of *Eucalyptus* known as "Box," owing to the timber being tough and inlocked; "Brush," because it is essentially a brush (an Australian word for luxuriant vegetation—jungle in fact) timber. The name "Brush Box" distinguishes it especially from "Forest" or "Grey" Box (*Eucalyptus hemiphloia*). The name "Woollybutt" is in use in the Port Stephens district as well as on the Manning. It must not be confused with the true "Woollybutt" (*Eucalyptus longifolia*).

Synonym.—*Lophostemon arborescens*, Schott. Strange to say the name *Lophostemon* (usually *L. australis*) has stuck to this plant, particularly amongst nurserymen. It has no priority, and its use should be discouraged.

Timber.—Its characteristics are toughness, strength, and durable qualities. It has a more than usual tendency to warp and twist, which could be largely counteracted by felling at the proper season, and by giving some attention to seasoning. The timber wants a little humouring, but it is so promising as regards durability and resistance to wear, that it is worthy of pains being taken to give it fair play. With the knowledge that we possess of Myrtaceous timbers, to cut Brush Box when in full growth, and then to expose it to the rays of the sun as we often feel them in New South Wales, is *not* to give it fair play.

It is one of the timbers most obnoxious to white ants. It is pale-coloured, usually brownish or pinkish, and turning greyish on exposure. It dulls the saws. This is the timber perhaps universally used in the northern districts for tram-rails for haulage of the logs from the forest to the saw-mill. It is not cut by the iron wheels, but becomes polished by the traction, while it is eminently durable. Much used for bullock-yokes. I am of opinion that if proper attention were paid to the time of felling, and if it were moderately seasoned, it would be a useful timber for paving-blocks. I also am of opinion that the question of its suitability for bridge-decking should form the subject of careful inquiry. I have seen inch boards of this timber exposed to the atmosphere for months without warping; at the same time, that it warps a good deal if cut all through the year, and never seasoned, is notorious. Owing to its toughness, it is used locally for mallets, chisel-handles, planes, jaws of hand-screws, &c.

It is extensively used in the North Coast districts for wheelwrights' work.

Following are specific reports upon it:—

One of the most valuable timbers in the colony on account of its durability: it is averred on credible authority that instances are known of this timber remaining perfectly sound after being nearly thirty years worked up as ribs of vessels. . . . Used for scantling, flooring-boards, &c.—(N.S.W. *Catal.*, London *Exh.*, 1862.)

I would suggest it as worth trying for large wood type-making and similar purposes, as it does not crack. It is excellent for bullock-yokes. It is generally said to twist very much when in boards, but at Cooperbrook saw-mill I saw last week (June) boards of it 1 inch thick, which had been exposed for months and had not warped; also rails of it laid down as a tramway for bringing logs to the saw-mill, in moist ground (and for months swampy), in use for four years, and now perfectly sound, and has worn well. It is excellent for paving blocks. White ants will not touch it, whether it is alive or dead. The sap which runs out of a nob or swelling in a living tree, when cut with an axe, is said to taste strongly of salt.—(Mr. Forester Brown, Port Macquarie.)

He also states (*Agricultural Gazette*, 1896, page 557):—

I find that, besides the many valuable uses to which Brush Box is put, the following may be added, gleaned from Mr. A. Jennings, Port Macquarie:—"A countershaft, which drives from the main countershaft, also drives a planing machine, hand-saw, and two gulleting machines, is 15 feet long. The centre bearing is of Brush Box, end on. It has been in use twelve months, and shows no perceptible wear, whilst the bearing at one end of brass has been renewed in nine months, and now shows $\frac{1}{8}$ inch wear. The other bearing of cast-iron, which has been renewed twice in twelve months, also shows $\frac{1}{8}$ inch wear."

Scrub Box has lately come much into use, and is considered a very useful and durable timber, free from pipes and very sound.—(Mr. Forester Green, Casino.)

Timber of a brownish colour, sometimes yellowish, turning grey on exposure, or generally so when dry; hard, heavy, and interlocked; used for ribs and planking of ships; very hard when dry. Considered to be very lasting (as I have observed), but said, however, by some not to be very reliable when used for the decking of bridges. Shrinks irregularly; when cut into thin stuff is liable to twist and warp. Unequalled when subject to friction; makes the best hardwood rails to carry trucks, and is excellent also for bullock-yokes. The tree, as a rule, is sound; but some of them are liable to heart shakes in the falling. As the cutting of this timber soon dulls the saws, it is not a favourite with the mill-owners.—(Mr. Forester Rudder, Booral.)

A further report by Mr. Rudder, published in the *Agricultural Gazette*, says:—

I can recollect this timber in the earlier days, over fifty years ago, as the chosen of all others by a firm of shipbuilders of the names of Malcome, Newton, and Ferrier, who used it for ships' planking. It becomes pale when dry, and in texture is fine and close in the grain, and is usually inlocked, and, when seasoned, stands more friction than any other timber I know of, not excepting the best ironbark, and for this reason is used for tramway rails, also for bullock-yokes and planes, as it works very smooth. I have seen it used in decking for bridges, of which there is now an example in a bridge at Cooloolook, in this district, where it has been placed for experiment side by side with tallow-wood, with the result, so far, after four and a half years, with the exception of two planks, one of which seems to be in part sapwood and the other too near to the heart, that it is wearing well, even better as regards friction than the other timber. Unfortunately, it shrinks unevenly, and in thin stuff is given to warp; but perhaps by soakage in water these defects might be remedied. In the house in which I am now writing, one of the floors is of this wood, which has been down for twenty-seven years, and is still in excellent order. I believe this timber will be found of value for carving and for engraving purposes. More attention should be given to it.

The timber is generally considered to be absolutely useless for any purpose except for firewood, for which it is admirably suited.—(Mr. Forester Pope, Murwillumbah.)

Timber more inlocked than that of any of the Eucalypts, being too short in the texture to split well, though sometimes will burst freely on the sap. It makes good mauls, being heavy and dense. As a mine timber (for props, &c.), it can scarcely be surpassed: It takes a fair polish, and is very durable, and forms splendid fuel.—(Mr. Forester Deverell, Glen Innes.)

Useful for ships' planking and decking of bridges, &c., &c. It is one of our best hardwoods, although not liked by sawyers and mill proprietors.—(Mr. Forester MacDonald, Kempsey.)

The Hon. W. Pettigrew, of Brisbane, wrote to me (August, 1891):—

Some of this timber was cut into sleepers for a railway near Double Island Point, Queensland, in 1878, and a few months ago they were examined and found sound—no white ants at all about them. The railway was abandoned over ten years ago.

Mr. Pettigrew's opinion (written in 1877) is, however, not favourable as to this timber.

This timber is of no account for sawing, as it twists and gets uneven in drying.

It would appear that this timber obtains its best development in New South Wales, say, from the Manning to the Richmond Rivers.

Following is an extract from a letter to the *Daily Telegraph*, Sydney, of 9th September, 1903:—

About 1890, I had a large contract for the Melbourne Harbour Trust. The specifications stated red gum, red ironbark, and box. The only box timber about here is brush box, and I cut some 16,000 feet of this, 12 x 4, for decking, and shipped it with ironbark. My agent in Melbourne sent me a wire that the inspector for the Harbour Trust had rejected all the box. I at once saw Mr. Ednie Brown, got letters from him, went to Melbourne, showed the letters to the chairman of the Harbour Trust, and got their inspector to give the brush box a trial asking him to place it alongside either karri or jarrah. This was done. Two years after I got word that the box was the best to stand the heavy traffic, having beaten all other timber. Surely that was good enough. I have made use of brush box for both flooring and lining boards, and have proved that white ants will not touch it, while other timbers alongside have been destroyed, and there are other scrub woods equally good.—(W. T. Pullen, Woolgoolga.)

A few years ago Scrub Box was described as firewood. It is most valuable for many purposes, and though on account of its having to be dressed green, it warps too much for "tongue and groove" boards, it is very good for weatherboards.—(A. W. Deane, L.S., Lismore.)

The following interesting letter by Mr. D. A. Rogers, timber merchant, contains useful notes in regard to the Brush Box:—

When in Glasgow I made strict inquiry, together with inspection, of the various systems adopted by the corporation, and, no doubt, as an adopted Australian, my tastes went in favour of wood of which some fair examples can be found in that city; still, I was forced to admit that climatic conditions in Glasgow were not so favourable to wood-blocking as here. Two things seemed apparent to me in my inspections: first subsidence, and second decayed blocks, and the reasons I naturally attributed were—subsidence, due to imperfect or insufficient bedding, or heavier traffic than has to be contended with in Sydney; decay of blocks, imperfect knowledge of the hardwoods used; and an admixture of the blocks cut from logs that had passed the stage of maturity, and only required a damp and humid atmosphere to hasten decomposition. The decaying blocks pointed out were said to be jarrah, and knowing our colonial mahogany—which is simply the former with another State name—I had no difficulty in stating that like conditions would apply with either timber under similar conditions, and recommended there, as I also do here, "Brush Box" as the very best of all paving timbers, in so far as it is unrivalled in durability underground, while in most atmospheres it has little contraction, and maintains a soft-springy surface unequalled with any other timber with which I am acquainted. Baltic is used in many parts, is cheaper than hardwood, but on sanitary grounds is an undesirable element in street formation. An objection to Australian hardwoods in street-blocking is their density and greasiness in ordinary weather, which is tenfold intensified with the first approach of frost

and "rime." The Brush Box previously mentioned has combative properties in this respect. Reporting on wood-paving in the *Glasgow Municipal Enterprise*, I extract a short paragraph bearing thereon, which reads:—"Wood-paving has been in use to a limited extent for a considerable number of years. Experience has shown that soft woods rapidly wear out under the influence of our moist climate and the wear and tear caused by the shoes of horses, the mode of shoeing adopted for the horses in the city being very detrimental to this class of paving. The only woods that have given any satisfaction are the hardwoods from Burmah (*pynkadoe*) and Australian jarrah." After reading this I came to the conclusion that Glasgow had yet much to learn about timbers suitable for paving purposes, and that an expert from this State was badly wanted to "convince and convert" as to the superiority of New South Wales timbers over all others hitherto experimented upon. I carried back with me a sample of the Burmah article, and while placing it before jarrah, must say that against either I place turpentine and brush box as the timbers best adapted for street-paving throughout the United Kingdom.—(*Balmain Observer*, 7th October, 1905.)

Bark.—The tree has brown deciduous sub-fibrous bark on the butt, with smooth branches. It has been stated that this bark is occasionally used for tanning, but it does not appear to promise much in that direction.

Habitat.—It is confined to Eastern and Northern Australia, chiefly to northern New South Wales and southern Queensland, in the coast districts. The most southern locality known to me is Port Stephens. It is found generally in mountain brushes near watercourses, and in gullies near and on the coast and eastern slopes of the Dividing Range; occasionally in the open forest.

It thrives in and about the edges of brushes, along creeks and shady hollows, but not to any great extent, and is not found in belts in this district.—(Mr. Forester Brown, Port Macquarie.)

Plentiful in places in this district, Macleay, Nambucca, Bellinger, and Clarence to the Tweed River. Generally in mountain brushes near watercourses, and in gullies near and on the coast, and eastern slopes of the Dividing Range, occasionally in the open forest.—(Mr. Forester Rudder, Booral.)

Found to a large extent growing on the crests of forest ridges, its presence generally in mountain brushes near watercourses, and in gullies near and about Murwillumbah.

This is one of the most plentiful timbers we have in the brush forests here.—(Mr. Forester MacDonald, Kempsey.)

Queensland.—Sandy Cape and Keppel Bay, mouths of the Burdekin River, Rockhampton, Edgumbe Bay to the Brisbane River, Moreton Bay, &c. (B.Fl.) It is plentiful on the ridges near Brisbane, but is of no great size. It grows in the scrubs near Double Island Point, and in similar places up Moggill Creek, and in these places it is a tall straight solid tree. (Hon. W. Pettigrew.)

Size.—Up to 150 feet, with diameter of 5 feet. (Mr. Forester Brown, Port Macquarie.)

40 to 50 feet. (Mr. Forester Green, Casino.)

Generally about 3 to 4 feet in diameter, exceptionally up to 7 or 8 feet; height up to 120 or 130 feet. (Mr. Forester Rudder, Booral.)

On another occasion Mr. Rudder stated:—"This tree is of large size, not infrequently up to 17 and 18 feet in circumference. Of eighteen I measured, their average girth was 17 feet 4 inches."

"A tree was measured with a girth of 29 feet at 3 feet from the ground. It was growing 1,800 to 2,000 feet above sea-level on Bulga Mountain, head of Ellenborough River." (George S. Hill, Bungay, Wingham, 27th November, 1906.)

"The trees grow to an average height of 120 feet, with an average diameter of 2 feet 6 inches." (Mr. Forester Pope, Murwillumbah.)

"Height 150 feet, diameter 3 feet." (Mr. Forester MacDonal, Kempsey.) I saw trees of this size also in the Bellinger River district.

Propagation.—From seed. It is one of the best shade-trees of New South Wales, is evergreen, with rich glossy leaves, white feathery-looking flowers, and fruits looking very much like those of gum-trees. It is to be seen in thousands of Sydney gardens, planted for shade and ornament, the tree being shapely as well as possessing handsome foliage. It is one of the best trees for street planting in the Sydney climate, and has been largely adopted by the Municipality of Strathfield in boulevarding the streets of Strathfield and Homebush, but more extensively by Ashfield. Other municipalities have used it less. It is well worthy of being planted in the play-grounds of schools where there is a fair depth of soil, and the climate is warm and not too dry.

EXPLANATION OF PLATE 17.

- A. Expanding bud.
- B. Front view of fully expanded flower, showing staminal bundles.
- C. Vertical section of ovary, with style and stigma (petals removed).
- D. Transverse section of ovary.
- E. Top view of fruit.

Melaleuca leucadendron, L.

THE BROAD-LEAVED TEA-TREE.

Botanical Name.—*Melaleuca*, from two Greek words—*melas* (black), and *leukos* (white), because the trunk of the first tree described was black and the branches white. The explanation probably is that trunk and branches were alike papery and white, but that the trunk (as is often the case) was charred by a fire, giving it a blackish appearance. *Leucadendron*, also from two Greek words, *leukos*, white, and *dendron*, a tree, hence "White tree" from its general appearance. In fact, we in Australia sometimes call it "White Tea-tree."

Vernacular Names.—Like so many Australian Myrtaceous trees and shrubs it is known as "Tea-tree." Because of the broadness of its leaves it is usually known by the name "Broad-leaved Tea-tree." It is known also as "Swamp Tea-tree" because (with other species of the genus) it grows in swamps. Because of the foliaceous character of its bark, which gives the trunk a whitish appearance, it is known as "Paper-bark tree" and "White Tea-tree." Baron Mueller calls it the "Tropical Paper-bark tree." I have heard that it is called "Milkwood" in the Northern Territory.

Aboriginal Names.—"Numbah" of the aborigines of the southern part of New South Wales, according to the late Sir William Macarthur. I would suggest that this is the origin of the name of the township of Numba, near the mouth of the Shoalhaven River.

Following is a note by Mr. J. D. Lord, Public School, Numba, in regard to my suggestion that the township may be named after the tree.

The name Numba is generally spelt with a final double "a"—"Numbaa," and is most certainly an aboriginal word; I have often discussed this very name with old settlers, who are more or less acquainted with the early naming of this district, but no two agree.



TRISTANIA CONFERTA. R.Br. (Brush Box.)

Numba has little or no sandy soil, but out "Warri Warri"—(this word, I always think, is wrongly spelt, more likely a final "a" instead of "i"; "Warra Warra" means rain).—there are miles of sand; I have often seen the Broad-leaved Tea-tree growing as I passed along. Again, on "Comarong Island," between Numba and the sea, I find sand and the Tea-trees.

It may be, of course, that the township was named Numba after the trees, although Numba trees may not be on the exact site of the township.

It is "Belbowrie," or "Belbourie," of the county of Gloucester, as far as Kempsey at least, hence the place-name Belbowrie, near Krumbach, New South Wales.

Leaves—Oil.—The young leaves are bruised in water and the liquid drunk for headaches and colds, and general sickness; the bark is also used for bedding, &c., on the Mitchell River, Queensland (E. Palmer). But by far the most important use of this tree is for the oil the leaves contain; this is the well-known "Cajeput oil" of commerce.

Bark.—Several species of *Melaleuca* have a thin papery bark which tears off in several layers. It is used, amongst other purposes, by the aboriginal women to wrap their children in. Mr. W. Soutter, of Brisbane, has used the ground paper bark of this tree for packing fruit for export. (See *Queensland Agricultural Journal*, also *Cape Agricultural Journal*, 11th and 25th January, 1894.)

Timber.—Exceedingly hard and cross-grained, almost imperishable in moist places, but otherwise not of special merit, greatly used for ship timbers, boat knees, and posts; wood much resembling that of the *Melaleucas* generally, very apt to crack and fly open on drying.

It is hard, fairly heavy, close-grained, and not unlike Mararie in texture; it makes a good club that drives well, and is of the right weight and toughness."—(R. T. Baker, in *Golf Illustrated*, 28th July, 1905.)

"Belbourie," or Broadleaf Tea-tree, makes excellent flooring and lining boards, wears well under cover and keeps white appearance; crooks made out of the roots very much used in building wooden vessels; grows to 7 or 8 feet girth, bark also in layers similar to White Prickly Tea-tree. Both kinds practically white-ant resistant."—(Forest Guard McKinnon, Gulgong.)

The timber splits fairly well, and is largely used for firewood at Ballina, Richmond River, N.S.W.—(J.H.M.)

Tea-tree (*Melaleuca leucadendron*, var. *lanceifolia*).—A fairly large tree having a white spongy bark, in very thin paper-like layers. There are numerous varieties, most of which may be used for the purposes mentioned below. The leaves of this variety are stiff and sharply-pointed. Wood of a grey colour.

Used for piles and underground work (without removal of bark); and, when thus completely buried in the ground for drainage purposes, they have been known to last a number of years. When barked, the saplings are often used in the round for rafters, &c., in outbuildings, and last a long time.—(*Catal. Queensland Forestry Museum*, 1904.)

Size.—Up to 40 or 50 feet, and a diameter of 1 or 2 feet in central and coastal New South Wales, but attaining a large size as Queensland is approached. Mueller says it is the largest and straightest tree in the Northern Territory.

Habitat.—From the Shoalhaven River, New South Wales (I do not know its furthest southern locality), north right along the coast, in moist sandy localities, to Northern Queensland and the Northern Territory. Found also in Western Australia (its precise range I do not know), in New Caledonia, the whole Malayan Archipelago, and Burma.

EXPLANATION OF PLATE 15.

- A. Outside view of the flower opened out—(a) Calyx, (b) Petals, (c) Stamens.
- B. Inside view of the flower opened out.
 - d. Pistil.
- C. One staminal bundle with a petal.
- D. Stamens.
- E. Pistil.
- F. Ovary, showing convex summit.
- G. Vertical section of ovary.
- H. Horizontal section of ovary.
- I. Fruiting spike.

Syncarpia laurifolia, Ten.

THE TURPENTINE-TREE.

Botanical Name.—*Syncarpia*, indirectly from two Greek words, *sun*, together, and *karpos*, a fruit, in allusion to the heads of fruits which have their calyces joined or grown together. (connate). This may readily be seen from the figure.

Vernacular Name.—"Turpentine-tree." It is so called because of the resinous exudation which flows between the bark and the wood when the timber is cut into. It is an unfortunate name, as it suggests inflammability, and turpentine is one of the most unflammable of timbers. In some districts the fresh red-coloured turpentine is called "red-turpentine" to distinguish it from the chocolate or dark-brown coloured timber known as "black turpentine." They are the same timber, the latter either being over-matured, or suffering from incipient decay. In the Gosford district the name "silky turpentine" is applied by timber-getters to turpentines in which the bark is thinner and stringy, and the wood comparatively light in colour when freshly cut.

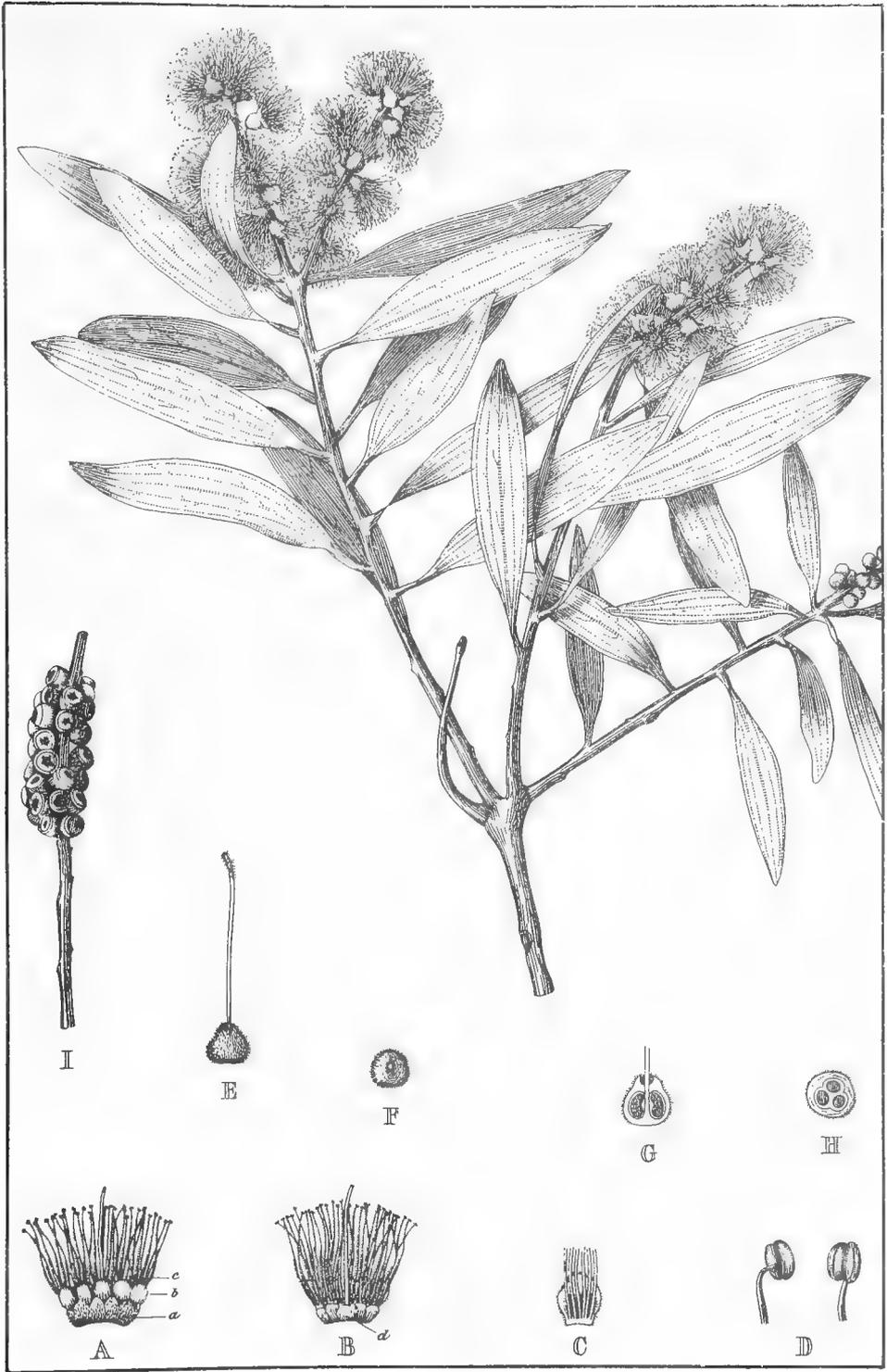
Leaves.—Somewhat laurel-like, as the specific name denotes. The underside of a dirty white, often with small black patches, caused by a minute fungus.

Flowers.—White, and in small round balls, consisting of a number of individual flowers joined together by their calyces.

Fruit.—Hard and woody, and containing abundance of the brown dust-like seed, which sheds as soon as the fruits get dry. On the fruit are often seen globules of the so-called "turpentine."

Bark.—The bark is of a flaky, fibrous character, and often of a considerable thickness. It is of a brown colour. In large trees it has a furrowed appearance. The bark of our turpentine-tree does not appear to be put to any useful purpose, with the exception, an important one, of a covering to the logs.

Timber.—In colour it is usually dull red, but it varies to brown or purple-brown. It has a neat and perhaps characteristic grain. Mr. Augustus Rudder says:—"I believe that this timber might be used to advantage in cabinet work, as some of it is handsome, and takes a good polish, and only, I believe, requires proper treatment to make it more highly esteemed for many purposes." It has been successfully used by local billiard-table manufacturers for table-legs.



MELALEUCA LEUCADENDRON, L. (Broad-leaved Tea-tree.)

It is said to be comparatively soft and brittle, but perhaps there is some mistake in this, as I have always found it to be as hard as the average myrtaceous timbers, and it is not brittle when the sapwood is removed. In Professor Warren's work on Australian Timbers there are a number of tests of the strength of this timber.

Like many other myrtaceous timbers, such as myrtles, turpentine is very liable to rend in drying. It also warps when much exposed, unless seasoned with unusual care; this is a drawback to its use for uprights in buildings. In the Jurors' Reports, London International Exhibition of 1862, it is stated to be "the best wood for railway sleepers." At the present day, however, it is never knowingly used for such a purpose, its tendency to warp and rend being against it. Mr. Rudder, however, states that its tendency to warp as sawn stuff is "entirely obviated by a few weeks' soakage in water, and I have seen it after this treatment free from cracks. It steams remarkably well, so much so, that I have observed stout planking successfully turned edgeways at an angle of over 30 degrees."

It is very abundant, as its chief utilisation at the present time is for piles and hewn posts and rails, since saw-millers dislike it exceedingly, as it rapidly dulls their saws. It would be very desirable to subject it to proper microscopic examination; possibly this might throw light upon this property of turpentine. It is not easy to burn, except with a good draught. In such situations as pillars, girders, &c., in buildings it usually only chars, and is in consequence easily extinguished—a very useful property in buildings. I was informed that, in a very large fire in Sydney, surprise was expressed that the building was not gutted, for the wooden girders and joists were put to a very severe test. It was believed that the girders were ironbark, and they were so specified, but the contractor substituted turpentine without anyone being any the wiser. This pious fraud was, however, the means of minimising the destructive effects of the fire. It is very resistant to white ant, but it must be remembered that no timber is absolutely white-ant proof, as white ants, if put to it, will probably eat any timber on the face of the globe. To sum up, its chief recommendation is its durability, resisting decay in the ground, whether from white ant or other causes, while it is one of the best timbers we have for resisting marine borers, especially if the bark be intact. It is very difficult to burn, a great recommendation to its use in buildings. It will thus be seen that the properties of turpentine, those at least which give it its value, are mostly of a negative character.

Its principal use is, besides those indicated in the foregoing paragraphs, as a second-class timber for wood-paving.

At this place I give the findings of the Report on this timber, particularly with reference to its resistance to Cobra (Toredo) made by Mr. J. V. de Coque and myself, and ordered by the Legislative Assembly to be printed on the 29th October, 1895. The greater part of the Report was reprinted in my "Forest Flora of New South Wales," Part I.

SUMMARY OF FINDINGS AND RECOMMENDATIONS.

To the *1st Question*.—Does the true turpentine resist the attacks of cobra when used in piles, girders, &c., and in public works?

Our answer is that turpentine is not an absolute resistant to cobra, either in pure salt water or in tidal waters, whether the bark is on or not. The turpentine will resist the cobra as well, or better, than any other hardwood, providing the bark remains uninjured.

That cobra is much more active in attacking turpentine in tidal waters, where salt and fresh water mix, than in pure salt water.

To the 2nd Question.—Are there two varieties of turpentine timber, one cobra-resisting, the other not?

Our answer is, that there are two turpentines of the same species, called the black and the red, but, although frequently no sufficiently sharp line of demarcation exists between the two timbers for us to single one variety for special commendation, we would prefer typically red turpentine. There is also a brush turpentine, whose botanical name is *Rhodamnia trinervis*, somewhat similar to true turpentine, but we found no evidence to show that it had been substituted for true turpentine, and we failed to find any inducement to timber-getters to do so.

To the 3rd Question.—Have any other timbers been substituted for turpentine and used for piles, &c.?

Our answer is, that we found no evidence that such is the case. Further, we failed to find any inducement to suppliers to do so, as turpentine is very plentiful in the coast districts.

We recommend,—

- (a) That in pure salt water, in special instances where it is known that cobra is not very active, also in very foul salt water, such as around Pymont and Glebe Island bridges, the use of turpentine piles be continued, providing they are driven with their back attached and uninjured. In cases of outside piles, exposed to the friction of the sides of vessels, some protection or guard should be adopted to prevent damage to the bark of the piles.
- (b) That where turpentine piles are specified to be with the bark on, the condition should be rigorously enforced, piles found to show defect in the bark below high-water mark being condemned as unfit for use.
- (c) That turpentine piles be, as far as possible, felled when the sap is down, and the bark closely adheres to the log.
- (d) That in unpolluted tidal waters, turpentine piles be protected by metal sheathing.

Speaking more generally, and taking into consideration the fact that turpentine is not absolutely resistant to cobra, and the very great expense the Department of Public Works is annually put to in replacing cobra-infested timber, we recommend that for the future the use of turpentine timber, either with or without bark, or in squared or sawn sizes, when placed in any position in which cobra is known to be active, should be discontinued in the public works of this colony, unless it is absolutely protected throughout its entire face and ends by copper or some other equally satisfactory protective covering.

We would recommend the sheathing of turpentine piles, without any exception whatever, if the question of expense did not stand in the way, and the only exceptions we recommend are those of piles on the coast and in parts of Sydney Harbour, as already stated.

The cost of coppering piles, or rather the increase of the practice of coppering piles, will at once claim attention; but we would observe that the expense of the piles themselves is not the only consideration. If they are eaten through, the superstructure may have to be replaced, perhaps at a cost many times exceeding that of the piles themselves. The matter of the life of a pile involves other considerations than that of the durability of a post in fencing which carries no superstructure.

Turpentine is plentiful in most of the coast forests of New South Wales. It is essentially a pile timber, growing as it does in suitable sizes, straight and even in the barrel, and up to 90 and 100 feet in length, and it is the cheapest class of hardwood procurable in the round in the colony. If the timber be coppered there will be no necessity, except in rare instances, to use coppered ironbark for piles, and the drain on ironbark for this particular work will be very largely reduced. We desire to encourage the use of turpentine for piles, but subject to all the precautions we have indicated.

Commenting on this Report, Mr. C. W. Darley, late Engineer for Harbours and Rivers, New South Wales, who gave especial attention to the subject of turpentine timber and cobra, wrote to me—

There is one portion which, from long experience and observation, I must remain at issue with your conclusions. I refer to your conclusions set forth in clause V that the bark will afford protection to the piles. I had in my old office a bag full of samples of bark and wood cut from turpentine piles under water, showing the worm-holes passing through the bark and into the timber (sap-wood only)—indeed some samples rather indicated that they had a weakness for the bark-covered portions. It may be that where the bark is *closely adherent* they pass through, but when at all loose they do not. I have never yet met with a case when *Teredo* sinking in one piece of wood has passed out into an adjoining piece even though in close contact—for instance, I have seen dozens of defective planks removed from punts, and never detected a worm passing from the bad one to those adjoining or to the planks inside. In 3-inch planking the caulking would perhaps only go half-way as shown in rough sketch,* having $1\frac{1}{2}$ -inch of wood in close contact.

I never saw this joint crossed. May it not be the same with the bark if still loose it forms such a joint, while if it is closely adherent the worm may pass as shown by the samples I had in my possession, now all lost I fear. I never troubled about the bark being kept on after the piles were brought on to the ground and passed. I looked to the bark as one of the means for identifying the timber only, and I have never yet seen any difference in life between those driven with or without bark. All are equally liable to be damaged as far as the sap-wood goes.

When deciding to use *sheathed* piles I would never think of using turpentine, as they invariably run much larger in the girth at the butt for (say) a 40-foot pile than ironbark, as a rule, indeed, quite 50 per cent. larger. So when sheathing is paid for at 1s. 6d. per super. foot, the extra price of the timber is soon covered by the saving in sheathing.

REPORT ON THE DURABILITY OF UNSHEATHED TURPENTINE PILES FOR WHARF CONSTRUCTION.

During the past three years, while demolishing a number of old wharves in Sydney Harbour to make room for improvements necessitated by the growth of the trade of the port, we have had ample opportunity of ascertaining the value of turpentine piles for wharf construction. Nearly all the old private wharves in Darling Harbour were built of unsheathed turpentine piles of from 8 inches to 12 inches in diameter. Though the exact dates of erection are not obtainable, it is well known that many of them have been standing from thirty to forty years. They were usually of light construction, having been built to suit a much smaller class of vessels than we find it necessary to provide for now. Had it not been for the great increase in tonnage of ships in recent years, several of these old wharves might have been repaired and made serviceable for a few years more. Naturally some of the piles drawn were found to be entirely crippled, but an examination showed that these were usually not turpentine, but some other timber.

We have, in our sample-room in the office, four sections cut from piles drawn from Smith's wharf, Miller's Point, which, from outside indications, appeared to be amongst the most damaged of the piles, usually about low-water mark. In three instances, while the sapwood has disappeared, having been destroyed by *Limnoria terebrans*, the timber itself is as sound as the day it went into place. Only one of the three sections has any teredo holes, and that not more than ten small ones, which would not materially weaken the pile. The fourth section, which is completely riddled with holes, is not turpentine, and has been classed as ironbark. It may be added that about 80 per cent. of the old turpentine piles, which we have drawn recently after a service varying up to forty years, have been used over again for various purposes, such as sleepers for cargo-shed floors, repairs to old wharves, &c.

* Not reproduced.

Touching upon more modern experience, we recently demolished a jetty in Woolloomooloo Bay which had been standing twenty years. The piles were of unsheathed turpentine, and proved to be so sound that they have been used again in additions to wharves such as Jones Brothers' coal wharf, Gillespie's wharf, &c. These piles only showed a few teredo holes in the sapwood, and a little erosion above low-water mark, due to *Limnoria*.

From our experience, which it will be seen is based upon the test of a great many years, it is quite certain that turpentine piles, unsheathed, are incomparably superior, not only to any other Australian timber, but, also, to any other obtainable of the same size.

Our opinion of the value of turpentine as a teredo-resisting timber has received such confirmation that we have built several wharves on unsheathed turpentine piles, amongst which may be mentioned Dalgety's White Star wharf, at Miller's Point, 1,200 feet long by 40 feet wide, and we confidently look forward to a life of from thirty to forty years for these wharves.

H. D. WALSH,
Engineer-in-Chief.

W. E. ADAMS,
Assistant Engineer.

Sydney Harbour Trust,
28th November, 1904.

Exudation.—If the tree be wounded, there exudes a brownish liquid resin. If it be desired to collect this substance in quantity, the best way is to fell the tree and to cut it into logs, which may be inclined. The resin will exude, forming a ring between the wood and the bark, and may be scraped off or drained into a suitable vessel. It belongs to the class of bodies known as "oleo-resins."

Size.—From 120 to 180 feet is no uncommon height for this tree to attain. It often measures 20 to 30 feet in circumference, with a great length of bole; but such magnificent specimens are, within easy range of Sydney, usually found in gullies difficult of access.

Habitat.—It extends throughout the coast districts from the Tweed to the Ulladulla district, arriving at its greatest luxuriance in deep gullies containing good soil, in which situations it is also found well into the mountains. Its southern limit is the head of Cockwhy Creek, between Ulladulla and Bateman's Bay. It extends into Queensland. The return, in my "Forest Flora of New South Wales," Part I, gives valuable information concerning turpentine, and is a guide to the distribution of this timber.

In walking over the Blue Mountains, New South Wales, the last tree of this species, seen by Mr. R. H. Cambage and myself, is at the top of the big hill, Lawson to Wentworth Falls.

It is indigenous to the Sydney Botanic Gardens and Domain.

Propagation.—From seed, which is very freely produced. This tree is one of the best indigenous shade-trees in the State. It is gregarious, and its noble, leafy head makes it an ideal tree under which to put garden seats, or to serve as shelter trees for men or animals in a paddock, or as specimen trees, to give a park-like appearance to the land. It is one of those trees that should always be spared in clearing operations, unless its room is actually wanted. It is so different in appearance to the ordinary run of gum-trees that the occurrence of turpentines is often a relief to the eye. My experience tends to show that turpentines have a large number of roots near the surface, which, if disturbed, readily kill the tree. I would not, however, like to generalise on this point. I have seen some experiments on pollarding the turpentine. The trees were cut in the month of May, and



SYNCARPIA LAURIFOLIA, Ten. (The Turpentine Tree.)

have freely sent forth leaf-buds a considerable distance down the trunk, giving the tree quite an ornamental appearance. Where a tree is growing too large, and it is not necessary to absolutely remove it, the experiment I have indicated might be made.

EXPLANATION OF PLATE 3.

- A. View of individual flower, seen from above—(a) Petal, (b) Sepal (calyx-lobe).
- B. Flower seen from below—(a) Petal, (b) Sepal.
- C. Flower with stamens removed—(a) Bract.
- D. Stamen.
- E. Pistil.
- F. Transverse section of ovary.
- G. Cluster of fruits.
- H. Longitudinal section of a head of fruits.

Wattles (Acacia).

DRY COUNTRY WATTLES.

a. Flowers in heads.

1. *Acacia pendula* (Weeping Myall).
2. *Acacia homalophylla* (Yarran).
3. *Acacia Cambagei* (Gidgee).
4. *Acacia harpophylla* (Brigalow).
5. *Acacia salicina* (Cooba).

b. Flowers in spikes.

6. *Acacia aneura* (Mulga).
7. *Acacia Cunninghamii* (Bastard Myall).

Acacia pendula, A. Cunn.

THE WEEPING MYALL.

Botanical Name.—*Pendula*, Latin, owing to its drooping branches, after the manner of the Weeping Willow.

Vernacular Name.—The most common name is "Myall" or "Weeping Myall." In the Riverina it is often called "Boree" (a name it shares with at least one other Acacia). From Grenfell I have received twigs labelled "Myall" and "Boree" respectively. My correspondent wrote, "The more slender twig is Myall, and the more clustered one is Boree." At the same time I could not make out any differences between the Myall and Boree sent. I hope correspondents who live in districts where the names are both in use will clear the matter up. The name Myall seems to be commonest employed nearly due west and Boree in the Riverina.

Aboriginal Name.—The name "Balaar" has been given to me as an aboriginal one for this tree, in use in the north-west. I would like to know more about this name, which too much resembles Belah (*Casuarina lepidophloia*) to be convenient.

"Boree" is a native name in the Hay district according to the late K. H. Bennett. It bears this name also in the Balranald, Wagga Wagga, Barmedman, and Grenfell districts.

Leaves (Phyllodia).—That this is a useful fodder tree is unquestionable, but there are differences of opinion as to its precise value.

Stock, especially sheep, are very fond of the leaves of this tree, especially in seasons of drought, and for this reason, and because they eat down the seedlings, it has almost become exterminated in many parts. Horses do not like it.

Mr. R. W. Peacock writes of it:—Myall is rapidly becoming exterminated through overstocking. Although of the same genus as the "Mulga," is not nearly such a good fodder plant, sheep not being particularly fond of it. Its silvery foliage and pendulous habit give it rather an attractive appearance."

Timber.—Wood hard, close-grained, of a rich dark colour, and beautifully marked. It was used by the aborigines for boomerangs. It is heavy, and rarely exceeds a foot in diameter, and yet has been used for veneers. So long as it remains unpolished it preserves its peculiar fragrance of violets, which does not occur in greater perfection in any other tree. As soon as this remarkable property became known to European manufacturers the wood came into request for making glove, handkerchief, and other fancy boxes, and especially for tobacco-pipes. Other *Acacia* woods are often artificially scented to imitate the true Myall, but the perfume of the wood thus prepared is fugacious.

In the *Sydney Morning Herald* of the 16th March, 1894, appeared an announcement that the Aberdeen liner steamer "Damascus" took "a lot of Myall for the British Admiralty, that wood having been selected as best suited to the requirements of the Ordnance Department as material for the manufacture of spokes for gun carriages." I never heard whether the timber was considered suitable for that purpose. It is one of the best fuel woods in the districts in which it occurs.

We have a number of intensely hard, heavy, dark-coloured woods, which smell more or less of violets. They are used chiefly for turnery work. The trees attain no great size (say 30 feet), with a trunk-diameter of 12 to 18 inches. They are mostly found in the drier parts of the State, and are plentiful. Considerable railway freights add to their cost, but not to a prohibitive extent, as these timbers are usually used for small articles, such as mallets (presentation and otherwise), turned cups and boxes, rulers, draughtsmen, chessmen, and the better class of turned work generally.

The Myall is the most important, as has already been stated, but the Brigalow (*Acacia harpophylla*), Yarran, (*Acacia homalophylla*), are also valuable timbers of the above class. There are others, and the quantity available will satisfy any demand ever likely to be made upon them.

Miss Ada Wythes, of Tomingley, informs me that the abundant saline ash of Myall wood is often used by bushmen in the preparation of damper, while housewives, in the districts in which the tree grows, often use it for the purpose of whitening fireplaces.

Exudations.—The exudation of gum in this species is rare.

Size.—Up to 20 or 30 feet, with a diameter of, say, a foot.

Habitat.—This tree appears to be confined to the drier parts of New South Wales and Queensland. It has been found across the Darling, and I should not be surprised to hear of its occurrence in South Australia. In our own State some of its most eastern localities are Willow Tree, near Mudgee, and Narrabri. Records of its occurrence as far east as possible would be valuable.

As a rule it is a sign of good land. It grows on the heavier soils of the west, as Oxley long ago pointed out. In the following passage he is referring to our tree:—

The *Acacia* brushes grow generally on a hard and clayey soil evidently frequently covered with water, and I consider that these plains or brushes are swamps or morasses in wet weather, since they must receive all the water from the low ranges with which they are generally circumscribed.

Propagation.—In some seasons it produces large quantities of pods, and the germination of the seed is attended with no particular difficulty. In view of the value of this tree for stock-fodder, and of the fact that it is gradually becoming scarce, it would appear to be a public duty for pastoralists and others to fence in at least a few trees, so as to enable them to mature their pods and propagate their kind. If this be not done the tree may eventually be in danger of becoming extinct, as the seedlings are readily eaten out by stock, and no young trees are, therefore, in many districts, coming forward to replace the old ones. The Mistletoe pest is also destroying it.

EXPLANATION OF PLATE 61.

- A. Flowering branch.
- B. Bud.
- C. Flower.
- D. Portion of expanded flower showing—(a) Calyx, (b) Petal, (c) Stamens, (d) Pistil, (e) Stigma.
- E. Pods.
- F. Seed (enlarged).

The flowers from Coolabah, N.S.W. The fruits from Miss Officer, Zara, *viâ* Hay.

Acacia homalophylla, A. Cunn.

THE YARRAN.

Botanical Name.—*Homalophylla*, from two Greck words—*omalos* (*omalos*), even, level, referring to the smoothness, and perhaps also to the general uniformity of the phyllodes in this species; *phullon* (*phyllon*), a leaf (phyllode).

Vernacular Names.—This is the common "Yarran." I do not know the origin of the name, which is well established and distinctive. Some trees have a curly inlocked grain in their wood, and hence are known as "Curly Yarran." Concerning these the late Mr. Forester Kidston, of the Lachlan district, wrote some years ago:—

I never could discover any external difference between "Curly Yarran" and "Yarran," except a wave in the bark showing the curls in the wood. I only know one patch of "Curly Yarran" in my beat. There are, however, several kinds of Yarran. 1st, Yarran; 2nd, Mowar, and, 3rd, another out near Mossiel, which sheep eat. The two former are no good to sheep.

I never got the specimens from Mr. Kidston to which he referred, and would point out that the term "Yarran" is somewhat loosely used, and that sometimes twigs have been sent to me as Yarran which really are not Yarran at all, but other wattles.

In New South Wales the opinion is pretty widely held that the leaves of certain trees may be edible in one district and not edible in another. As a very general rule, I believe this idea to be erroneous, and to have arisen through confusion of closely related trees. I have raised the question, which is very important to pastoralists, in my "Forest Flora of New South Wales," but the material sent to Sydney for examination has been unsatisfactory.

Acacia Oswaldi is also sometimes called "Yarran," with some qualifying adjective.



ACACIA PENDULA, A. Cunn. (The Weeping Myall.)

WHAT IS "NARRAN?"

Narran is an edible scrub somewhat resembling Brigalow, but is more desirable as fodder. It grows mostly in the interior and far west of New South Wales, and in one small patch in the north of Queensland. It had been known for some time that Narran grew somewhere up north, as blacks had been found with spears made of it, but it had not been seen by the whites. In 1881, when taking cattle out to stock some new country in the Northern Territory, I came across a large belt of it on the very head of a branch of the Nicholson River, almost on the dividing watershed. From the appearance of the scrub it was a popular resort of the natives for the purpose of making their weapons, the whole belt having been picked over, and the ground was strewn with shavings and chips. Narran is not found in Western Australia.

The above paragraph occurs in the *Sydney Mail* for 1890. I have vainly tried to trace the name of the writer.

Then the well-known explorer, Mr. Ernest Favenc, wrote an article in the *Sydney Morning Herald* of the 25th August, 1906, in which the following passage occurs:—

The next scrub we find mentioned as a hindrance to travel is between the Lachlan and Murrumbidgee, where the "thick Eucalyptus scrub" turned Oxley back in disappointment and disgust. Oxley afterwards met with clumps of Myall scrub, when north of the Macquarie, of which he at first speaks rather disparagingly, although now considered one of our most useful trees, as well as one of graceful and ornamental appearance. Other trees of the same species, the Narran, &c., seldom grow so dense or close as to be impenetrable to a rider, although requiring great care to steer a safe course through, and being eminently adapted to fostering the growth of wild cattle, and the development of that human centaur, the Australian scrub-rider.

Seeing the old name Narran once more, I wrote to Mr. Favenc, and he kindly replied:—

Re Narran. It may be only a locally-used name, but when I was droving about twenty-five years ago it was commonly used on the Bogan, and right across to the Warrego. I had been all my life in Queensland before then, and took it for a kind of Brigalow until corrected.

I wrote to Mr. Hunt, of Burdenda, Dandaloo, at Mr. Favenc's suggestion, and that gentleman kindly sent me a twig of Yarran.

Later on, under date 28th December, 1906, a letter from me in the *Sydney Morning Herald* contained the following passage:—

On 25th August last Mr. Favenc had an interesting article on "Scrub" in the *Herald*, in which the following passage occurs:—"Other trees of the same species (genus), the Narran, &c., seldom grow so dense or close as to be impenetrable to a rider." He had been referring to Myall, so that Narran is a Wattle. I wrote to Mr. Favenc, and, following up clues that he gave, wrote to certain people, and they sent me twigs of Yarran (*Acacia homalophylla*). I also wrote to a Queensland friend, but without result.

Now, I have occasionally, though very rarely, heard the name Narran used both in New South Wales and Queensland, but my efforts to trace this Wattle have never met with success. I venture to ask your readers if they can send me a 6-inch twig of Narran, otherwise I must begin a second twenty years' search after this botanical "will o' the wisp."

To this letter a number of replies were received, amongst others the following two:—

There is no such timber as Narran in this Colony or Queensland. Beyond a river of that name the word Narran is almost unknown. We have Brigalow-Creek, Gum Flats, Myall Hollows, Mulga Scrubs, and so on, but never, as an out-and-out bushman, traversing the bowels of New South Wales and Queensland, have I even heard of Narran. False names, through faulty pronunciation, may deceive an ordinary layman, but never a bushman. Hence Narran

is undoubtedly meant for Yarran. There are many bushes (scrub) for which I admit even the bushman has no name. But nothing growing approaching a *tree* in the strict sense of the term has been left unchristened. (James Frederick.)

Referring to the paragraph "What is Narran?" It must be Yarran that is meant, but in some parts the blacks may call it Narran. I have never heard it so called anywhere.

I am a native of the colony, and until the last twenty years was in the country—boy and man—over forty years. (James Stainway.)

As to the geographical name Narran we have the following:—

Narran, a large swamp and river of New South Wales. It was discovered by Sir T. L. Mitchell in 1846. Narran Swamp is situated 26 miles beyond the River Darling; the Narran River terminates in this extensive swamp; it joins the river Balonne in long. 148° 25' E., and lat. 28° 35' 38" S. Along the banks of this river the grass is of the very best description, growing on plains or in open forests; very available in every respect for cattle stations. ("A Geographical Dictionary; or Gazetteer of the Australian Colonies," by W. H. Wells, Sydney, 1848.)

If we turn to chapter 3 of Mitchell's "Tropical Australia," we find abundant references to the Narran Swamp and River.

It was evidently a native name, not given by Mitchell, but adopted from the name the stockmen gave him. I cannot connect it with our Yarran.

It seems to me that we must write "Narran" the scrub as a variant of the word "Yarran," and it may be now buried decently. If, however, any further evidence be forthcoming, it can be disinterred at any time.

Aboriginal Name.—"Wong-arrah" is an aboriginal name at Cloncurry, Northern Queensland, according to Mr. E. Palmer; but in regard to all names attributed to the Yarran, care should be taken that the herbarium specimens do not refer to the Gidgee (*Acacia Cambagei*) (see p. 99), these two species being often confused with dried specimens only.

Leaves.—There is considerable difference in the width of young and mature leaves (phyllodes) in this species. Cattle eat the foliage.

Fruit.—This is one of the Wattles of which the blacks used to eat the seeds.

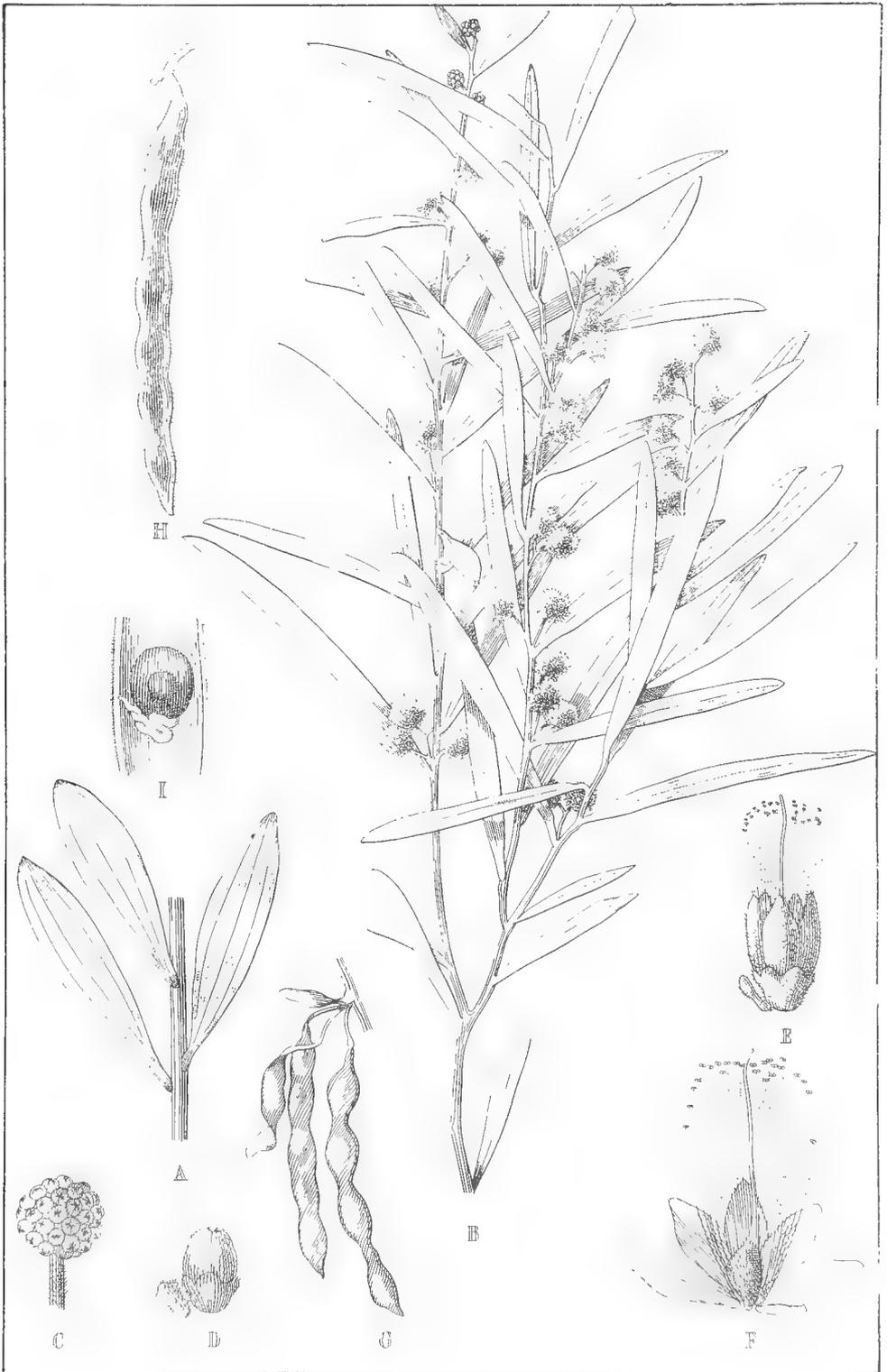
Bark.—A specimen of this bark gave the following result:—Tannic acid, 9.06 per cent., and extract 21.51 per cent. It was from an old tree full of flakes, and could be pulled to pieces with the fingers. A dry-country bark, but hardly a fair specimen of that.

Timber.—One of the best firewoods of the west. Timber hard, and of a violet odour. This dark-brown wood is much sought after for turners' work on account of its solidity and fragrance. It is well adapted to cabinet-making purposes, and stock-whip handles and fancy articles, such as rulers and napkin rings, are often made from it. Allan Cunningham says the natives of New South Wales formerly employed it for spears. Referring to the blacks of Northern Queensland,—

The wood is made into boomerangs, and is the favourite wood for spears. Some spears are found 12 and 14 feet long, in one straight piece, not thicker than a man's finger, being very tough and free in the grain. (E. Palmer.)

Exudations.—E. Palmer says the gum is gathered and eaten from this tree on the Cloncurry, Queensland. It is also used for adhesive purposes in New South Wales.

Size.—As a rule it is a small or medium-sized tree, often gnarled. Speaking of the Lachlan district, Mr. Forester Kidston stated:—"Yarran



ACACIA HOMALOPHYLLA, A. Cunn. (Yarran.)

cannot be called 'timber,' as not over one in 5,000 could be got 6 feet long, 6 inches in diameter, and straight." At the same time the Yarran, in some districts, exhibits a better trunk than that.

Habitat.—It is a dry-country species, confined to New South Wales, Queensland, South Australia, and Victoria.

In the "Flora Australiensis" it is recorded from:—

New South Wales.—Abundant on the barren heaths of the interior, from the Lachlan to the Barrier Range; one of the spear-woods of the natives.

We have it in the National Herbarium, Sydney, from the following localities:—

Wanganella, near Hay; Ivanhoe, *via* Hay; Wyalong; "A spreading tree 20-25 feet, stems 6-12 inches diameter, plentiful all over the Lachlan district," Murrumbidgee; Darling to Warrego, Cobar Road, Dunlop, Louth, Bourke, Coolabah, Nyngan, Tomingley to Peak Hill, Dandaloo, Minore, Coonamble, Bylong, Belltrees, near Scone, Warialda, Narrabri West.

There is a large clump of Yarran at Belltrees (the most easterly locality recorded), perhaps a thousand trees of all sizes, up to fine umbrageous specimens (growing alone) of 30-40 feet and 1-2 feet trunk diameter. Abundance of seedlings growing where stock are excluded.

EXPLANATION OF PLATE 133.

- A. Young foliage (note its comparatively great width).
- B. Flowering branch.
- C. Flower-head.
- D. Individual bud and bract.
- E. Flower.
- F. Flower opened out, showing—(a) Calyx, (b) Corolla, (c) Stamens, (d) Pistil.
- G. Pods. These smaller constricted pods are from Gunbar (W. Baeuerlen).
- H. This pod is the normal form.
- I. Seed. Natural size.

Acacia Cambagei, R. T. Baker.

THE GIDGEE.

Botanical Name.—*Cambagei*, in honour of Richard Hind Cambage, Under Secretary for Mines, New South Wales, an enthusiastic botanist.

Vernacular Names.—The aboriginal name "Gidgee" is in almost universal use.

The smell of the tree is abominable, and just before rain almost unbearable, and on this sign people frequently foretell the approach of rain. I have heard of instances in which men who were employed in cutting down a tree of this species just before rain became so sick as to be compelled to leave the tree.

Aboriginal Name.—"Gidgee." Of this word there are various spellings, such as "Gidgea," "Gidgi," "Gidgy," "Gidia," "Gidya." Originally spelt "Gidgea," which is nearer to the aboriginal pronunciation, but the universal pronunciation now is "Gidgee."

Leaves.—Its evil-smelling foliage renders it of little or no value to the stock-owner, except perhaps for camel-feed.

There is another Queensland Gidgee (*Acacia Georginae*, *Bail.*), also with a disagreeable odour. So far as I know, these are the only two Gidgees.

The chief distinction between the two species is in the pods and seeds.

Timber.—

Hard, close-grained, often interlocked, of a dark reddish or almost black colour. It is very durable, and Mr. R. H. Cambage records an instance of its having been used as fence-posts for over thirty years. (R. T. Baker.)

It is much used for fencing posts, and lasts well; also a first-class firewood, being a good, if not better, than Mallee roots. The white ash is sometimes used for whitewash. It also makes good picture-frames and walking-sticks, especially if ringed. (R. J. Dalton, Wanaaring.)

In western New South Wales the wood is considered very durable, and is, therefore, used for the lining of wells, but then it is said to give the water a bad taste for several years. Perhaps this is owing to the presence of a saponin. It has been stated that the wood has a bad smell like the foliage, particularly when burned, but this is a mistake.

The beautiful parallel markings often seen in this wood, which then takes the name of "Ringed Gidgee," are caused by a uniform wavy grain. This form is very well known, and leads to its extensive use for small ornamental articles, particularly stockwhip handles and walking sticks. Mr. R. H. Cambage has some notes on Ringed Gidgee in the Proceedings of the Linnean Society of New South Wales for 1902, p. 563.

Size.—A small or medium sized tree.

Habitat.—The interior of Australia generally. For example: In New South Wales, Bourke, and Brewarrina, and beyond the Darling River; Western Queensland; also the northern areas of South Australia.

EXPLANATION OF PLATE 121.

- A. Flowering branch.
- B. Flower-head.
- C. Individual bud.
- D. Flower.
- E. Flower, opened out, showing—(a) Calyx, (b) Corolla, (c) Stamens, (d) Pistil.
- F. Pod.
- G. One valve of a pod showing seeds.

Acacia harpophylla, F.v.M.

THE BRIGALOW.

Botanical Name.—Harpophylla, from two Greek words (*h*)*arpe*, a scimitar, and *phu(y)llon*, leaf, in allusion to the curved, scimitar-shaped leaves.

Vernacular Name.—The common "Brigalow," so called because it forms the scrubs of that name; the meaning of the word is unknown.

It is a thoroughly well recognised vernacular name, but because I imagine it is of aboriginal origin, a note will be found under "Aboriginal Names."



ACACIA CAMBAGEI, R. T. Baker. (Gidgee.)

Aboriginal Names.—The common "Brigalow." The word was spelt "Brigaloe" by Gould, and "Bricklow" by Leichhardt. The latter stated he could not ascertain the meaning of the name. "Orkor" of some aborigines. (W. Hill in *Cat. Queensland Timbers*, No. 141, London International Exhibition, 1862.) Hill gave the botanical name as *A. excelsa*, but it is obvious, from his description, that this is a slip of the pen for *A. harpophylla*. The mistake is, however, of some importance since it is repeated in the "Treasury of Botany" and other works.

Leaves.—The scimitar-shaped leaves (phylloides) of this species, with their blue-grey, silvery sheen, present an appearance which is characteristic, and which, once seen, is never forgotten.

The tree grows in almost impenetrable forests with open glades, in which are some of the most beautiful landscape effects I have ever seen. For the greater part of the year the foliage has a brilliant aluminium sheen, which, added to the very symmetrical form of growth of the clumps and fringes of the forest gives a very fine effect. (C. J. McMaster, Chairman, Western Lands Board.)

Brigalow, the national scrub of Queensland, as it may be called, for it is found there more largely than in any of the other colonies, can scarcely be called a fodder plant, for it is only eaten by stock under pressure of hunger, nor will it of itself sustain life, although it may prolong it. It grows all over the north of Queensland, both on the coastal and inland waters, and extends west beyond the boundary of the colony until it is supplanted by the mulga. It is generally, but not always, accompanied by a low undergrowth of edible and fattening plants and shrubs, including saltbush. Brigalow, like pine, evinces a great facility for spreading and extending its area on the country being stocked. The reason for this is hard to determine. Apparently there is no more encouragement for it to grow after the settlement of the country than before. The eating down of the grass and consequent lessened fierceness of the bush fires can have nothing to do with it, as brigalow, unlike pine, cannot be destroyed by fire. (*Sydney Mail*, 1890.)

Brigalow is rung with a wide ring as it suckers from the roots. (Forester Bishop Lyne, Narrabri.)

Fruits.—The pods were only described a few years ago, and the following memorandum of the Chairman of the Western Lands Board will show that it is not surprising that the fruits were not earlier described.

I have had a little experience in collecting and germinating Brigalow seed in the Moree district. I am under the impression that the tree matures seeds only at long intervals, and the pods appear to hang until heavy rains fall, when they burst, and the soft seed falling germinates immediately. I have tried in a primitive way to germinate the dry seeds, but without success, but the seeds collected and planted in the condition first above-mentioned grew freely, and the young plants have attained the height of fully 3 inches in as many days after planting the seed. Once the seed becomes settled it seems to grow slowly. I may mention that I was on the look out for Brigalow seeds for about ten years before I finally secured some, and, in reply to questions, I was informed by people who had lived many years in the Brigalow country that they had never seen any seeds on the trees. This, of course, may have been due to want of careful observation. (C. J. McMaster.)

The pods drop off as soon as they are ripe, which was in November (1906). They resemble snake beans in their green state, and when they ripen they open, drop the seed out, and then fall off the tree. (J. F. Turner, Ellerslie, Enngonia, February, 1907.)

Bark.—This tree yields a considerable amount of tan-bark of inferior quality. A Queensland correspondent informs me that a sample analysed in London gave 11.59 per cent. of tannic acid.

Timber.—Brown, hard, heavy, and elastic; used by the natives for spears, boomerangs, and clubs. The wood splits freely, and is used for fancy turnery. Saplings used as stakes in vineyards have lasted twenty years or more. It is used for rough building purposes.

A fairly large tree, with rough bark, somewhat resembling that of Ironbark. Leaves curved and tapering, having a silvery hue. Wood dark-brown, and also of a grey colour, fragrant, close-grained, and bends well.

The timber is very heavy and dense, resembling Myall (*Acacia pendula*; see p. 96), but without the pronounced scent peculiar to that timber. It is different also from the Myall in being not so brittle, and it is the favourite material used for stockwhip handles in the Moree district. I am satisfied that the timber possesses commercial value, which is restricted, however, by the fact that the trunk of the matured tree would average, say, 15 feet long and 8 inches diameter at each end.

The aborigines used it almost exclusively in that district in the construction of their fighting and hunting implements. (C. J. McMaster.)

Exudation.—An astringent gum of this species has been described, but it has no commercial value.

Size.—Usually it attains a height of 20 or 30 feet in New South Wales, and 10 feet more in Queensland, but exceptionally a greater size.

Habitat.—Native of Central Queensland and New South Wales. It is very gregarious and abundant, as has been already indicated. Someone has called it the "national scrub" of Queensland. It forms very large scrubs on inland downs country, and in some parts not far from the coast, such as the Fassifern district. In the Narrabri district, New South Wales, it is very abundant, and it extends more or less abundantly as far as the Darling and beyond. It extends as far south as Coolabah and Marsden (the most southerly locality recorded).

New South Wales localities not previously specifically enumerated are Tarcoon, Bourke District, Nyngan, Dubbo, plains near Baradine, Warrah, Willow-tree, Scone, Moree, Warialda.

The trees attain a height of 20 to 30 feet, according to Mr. Cambage, and cover about 5 acres, $3\frac{1}{2}$ miles west of Marsden.

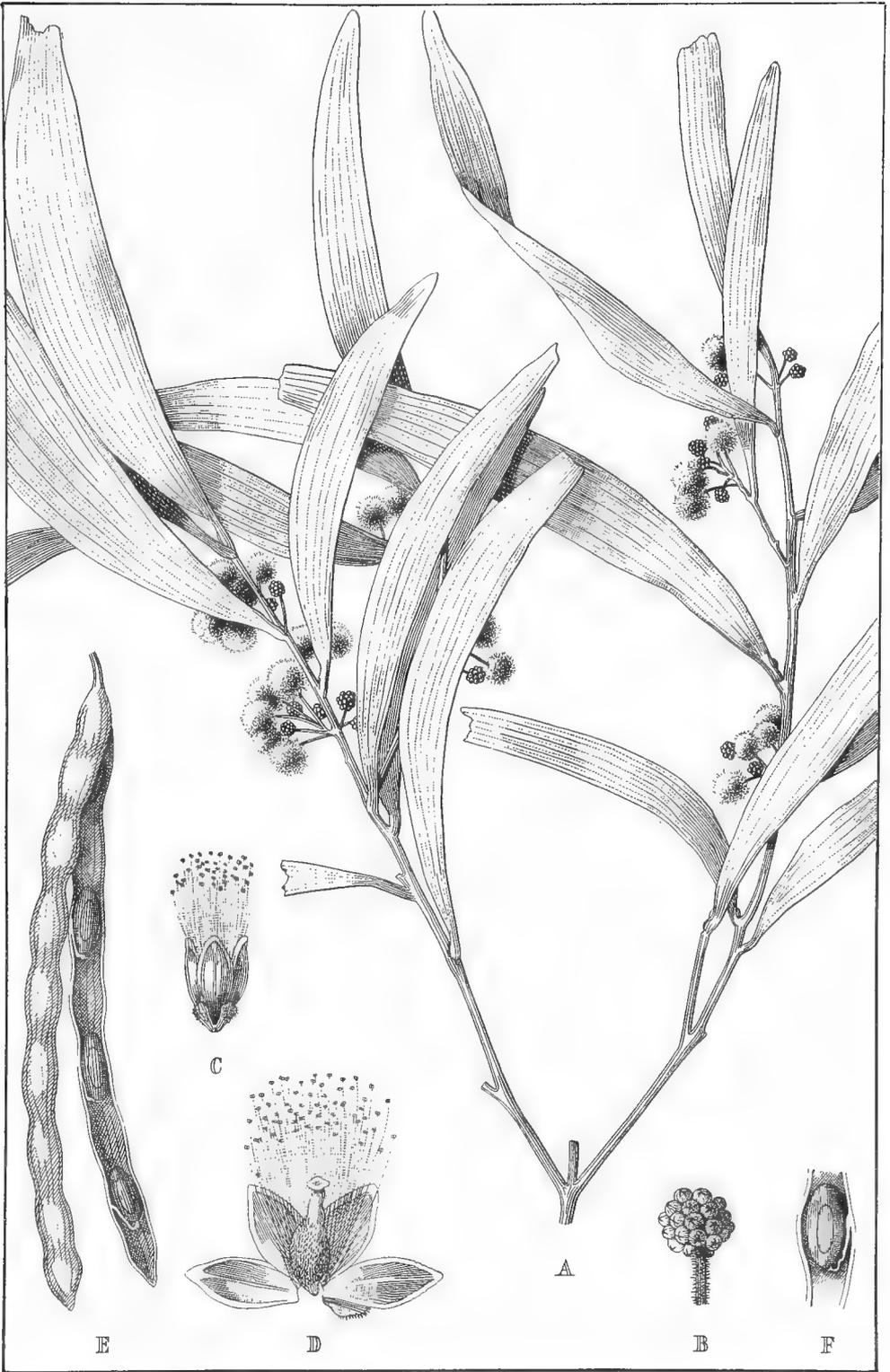
Half a mile from Scone, on the Gundy Road, there are thirteen trees 30–40 feet in height, and up to 2 feet through. Fine healthy trees now, but no seedlings, as sheep eat them down. It is likely that when these trees die the species will be exterminated in the district.

Mr. C. J. McMaster says: "There are immense forests of matured Brigalow extending from about 20 or 30 miles north of Moree far into Queensland."

EXPLANATION OF PLATE 129.

- A. Flowering branch. Natural size.
- B. Flower-head.
- C. Young flower.
- D. Flower, opened out, showing—(a) Calyx, (b) Corolla, (c) Stamens, (d) Pistil.
- E. Pod (natural size) opened, showing seeds inside.
- F. Seed.

The fruits from Ellerslie; the remainder of specimens from Pilliga.



ACACIA HARPOPHYLLA, F.v.M. (Brigalow.)

Acacia salicina, Lindl.

THE COOBA (AND UMBRELLA BUSH).

Botanical Name.—*Salicina*, Latin, *salix*, *salicis*, a Willow, and hence “willow-like,” but this name is most applicable to the variety *varians*.

Vernacular Name.—“Umbrella Bush.”

There are three more or less distinct forms of this species:—

- (a) The normal form, which may be termed a big Umbrella Bush.
- (b) Var. *varians*, Benth., a fair-sized tree.
- (c) Var. *Wayæ*, Maiden, *Proc. Roy. Soc. S.A.*, xxxii, 277 (1908), a small Umbrella Bush, belonging to South Australia so far as is known at present.

(a) *Normal Form.*

The type was collected 30th March, 1836, near Oxley and G. W. Evans' marked tree on the Lachlan, New South Wales.

Aboriginal Names.—“Muntharra,” Lake Eyre natives eat seed (W. Baldwin Spencer); “Wirrha,” Cooper's Creek, near Lake Eyre (A. W. Howitt); “Kakooroo” or “Wurra” (Max Koch). (“Wurra” and “Wirrha” are evidently the same word.) All the above in use in South Australia.

Leaves.—This is one of the species whose leaves are used to burn for the ash which the aborigines mix with the Pituri, their masticatory.

Flowers.—Of a bright yellow colour, in contradistinction to the paler, sparser flowers of var. *varians*.

Fruit.—The pods are fleshy.

Exudations.—“We found a curious, willow-like *Acacia*, with the leaves slightly covered with bloom, and sprinkled on the underside with numerous reddish minute drops of resin” (Mitchell). This species also exudes a soluble gum from the bark. The genus *Acacia* therefore produces both a gum and a resin.

Size.—A tall shrub up to about 8 or 10 feet high, and very umbrageous.

Habitat.—Extensively diffused in the drier parts of the Australian States.

As regards New South Wales, the “Flora Australiensis” quotes it as on the Lachlan, and thence to the Barrier Range, A. Cunningham, Mitchell, *Victorian Expedition, &c.*; Liverpool Plains, Leichhardt.

To which may be added the following notes from specimens in the National Herbarium, Sydney:—

New South Wales.—On red soil only, Bourke district. Grows about 8 feet high, with branches touching the ground and spread out like an umbrella (A. W. Mullen); Paroo River (E. Betche).

(b) *Variety varians*, Benth.

This is a tree, and the only form which yields timber.

Vernacular Names.—The “Cooba,” or “Koobah,” of the aborigines and colonists of western New South Wales. “Native Willow” is another name. Called “Broughton Willow” in South Australia. “Gurley or Curley tree” of the Bogan, New South Wales (A. W. Mullen).

Aboriginal Names.—Mitchell calls it “Goobang,” perhaps really the same as “Cooba,” the modern name. About the Castlereagh River (New South

Wales) it is one of the trees which takes the name of "Motherumba." "Bremgu" is the name at the Lake Hindmarsh aboriginal station (Victoria). "Bakka" is a Queensland aboriginal name. "Balkura" is a South Australian name.

Leaves.—The leaves are eaten by stock. This is another tree which is rapidly becoming scarce, owing to the partiality of stock to it.

Bark.—Mentioned by Sir T. Mitchell for poisoning the fish in small lagoons, and Mr. Hill says that the natives of the Fitzroy River, Queensland, put it to a like purpose.

A sample from the Lachlan River, N.S.W., which had then been in the Technological Museum five years, is a good specimen of this bark, being fairly smooth, close, compact, and containing comparatively little fibre. It was analysed May, 1890, and found to contain 15.1 per cent. of tannic acid, and 32.75 per cent. of extract. This species is undoubtedly worthy of conservation, and even culture, in the dry interior where it is found, particularly as the barks there are usually so poor in tannic acid. The blacks are aware of the value of this tan-bark, as they use it for tanning wallaby and other skins.

Timber.—Close-grained, tough, heavy, dark brown, and nicely marked. The aborigines make boomerangs, and the colonists tables, chairs, and other furniture from it. (*General Report, Sydney International Exhibition, 1879.*) It is valued for bullock-yokes in western New South Wales, and also for shafts of carts. Mr. G. S. Home tells me that cheffoniers, and other articles of drawing-room furniture, are commonly made from it in western New South Wales, as it takes such a high polish.

Eumung (Acacia salicina). This acacia is found in the interior of New South Wales. It is similar in colour and texture to Blackwood (*Acacia melanoxylon*) and makes a good club, although inclined to chip and fray. (R. T. Baker.)

Acacia stenophylla is also called "Eumung" or "Eumong."

Habitat.—It grows in the drier parts of the States. Following are some New South Wales specimens in the National Herbarium, Sydney:—

Another tree growing on the river flats (Lachlan River) is *Acacia salicina*, Lindl. (Cooba or Native Willow). It has a diameter up to 2 feet, and is a most useful timber, being in request for cabinet-making and certain wheelwrights' work. (R. H. Cabbage.)

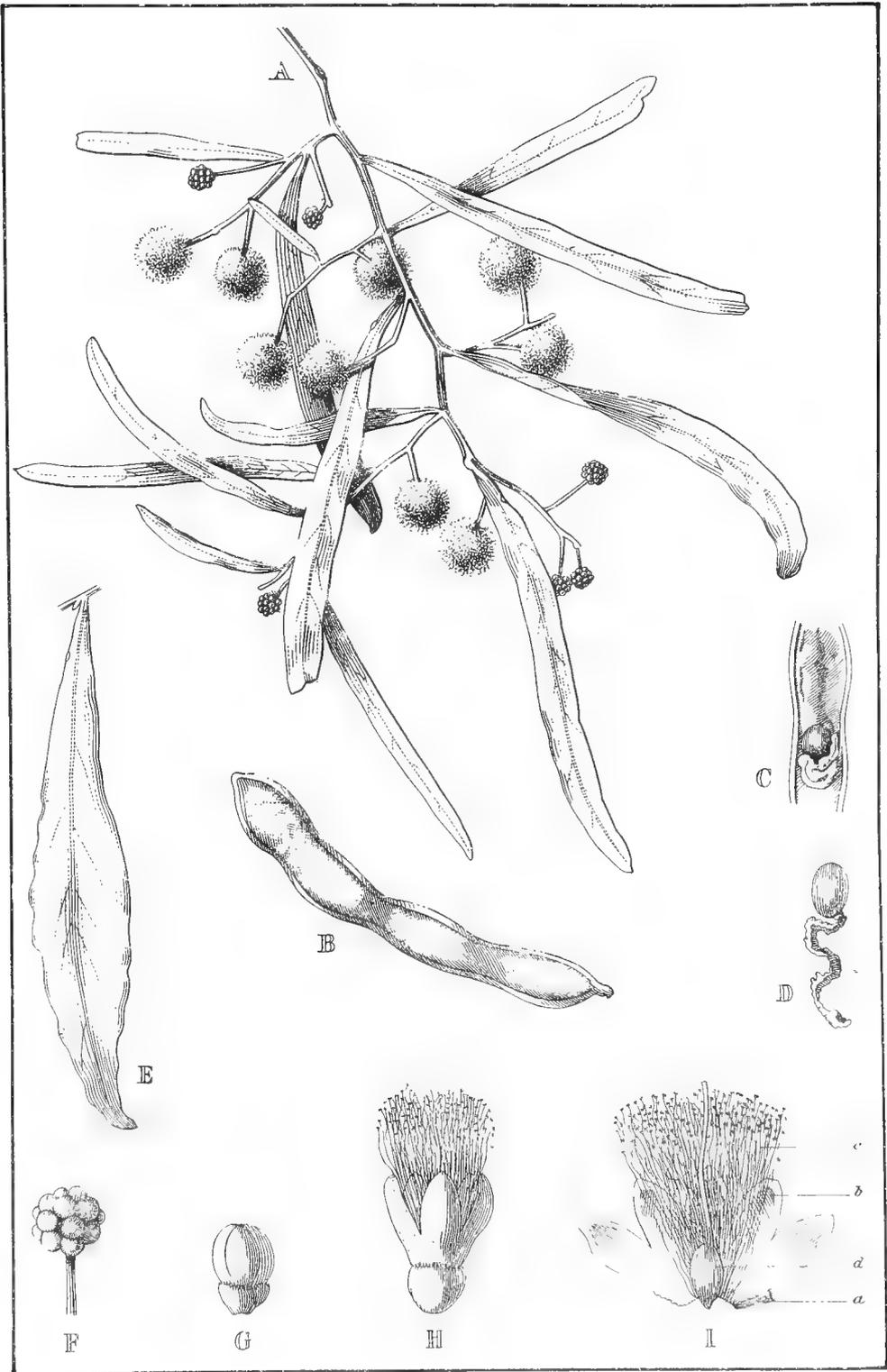
Thackaringa (Acting Forester?); Bongbilla, Moulamein (T. Grieve). Local name, "Willow."

This tree in favourable situations attains a height of 35-40 feet, and is the largest and handsomest of our Acacias; is usually regarded as an indication of water at a shallow depth; wood remarkably light and tough. Ivanhoe, *viâ Hay* (K. H. Bennett).

Palesthan, *viâ* Condobolin (Miss M. A. Clements); Lake Cudgellico (J. L. Boorman); "Cooba." The most western limit in this part of the Central Division is 26 miles east of Nyngan (E. F. Rogers, Forest Guard, Nyngan); Marra Creek, *viâ* Coolabah (R. W. Peacock); Coolabah, large tree "Willow," locally called "Eumung" (J. L. Boorman).

A bushy tree about 20-30 feet high. Grows in swampy Box flats or on river banks, Bogan River (A. W. Mullen); Brewarrina, Burren Junction (J. L. Boorman).

Drooping branches, has appearance of Myall, Page River, 8 miles from Scone (R. H. Cabbage and J. H. M.); Minembah, Whittingham, near Singleton (Sylvester Browne); Denman (J. H. M. and J. L. Boorman); Denman. Small trees, rather erect. No. 1,648 (R. H. Cabbage).



ACACIA SALICINA, Lindl., Var. VARIANS. (The Cooba.)

"Drooping foliage. Grows on ridge as well as in valley; some leaves rather viscid. Attunga, 12 miles north-west of Tamworth. No. 656" (R. H. Cambage); Warialda, No. 11 (Rev. H. M. R. Rupp).

EXPLANATION OF PLATE 149.

Acacia salicina, Lindl.; var. *varians*, Benth.

- A. Flowering twig.
- B. Pod.
- C. Portion of valve showing seed with folded funicle.
- D. Seed (slightly magnified) with funicle extended.
- E. Broad phyllode from Coolabah.
- F. Flower-head.
- G. Individual bud.
- H. Flower.
- I. Flower, opened out, showing—(a) Calyx. (b) Corolla, (c) Stamens, (d) Pistil.

Acacia aneura, F.v.M.

THE MULGA.

Botanical Name.—*Aneura*, from two Greek words—*a*, not, and *neuron*, a nerve—in allusion to the veins or nerves of the leaves (phyllodes), "without conspicuous nerves, but finely and obscurely striate under a lens."

Vernacular Name.—"Mulga," the chief ingredient of Mulga scrub, so called from the Mulga, or long, narrow shield of wood made by the aborigines out of *Acacia* wood.

Aboriginal Name.—"Mulkathandra" is the name given to the seeds by the Dieyerie tribe, of Cooper's Creek, according to Gason. (Quoted by Brough Smyth, *Aboriginals of Victoria*, i, 223.) "Malka" of certain Lake Eyre tribes (Howitt and Siebert).

Leaves.—The leaves, or, rather, phyllodia—for, in strictness, they are not true leaves, but structurally expansions of the leaf-stalks—form excellent food for stock; in fact, some people call the plant the "king of fodders," and it has been so much appreciated that it is now scarce in many districts where it was once plentiful. Sometimes this plant is exempted in certain districts from the operations of licenses to cut timber. It is a matter for regret that so valuable a fodder plant should require to be cut for timber at all, and it is to be hoped that increased vigilance will be shown on the part of homestead lessees and others, in their own interests, in conserving the Mulga. Mulga should never be cut down, except when absolutely necessary—it should only be pollarded or lopped; and if these operations be performed by careful men no real harm to the tree will result. One reason why the tree is becoming extinct in some areas is because the seedlings are eaten out by stock. This is a matter for regret, and, of course, the only way of guarding against this is to protect as many of the seedlings as possible until they are able to take care of themselves. It does not appear to be known to some dwellers of the more highly-favoured coast districts that in some seasons in parts of the West there is practically no grass at any period of the year, and that stock not only feed on scrub-plants such as the Mulga, but actually thrive thereon.

Note that there is a normal or Broad-leaved Mulga, and a Narrow-leaved Mulga, but that there is no botanical difference between them. At the same time, recent investigation has shown that, particularly in Western Australia, there are other Mulgas, recognised by other botanical names.

Following is an interesting note on Mulga, from the *Sydney Mail*, in 1890, written by an author whose name I have lost:—

We now come to the edible scrubs, which often, of necessity, take their place amongst the fodder plants of Australia. Amongst these, the most widespread and perhaps the best known is the Mulga. On the southern flats of the main inland rivers, Mulga grows as a low bushy tree, the branches commencing to spread some 6 feet from the ground. In the north, it grows with a tall straight stem, 20 feet high, and is, therefore, quite unavailable as a fodder plant. On the west coast, and in the interior, it is a true scrub, attaining a good height, but branching out only a foot or two from the ground. Both here and on the lower courses of the rivers, it grows in open forest; to the north it is a thick scrub almost too dense to ride through. It is not by any means a barren scrub, good feed, both grass and herbage, being generally found within its limits. As a rule, it is only available for cattle, although the species found in Western Australia grows low enough for sheep to feed on. The utility of horns to cattle when scrub-feeding is soon apparent. An old bullock will twist down saplings and break down limbs of trees, and obtain a good meal where a polled beast would go hungry. Mulga is likely to become an important factor in the settlement of the interior, as it forms good fodder for camels, and, as they are certainly to be the beasts of burden and draught over the long dry stages of the heart of Australia, until superseded by steam and iron, the universal presence of the Mulga will prove of some service. Mulga affects all kinds of soil. It is to be found on hard, gravelly ironstone ridges, on the dreaded sand-hills of the desert, and on the alluvial flats of the inland rivers.

In western New South Wales two kinds of galls are commonly found on these trees. One kind is very plentiful, very astringent, and not used, but the other, while less abundant, is larger, succulent, and edible. These latter galls are called "Mulga apples," and are said to be very welcome to the thirsty traveller.

General Remarks on Mulga.

Mr. C. J. McMaster, Chairman of the Western Lands Board, has very kindly furnished the following general remarks on Mulga:—

Mr. D. W. F. Hatton, Inspector of Stock, stationed at Bourke, who has had many years practical experience in feeding stock upon Mulga, states:—

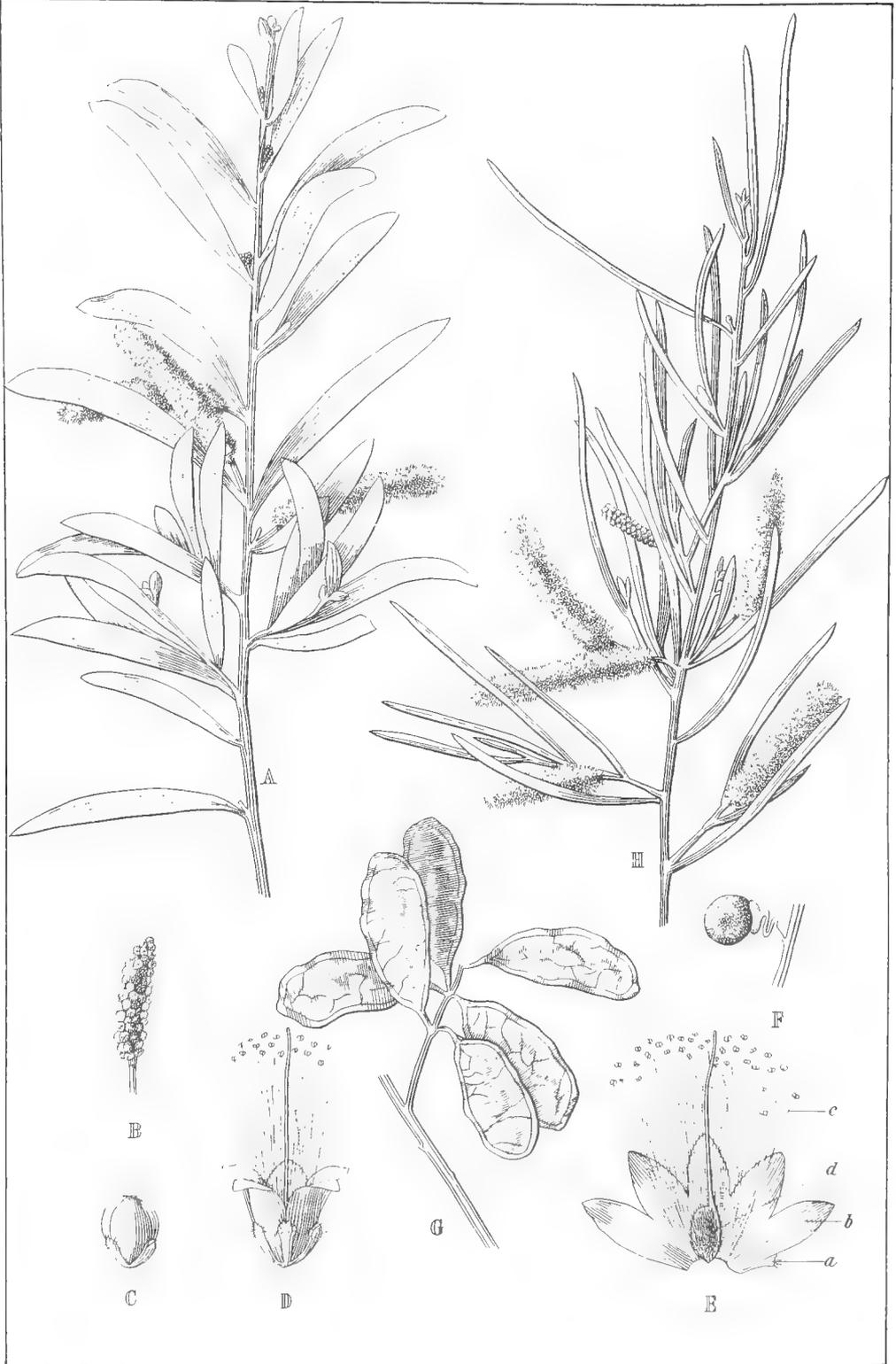
"There are four different kinds of Mulga in the Bourke district. *Umbrella Mulga*—so called because it somewhat resembles an open umbrella—grows on hard, stony ground, and attains a height of about 10 feet; it has a narrow leaf, and is a good stock food. *Broad-leaved Mulga* thrives best in the deeper and better soils in the valleys, between the stony ridges; it grows about 15 to 20 feet high, but as a fodder tree does not rank as high as the umbrella or the yellow varieties. *Black Mulga*: The leaves are dark and narrow, and are shorter than the other narrow-leaved kinds, being only about 2 inches in length. It attains a height of from 15 to 20 feet. *Yellow Mulga* grows to about 20 feet high, and prefers sandy, red-soil ridges; it is considered one of the best of the Mulgas for fodder purposes; the leaf is comparatively broad, and has a yellow tinge.

"The leaves of all Mulgas are eaten by sheep and cattle, and the seeds, particularly, are relished and are very fattening; but horses, unless bred in Mulga country, do not take kindly to it."

Mulga appears to be the most universally distributed fodder tree in the arid parts of Australia, and during times of extreme drought the limbs (with the exception of one or two of the leading ones) are cut off for the benefit of the starving stock.

In former years Mulgas have been destroyed on thousands of acres of land, because the precaution to leave at least one leading branch uncut was not observed; but now that stock-owners realise that stock and rabbits eagerly devour young plants, and that, consequently, the supply of Mulga—the mainstay in times of drought—depends upon the proper treatment of the existing matured trees, they, as a rule, exercise the utmost care to conserve the trees as much as possible.

If Mulga is cut off at the stump it will not throw out new growth. In this respect it differs from nearly every other Western fodder-producing tree.



ACACIA ANEURA, F.v.M. (Mulga and Narrow-leaved Mulga.)

Seeds.—The seeds were eaten by blacks, and continue to form part of the food of some aborigines to this very day. I need scarcely say that they are astringent, and that they yield only a small proportion of starchy matter.

Timber.—Excessively hard, dark brown, used by the aborigines for boomerangs, sticks to lift edible roots, shafts of spears, nulla-nullas, and jagged spear-ends (Mueller). It is highly irritating in flesh wounds. It makes excellent fencing posts, and in parts of western New South Wales it is very plentiful, and much appreciated. It is often used for bullock-yokes.

“In the absence of other timber, Mulga is now one of the principal trees burnt for charcoal near Cobar.” (Cambage.)

Exudation.—The Mulga yields a small quantity of soluble gum, similar in properties to that of good gum-arabic. It would be commercially valuable if it were procurable in quantity.

Size.—Often a tall shrub or small tree, and rarely more than 25 feet in height. It is often with a stem diameter of 9 to 12 inches.

Habitat.—Western Australia, through the other mainland States to Queensland. It is a native of the drier western parts of New South Wales. Its precise eastern boundaries are not yet defined.

Localities and collectors of some New South Wales specimens in the National Herbarium, Sydney, are:—

Broken Hill (A. C. Loder); Paldrumatta Bore and Mount Browne (P. Corbett); Mount Hope (J. L. Boorman); near Cobar (J. V. d’Apice), both broad and narrow leaf; North Bourke (A. Murphy); Pera Bore (W. W. Froggatt); Tarcoon (J. L. Boorman); Byrock (H. Deane); Coolabah (R. W. Peacock); Nyngan (E. F. Rogers).

“Up to a height of 25 feet. Wood very hard, and used greatly by natives for weapons, &c. Capable of high polish.”—Ivanhoe, *via* Hay (K. H. Bennett).

EXPLANATION OF PLATE 99.

- A. Flowering twig of the broad-leaved form.
- B. Spike of flower-buds.
- C. Individual bud.
- D. Flower.
- E. Flower, opened out, showing—(a) Calyx, (b) Corolla,
(c) Stamens, (d) Pistil.
- F. Seed, attached to the pod by a white arillus.
- G. Pods.
- H. Flowering twig of the narrow-leaved form.

Acacia Cunninghamii, Hook.

THE “BASTARD MYALL” OR “KURRACABAH.”

Botanical Name.—*Cunninghamii*, in honour of Allan Cunningham, King’s Botanist, who arrived in Sydney in the year 1816, and who was the Superintendent of the Botanic Gardens, Sydney (1837–1839). He was an admirable botanist and a distinguished explorer, one of his feats being the discovery of the Darling Downs, Queensland.

Vernacular Name.—It is sometimes known as “Bastard Myall,” and less frequently as “Black Wattle.”

Aboriginal Names.—At Narrabri, New South Wales, it bears the name of “Kurracabah.” I am not certain whether the name is exclusively held by this species. It is also called by the name “Motherumbah” (of which

"Motherbung" is a variant), but I have received at least two other wattles under that name. "Kowarkull" is a Queensland aboriginal name (Stradbroke Island, Watkins), and "Tchilgar" is the Bundaberg (Queensland) name, according to Keys, quoted by Bailey.

Fruit.—Dr. T. L. Bancroft says that the green pods of this plant are rich in saponin. Dr. Lauterer draws further attention to saponin in this plant. He found 3 per cent. of saponin in the unripe pods, and gives an instance of supposed sandy blight in a woodcutter, which he traced to the eyes having been rubbed by the hands on which was some juice of the pods of this species. Saponins are poisonous, and hence this wattle should be viewed with suspicion as a fodder when in pod. For an account of saponins see my "Forest Flora of New South Wales," Part VI, p 55.

Bark.—A specimen of this bark received from Dr. T. L. Bancroft, of Brisbane, and obtained from Deception Bay, gave 12.32 per cent. of tannic acid and 26.95 per cent. of extract. It is known locally as "Black Wattle." It is from a tree 30 feet in height and 1 foot in diameter, stripped in May, analysed in July. Dr. Bancroft says: "This is the only tanning wattle which grows near Brisbane in any great abundance."

The inner bark consists largely of fibre, while the outer is furrowed and scaly, of dark-brown colour; the thickness of the bark analysed averaged $\frac{1}{2}$ inch under the outer scaly portion. The colour is dark-reddish brown, and altogether it looks a poor tan-bark. As a rule this tree carries a heavyish bark.

Timber.—Wood close-grained, and takes a good polish. It is dark-coloured and heavy, and a useful wood for cabinet purposes. It reminds one very much of Red Cedar, but it is heavier. It is very homogeneous. A slab of this wood in the Technological Museum, which had been seasoned over twenty-five years (having been exhibited at the London Exhibition of 1862), had a weight which corresponds to 46 lb. 12 oz. per cubic foot.

Exudations.—Dr. T. L. Bancroft states that, in Queensland, gum of this species makes a good adhesive mucilage; it is, however, dark in colour.

Size.—None of the trees I have seen have exceeded 25 or 30 feet in height, with a trunk diameter of 9 inches or 12 inches, but the size of the trees referred to by Mr. Charles Moore (1862 Exhibition) is much greater.

Habitat.—This is a widely diffused species, but its range requires much more investigation yet. It is common in Queensland and New South Wales, and Prof. Baldwin Spencer collected it at Hanson's Wells in Central Australia.

Its range in Queensland is very extensive, both coastally and further west.

In New South Wales the following localities of specimens in the National Herbarium, Sydney, will give a good idea of its range in this State:—Myrtle Creek, Richmond River; Woodburn, Richmond River, Evans River, 30–40 feet, Lawrence to Casino, Hastings River; 6–10 feet, "Kurracabah" or "Motherumba," Narrabri; Owen's Gap, Scone; Goulburn River; Denman; Sackville Reach, Hawkesbury River.

EXPLANATION OF PLATE 137.

- A. Flowering twig.
- B. Flower bud.
- C. Flower.
- D. Flower, opened out, showing—(a) Calyx, (b) Corolla,
(c) Stamens, (d) Pistil.
- E. Pod.
- F. Seed.



ACACIA CUNNINGHAMII, Hook. (Bastard Myall or Kurracabah.)

EASTERN NEW SOUTH WALES WATTLES.

1. *Acacia pycnantha* (Broad-leaved or Tanning Wattle).
2. *Acacia penninervis* (Mountain Hickory).
3. *Acacia melanoxylon* (Blackwood).
4. *Acacia binervata* (Two-veined Hickory).
5. *Acacia decurrens* (Black, Green, and Silver Wattle).
6. *Acacia Baileyana* (Cootamundra Wattle).

Acacia pycnantha, Benth.

THE BROAD-LEAVED WATTLE.

Botanical Name.—*Pycnantha*, from two Greek words, *pyknos*, dense, and *anthos*, a flower; hence dense-flowered.

Vernacular Names.—The “Broad-leaved Wattle” of South Australia; called also “Golden, Black, or Green Wattle.” The term “Broad-leaved” is as good as any, the names “Golden,” “Black,” and “Green” being applied to quite a number of other Wattles.

I have heard it occasionally called “Plum-coloured Wattle,” owing to the dark cast of the foliage at certain seasons.

Flowers.—It is a very handsome species, with its large deep-yellow flowers, abundantly produced, and full of perfume. The stout pedicels and petioles appear to be characteristic of the species.

An extract of the flowers of this Wattle was shown as a perfume at the Colonial and Indian Exhibition of 1886.

A score of other species of *Acacia*, e.g., *A. suaveolens*, might be selected as worthy of experiment as perfume plants. “Mutton fat being cheap, and the Wattle plentiful, a profitable trade may be anticipated in curing the flowers, &c.” (Piesse, *Art of Perfumery*.)

On the other hand we have:—

All my experiments have proved that the perfume of Wattle-blossoms is very evanescent, and is stronger about mid-day than at any other time. (Evidence of Mr. Bosisto before Victorian Royal Commission on vegetable products.)

Bark.—One of the richest tanning barks in the world; a richer may exist, but I do not know of it. A sample of this bark was received by me in 1883 from Messrs. F. Pfau & Co., of Blumberg, South Australia, with the note, “contains 33.5 per cent. of tannin, according to Mr. Thomas, of Adelaide.” I analysed the sample in April, 1890, and obtained the following extraordinary result by Löwenthal’s improved process—the process I always adopted, viz. :—

Tannic acid	.. .. .	46.47 per cent.
Extract	.. .. .	74.7 per cent.

This had been stored seven years in the Museum, and had doubtless increased in percentage of tannic acid during that period. Nevertheless it was the grandest specimen of wattle-bark I ever examined. It was

smooth, a model of compactness, contained a minimum of fibre, and therefore powdered splendidly, was of good colour, and an excellent bark in every way. South Australia had practically the monopoly of this bark, and it is a grand heritage,—the envy of the Eastern States.

Timber.—It is of no importance as a timber. After the bark is stripped, the wood is sometimes used for fuel, for which it is excellent.

Size.—Average height of typical form, 20 to 25 feet; and diameter, 6 to 10 inches. (Brown.)

Habitat.—It is confined to South Australia, Victoria, and New South Wales. In our own State it is confined to country, so far as is known, adjacent to Victoria and South Australia. It is only, as regards New South Wales, represented in the National Herbarium, Sydney, from Tocumwal and from the south-east coast. We look upon this species as so essentially South Australian that we often forget that the type comes from "Interior of N.S. Wales" (Mitchell).

This Wattle has been acclimatised in many districts of New South Wales, so much so that it is often looked upon as indigenous in localities in which it has been planted.

It is so valuable that it should be still further cultivated in localities approximating in conditions to those of the Mount Lofty Range near Adelaide. The day is past when theorists may allege that it will not flourish in the Port Jackson district.

I have seen excellent specimens growing as far west as Coolabah, near Bourke. It is handsome enough to grow for purely ornamental purposes.

It should supplement *Acacia decurrens*, our most generally diffused and most generally useful tanning Wattle for New South Wales conditions.

Mr. J. E. Brown, when in South Australia, cultivated this species very largely in districts found suitable for it, and his general remarks on Wattle cultivation were chiefly written with this species in view.

Except in very dry localities, this species is common to nearly all districts of South Australia north of Encounter Bay, and is occasionally to be met with along the coast from Kingston to the Glenelg River. Its principal habitat, however, and the one where the thoroughly typical botanical form and the largest trees of the species are found, is in the Adelaide hills and plains, from Encounter Bay to Clare. For propagation purposes seed should, if possible, be obtained from trees grown within these limits. In some parts of the north of the colony there is a narrow-leaved variety, with the stem and branches covered with a whitish substance, which is desirable should not be propagated, as the tree is of slow growth, and does not attain payable dimensions. (J. E. Brown. Reports.)

Baron von Mueller (*Select Extra-Tropical Plants*) says:—

It is of rapid growth, content with almost any soil, but is generally found in poor, sandy ground, near the sea coast, and thus also important for binding rolling sand.

Generally speaking, it loves a warm climate, with only a moderate rainfall. It, therefore, will not usually flourish at elevations over 2,000 feet.

Propagation.—Readily from seed.

Mr. G. S. Perrin summarises the advantages of this species over *A. decurrens* by stating that the former species is more amenable to culture, and can be pruned to a better shape, occupies less space in the plantation, and is much better stripped.



ACACIA PYCNANTHA, Benth. (Broad-leaved Wattle.)

So-called delicate plants, such as this species, may be successfully grown in rather cold districts, *e.g.*, Blue Mountains, Moss Vale, &c., in New South Wales, by taking advantage of a fact well known to gardeners, namely, they should be planted with a westerly aspect, so that the sun will not shine on them too early after a severe frost.

Mr. Brown gives the life of this tree at from ten to twelve years, and states that it may be stripped from the sixth to the ninth year, according to circumstances. It lives longer in sandy soils than in clay ones.

EXPLANATION OF PLATE 107.

- A. Flowering branch.
- B. Individual bud.
- C. Flower-head.
- D. Flower.
- E. Flower, opened out, showing—(a) Calyx, (b) Corolla,
(c) Stamens, (d) Pistil.
- F. Pods.
- G. Seed.

Acacia penninervis, Sieb.

THE MOUNTAIN HICKORY.

Botanical Name.—*Penninervis*, from two Latin words—*penna* (a feather), *nervus* (a nerve, or, in botany, “a vein”). So that penninerved means that the phyllodes (“leaves”) have their venation arranged after the fashion of a pinnae of a feather.

Vernacular Names.—Usually called “Hickory,” or “Mountain Hickory.” Occasionally called “Black Wattle,” *e.g.*, Blue Mountains.

Unfortunately there are several so-called Hickories in this State, and, therefore, care is necessary to indicate the right one. Amongst those which are known as Hickory in different places are *Acacia binervata* (another of the Black Wattles), and even the Blackwood (*Acacia melanoxylon*) and the closely-allied *Acacia implexa*.

Synonyms.—

1. *Acacia penninervis*, Sieb. The normal form, usually a shrub, and of no economic importance.
2. Variety *falciformis*, Benth. (the Tanning Wattle). Often a big tree.

Leaves.—It is worthy of note that in some districts in which Mountain Hickory occurs the bark has never been stripped and tried, for the reason that people do not look upon it as a Wattle, imagining it to be a Gum-tree because of the appearance of its leaves (phyllodes)! This state of things is passing away, as the bark is now becoming appreciated in certain quarters, to my personal knowledge, and it is only another instance of the unknown wealth waiting to be known, and therefore utilised.

My readers will observe from the plates how variable in size and contour are the leaves (phyllodia) of the Mountain Hickory. It is, in fact, a very variable species, but it may be usually known by means of the thickened dot or gland which is found a little distance along the rim (or marginal vein) of the leaf, and from which another vein extends, in a curved manner, to the leaf-stalk. A small leaf-shaped enclosure, varying in size, is thus partitioned off out of the area of the leaf itself.

Bark.—The greater amount of wattle-bark used by Australian tanners, or exported from our shores, is the produce of two species of *Acacia*—namely, *Acacia decurrens* (and its varieties) and *Acacia pycnantha*. There is another Wattle of surpassing excellence, that of *Acacia penninervis*, variety *falciformis*, worthy to be mentioned in comparison with these two. Some years ago I examined a wattle-bark from the extreme south of this State, quite different in appearance from the smooth barks which are usually associated in Australia with high percentage of tannin. To my surprise I found it to contain 34 per cent. of tannic acid. I repeated the experiments with fresh samples, but the results never varied 1 per cent. altogether. In other words, this bark contains one-third of its weight of tannic acid, calculated on the dry bark. Many communications have reached me, particularly from Queensland, in regard to this matter, and the subject is of commercial importance to our State.

I proceed to give a number of analyses of representative samples of this bark from different places in New South Wales. I have already alluded to one bark which gave 34 per cent. of tannic acid; it also yielded 55.2 per cent. of extract, and came from Brown's Camp, near Delegate. I have not come across a finer sample of this bark, though there is much of equal quality. The mature trees which yielded this excellent result must have each contained half a ton of bark.

Bark from Mount Dromedary, stripped in December, gave 32.25 per cent. of tannic acid and 53.15 of extract. A sample grown at Mount Victoria (Blue Mountains), stripped in June, gave 29.03 per cent. of tannic acid, and 57.25 per cent. of extract. Height of the tree, 40 feet; diameter of stem, 6 inches. Bark from Rylstone (Mudgee Line), stripped in December from young (immature) trees, yielded 25.25 per cent. of tannic acid, and 42.45 per cent. of extract. All the above are from the "broad-leaved" or typical kind.

Timber.—This wood does not appear to have come into general use; but an expert in the Bombala district considers it excellent, being very durable and very tough, on which account he prefers it to anything else for axe and tool handles. It is said that the timber can almost be bent double upon itself. Trees obtained from high, stony ridges are usually sound, and not attacked by grubs. The above remarks apply to those grown in such a situation.

Timber examined by me was flesh-coloured, very little sap-wood, and a good, tough timber. Nevertheless, it is inferior to other timbers abundantly available in the places in which it grows.

Size.—The typical form is usually a shrub or small tree. The variety *falciformis*, on the eastern mountain slope and ranges, attains a good height (20 to 40 feet), with a diameter up to 18 inches. Trees a foot in diameter are common. It is found a good size along the strip of forest land fringing the plains of the Monaro. The largest trees appear to occur in the mountain ranges, near Delegate, which form the southern boundary of the Monaro, where, for instance, near Brown's Camp (the locality from which I first obtained the samples which enabled me to draw attention to the extraordinary value of this bark), the trees attain a height of from 40 feet to 80 feet, and a diameter up to 2½ feet, while trees of a diameter of 18 inches to 24 inches are not scarce in the locality.

Habitat.—The typical form is recorded in the "Flora Australiensis" from Queensland, northern Victoria, southern Tasmania, and from the following New South Wales localities:—Blue Mountains (Sieber n. 458 and

others), and inland to the Macquarie (A. Cunningham, Fraser); northward to Hastings River (Beckler); and southward to Twofold Bay (F. Mueller).

Following are some New South Wales localities represented in the National Herbarium, Sydney, for the normal form:—

Shrubs of 3* and 4 feet.—Foot of Big Jack Mountain, Bombala district; "Black Wattle," Weddin, Grenfell, and county of Ashburnham generally.

Rylstone district; Cow Flat, 11 miles south of Bathurst; Parkes Water Supply; Bushrangers' Rocks, Eugowra; Wellington; Minore, Dubbo; Harvey Range.

Tamworth; Tingha; Moona Plains, Walcha; Howell, Warialda, and Em-maville. Phyllodes very attenuate at the base in these two localities.

It is a small tree about Brisbane.

Now we come to the variety *falciformis*, the tree which is of such importance for its tanning bark.

As regards the occurrence of the Mountain Hickory in Victoria, Baron von Mueller speaks of it as scattered through the eastern half of the State, over ridges and ranges, gregarious on some of the sub-alpine declivities and plateaux.

New South Wales seems to be the natural home of the tree. In our State it extends from south to north, in the eastern half, on the southern ranges, the Dividing Range and its spurs, and the New England district.

While this species is so abundant and so extensively distributed, it would appear that only bark from the colder parts of New South Wales is of any great commercial value, and I therefore give particulars of such localities in a little more detail.

It is found from the Clyde and Bateman's Bay district, all along the coast land, right down south to the boundary of Victoria.

Nelligen, Moruya, Araluen, Tilba, Cobargo, Colombo, Bega, Candelo, Bombala, Delegate, and the Twofold Bay district are good localities.

It is less common in New England, but employed in the Mudgee, Tamworth, and other districts for tanning.

The following notes from a southern correspondent, who forwarded me some barks, include some additional localities:—

"No. 1. Local name Hickory or Black Wattle, taken from a tree 40 feet in height, 16 inches in diameter, growing plentifully on ridges and high lands in the parishes of Wagonga, Noorooma, Tilba, Bodalla, and neighbourhood, county of Dampier, for miles round the base of Mount Dromedary; soil generally light on slate formation.

"No. 2. Local name Broad-leaved Hickory, though not so plentiful as No. 1, yet in abundance, more particularly about Milton, Bermagui, Tilba, Tilba, Reedy Creek, Cobargo, and along Tuross River. It is not uncommon to see trees 2 feet in diameter; that from which No. 2 specimen was taken measured 20 feet in height and 12 inches in diameter."

If possible, no tree under a foot in diameter should be stripped; immature trees give little bark, which contains comparatively little tannic acid. To strip Mountain Hickory saplings is simply killing the goose with the golden eggs. It is not surprising that so large a tree yields rather a thick bark. A certain specimen is over five-eighths of an inch thick, is rugged, something like an ironbark, only more stringy.

Some of the localities represented in the National Herbarium, Sydney, are as follows.

VICTORIA.

Mount St. Bernard and Mount Hotham, both in the Victorian Alps.

NEW SOUTH WALES.

Southern Localities.—Thredbo River and Mount Kosciusko up to 5,500 feet; Mount Imlay, Twofold Bay, and Eden to Pambula; Nimitybelle to Tantawanglo Mountain; Barber's Creek; Hill Top; Menangle.

Western Localities.—Mount Victoria; abundant, Mount Victoria to Jenolan Caves; Bowenfels Churchyard, a tree 2 feet in diameter; Jenolan Caves; Sunny Corner; Rylstone district and Bylong Creek; sometimes called "Tanning Gum" in Bathurst district. The phyllodes are looked upon as "gum leaves."

Northern Localities.—Near Copeland.

"Hickory it is always called in New England. I have stripped trees over 2 feet in diameter, and 50 feet of bark, and weighing over 8 cwt. It also grows on the main Liverpool Range. The trees from which we get the bark grow mostly on spurs off the main range both east and west. I have seen the same kind of bark used in Bathurst, and which I was told was got from towards Mudgee. We have been using the bark twenty-three years, and like it for dressing leather better than any other. As I told you, the tree blossoms early in November.—W. J. Smith (The Tannery, Tamworth, 1890).

"The Broad-leaved Hickory grows all over this (Glen Innes) and Tenterfield districts, but very scattered with few exceptions, those being principally on Pastoral Holdings Rivertree, Koreelah, Oakwood, Morven, and Sandy Hills. Although it is stripped when it is in full blossom, it retains enough sap in the limbs for the seeds to properly ripen" (Forester Powell). Mount Mitchell, 5,000 feet; a New England locality quoted for var. *falciformis*, by Bentham; Guy Fawkes and Round Mountain. Forming dense belts of a scrubby growth up to 8 or 10 feet high in various localities about Guy Fawkes, and up to within a very few feet of the very top of the Round Mountain. Young shoots and inflorescence minutely hoary or golden-pubescent, phyllodia falcate, but rather small at the highest elevations.

Tenterfield to Sandy Flat.

Mr. R. T. Baker gives the following localities:—Murrumbo; Bylong Creek; Gulf Road; Church Mount, Reed Creek, Rylstone, all in the Rylstone district.

EXPLANATION OF PLATE 91.

Acacia penninervis, Sieb.

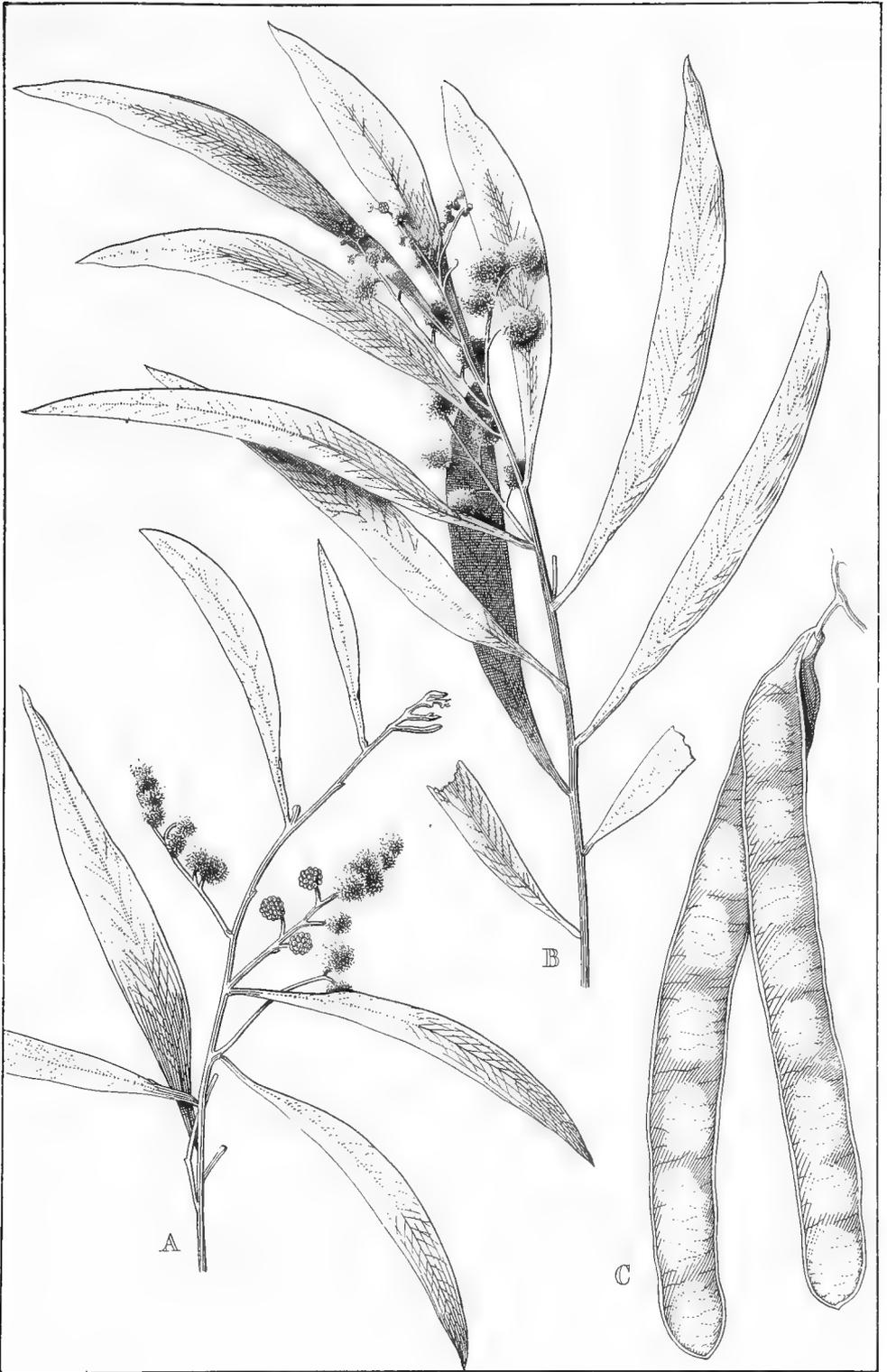
- a. Flowering spray from type.
- b. Flowering branch, Rylstone district.
- c. Ripe pods.

EXPLANATION OF PLATE 92.

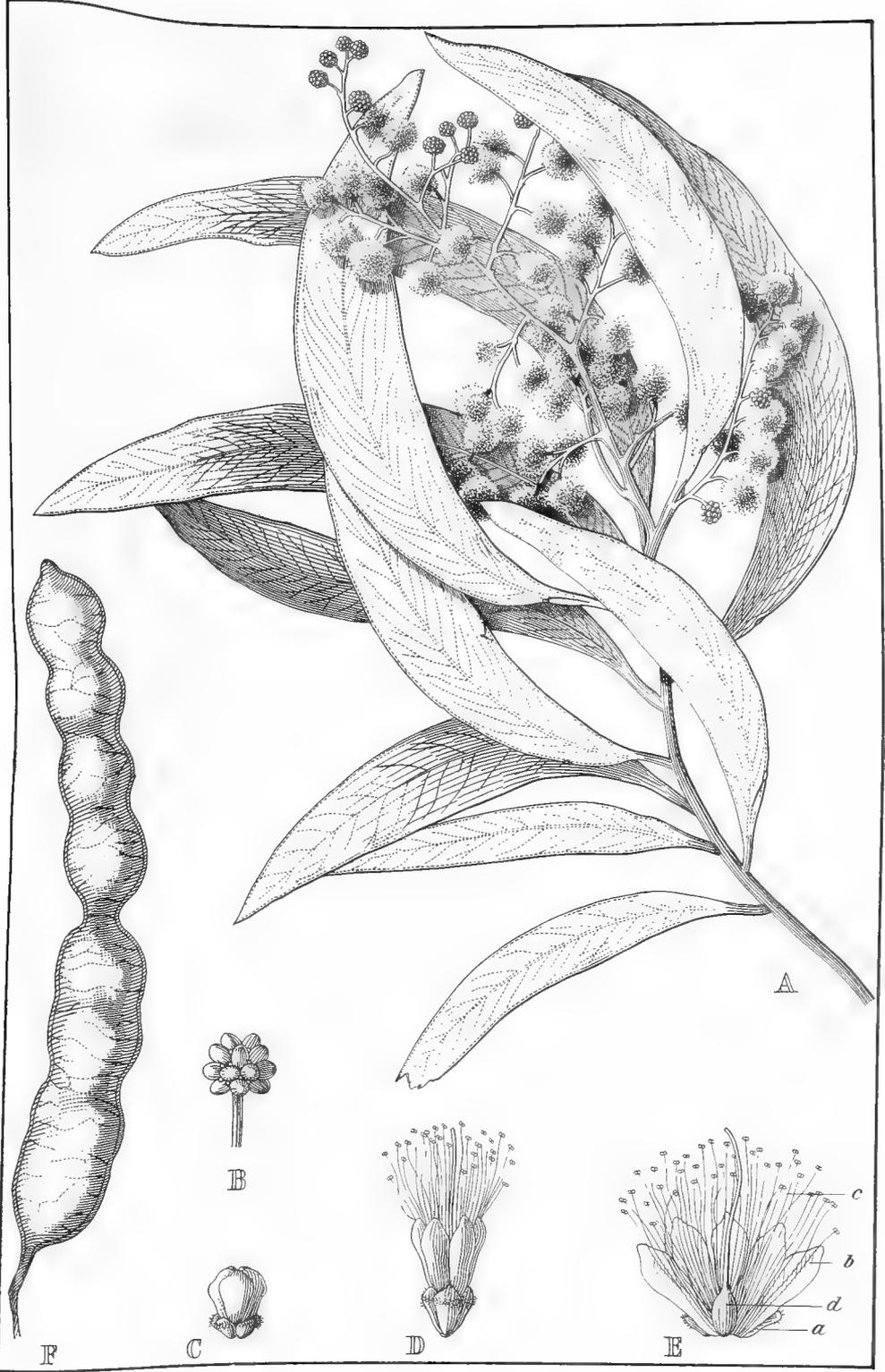
Acacia penninervis, Sieb. var. *falciformis*, Benth.

(The Tanning form of the species.)

- a. Twig, from the Blue Mountains.
- b. Flower-head.
- c. Flower-bud.
- d. Flower.
- e. Flower opened out, showing.
- f. Pod.



ACACIA PENNINERVIS, Sieb., (The Mountain Hickory.)



ACACIA PENNINERVIS, Sieb., and Var. FALCIFORMIS, Benth.
(The Mountain Hickory.)

Acacia melanoxylon, R.Br.

THE BLACKWOOD.

Botanical Name.—*Melanoxylon*; this is from two Greek words signifying “black wood,” and Robert Brown, the botanist, who adopted this designation, simply translated the commonly accepted Australian name.

Vernacular Names.—It is called “Blackwood” on account of the very dark colour of the mature wood. In Captain P. P. King’s work, Allan Cunningham refers to it as the “Black-hearted Wattle” or “Native Ash.” It is also called “Lightwood” in Tasmania, Victoria, and southern New South Wales; but the origin of the term, even amongst many people who use it, is not always clear. An explanation often given is that since the great majority of the useful timbers of Australia and Tasmania are heavy, the name is simply to draw attention to its comparative weight. This explanation is, however, untenable. The Blackwood has rather a wide sapwood, up to 4 inches, and this is very light in colour,—almost white; so that, on removing the bark from a blackwood, a man would at once come across this very light-coloured wood, hence the name “Lightwood;” and this is how a good many people explain it. I think, however, the explanation simply is that pale-coloured Blackwood is called Lightwood. A Blackwood which has grown rapidly has often timber paler in colour, and more porous than the standard Blackwood, and would be called Lightwood. Anyhow, the fact remains that Blackwood and Lightwood are absolutely identical from a botanical standpoint, and differ only on account of differences in soil and climate. While on the subject of the pale sapwood, Mr. Bäuerlen informed me that, years ago, an old man in the Braidwood district displayed great skill in cutting it into very thin strips, which he used to fashion into baskets of various kinds, and these had a ready sale. The old man’s knife was made of hoop-iron, and no one seemed able to imitate him in making such excellent basket material. North of the Clyde River, people are ignorant of the identity of the tree with the Blackwood of Tasmania and Victoria, and hence do not employ that term to designate it.

Aboriginal Name.—“Mudgerabah” is an old aboriginal name in northern New South Wales, and is the name by which the tree is generally known, at the present day, in New England and lower plateaux.

Bark.—The bark has usually gone to waste after the wood has been obtained from the logs. Baron von Mueller says:—“The bark is, however, rich in tannic acid, and ought not to be left unutilised, though no trees of this species should be sacrificed for their bark alone.” This may be true as regards Victorian trees; but I have not seen any New South Wales Blackwood barks of much value. One from an oldish tree from Monga, near Braidwood, yielded 11·12 per cent. of tannic acid, and 20·63 per cent. of extract. This is the only specimen I have subjected to chemical analysis; but I have roughly tested other barks of the same species, and am inclined to think that Blackwood bark is very inferior for the purposes of the tanner. The bark contains some saponin.

Timber.—This is considered by some people to be the most valuable of Australian timbers. Perhaps this is a bold claim to make, bearing in mind the high merits of such timbers as Ironbark and Red Cedar; but it is undoubtedly a timber of the highest class, happily combining an ornamental character with great strength. It is hard and close-grained, and is much valued for furniture, billiard-tables, cabinet-work, picture-frames, gun-stocks, walking-sticks, crutches, tool-handles, railway and other carriages, boat-building (stem and stern-posts, ribs, rudder), naves of wheels, parts of

organs, pianofortes (sound-boards and actions), and many other purposes too numerous to individualise. It is a most useful timber for coach-builders, in the bent timber branch. It bends well, and with proper treatment from the felling and sawing of the lumber, it substitutes perfectly for the bent timber in, say, an Austrian chair, and would look as well, and feel as light. For narrow boards it is used in the coach-building trade in Sydney in place of American Walnut, and it is taken for that timber when polished. It would last indefinitely in dry situations. It is really valuable for panelling, and perhaps framing. Blackwood is strikingly like American Walnut in most respects,—in fact, the former is probably often substituted for the latter without the purchaser being any the wiser, the incentive being that Walnut brings about four times the price in the Sydney market. If Blackwood be treated with lime-water or potash, the deception will be complete. Blackwood is pushing itself forward on its own merits, but it has to fight against a good deal of the prejudice which is shown to Australian timbers, largely caused by unseasoned timber having so often been supplied. It requires fair play in the matter of seasoning, and will well repay any reasonable care expended on it. The similarities of Walnut and Blackwood are not confined to outward appearance, for their properties appear much the same, hence a knowledge of the many uses to which the former timber is put is useful as a guide to the capabilities of our Blackwood. A good deal of it possesses a "broken grain" and satiny lustre which are exceedingly ornamental. Nothing, in my opinion, resembles the figure of picked samples so strongly as the South African mineral crocidolite, which, as is well known, has a characteristic and beautiful appearance. The figured wood is cut into veneers. It takes a fine polish. A drawback to this valuable timber is that it does not take the glue as well as many others. Rosewood behaves similarly to glue; I do not know the reason of this; it may be from the presence of oil cells. It was largely used for oil casks, chiefly for the Hobart whaling trade. The Lightwood was chiefly used for this purpose.

I quote descriptions of Tasmanian wood by Mr. Allen Ransome, as, since we look forward to an increasing trade in Australian timbers with the United Kingdom and the continent of Europe, a report by a well-known English expert has peculiar value:—

Blackwood.—A sound, mild-working timber of a brownish colour, closely striped with streaks of various shades of reddish-brown, and frequently crossed by diagonal marks of a light golden colour. The more ornamental logs of this wood are exceedingly beautiful, and should fetch a high price in this (London) market, where they could be used to advantage in place of the best Honduras Mahogany, while the less ornamental logs would serve for a higher class of joinery work, such as counter and shop fittings. The younger growth is well suited for cooperage work, and a barrel made from one of the pieces submitted for trial, before being artificially seasoned, is still quite tight, and shows no sign of shrinkage.

Lightwood.—This is an inferior description of Blackwood, from which it differs mainly in being of a lighter colour, and having a somewhat more open grain. Although it will not compete with the Blackwood for highly ornamental cabinet work, it can be used in the place of cheap Mahogany for wardrobe backs and other similar work.

It will be observed that most of the reports on the utility of this timber refer to Tasmanian and Victorian wood. This is because the occurrence of Blackwood in New South Wales is known to very few people, whereas, as is stated in the proper place, it is very widely distributed in this State, although usually looked upon as some other timber.

Still, in the southern districts, it is worked up to some extent, and it only requires that our people shall be informed that they have growing near

them the true Blackwood for them to use it a good deal more. Years ago Mr. Bäuerlen told me of a Braidwood tradesman who made, for many years, articles of local Blackwood. His work had a deservedly good reputation, and a skilled workman does not make chests of drawers, secretaires, plate-chests, out of a timber of whose value he has any doubt. I know of another tradesman at Delegate who used to make beautiful gun-stocks of it. The price he got for his gun-stocks is so high that I am afraid to mention it, as everybody may turn to gun-stock making. Another tradesman uses it for buggy naves. He, from time to time, used to go out and cut down a fair-sized tree, let it season outside in the log, and cut length by length off as he wanted it.

The manufacture of gun-stocks from this timber is a very old industry, particularly in Tasmania. I find that, in the season 1844-5, 430 gun-stocks were exported from Launceston to Great Britain.

Size.—In the southern mountain districts there are many trees 70 or 80 feet in height, with a stem diameter of 2 or 3 feet. The Mudgerabah, which may be taken as a type of the northern New South Wales form, is usually 40 to 50 feet high, and also has a diameter of 2 or 3 feet. In Tasmania and Victoria it is as large and larger than those of the southern mountain districts of New South Wales.

Distribution.—The Blackwood is best known as a Tasmanian and Victorian tree. It also occurs in South Australia. It is extensively distributed in the southern mountainous districts of New South Wales. It then seems to skip over the immediate neighbourhood of Sydney, but reappears in the rising country at the back of Port Stephens, and is extensively distributed in the tableland of New England, extending into Queensland. From Port Stephens to Queensland it is frequently found wherever the elevation is not less than 2,500 feet. What its precise western boundary is we do not know at present; but I have seen it from Tenterfield, Glen Innes, and near Armidale. It is by no means rare on the western slopes of the Blue Mountains, not on the sandstone; but on the granite, following up the granite gullies where there is a little seepage. It occurs abundantly in the Mudgee district. As far as southern New South Wales and Gippsland are concerned, the Blackwood must be considered as a mountain species, though it occurs occasionally in the low coast-land; but there it never attains any size. It varies a good deal in mode of growth, according to situation and geological formation. In the rich humus of the jungle of the mountain slopes it attains a height of from 60 to 80 feet, and in Gippsland, along the boundary of New South Wales and Victoria, localities may be found where it attains a height of 120 feet, and a diameter of nearly 3 feet. There straight trunks may be seen without a limb, from 60 to 80 feet high, the timber quite sound, and possessing that beautiful dark colour whence the species has derived its popular as well as its scientific name. When it grows on high mountains, as on the Delegate and Tingiringi Mountains, amongst rocks and precipices, it grows very gnarled and spreading, from 20 to 40 feet high, and from 1 to 2 feet in diameter, sending out thick, long, gnarled, and crooked limbs quite close to the ground. Mr. W. Bäuerlen tells me that on the Delegate Mountain he has seen them as low as 1 foot from the ground, with the limbs of great length, and eventually touching the ground. Those trees furnish most beautiful timber as far as grain and figure are concerned; but generally not quite so dark as the timber growing in the rich soil; but the situations are mostly inaccessible to vehicles of any kind. As regards the southern part of the State, the Clyde Mountains, Braidwood, and the Bate-man's Bay district, may be considered the most northern localities in New

South Wales for Blackwood of commercial sizes. From thence it can be obtained all along the coast range right down to the southern boundary, where, as has been already stated, it attains its greatest luxuriance in the brush country, in common with Sassafras, Musk, and other well-known plants. On the mountains east of Bombala, Nimitybelle, and Cooma, but yet on the high tableland, there is a belt of forest fringing the Monaro Plains. This forest, where it is intersected by its numerous creeks, valleys, and gullies, should furnish a plentiful supply of Blackwood. It has been but imperfectly prospected for that valuable timber, yet plenty of trees 2 feet or more in diameter have been seen with trunks furnishing logs from 20 to 40 feet in length. This is a favourable locality, since carriers go from thence to the Cooma railway station on the west side, and to the seaports of Merimbula and Twofold Bay on the other. The eastern mountain slopes near Candelo, Colombo, Bega, Cobargo, Tilba Tilba (Dromedary), and Moruya, contain also a large supply of this timber.

For the sake of clearness it may be stated that the Blackwood is abundant on the tableland, and on the edges and slopes of the tableland in such southern localities as far north as Barrengarry Mountain and the Kangaroo Valley generally, Cambewarra Mountain, the Berry Mountain, Robertson, and the Macquarie Pass. What its most northerly locality is south of Sydney I do not know, but as the species approaches Sydney it generally diminishes in size.

North of Port Jackson I have it from Gentleman's Halt, Hawkesbury River (A. Murphy).

The Mudgerabah as a Shelter Tree.—The traveller in New England cannot fail to notice a symmetrical, umbrageous tree, usually some 40 or 50 feet in height, with a trunk diameter of 2 or 3 feet, and with a great spread of leafy branches. It has a rough bark, and its leaves remind some country people of "some sort of gum-tree." When in flower or seed it will be noticed to be a wattle. It is found a few miles from the coast, at an elevation of about 2,500 feet above sea-level, and I noticed it all over the New England country, even at Guy Fawkes, the summit of the Snowy Range, and the highest point of New England. The climate here is very severe, yet the trees of this *Acacia* are magnificent specimens, showing how hardy it is. It is everywhere called Mudgerabah, and it is about the only tree that pastoralists do not ringbark, as it gives a grateful shelter to the stock during the summer, while, in those districts where frosts occur, the cattle are found under it during the coldest nights, as the frost cannot penetrate the dense foliage. From the æsthetic point of view, it is desirable that these trees should be conserved, for they are charming objects in the landscape, many of them being nearly as symmetrical as it is possible for a tree to be. This tree is none other than the Blackwood. From the point of view of the timber-getter, the trunks of the Mudgerabah are usually too short; but if it be necessary to fell one, the timber deserves a better fate than to be utilised as fuel.

EXPLANATION OF PLATE 57.

- A. Flowering branch.
- B. An individual bud removed from a head of flowers.
- C. Individual expanded flower, showing—(a) Sepal, (b) Petal, (c) Stamens.
- D. Portion of flower, opened out—(a) Sepal, (b) Petal, (c) Stamens, (d) Pistil.
- E. Ripe pod.
- F. Seed, with funicle partly encircling it in double folds.
- G. Phyllode with pinnate true leaves.



ACACIA MELANOXYLON, R.Br. (The Blackwood.)

Acacia binervata, DC.

THE TWO-VEINED HICKORY.

Botanical Name.—*Binervata* (Latinised adjective, from *nervus*, a nerve or vein) denoting “two-nerved,” in allusion to the two veins in the leaves (phylloдия), a characteristic so readily recognised that every person can bear it in mind.

Vernacular Names.—In the Illawarra district, where this Wattle is particularly abundant, and attains its greatest luxuriance, it usually goes under the name of “Black Wattle”; but, to save confusion, it would appear desirable to restrict the use of this term as far as possible to the forms of *Acacia decurrens*.

It shares with other broad “leaved” Wattles the name of “Hickory,” and in order to distinguish it, the name “Two-veined Hickory” is proposed.

Aboriginal Name.—“Myimbarr,” of the aborigines of Illawarra (New South Wales).

Leaves.—Note the two well-marked veins on the phylloides (leaves) of this species.

Bark.—It yields a valuable bark; specimens from Cambewarra, N.S.W., yielded me up to 58.03 per cent. of extract, and 30.04 per cent. of tannic acid. The colour of this sample was dark brown; the inner bark warm reddish-brown; the outer bark deeply-fissured or flaky, which makes it more or less pulverulent; the inner bark contains abundance of strong fibre; diameter, 12 inches; height, 20 to 25 feet; locally called “Black Wattle.”

A second sample from the same locality gave 28.2 per cent. of tannic acid, and yielded 51.5 per cent. of extract.

I examined a specimen from Tomerong, near Jervis Bay, N.S.W. (between Nowra and Milton), which was collected February, 1888, and analysed the following September. As received, it had had its first crushing in the mill; nevertheless it was possible to pick samples showing a fair proportion of inner and outer bark. The outer bark is somewhat scaly, and the inner bark is light reddish-brown and very fibrous. It cannot be mistaken for *A. decurrens* bark owing to its fibrous nature. It gave tannic acid 19.3 per cent.; extract, 37.8 per cent.

This sample was taken from bulk actually used by a tanner, and it will be found, in general, that barks containing 20 per cent. of tannic acid are commonly used by country tanners; in fact, if bark of a species gives as high as 15 per cent. of tannic acid, it is worthy of inquiry whether richer specimens are available.

The above are southern localities; following are from northern:—

Bark from Booral, county of Gloucester, stripped in July, and analysed in August, gave 28 per cent. of tannic acid, and 51.55 per cent. of extract. It was from a tree 30 feet high, and 8 inches in diameter.

A further sample from Stroud (in the same neighbourhood) collected in January, gave 27.75 per cent. of tannic acid, and 48.9 per cent. of extract.

This tree is frequently a large tree, and yields much bark.

Timber.—The wood is close-grained, tough, and light, and much prized for axe-helves and bullock-yokes. As regards colour, it varies between a dirty white and pinkish and a uniform dirty colour, similar, but more

intense, than California Red Pine. The specimens seen by the author have no figure. Three slabs of this wood in the Technological Museum, which have been seasoned over twenty-five years (having been exhibited at the London International Exhibition of 1862), have weights which correspond to 50 lb. 8 oz., 51 lb. 4 oz., and 56 lb. 11 oz. respectively per cubic foot.

Exudations.—Like many other Wattles, it exudes a crude gum arabic.

Size.—One of the largest of the Wattles. Specimens in the Berry district, for example, are large forest trees, very umbrageous, with foliage almost to the ground, and handsome in shape. The height of the tree may be stated at (say) 40 feet as a general rule, with a stem-diameter of 9 inches to a foot and more.

Habitat.—It is found in New South Wales and Queensland. In the former State it occurs as far south as Mount Dromedary, but it appears to attain its greatest luxuriance in the Illawarra. North of Port Jackson it is less plentiful, becoming more and more scarce to southern Queensland. Going west, it is found sparsely in New England, and also in the Mudgee district.

Propagation.—I commend this as one of the best species to grow in the Sydney district, where a large umbrageous wattle is required. While not objecting to good soil, it grows remarkably well in the poorest soil. For example, it grows the most luxuriantly of all wattles in the Centennial Park, Sydney, a place of sand, with much ferruginous hardpan.

EXPLANATION OF PLATE 95.

- A. Flowering branch.
- B. Flower-head.
- c. Individual bud.
- D. Flower.
- E. Flower, opened out, showing—(a) Calyx, (b) Corolla, (c) Stamens, (d) Pistil.
- F. Pod, Stroud district.
- g. Pods, Moruya district.
- H. Seed, Moruya.

Acacia decurrens, Willd.

AND ITS VARIETIES.

THE ACACIA DECURRENS GROUP OF WATTLES.

BLACK, GREEN, AND SILVER WATTLES.

The well-known feathery-leaved Wattle, familiar to most people in the eastern and southern States—by whom it is chiefly known by one of two names, viz., Black or Green Wattle—was first botanically described by the botanist Willdenow, who defined two species, *Acacia decurrens* and *Acacia mollissima*.

We will now discuss the several varieties:—

- (a) The typical form. The var. *normalis* of Bentham.
- (b) Var. *mollis*, Lindl. (*A. mollissima*, Willd.).
- (c) Var. *pauciglandulosa*, F.v.M.
- (d) Var. *Leichhardtii*, Benth. (*A. Arundelliana*, Bailey.)
- (e) Var. *dealbata*, F.v.M. (*A. dealbata*, Link.)
- (f) Var. *lanigera*, Maiden.



ACACIA BINERVATA, DC. (Two-veined Hickory.)

Mr. C. T. Musson writes in the *Hawkesbury Agricultural College Journal* for 1904:—

Another colour peculiarity is found in a bright yellow or orange strip crossing the angle formed by the branches in *Acacia decurrens*. Here is the spot mostly attacked by borers. Is there toughening tissue present?

Many of my readers have observed this coloration in *A. decurrens*. Its function is not obvious, and I draw attention to it since it is one of the innumerable morphological indications which we are not yet able to interpret, and the key to the physiology of such marking may be found by the observant bush-naturalist. It may appear to be a little thing; but the science of botany is built up by "little" observations, often by untrained men.

An interesting study is W. W. Froggatt's "Insects of the Wattle-trees," in the *Agricultural Gazette of New South Wales* for 1902. Unfortunately our wattles are very liable to insect pests, but this causes them to be of special interest to entomologists.

A. decurrens yields an important tan-bark in most of the States, and every encouragement should be given to its cultivation. This wattle and the South Australian *A. pycnantha* will supplement each other, the former flourishing in situations too damp and cold for the latter. Varieties of *A. decurrens* are at present abundant on some Crown and other lands in various districts of the State, where thousands, and perhaps millions, of seedlings may be sometimes seen, forming a dense, useless brush, liable to destruction by bush fires. In these localities we do not require to sow seed, but to use the tomahawk. They should be thinned out freely, to admit light and air to the most promising seedlings, which will then have some chance of forming trees capable of carrying a merchantable amount of bark. In many places selectors wage war against this tree, simply looking upon it as a troublesome weed. They should try the thinning process, leaving the most shapely trees. They will find that wattle scrub (of the right kinds) will become of value, instead of a nuisance.

Mr. J. E. Brown stated that, in South Australia, this species is much less hardy than *A. pycnantha*, but in other States this is not the general experience. Baron von Mueller recommends planting of *A. decurrens* in worn-out lands overrun with sorrel. It is fond of moisture, and not of too much heat. The Baron also gives its rate of growth as about 1 inch in diameter every year. Mr. J. E. Brown mentions some trees in South Australia 30 feet high and 8 inches in diameter, only 5 years of age, and I can record similar experience near Sydney. It is rather liable to attacks by borers. It is a useful tree for making a quick-growing shelter for vineyards, orchards, &c.

Cultural Notes.—The following notes are, as a rule, directly based upon observation with the *mollis* variety of *Acacia decurrens*, but are more or less applicable to all varieties of *decurrens*.

Mr. Evan Francis writes:—

In a garden in Bega, a few years ago, I sowed seeds of Black Wattle on 1st September, and on the 1st January, following, plants were measured 11 and 12 feet high; this, for four months, was enormous growth.

Following is an account of a New Zealand correspondent (Waikato, Auckland), of his experience in regard to this variety, which may be useful for the guidance of others in similar localities:—

I have about 5 or 6 acres of *mollissima*. I got the seed from Tasmania. They are growing the best of any I have got. They do not make much tap

root; they spread the roots near the surface. They were sown two years ago last month (September), and some of them are 12 feet high, without any shelter. They are the best to remove. I planted an acre with young trees taken out of them twelve months since last March. I took them without any soil, and there is not one dozen in the whole lot that have died; but I find that after you plant any of the *Acacia* tribe, they do not commence to grow till twelve months after they are planted. I have no doubt that they will grow much better under the bamboo system.

In another letter my correspondent says:—

Trees four years old are 15 to 28 feet high, and 5 inches in diameter at 3 feet from the ground. They had no shelter.

The following interesting observations of Mr. William Bäuerlen are instructive, as showing the advantages of cultivating natural seedlings of wattle instead of allowing them to take their chance—in other words, they are responsive to any attention. At the same time this method is most successful in rainy, rather cold districts.

Major's Creek, near Araluen, New South Wales, planted Green Wattles from seedlings in August, from 12 to 15 inches high.

			Height.		Girth.
6 years old	...	1	...	25 feet	...
					30 inches, 3 feet above ground. }
Do	...	2	...	28 „	...
					24 „
Do	...	3	...	21 „	...
					21 „
4 years old	...	1	...	20 „	...
					24 „
Do	...	2	...	18 „	...
					20 „
2 years old	...	1	...	15 „	...
					11 „

None of the wattles from the place from which these were taken for planting (and some even exceed six years in age) exceed 15 feet in height and 10 inches in girth.

In the same locality, there is a tree ten years old, which is 30 feet in height, and has a girth of 3 feet 7 inches. The tree is remarkably straight and healthy, the bark on the trunk having quite a smooth, young appearance yet. A tree of the same dimensions out in the bush would have a dark, rough, furrowed bark, and would doubtless be twice the age.

Mr. Evan Francis, when at Bega, also experimented with bush seedlings, and this is what he says:—

In six months the trees ranged from 10 to 15 feet in height. The taller trees were in the more sheltered positions. Single specimens in open ground did not succeed half as well as those in the centre of the grove, where they were mutually sheltered. A distance of 9 feet, plant from plant, seemed the correct thing.

At two years the trees were fine saplings of about, on an average, 20 to 25 feet high. We estimated that a yield of from 30 to 40 lb. of dry bark would be given by these trees at four years old, but they reached their prime at six years, when the bark at the lower parts of the trees had great substance, and the yield of dry bark would be fully 60 lb.; and I am sure selected trees would have reached 100 lb.

My Forest Flora is not a work on wattle cultivation; that part of the subject and the quality of wattle-bark has been very fully gone into in my special work on the subject (“Wattles and Wattle Barks,” illustrated, 3rd Edition. Government Printer, 1s. 6d.), which has been written for growers, bark-strippers, merchants, tanners, and naturalists.

I give a list of contents of the work:—

PART I.

Demand and supply of bark.

Wattle-bark in Natal.

What New South Wales may do.

THE SOIL.

- (a) General considerations.
- (b) Preparation of the land.
- (c) Moisture.

Objections to Wattle-growing considered.

THE SEED.

- (a) Commerce in Wattle Seed.
- (b) Quantity of seed required to the acre.
- (c) Preparation of seed for germination.
- (d) The Bamboo method of tree-planting.
- (e) Broadcast sowing.

Addendum.

THE TREE AND ITS BARK.

- (a) Pruning and thinning.
- (b) Time of year for stripping.
- (c) How to strip.
- (d) Age and size of trees.
- (e) To increase bulk of bark.
- (f) Fibre in barks.
- (g) Drying of bark.
- (h) Grading of bark.
- (i) Export, packing, &c.
- (k) Alterations or substitutions.

PROFITS AND LOSS AND MINOR INDUSTRIES.

- Profits to be derived from Wattle cultivation.
- Detailed estimates.
- Extracts.
- Technical education in leather and tanning materials.
- Wattle galls.
- Wattle gums.
- Wattles as drugs.
- Wattle blossom.
- Brief bibliography of Wattle-barks.

PART II.

The best New South Wales Wattle-barks.

- Acacia decurrens* group of Wattles.
- Acacia pycnantha*, Benth.
- Acacia penninervis*, Sieb.

- Acacia binervata*, DC.
- Acacia elata*, A. Cunn.
- Acacia leiophylla*, Benth. (introduced).

PART III.

- Notes on New South Wales Wattles.
- A few general remarks on Morphology.
- Wattles and the poets.
- Brief bibliography of the botany of Australian Acacias.

- New South Wales Acacias arranged in botanical sequence.
- Notes on the species of New South Wales Acacias, arranged in alphabetical order.
- Vernacular names.
- Index.

Botanical Name.—*Decurrens*, Latin, “running down or along;” decurrent, in allusion to the bases of the leaf-stalks, which run along the branchlets, forming a ridge more or less prominent.

1. Variety *normalis*, Bentham.

Vernacular Names.—The “Black Wattle” of the Sydney district. (N.B.—Australians are not always unanimous or consistent in the use of the terms Black and Green Wattle for varieties *A. decurrens*.) “Sydney Wattle,” the common Black Wattle of the older colonists.

Aboriginal Name.—Formerly known as “Book-kerricking” by the aborigines of the Counties of Cumberland and Camden, New South Wales (Macarthur).

Leaves.—Attention is drawn to the great length and narrowness of the leaflets in this variety.

Flowers.—It has been thought that the period of flowering affords an infallible guide to the discrimination of at least two varieties, *e.g.*, *normalis*, a winter, and *mollis*, a summer flowerer. Under each variety will be given notes as to the months of flowering of some specimens in the National Herbarium, Sydney. The present list is of var. *normalis*, and other varieties will be dealt with separately. It will be seen that the time of flowering is not an absolute criterion as to the variety. Knowledge of the flowering period is, however, often useful to people who have devoted particular attention to the wattles of a district. Sometimes the same tree flowers twice in a season, and the period of flowering is affected by climatic influences of a particular district, and a particular season.

<i>Normalis.</i>	Locality.
June	Sydney.
July	Sydney.
”	Campbelltown.
”	Picton and Bargo
August	Sydney, Barber’s Creek, Burrarorang.
September	Sydney, Taralga.
October	Bowral to Bullio.

Bark.—A not very good specimen from Campbelltown, stripped in August, yielded 31·5 per cent. of tannic acid, and 57·35 per cent. of extract. A specimen from Ryde, near Sydney, yielded 32·33 per cent. of tannic acid, and 48·74 per cent. of extract.

Timber.—Of pale colour, more or less brown in the centre. Only useful for fuel, for which purpose it is appreciated for bakers’ ovens.

Size.—A small or medium sized tree, with a diameter of, say, 9 inches, and a height of 25 to 30 feet.

Habitat.—Apparently confined to New South Wales, and restricted to the eastern portion of it.

It is a coast and coast mountain variety, occurring chiefly about Port Jackson, Campbelltown, Picton and Bargo Brush, Berrima to Wollondilly, to Goulburn, and Taralga.

Its southernmost locality in the National Herbarium is Bateman’s Bay, but I have no doubt it extends further.

I do not think I have seen it north of Port Jackson.

2. Variety *mollis*, Lindl.

This is a sweet-scented, almost overpoweringly-scented form, and it flowers in the summer or early summer. It is the form which yields the best tan-bark. At the same time it passes imperceptibly into other forms, and I advise landowners not only to have a botanical examination of their wattles, but also to have a chemical examination of their barks.

Botanical Name.—*Mollis*, Latin, soft, in reference to the foliage.

Vernacular Names.—Sometimes called “Black Wattle” in New South Wales, and commonly so called in Victoria and Tasmania, but usually called “Green Wattle” in New South Wales, and occasionally “Silver Wattle.” The common Green Wattle of the older colonists.

Aboriginal Names.—Formerly called “Wat-tah” by the aborigines of the Counties of Cumberland and Camden; “Nummerak” of those of the Illawarra district, New South Wales (Macarthur); “Garrong” or “Currong” of the aborigines of Lake Condah, and also of the Yarra, Victoria, aborigines; “Warraworup” of those of the aboriginal station, Coranderk, Victoria.

Flowers.—In the National Herbarium, Sydney, we have flowering specimens in the following months. See page 124.

<i>Mollis.</i>	Locality, N S. W.
January	Major's Creek.
”	Araluen, Tallwong, Shoalhaven, Peak Hill, Sydney.
February	Minore, Dubbo.
March	Nyngan.
April	Gulgong.
June	Booral, near Stroud.
July	Greta, Newcastle, Wagga Wagga.
August	Port Stephens, Condobolin.
September	Burwood, Sydney.
”	Middle Head, Sydney.
October	Illawarra.
”	Port Stephens.
November	Port Stephens, Sydney, Moruya.
December	Major's Creek.
”	Sydney.

October, December, January, February—Tasmania.

September, November, December, March—Victoria.

Bark.—This variety of *Acacia decurrens* is the one which has made the reputation of the bark. The celebrated Tasmanian and Portland (Victoria) bark is the product of this variety.

I now proceed to give brief descriptions, with analyses, of illustrative samples of this bark, and for practical convenience I divide those of New South Wales into southern and northern localities, taking the Hawkesbury River as a natural boundary.

Southern Barks.

A sample of a smooth green bark from a young tree afforded 33·5 per cent. of tannic acid, and 61·85 per cent. of extract, while a second sample, from an older tree, gave 35·3 per cent. of tannic acid, and 59·05 per cent. of extract. Both were grown near Penrith, New South Wales.

A black bark, slightly rugged, from Mulgoa, Penrith, gave 35·56 per cent. of tannic acid, and 59·2 per cent. of extract. It was known locally as “Green Wattle.”

A sample received May, 1890, and analysed the following month, was found to contain 34·85 per cent. of tannic acid, and 61·5 per cent. of extract. It came from Burragorang. It is thicker than most barks of this species, and is beginning to be scaly on the outside. Were it not for that defect it would be a splendid bark. It was allowed to remain a year too long on the tree, a fault not usually to be found with bark-getters.

Another sample, taken from a tree between 40 and 50 feet high and 15 inches in diameter, at a place 12 miles from Burragorang Mountain, where this species was growing in very large quantities, was analysed July, 1890, and found to contain 34.4 per cent. of tannic acid, and 69.33 per cent. of extract. This is a perfect specimen of bark of this species, being of good thickness, smooth, and of good colour.

A sample from Cambewarra, from trees 20 to 30 feet in height, and 6 to 8 inches in diameter, gathered in August, 1886, was found to contain 32.08 per cent. of tannic acid, and 52.16 per cent. of extract. A bark grown in the same neighbourhood, and analysed in April, 1890, gave only 24.13 per cent. of tannic acid, and 47.1 per cent. of extract. It is a smooth bark, but from a young tree, being only one-eighth of an inch thick, and rather fibrous. Had it been allowed to remain on the tree a couple of years longer, I feel sure that the percentage of tannic acid would have much increased.

A sample from Nerriga (on the high tableland from Nowra to Braidwood) gave the excellent result of 36.3 per cent. of tannic acid, with 62.54 per cent. of extract. Height of tree, 15 to 20 feet; diameter, 8 to 12 inches. It was stripped in January, and analysed the following August. This is the best sample of *A. decurrens* bark which has hitherto been examined by me.

A second sample from the same district yielded 31.75 per cent. of tannic acid, and 62.35 per cent. of extract; while a third gave 29.25 per cent. of tannic acid, and 59 per cent. of extract. A fourth gave 24.99 per cent. of tannic acid, and 53.96 per cent. of extract.

A bark from Bateman's Bay, collected in February, and said to be known locally as "Silver Wattle,"* yielded the very satisfactory result of 34 per cent. of tannic acid, and 59.45 per cent. of extract. It was obtained from trees 50 feet high and 9 inches in diameter.

A second specimen from the same locality, collected at the same time, and labelled, probably more correctly, "Green Wattle," gave the even better result of 36.25 per cent. of tannic acid, and 60.3 per cent. of extract. It is as good as any Victorian or Tasmanian.

Mr. Thomas Shepherd, an enterprising tanner of Cambewarra, kindly furnished me with the following information in sending the first sample from Nerriga. Of all New South Wales localities, he prefers Nerriga for *A. decurrens* bark. He says it would be quite equal to Tasmanian if it could be obtained as finely ground. From Cambewarra bark Mr. Shepherd obtains only two liquors, of which the second is very weak, while from the Nerriga bark he invariably obtains three strong liquors. In his opinion the best time for stripping is when the trees are in bud, and have just come into flower. Next to the Nerriga bark he speaks highest of that coming from the Bega district.

I have examined a sample of bark called "Green Wattle," from Bell's Creek, Araluen, N.S.W. It was from trees 25 to 30 feet high, with diameters from 6 to 18 inches, was grown on granite soil, and was collected in November, 1888. In April, 1890, it was analysed, with the following result:—Tannic acid, 31.23 per cent.; extract, 64.15 per cent. It is smooth, compact, yields a light-coloured powder with some fibre, is a quarter of an inch thick, and is to be ranked with the best of our New South Wales barks.

* It is sometimes difficult to tell this tree from the true Silver Wattle (var. *dealbata*), but usually they are different enough.

Bark from Eden, stripped in November, gave 30.25 per cent. of tannic acid, and 51.65 per cent. of extract.

A specimen of "Green Wattle-bark," grown at Tombong, Snowy River, N.S.W., was collected in March, 1889. It was obtained from trees 20 to 30 feet high, with diameters 6 to 15 inches, and was grown in granite country. It yielded (April, 1890) 24.63 per cent. of tannic acid, with 45.8 per cent. of extract. This sample is hardly fair to the species. It is rather thin, rugged, covered with lichens, and rather more fibrous than the generality of barks of this variety. In spite of the badly-selected sample, the analysis shows that it is full of promise.

Northern Barks.

Bark from Booral, stripped in June, yielded 28.52 per cent. of tannic acid, and 56.1 per cent. of extract. A second sample from the same place gave 27.5 per cent. of tannic acid, and 57.1 per cent. of extract.

A sample from Raymond Terrace, collected in December, gave 33.20 per cent. of tannic acid, and 56.5 per cent. of extract, showing that good barks can come from the north.

Bark from Gosford, stripped in July, from four-year-old trees, gave 22 per cent. of tannic acid, and 46.4 per cent. of extract.

Habitat.—The only form in Tasmania, and the most common one in Victoria; less frequent in the northern districts of New South Wales.

Queensland.—Inland extra-tropical Queensland.

South Australia.—South of the Murray Desert, embracing the 90-mile Desert and the Tatiara; Mount Gambier District.

In New South Wales this variety flourishes best in the colder districts of this State, chiefly on the southern tablelands, but is by no means confined to the colder districts, as the following specimens in the National Herbarium, Sydney, show:—

Cooma; Mogo, near Moruya, "Green Wattle," the tan-bark; Tallong, Marulan, Hill Top, National Park, Parramatta (examined by Bentham), Wahroonga, Sydney. It is apparently not common in northern New South Wales, e.g., Warialda. Pods nearly glabrous, leaflets more spatulate than var. *pauciglandulosa* and not hairy on the tips; Warialda—More glabrous than the preceding, and further remote from var. *pauciglandulosa*; Warialda—Nearer the *pauciglandulosa* type, but glands abundant; Inverell—almost entirely glabrous.

These northern specimens alone show that vars. *mollis* and *pauciglandulosa* run into each other.

Out West, the variety becomes more stunted, but otherwise nearly normal. Fine, short golden hairs sometimes extend lower than the tips of the branches. Minore, Peak Hill, Condobolin Hill, Coolabah, Nymagee.

3. Variety *pauciglandulosa*, F.v.M.

I do not think that this is a strong variety. It runs into var. *mollis* too much. Typical var. *mollis* has more spatulate leaflets than has var. *pauciglandulosa*, and the plant is more angular, and altogether more hairy, and even sometimes scabrous. The fine leaflets are sometimes tipped with hairs.

I find the number of glands an uncertain character. Its young tips are decidedly and more extensively golden than var. *mollis*. The young pods are also yellowish.

Vernacular Name.—A “Green Wattle.”

Botanical Name.—*Pauciglandulosa*, from two Latin words, signifying “with few glands.”

Flowers.—The following indicate some flowering seasons of this variety. See above, pp. 124, 125.

<i>Pauciglandulosa.</i>	Locality.
January	Taree ; Narrabri, N.S.W.
April	Richmond River (Rous), N.S.W.
June	County of Gloucester, N.S.W.
July	Brisbane, Queensland ; Wallangarra, N.S.W.
August	Port Stephens, N.S.W.
November	Upper Hastings, N.S.W.
December	Stroud Road, Hunter River, N.S.W.

Bark.—A specimen of bark from Port Stephens, N.S.W., stripped in December, yielded 31.75 per cent. of tannic acid, and 51.55 per cent. of extract.

A sample from Bateman’s Bay, N.S.W., stripped in February, from trees 30 feet high, and up to 15 inches in diameter, gave the result of 27 per cent. of tannic acid, and 53.45 per cent. of extract.

Habitat.—So far as our specimens are concerned, it may be looked upon as a northern New South Wales and southern Queensland form. That is to say, it hardly comes south of Sydney.

It also extends to the tableland. Specific localities are:—Gosford, Port Stephens, Booral, Stewart’s Brook, Brushy Mountain, Gloucester, Taree, Hastings River, Upper Hastings River, Bellingen, Bolivia, Wallangarra, Rous (Richmond River); Acacia Creek, Macpherson Range.

Under var. *mollis*, Benth., (B.Fl ii. 415) has the note “Some of Beckler’s specimens from Warwick (Queensland) have the numerous glands of this form with the very small leaflets of the following (*pauciglandulosa*).”

I have a specimen of Beckler’s before me, also Narrabri, on sand-ridges; Woolooma Mountain, Belltrees, Scone. They seem to me nearest to var. *pauciglandulosa*, and are evidence of the statement I have previously made that vars. *mollis* and *pauciglandulosa* run into each other.

4. Variety *Leichhardtii*, Benth.

This might be described as an extreme form of var. *pauciglandulosa*. It resembles it strongly in general appearance, but has a profusion of comparatively long, weak hairs, particularly on the rachises, which give it a rather ornamental aspect. The leaflets have, however, fewer hairs than var. *pauciglandulosa*.

Botanical Name.—*Leichhardtii*, in honour of Dr. Leichhardt, the explorer, who first collected it.

Vernacular Names.—A “Green Wattle.”

Bark.—The bark of this variety is used by the local tanners, and is spoken of fairly well as regards percentage of tannin, but is not much liked on account of its being considered too hard and fibrous, and therefore difficult to break up in the mill.

It is a common belief amongst tanners (and at present I am not prepared to say what basis of truth it has), that barks much subjected to frost and snow are much richer in tannin than those not so subjected. The present sample is from a tree grown in a very cold district. It was collected October, 1888, at Monga, from trees 20 to 25 feet high, and 6 to 18 inches in diameter, growing on granite soil. Thickness of bark about $\frac{1}{8}$ inch. A smoothish bark of a light colour, but forming a rather fibrous powder. It was analysed April, 1890, and found to contain 26.4 per cent. of tannic acid, and 45.25 per cent. of extract.

This variety would appear to attain exceptional dimensions at Yalwal, not far from Nowra, as I have been informed that trees in that locality have been stripped of the following diameters, viz., 9, 12, 18, and 36 inches. The last diameter is certainly extraordinary, and I have not heard of authentic measurements of any variety of *Acacia decurrens* giving over 24 to 30 inches, and then only in exceptionally favourable localities; but my information appears to be quite reliable, and I have heard from another source of the immense size of the trees in this locality. The bark is not less than 1 inch thick, and must have come from a huge wattle. It is scaly on the outside, and reminds one of mountain hickory bark (*A. penninervis*). It was stripped in March and analysed the same month, with the result of 29.25 per cent. of tannic acid, and 46.75 per cent. of extract. A second specimen from a tree 18 inches in diameter gave 25.75 per cent. of tannic acid, and 40.8 per cent. of extract. A third specimen from a tree 9 inches in diameter gave 26 per cent. of tannic acid, and 44.05 per cent. of extract.

A poor, thin, too-early stripped specimen (near the type) from Tewantin, Queensland, stripped in July and analysed in September, gave 22.1 per cent. of tannic acid, and 41.6 per cent. of extract.

Habitat.—This form is best developed in South Queensland.

QUEENSLAND.

Between Archer's Station and Biron, and towards the Bunya (Leichhardt) are localities given by Bentham. It also occurs at Maroochie.

NEW SOUTH WALES.

Mogo, Moruya, Nelligen, Bateman's Bay. Found also in the Monaro and Braidwood districts, and in the Jingera Mountains.

The range of this variety should be further inquired into.

5. Variety *dealbata*, F.v.M., "The Silver Wattle."

Botanical Name.—*Dealbata*, Latin, "whited," hence white-washed, in allusion to the whiteness of the stem (and foliage).

Vernacular Name.—The Wattle which most commonly goes under the name "Silver Wattle." There are, of course, several other wattles known as "Silver Wattle" in restricted areas.

Aboriginal Names.—Formerly called “Ur-root” by the Yarra (Victoria) aborigines. Native name on the Castlereagh River, N.S.W., “Eumung,” according to the late Rev. Dr. Woolls, but I would point out that at least three other western New South Wales wattles share that name.

Flowers.—At one time a well-known London firm of perfumers stated that they prepare their “Extract of Australian Wattle” from the flowers of this wattle, which is grown in enormous quantities on the Riviera in southern Europe for decorative purposes.

Bark.—Some specimens of bark from Quiedong, Bombala, N.S.W., yielded the author 21.22 per cent. of tannic acid, and 39.86 per cent. of extract. They were from trees 12 to 18 inches in diameter and 20 to 30 feet high, and were grown on limestone country. A second sample from the same district gave 17.1 per cent. of tannic acid, and 39.3 per cent. of extract. They were apparently from an old tree. The barks form a rather fibrous powder.

I have examined a sample from the Delegate River, N.S.W., where the trees are growing in the brush (rich jungle), in chocolate soil, attaining a height of 60 to 100 feet, with a diameter of 1 to 2 feet. Bark collected in April, 1889, yielded the following April 25.9 per cent. of tannic acid, and 45.7 per cent. of extract. This has the general appearance of *A. decurrens* bark, but is in layers, separable with a little difficulty, more fibrous, and has the appearance of having been dusted on the outside with a white powder. The whitish appearance does not rub off, and the stem looks as if it had had a coat of lime-wash. It is the work of a lichen.

A perfectly smooth, thin, silvery or ash-grey bark, from near Penrith, N.S.W., gave 24.13 per cent. of tannic acid, and 47.85 per cent. of extract.

Barks received from Mr. C. Brownrigg, gathered in June, and obtained from parish of Beaufort, Cowra district, diameter of tree 10 inches, yielded 16.5 per cent. of tannic acid, and 42.4 per cent. of extract. A second sample from the parish of Calout, in the same district, from a tree 7 inches in diameter, gave 20.3 per cent. of tannic acid, with 43 per cent. of extract. Mr. Brownrigg kindly furnished the following notes with these samples:—*Beaufort sample*—“Extensive forests of good, sound, old and young trees, not affected by the ringbarking of other timber.” *Calout sample*—“Since the ringbarking of the box and other timber, nearly all the old wattle-trees have died away; a young forest appears to be growing up.”

Bark from county Auckland (Monaro), and stripped in November, gave 24 per cent. of tannic acid, and 42.55 per cent. of extract.

Two samples from the Cooma district gave 24 per cent. of tannic acid, with 49.6 per cent. of extract, and 25.5 per cent. of tannic acid, with 51.2 per cent. of extract, respectively. The latter bark is worthy of special mention. It is quite black, having not a trace of the whitish appearance generally found on the bark of this species. It was brought to me as Green Wattle (*Acacia decurrens*, var. *mollis*), and there seemed no necessity to doubt the diagnosis. No expert could have told the difference between it and Green Wattle if he had not been permitted to test it. It is a good instance of the deceptiveness of appearances.

“Silver Wattle” bark may be assumed to contain about 25 per cent. of tannic acid in the best samples.

In Tasmania the destruction of these trees has often been recommended in order to let var. *mollis* grow, and this advice is probably sound, but only in cases in which one or other has to be sacrificed.

I think I have adduced sufficient evidence to convince intelligent people that the bark is by no means a worthless one, and barks inferior even to this are locally used in districts not favoured with the alternative of the use of such a bark as other varieties of *decurrens*. I hope that barks in a particular district will be tried on their merits, and not be condemned without trial.

In insisting on the general principle of assay of barks, just as a man engaged in the mining industry is always careful to sample his stone as occasions require, I am quite aware of the special circumstances of Tasmania as regards the "Silver Wattle," and that the case in that State against this particular variety is stronger than it is in our own. In Tasmania the "Silver Wattle" grows more in spars than with us; its bark has a more than ordinary tendency to shrink; it is tough and fibrous (though not to such an extent as *A. binervata*, for instance). As wattles take longer to mature in Tasmania than with us, it will be quite understood that I am in no way reflecting on the wisdom of the advice of letting the cultivation of the best species remain unimpeded.

A New Zealand (Auckland) correspondent states that his four-year-old var. *dealbata* trees are 35 feet high in a sheltered place, with a diameter of 4 to 8 inches at 3 feet from the ground. They grow quicker than var. *mollis* in his particular district. Var. *dealbata* is not indigenous in New Zealand (nor is, in fact, any *Acacia*), and it is a pity that this species has been introduced into that colony for its yield of tan-bark, as I understand has been done in several instances, whether deliberately or by a mistake in seed I am unable to say.

The "Silver Wattle" sometimes obtains an enormous size in Tasmania, Victoria, and southern New South Wales. In Tasmania, Backhouse measured a tree 11 feet 2 inches in girth, and "Silver Wattles" approaching 100 feet in height have frequently been found in all three States.

Size.—It attains the largest size of any of the varieties of *A. decurrens*. In Tasmania it attains the dignity of a large forest tree, but in most of the States it is of medium size.

Habitat.—The "Silver Wattle" is found in Tasmania, Victoria, New South Wales, and a not strictly typical form occurs in the extreme south of Queensland.

NEW SOUTH WALES.

Southern Localities (in National Herbarium, Sydney).—Jindabyne, Snowy River; Tumut, McLachlan River, Nimitybelle to Tantawanglo Mountain; Barber's Creek; Wingello; Berrima; 15-16 mile-post, Wombeyan Caves to Taralga; Queanbeyan (with a yellowish indumentum, and certainly constricted between the seeds. The indumentum in this variety may sometimes be very sparse, and sometimes consist of a glaucous covering).

Western Localities.—Faulconbridge; Mount Banks or King George, with bright yellow tips; Jenolan Caves; Kerr's Creek, Orange; Parkes Water Supply.

Northern Localities.—Acacia Creek, Macpherson Range, near var. *mollis*; Apsley Falls; Stewart's Brook, showing transit to var. *pauciglandulosa*.

It is very widely diffused in New South Wales, attaining its greatest development in the valleys of the Southern Tableland, in cold situations approximating to those in Victoria and Tasmania.

Propagation.—I have already referred to its rapid growth in India, and to its cultivation in Southern Europe. The following unpublished notes were written some years ago, and give some idea of the appreciation it receives in the Northern Hemisphere:—

It appears to be one of the hardiest of the genus, as it is one of the most ornamental. At Bayonne, in the Lower Pyrenees, Madame Leon made a considerable plantation of it a few years ago which has now developed into a charming miniature forest. Even as far north as Nantes it flourishes and resists ordinary winters. In very severe winters it is sometimes killed down to the ground, but it throws up again with increased vigour. The foregoing particulars we glean from the organ of the Central Horticultural Society of France, and we have no doubt that this *Acacia* will prove equally as hardy in the West of England.

Its white foliage contrasts well with the sombre foliage of many Australian trees, and I certainly think it is worthy of more extensive cultivation for ornamental purposes. We take far greater pains over less meritorious exotics.

6. Variety *lanigera*, Maiden, in "Wattles and Wattle-barks," 3rd Edition, 1906, p. 41.

A small tree or tall shrub, characterised by every part of it—old and young leaflets, rachises and twigs, and pods—being densely covered with a white or brown indument.

It may be described as an "exaggerated" form of var. *dealbata*, but so much more woolly-hairy than var. *dealbata* as to be worthy of some designation.

Leaflets about twenty and over, coarser than those of var. *dealbata*, the variety it most closely resembles. Harvey Range, J. L. Boorman, 1905 (type). Closely allied forms from Gloucester Buckets, E. Betche, 1882; J.H.M., 1897; Parkes Water Supply, J.H.M., 1897.

This remarkable form will be better understood, on reference to the Plate. It seems to me the handsomest variety of the species, and worthy of cultivation for ornamental purposes. It is too rare to be of commercial importance. It grows in dry localities.

EXPLANATION OF PLATE 87.

A. decurrens var. *normalis*. A—G.

„ var. *Leichhardtii*, H—K.

(N.B.—Var. *Leichhardtii* is closest to var. *pauciglundulosa*, and has been put on Plate 87 as a matter of convenience.)

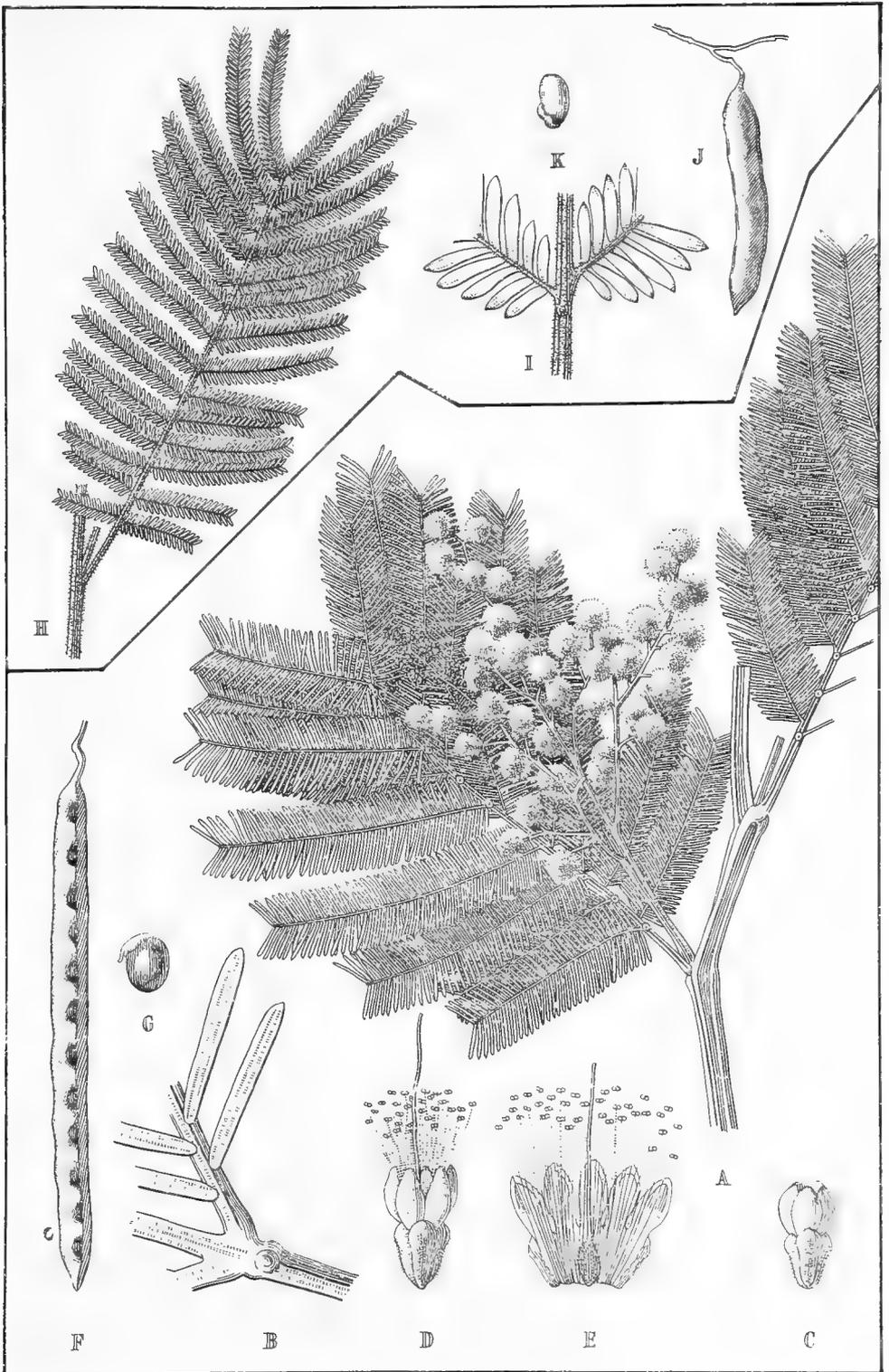
Variety *normalis*.

A. Flowering branch. Note the compound, bipinnate leaf. Pinna, plural *pinnæ* (Latin a feather), is a primary division of a pinnate leaf. Its leaflets are sometimes themselves pinnate, as in this case.

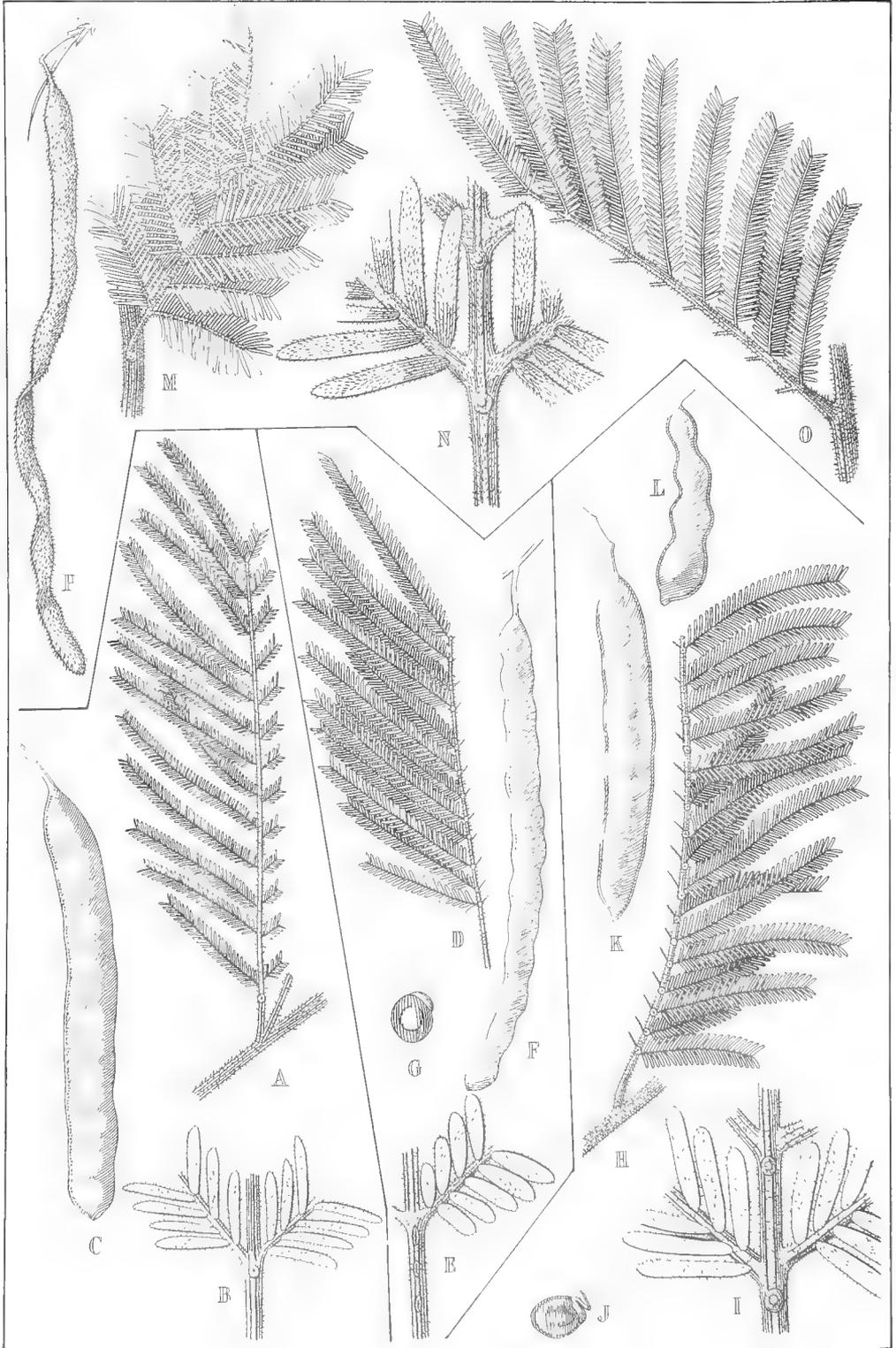
B. Portion of leaf (pinna), much magnified, showing the individual pinnules or leaflets, or secondary *pinnæ*.

Note the glands in A. and B. They vary a good deal in *A. decurrens*, and the glands depicted in the various drawings in Plates 87 and 88, while taken from average specimens, must not be looked upon as absolute as regards either number or position.

C. An individual bud removed from a head of flowers.



ACACIA DECURRENS, Willd. (Black Wattle, Green Wattle.)



ACACIA DECURRENS, Willd. (Black Wattle, Green Wattle, Silver Wattle.)

- D. Flower, showing—(a) Calyx, (b) Corolla, (c) Stamens, (d) Style.
 E. Flower, opened out, showing—(a) Calyx, (b) Corolla, (c) Stamens,
 (d) Pistil.
 F. Ripe pod.
 G. Seed.

Variety *Leichhardtii*.

- H. Leaf.
 I. Portion of leaf much magnified. Note the comparative absence of hairs from the pinnules. The hairs on the rachis are hardly sufficiently accentuated.
 J. Ripe pod. This is the smallest pod of all the varieties, but, as I have them from only one locality, I should not like to say that the pods are always so small.
 K. Seed.

EXPLANATION OF PLATE 88.

- A. *decurrens*, var. *pauciglandulosa*, A—C.
 „ var. *mollis*, D—G.
 „ var. *dealbata*, H—L.
 „ var. *lanigera*, M—P.
 Variety *pauciglandulosa*.

- A. Leaf, natural size. Note how the pinnae are separate from each other on the rachis.
 B. Portion of leaf much magnified. Note the shortness of each pinnule.
 C. Pod. Note its comparatively large size.

Variety *mollis*.

- D. Portion of leaf, natural size.
 E. Portion of leaf, showing the individual leaflets, magnified.
 F. Pod. Note that it is much constricted between the seeds.
 G. Seed.

Variety *dealbata*.

- H. Portion of leaf, natural size.
 I. Portion of leaf, magnified.
 J. Seed.
 K. and L. Pods. L is a pod examined by Bentham; hence his remark, “not contracted between the seeds.” M is a perfectly authentic pod of this species, and is introduced to show how the character “not contracted between the seeds,” which is usually employed to make an important difference between vars. *mollis* and *dealbata*, breaks down.

Variety *lanigera*.

- M. Leaf, natural size. Notice its intense hairiness. It is drawn from the type (Harvey Range, near Dubbo).
 N. Portion of leaf, magnified.
 O. Portion of leaf, natural size. It is drawn from the Gloucester specimen, E. Betche.
 P. Pod; drawn from the type. Notice its intense hairiness. No pod of another variety is hairy at all, so far as I know.

Acacia Baileyana, F.v.M.

COOTAMUNDRA WATTLE.

In 1889 I wrote: “During the last year or two a wattle has sprung into sudden prominence. The florists’ windows have been full of it; sprays of it sold readily at high prices, for its decorative properties were at once realised; seeds and plants of it were eagerly purchased; everybody now has

it, and it is already one of the commonest of cultivated wattles about Sydney—I allude to the so-called Cootamundra Silver Wattle (*Acacia Baileyana*). As a matter of fact, it has been largely cultivated (chiefly in Burwood gardens) for years. A Burwood gentleman (Mr. John Dawson), noticing its ornamental character, brought seeds from Cootamundra, and distributed them amongst his friends. It was for years looked upon (in an indefinite sort of way) as a variety of a well-known wattle, till the Rev. Dr. Woolls brought the matter under the notice of Baron Mueller, who had just described it under the name it now bears. It is one of the most local of wattles, being naturally found only in a small part of New South Wales—about Cootamundra, Bethungra, Big Mimosa Run, in the Wagga District, and thereabout. But, comically enough, this exclusively New South Wales Wattle was named and described in a Victorian publication after a distinguished Queensland botanist—a sort of botanical federation, in fact.”

Botanical Name.—*Baileyana*, in honour of Frederick Manson Bailey, late Government Botanist of Queensland.

Vernacular Name.—“Cootamundra Wattle,” because of its best-known locality.

Bark.—The bark has been used for tanning, but I am not aware with what result.

Timber.—Pale-coloured and worthless except for fuel.

Size.—Mr. C. W. Darley informed me that near Bethungra he saw a magnificent specimen of this tree. The diameter of the trunk was $25\frac{1}{2}$ inches, and the foliage had been nibbled off horizontally, so as to give the tree the general appearance of a gigantic mushroom. This flat portion of the “mushroom” (or greatest spread of the leaves) was no less than 38 feet in diameter. Following are additional dimensions:—Trunk diameter 12 inches from the ground, 18 inches. Height to first branch, 7 feet 4 inches. Height of top of tree, 24 feet.

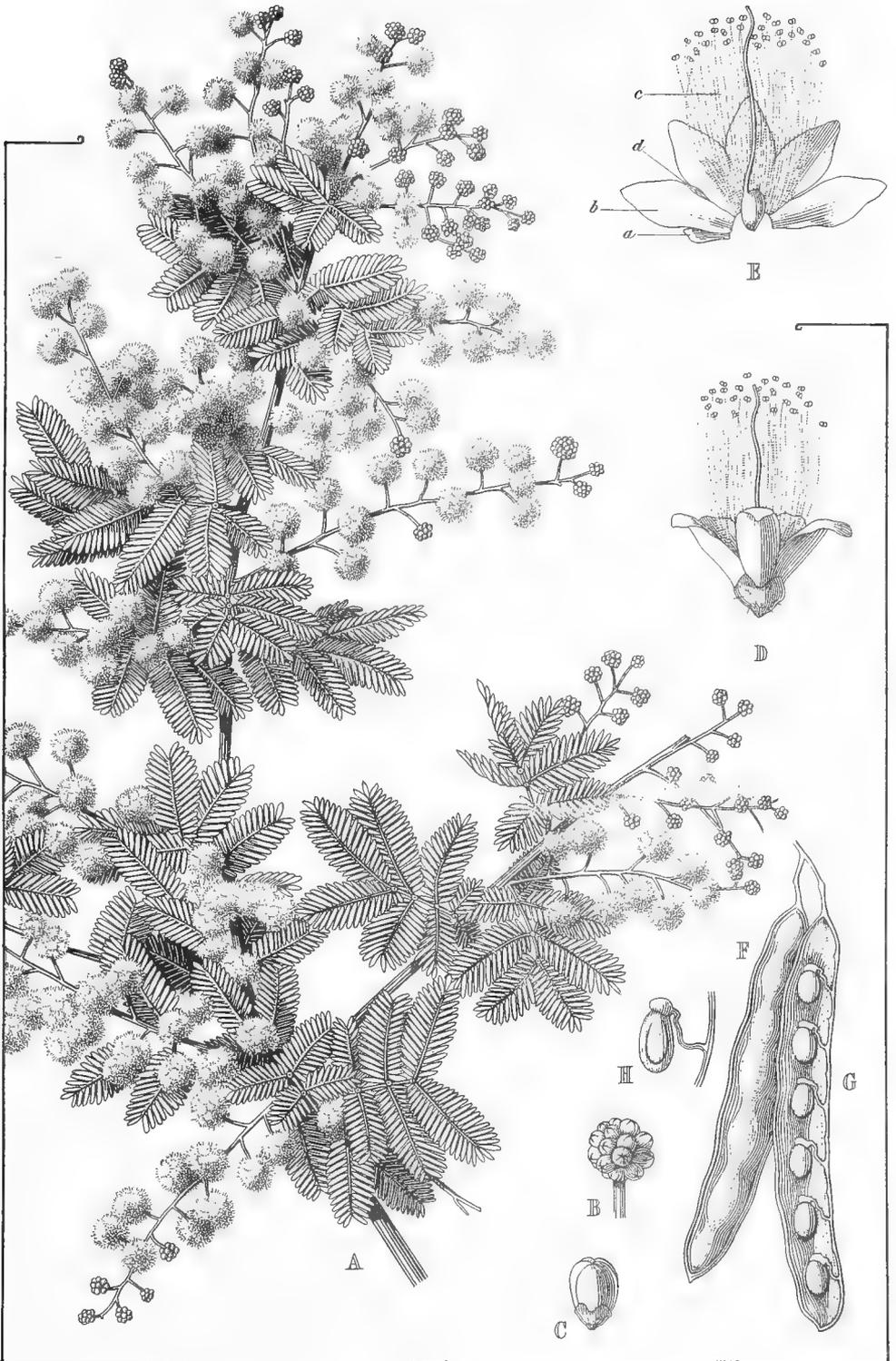
It was the admiration of the district, but some vandal killed it for the sake of a few pounds of bark.

Habitat.—Confined to New South Wales, in the district of Cootamundra, Bethungra, &c. Found also on Big Mimosa Run, Wagga District, also parish of Inglebah, county Bourke (Temora), and near Barmedman.

A small tree, glaucous, and very beautiful, hence largely cultivated for ornamental purposes.

EXPLANATION OF PLATE 117.

- A. Flowering branch.
- B. Flower-head.
- C. Individual bud.
- D. Expanded individual flower, much enlarged.
- E. Flower, opened out, showing—(a) Calyx, (b) Corolla, (c) Stamens, (d) Pistil.
- F. Pod.
- G. One valve of pod, showing seeds.
- H. Seed, showing the funicle (the thread-like body attaching the seed to the back of the pod.)



ACACIA BAILEYANA, F.v.M. (Cootamundra Wattle.)

The Cedar Group.

1. *Cedrela australis* (Red Cedar).
2. *Dysoxylum* (*Dysoxylon*) *Fraserianum* (Rosewood).
3. *Dysoxylum* (*Dysoxylon*) *Muelleri* (Red Bean).
4. *Owenia cepioidora* (Onion Wood).
5. *Melia Azedarach* (White Cedar).

Cedreda australis, F.V.M.

THE RED CEDAR.

Botanical Name.—*Cedrela*, derived from *Cedrus*, the Cedar-tree of the ancients, whose timber was durable and had a very sweet smell; *australis*, Latin, southern (Australian).

Vernacular Name.—Universally known in Australia as “Red Cedar,” the prefix being doubtless employed to distinguish it from “White Cedar” (*Melia azedarach*).

Synonym.—Bentham looks upon our Red Cedar as identical with *C. Toona*, Roxb., the Toon of India. It should be observed, however, that Baron Mueller differs from Bentham in considering the Australian “Cedar” specifically distinct from the “Toon.” In any case the trees are so closely related that any property possessed by one is shared by the other. Casimir de Candolle agrees with Mueller in keeping our Red Cedar distinct from the Indian tree.

Fruit.—The fruit is an oval capsule, about 1 inch long, which soon opens and sheds its light, membranous seeds. Mr. Gamble says that those of the Indian tree run about 1,200 to the ounce. These seeds have always a remunerative value, but care should be taken to collect fully-ripe seeds from healthy, mature trees. The seeds should be kept dry and preserved from insect pests, to which they are very liable. The collection of seeds of useful and ornamental Australian plants is one of those minor industries which are usually neglected, and I will always assist collectors in making them true to name.

Bark.—The outer bark is scaly, and in drying falls off, leaving an almost smooth surface of reddish-brown colour. It is moderately fibrous, and will tear into layers if some force be used.

Timber.—But the value of a Red Cedar lies in its timber, for it is without doubt the most valuable timber produced in New South Wales, and it is in universal use. It is equal to mahogany, to which it bears a good deal of

resemblance, except that it is much lighter in weight. The uses of the two timbers are much the same, *e.g.*, for tables, cabinets, and furniture in general, also for doors and fittings of buildings, where the cost does not stand in the way. When kept dry it is very durable. Pieces are now in existence which were taken from buildings erected in the very early days of the State, and are as sound as the first day they were used. Cedar often shows a beautiful figure, and it would be difficult to find any timber to surpass the beauty of picked specimens. Its colour is a pleasing red; it turns a deep rich colour with age. It is very rarely indeed attacked by white ants.

This is the first and foremost among colonial timbers for carriage building. Some grades of this, with clear, straight grain, dense and tough, make excellent framing for many parts of carriages—in fact, I have been informed that Sydney cabs of excellent quality have been built with cedar alone, except the shafts and wheels. The features that recommend it for the special use of the carriage builder are that it is light, and easily worked. It bends well for panels when seasoned. If a log be cut through the centre, then quartered, and fitches cut from each of these quarters, the result will be that panels even a quarter of an inch thick will not split at the ends more than an inch or so—an important matter in a good and expensive timber. Mr. Samuel Lownds, late teacher of coachbuilding at the Sydney Technical College, informed me that he examined some samples which had been exposed to the sun and rain, and also to the drip of water from a galvanized-iron roof for a period of three and a half years. The outer surface was almost unrecognisable; but the ends of the board were neither split nor shaken. A board was planed up, and it had not deteriorated in the slightest, the colour and the grain remaining perfect. Comparing cedar with the best English ash, the former timber remains sound under treatment which would cause the latter to become rotten. Our Sydney timber merchants might be reminded that cedar which is left floating in Sydney Harbour deteriorates for the purpose of the carriage builder. The salt penetrates the timber, and in the best-grade work the painting and varnishing suffer accordingly.

Mr. B. P. Mitchell, of Gumeracha, South Australia, remarks that cedar sawdust, when used for smoking ham, imparts a peculiarly nice flavour. Cigar boxes are, in this State, made of the softest cedar. It is used for railway keys. Fresh uses are constantly being found for this valuable timber.

Size.—A middle-sized to a very large tree, varying in height up to 200 feet, and with a trunk diameter up to 10 feet, though exceptional trees have exceeded these large dimensions. The size of the average trees now yielding cedar is about half the above.

“A tree cut down near Lismore in the good old days, which measured 10 feet in diameter at the base, was calculated to yield 30,000 feet of saleable timber.” (Moore.) In May, 1898, the steamer “Wodonga” brought from Barron Falls, Cairns, Queensland, a log weighing 8 tons.

Mr. A. R. Crawford, of Moona Plains, Walcha, gave me particulars of an even larger tree. He writes:—

This half fitch of cedar was cut from a tree which grew on Mr. H. Sauer's selection in Mulla Creek, 45 miles from Kempsey, and was cut from the trunk 56 feet from the stump. This tree was measured, after being felled, by Messrs. O. O. Dangar and W. Nance, and found to contain 80,000 feet of sound cedar;

the first limb grew 60 feet from the ground. The timber in this tree would be worth £800 in the flitch on the Kempsey Wharf. This flitch weighed 6 tons, and was drawn to Green Hills by Mr. Henry Davis, and exhibited by Mr. Robert Campbell, of Warneton.

Heinrich Sauer told me two years later that the top of the stump was about 10 feet from the ground, and that plenty of good cedar was cut from the branches, which were the size of fair-sized trees. It is said that the selection was chiefly taken up for the sake of this tree.

Grows in scrub from 100 to 140 feet high, generally with good straight, round barrel, free from branches about three-fourths of its length. Usually very sound when fallen; must be chopped through spurs in the spring, or is liable to split when touching the ground.—(Robert Kaleski, Dorriggo.)

The following note is taken from the *Sydney Morning Herald* of 25th October, 1861. While a big log—the biggest logs were not transported far in the old days, for the reason that suitable appliances were wanting:—

Yesterday afternoon our attention was called to four logs of cedar—being a portion of one tree—which had just been discharged at Russell's Wharf, Sussex-street, from the iron schooner "Black Diamond," from the Richmond. We understand that these are the largest logs ever brought to this market, and measure 14,359 superficial feet. With one exception, they are irregular shaped, the largest, which is 8 feet in length, measuring 23 feet in circumference; the next, 7 feet 10 inches in length, and 22 feet 4 inches in circumference; the third, 7 feet in length, and 21 feet 9 inches in circumference; the fourth, 9 feet in length, and 4 feet square. Each piece weighs from 5 to 6 tons. It appears that the tree was cut down about two years ago, but owing to its ponderous weight there was no means of getting it removed until very recently, when an extraordinary fresh occurring in the Richmond River it was floated down to the vessel's side, and shipped with great difficulty, owing to the absence of proper mechanical appliances.

Habitat.—The best cedar is found from the Bellinger River, northwards to the Richmond River, and throughout Queensland, especially in the warmest and moistest districts. It is, however, found from the Illawarra northwards, in the Shoalhaven gullies, Bulli Mountain, Kowmung, and thence northwards in increasing abundance until the northern rivers are reached. In localities to the south of Sydney the cedar is practically cut out, the only remaining trees being in almost inaccessible situations.

So far as I can learn, the most southern cedar tree in New South Wales is at Tillowrie, Milton, on the property of my brother, William Cambage, growing on igneous formation, and, of course, originally formed part of a brush. This species had most to do with first taking settlers to Milton and Ulladulla, and, in fact, to many other coastal spots.—(R. H. Cambage.)

An old log, cut forty years ago at Otford, on the Illawarra Line (30 miles south of Sydney), and found a few years ago, was over 5 feet in diameter, and almost perfectly sound. This is an instance of the proximity of merchantable cedar to Sydney at one time.

There is but little cedar on the Hawkesbury now; at one time it was plentiful. At Sackville (just past Tizzana) is a large spreading red cedar of several stems, by the banks of the river. This is one of the few remaining Hawkesbury River cedar trees.

District Forester Swain, of Narrabri, says:—"I have found Red Cedar growing in the Parish of Vant, County Hawes. I am wondering whether this is not one of the most western localities in which it is known to grow." This is just north of the Upper Manning River.

The following list of New South Wales Timber Reserves containing Red Cedar is furnished by the Forest Department:—

County.	Reserve.	Remarks.
Clarke.....	1,662	Matured and young cedar, mostly in gorges, in all stages of growth.
„	29,433	
Buller	4	Large quantities, matured and young.
„ and Drake ...	1,120	Small quantities, in very rough place.
„ and Clive ...	24,267	Scattered matured and young in the ravines.
„	33,219	Small quantity, young.
Dudley	158	A fairly large amount of matured cedar in patches in rough country; good growth of young timber.
„	3,753	
Drake	6,369	Moderate quantities of both matured and young cedar.
„	9,999	
„	11,452	
„	11,453	
„	22,413	
„	27,774	
Fitzroy	354	On some of these reserves there is a fairly large amount of matured cedar in patches; also, a large quantity of young growth, well distributed. In most instances the matured cedar is located in rough and broken gullies or gorges; large quantities are now to be found in the watershed of the Macleay and Nambucca Rivers.
„	19,418	
„	20,637	
Gresham.....	1,608	On some of these reserves there is a fairly large amount of matured cedar in patches; also, a large quantity of young growth, well distributed. In most instances the matured cedar is located in rough and broken gullies or gorges; large quantities are now to be found in the watershed of the Macleay and Nambucca Rivers.
„	6,670	
„	6,479	
Gough.....	1,433	On some of these reserves there is a fairly large amount of matured cedar in patches; also, a large quantity of young growth, well distributed. In most instances the matured cedar is located in rough and broken gullies or gorges; large quantities are now to be found in the watershed of the Macleay and Nambucca Rivers.
Raleigh	14,641	
„	34,088	
„	34,089	
„	34,090	
„	34,091	
Rons	249	Contains matured and young cedar.
„	4,353	
„	10,723	Contains matured and young cedar, in small quantities, in very rough localities.
„	31,841	
„	33,199	
Sandon	4,768	Scattered cedar, mostly young.

Propagation.—Red Cedar grows most vigorously in the rich, moist, alluvial flats and sloping ground of our Northern Coast districts, particularly so on the banks of creeks on the eastern slopes of the ranges, where the greatest shelter from the prevailing winds and shade are obtainable. Young plants may be successfully transplanted* in such localities during the winter, at which season at least 90 per cent. of the trees planted will survive, and grow at a rate of from 3 to 5 feet annually. The cedar flourishes best when planted in small open places in existing forests, where there is room for the trees to mature, and they obtain the most shade, and are better protected from the winds and the frosts than if planted in open ground. Too much air and light is fatal to them. The brush plants must be allowed to grow up with them, care being obviously taken that they do not smother the young cedar plants.

*Mr. Gamble says: "Seedlings are easily raised, but difficult to transplant. The roots are surface-feeders, so that it ought not to be grown on the edges of fields." These remarks refer to the Indian tree, but they largely apply to our red cedar also.

Seeds are rarely produced on cedar trees growing in dense forests; but trees, if planted in rich and moderately moist soil in open places, will annually produce seed after they have attained the age of 6 to 8 years. If the seeds be fresh and sound they readily germinate, but they are very liable to deterioration, as has been already stated.

As an instance, however, of cedar seeds retaining their vitality for a considerable period, Mr. Forester Brown, of Port Macquarie, relates, on the authority of Mr. Donkin, that some land at Kimbriki, Manning River, was cleared. No cedar was then on it, no cedar trees near. There had been no floods for years previously, yet twelve months afterwards numbers of young cedars sprang up.

It is one of the very few Australian deciduous trees, although in the warmest districts it is semi-deciduous, or even evergreen. It is a beautiful tree, and is well worthy of cultivation for that reason, apart from its value for timber.

The following particulars in regard to the cultivation and conservation of Red Cedar are of public interest. It is hoped that landowners in suitable districts will see that it would be enlightened policy on their part to propagate such valuable timbers as Red Cedar. A few thousand well-planted and well-tended cedars would be a valuable legacy.

Spasmodic attempts have been made to reforest the Red Cedar in this State. The Forest Department planted some on the Dorrigo, but the plantations were neglected. Greater success has attended the small plantations at Hogan's Brush, near Gosford.

The following I wrote nearly twenty years ago, but it may still be suggestive:—

Mr. Breckenridge, at Failford, near Cape Hawke, has the nucleus of a good cedar plantation. He has not gone to much expense in the matter; but has simply inexpensively fenced a part of the brush to keep cattle out. Here and there, in the rich soil, he has dug a small hole, and put in a seedling cedar. The young trees grow up with the rest of the vegetation, and most of them are doing well. About all that is now done is to see that the young cedars get fair play—that is (say) that they are not choked out of existence by some rampant growth. This very rarely happens, and practically all the attention given is to keep one's eye on them during an occasional walk in the brush. There are numbers of young seedlings at the head of Wollamba Creek, and it is Mr. Breckenridge's intention to add to his plantation from that source. This little cedar plantation is a valuable object-lesson to the hundreds, and perhaps thousands, of selectors and others who have bits of brush land in the coast and coast mountain districts. An inexpensive fence, seedlings which can usually be obtained in the district, and which may be inexpensively planted about August, little labour and very little supervision, and we have a cedar plantation. The plants grow up under natural conditions; the brush land near creeks is often not utilised at all under existing circumstances, and the land is being utilised with the promise, in many cases, of yielding a fair interest for the outlay in (say) thirty or forty years. Planting for posterity, perhaps; but forest planting (as distinct from forest conservation) is usually planting for posterity. What militates against plantations, as ordinarily carried out, is the heavy initial expenditure—expensive fences, heavy, and worse than useless clearing, and costly non-residential supervision. I hope my readers will think over the matter, and put in a small experimental patch next season.

Mr. Breckenridge's site is by no means perfectly favourable for the experiment, the soil being scarcely suitable, and the site too near the sea. On the Upper Paterson and Allyn and Williams Rivers (the late Mr. Augustus Rudder told me) there is ample scope on their banks, where, with unused rich land, good results would attend moderate effort to produce a fine growth of cedar in considerable quantity, but it would require more than twenty or thirty years to mature it for market.

Re the growing of our Red Cedar, I have seen it in many places thriving well in the open, where the soil was suitable. There were two on a property in which I had an interest on the Macleay, where they were under my observation for over fifty years. When first seen one of them was about 15 inches in diameter; the other about 18 inches. During the time mentioned, one increased in girth to over 11 feet; the other to over 12 feet. I do not think frosts injured it at all. (The late Mr. Augustus Rudder.)

EXPLANATION OF PLATE 9.

- a. Flower—(a) Calyx, (b) Petal, (c) Stamen, (d) Stigma, (e) Ovary half immersed in disk, (f) Pubescent disk.
- b. Young flower.
- c. Stamen, back and front view.
- d. Capsule opening in five valves, leaving the dissepiments attached to the persistent axis—(a) Valve, (b) Dissepiment, (c) Seed.
- e. Winged seeds.
- f. Cluster of fruits.

Dysoxylum (Dysoxylon) Fraserianum, Benth.

THE ROSEWOOD.

Botanical Name.—*Dysoxylon*, from two Greek words—*dysodes* or *dysosmos* (fœtid or ill-smelling), and *xylon* (wood), in allusion to the bad smell (usually of a garlic character) of some species. This odour is strongest in some non-Australian timbers. In the species under notice, the odour of the timber is the reverse of ill-smelling. *Fraserianum*, in honour of Charles Fraser, first Superintendent of the Botanic Gardens, Sydney, who early collected the plant.

Vernacular Name.—"Rosewood," because of the odour of the freshly-cut timber. It retains this sweet perfume for an indefinite period.

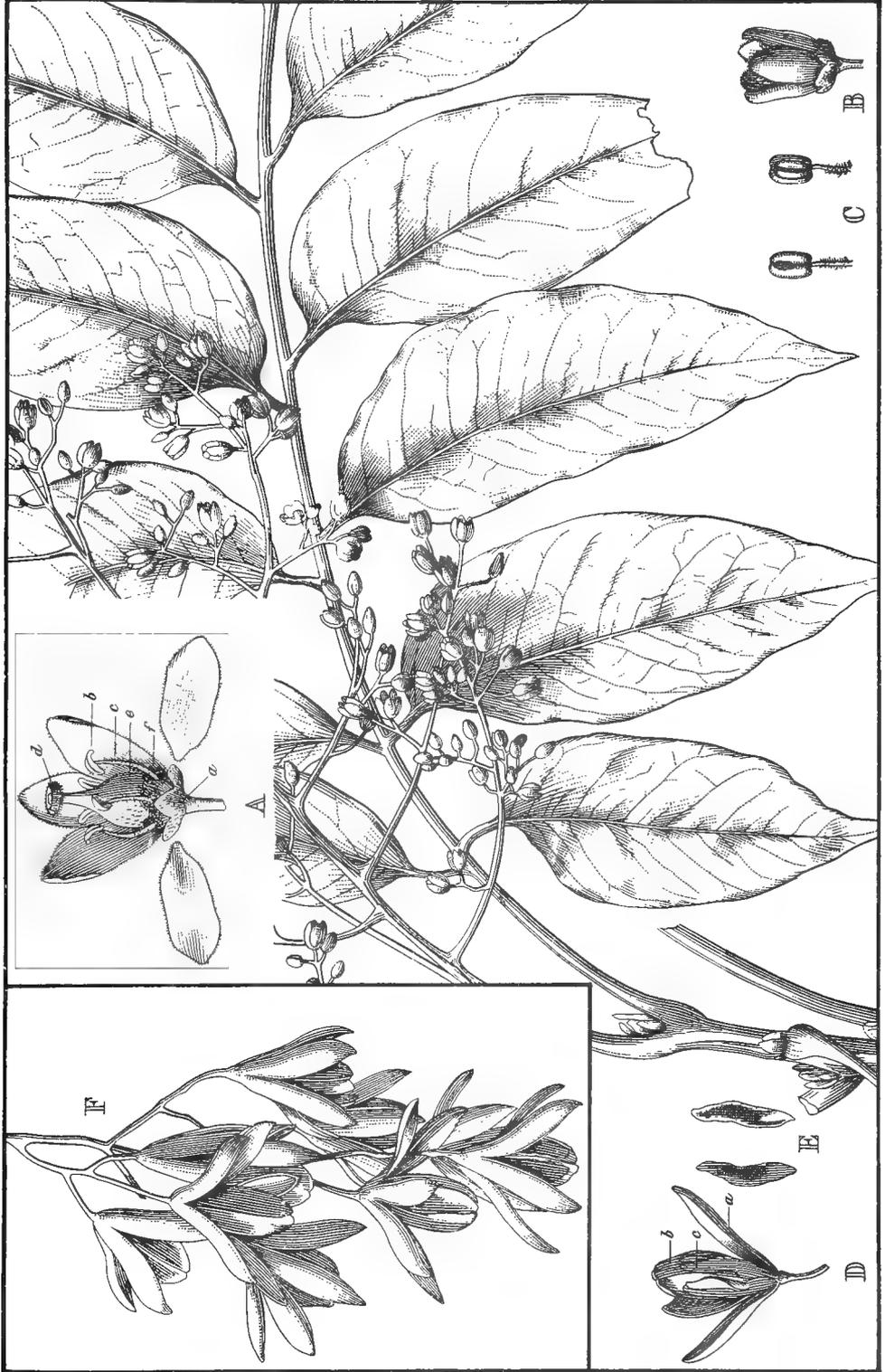
Leaves.—Dark, and rather shining on the upper side, paler underneath, leaflets 5-10, average length $2\frac{3}{4}$ -3 inches (W. Dunn, referring to living trees on the Macpherson Range).

Flowers.—Mr. Dunn states it flowers in the late autumn; later than Red Cedar. The flowers have a very agreeable smell.

Fruit.—"Of a pretty rosy red" when quite ripe.

Bark.—Often rather scaly; somewhat like Red Cedar.

Timber.—Characteristics: Of a reddish colour, and has a neat figure. Has a fragrant rose-odour. A timber of the mahogany class. Works splendidly, shrinks little, and is of good appearance.



Speaking of a Queensland specimen sent to the Colonial and Indian Exhibition, Mr. Allen Ransome says:—

This wood is of a reddish colour, with a good figure. It worked excellently in the machines, and planes especially well. If it can be imported at a reasonable price it might take the place of mahogany.

A specimen from the Myall Lakes, New South Wales, strongly resembles mahogany; but it has little figure. It is straight and close in the grain, and a good working timber.

This wood reminds one of Cedar, but it is a little heavier, is of rather a deader colour, and it is apt to tear a little under the plane, hence it fetches only about half the price of Cedar in Sydney. But it polishes well, and has a sheen which is very pretty.

Young Rosewood has hardly any colour, but the perfume is sweet. Under the axe it is a fairly hard timber. Straight in grain, heavy, and beautifully coloured red in centre, the thin sap-wood being pale yellow; the bark is slightly rough.

Mr. Yabsley, of the Coraki saw-mills, says that Rosewood will stand the weather almost as well as any of the best hardwoods, and can be split.

As evidence of *durability*, some large logs of timber, moss-grown, yet still sound, well-coloured, and emitting the usual fragrance when cut into, can be seen in some of our brush forests, with large trees growing all around them, and which have evidently come to maturity since the trees fell, probably before the British settlement of Australia. Settlers often use Rosewood for house-blocks; they know its durability in this trying situation. It resists both damp and white ants.

Principal Uses.—Furniture, cabinet-work, turnery, carving, and indoor work of all kinds. It is used for newels, mouldings, and framing of all sorts. Useful for show-case work, also for planes, levers, trundles, and studs in roller-boards of organs, &c., window-jamb, screws of hand-screws, and any uses where a wood a little harder than softwood is required. Recent test uses are for bee-boxes, broom-handles, and wire-mattress frames. Has been strongly recommended for wine-casks. It will split, and I am assured it imparts no taste to wine.

For boards for ballroom floors it is excellent; I prefer it to Tallow-wood.—(W. Dunn.)

Mr. Yabsley states that Rosewood can be put to more uses than any timber we have in New South Wales, so far as he knows.

I desire now to draw attention to a timber for wine-casks which I had not thought of for the purpose, until the late Mr. Thomas Bawden, of Grafton, brought it under my notice in 1891. His remarks on such a subject demand respect, for, as is well known, he gave a good deal of attention to the utilisation of our native products during thirty years and more. Mr. Bawden says:—

With regard to wine-casks, and the proper wood for the purpose, I think you will find Rosewood the very best. I know some years ago the late Richard Bligh had some large vats and casks made of that timber, which suited admirably, and certainly gave no taste to the wine. I yesterday asked an old wine-grower of large experience what he thought best for wine vats or casks, and he at once selected Rosewood, as giving no taste of a deleterious character to the wine. He has tried Silky Oak, but has condemned it, and has not been able to get anything better than Rosewood.

I replied expressing doubt lest an odorous wood, of the nature of Rosewood, would affect the bouquet of wines stored in it. In reply, Mr. Bawden wrote:—

With regard to the Rosewood for casks, I have the assurance, in addition to my own large experience, of one who has been engaged in wine-making in this district for the past thirty years, that the wood does not give any taste to the wine. Might I suggest an experiment of a small piece of seasoned Rosewood placed in a bottle of wine for a few months? Should the Rosewood turn out as I believe it will, there are large quantities of it in this district.

I venture to express the hope that those who have tried Rosewood for wine-casks will relate their experience, and that those will test it who have facilities for so doing and have not yet done so. It is high time that such an important matter was settled. I should also like to see exhaustive tests made of the Red Bean (*D. Muelleri*), which may be described as a scentless Rosewood.

Drawbacks to the Timber.

1. *Its Oily Nature.*—A drawback to this undoubtedly valuable timber is the circumstance that it takes glue with difficulty, owing, perhaps, to some oleaginous substance in it.

It is unsuitable for instrument cases. The following report sent in to the Public Works Department explains the matter:—

A 5-inch theodolite was sent in for repairs, supply of some parts, and new case, from Lands Department. New case was made of well-seasoned Colonial Rosewood by Government Architect's Workshop, the new parts of the instrument were bronzed and lacquered in the usual way, the other portion of the instrument merely cleaned, and delivered to the Lands Department on 8/2/05. After about three months the *whole* of the instrument was observed to be sticky, and was subsequently returned to be cleaned off, rebronzed and relacquered, which was done accordingly, and returned to Lands Department on 5/7/05. Then again, it was reported to be sticky on the 28/8/05, becoming similar to what it was before. A small box was made of a piece of the same wood, and a piece of brass tube bronzed and lacquered was placed in it on 30/8/05, and after about three months it was found to be quite sticky.

A similar thing has happened to another 5-inch theodolite, for which a new case was made of Colonial Rosewood for the Public Works Department on 15/3/05, and after lying in store was noticed to be the same on 1/5/06 (original lacquer affected).

Also on a parallel ruler that was placed in a Colonial Rosewood case.

Rosewood belongs to a group of plants called the Meliaceæ, certain of which contain an essential oil (in which is dissolved a resin) in their timber. At the ordinary temperature of the air, and more readily on the application of heat, this solution of resin in oil evaporates and the resin is condensed on any cool surface, preferably on metal or other conductor of heat.

King George III had a valuable watch which caused his watchmaker a good deal of trouble, when it was found that His Majesty often put it in a drawer made of odoriferous wood, the resin contained in which clogged the works.

The subject is worthy of exhaustive investigation which, so far as I am aware, it has not yet received. Meantime, so far as Rosewood is concerned, instruments should be kept in Red Cedar boxes.

2. *Its alleged Special Tendency to Shakiness.*—Mr. Robert Kaleski, who formerly resided on the Dorrigo, wrote to me some years ago:—

Rosewood grows about 120 to 160 feet, about 12 feet girth, sometimes round in barrel, sometimes very spurry; clean barrel like rest of scrub timbers. Faultiest tree for the mill in N.S.W., apparently sound trees shaking and splitting when broken down on the bench. Will not take glue, and will last for posts and blocks about eight years in the ground. Never loses scent; goes for same soil as Cedar. Mature trees nearly always rotten inside, often only a shell; sort of white ant responsible for this; goes in at the bottom of spurs and works upwards. Generally grows in clumps like Cedar. Belt runs from W. to N.S.: large quantity at N.E. to Paddy's Plain. Is at present being cut for Germany for the mills. Very pretty figuring, woolly to work, grain too short for building stuff. Fairly durable in weather; fair amount available. Has red seed (fruit, J. H. M.) something like a small cherry.

Out of 100,000 feet standing, which I bought on speculation. I could only find 30,000 to fall, and 40 per cent. of that proved to be faulty when down, some apparently sound trees splitting in halves, when hitting the ground, from end to end. Its drawing weight is 300 feet to a ton. Very liable to develop-shakes after being sawn a few weeks. Tree always unsound if dead branches on top. My own selection contained more Rosewood than any one I know of on the Dorrigo.

This is an exact copy. In 1893 I wrote, after a careful inspection of the Dorrigo:—

Rosewood.—A fine tree 5 feet 6 inches in diameter and 140 feet to the first branch was seen, but although the northern portion of the Dorrigo is full of Rosewood (merchantable), say 4 feet in diameter, it does not attain the same magnificent dimensions that it does in parts of the coast districts.

Nearly all our brush timbers lack tensile strength, and, particularly when they attain a large size, they require careful felling, otherwise the logs may be injured. In Europe, the injury to timber in falling is very carefully guarded against, but here special precautions to break the fall of a large tree, *e.g.*, by dropping it on smaller worthless timber, is very rarely thought of. Cedar is often shaken by careless felling. I have already stated that the Rosewood trees of the Dorrigo are not so fine as those of the coast belt, and if the large percentage of over-mature trees on the Dorrigo be as stated by Mr. Kaleski, then the sooner, in any rational system of forestry, they are cut out to make room for young growth the better. Over-mature trees only cumber the ground, and are a hindrance and a perplexity to the forester.

In view of Mr. Kaleski's very strong language, "Faultiest tree for the mill in N.S.W.," the following passage from the report of Mr. Boorman, Collector, Botanic Gardens, to me, is interesting. He wrote me from the Macpherson Range, and had never seen Mr. Kaleski's report:—

This (Rosewood) is a very large tree, of immense timber-producing qualities, as, in addition to size, it is perfectly sound throughout.

I want to get at the truth in regard to our timbers. I always state their alleged defects when I know them, for we must be as careful in stating defects as in attributing excellencies.

Size.—

One of the largest trees in the district in which it is found, varying in height from 70 to 100 feet, and from 4 to 5 feet in diameter (C. Moore, *loc. cit.*)

Tall and massive trees of 100-140 feet, 20 to 30 feet at base. Acacia Creek, Macpherson Range, N.S.W. (W. Dunn and J. L. Boorman.)

Following is another report from Mr. Boorman to me:—

It reaches the height of 80-140 feet, whilst its girth measurements are anything between 20-40 feet.

Here is another report from Mr. Dunn:—

You are aware the tree grows large in circumference, although not so extra tall. Yesterday I put a measuring tape around twelve of these standing trees. The largest gave a girth of $18\frac{1}{2}$ feet, and the smallest 12 feet; the twelve averaged 16 feet in circumference, measured 5 feet from the ground. To reckon each tree to carry a barrel 50 feet in length, with a mean or average girth of 16 feet, works out a return of 115,200 super. feet; this, at 12d. per 100 feet super. (the present royalty rates here on all brush timber other than Pine [Hoop]), amounts to £57 12s. royalty.

It will thus be seen that the Rosewood is one of the giants amongst New South Wales forest trees.

Habitat.—This is a “brush” or jungle timber found in northern New South Wales from Wyong (a little north of the Hawkesbury) to southern Queensland.

It was collected by Robert Brown on the Williams River, and, far later, by Wilcox and Beckler on the Clarence River.

It is plentiful on the ranges at the head of the Richmond. (A. H. Yabsley, Coraki.)

There is an abundant supply of Rosewood on the Clarence River watershed of the Macpherson Range, and the Tooloon and other brushes. (W. Dunn.)

It seems almost superfluous to give a list of localities.

Following is a list of the N.S.W. Forest Reserves containing Rosewood (February, 1905):—

County.	No. of Forest Reserve.	Area.
		acres.
Buller	32,130	21,512
”	35,944	12,310
”	37,004	36,800
”	38,397	8,500
Drake	6,264	9,000
”	11,111	900
Budley	37,568	89,900
Durham	196	10,000
”	201	22,440
”	202	34,465
Fitzroy	354	4,800
”	355	5,760
”	642	20,778
”	19,418	1,098
”	20,667	3,380
Gresham	1,608	24,960
”	36,928	16,500
Hawes	7,974	1,280
Rous	61	960
”	62	1,820
”	256	94
”	4,353	64,331

Quantity Available.—Practically unlimited. I look upon this as a valuable reserve timber. Its usefulness will be realised later on, when Cedar is even scarcer than it is.

Speaking of the Macpherson Range, Mr. Boorman reports:—

This is perhaps more common than any other species of softwood, save “Pine,” forming huge trees, straight in barrel, producing an enormous amount of good timber, the supply being almost unlimited.

The following statement was published in the Press in January, 1905, under the authority of the Minister for Lands:—

SUPPLY OF ROSEWOOD IN NEW SOUTH WALES.

The Minister for Lands having observed that the Commercial Agent in London had been informed that it would take New South Wales twelve months to supply an order for 200,000 feet of Rosewood, Red and Black Bean mixed, and having regard to the fact that the supply of Rosewood—a timber eminently suitable for furniture work—is stated in Maiden's "Commercial Timbers of New South Wales" to be "practically unlimited," the Minister has caused inquiry to be made, with the result that one saw-miller in the Bellingen district has intimated that he will undertake to supply 30,000 feet of Rosewood a month, while another offers to supply 250,000 feet of this timber per annum. One forest officer in the northern district says an order for 200,000 feet of Rosewood could be executed in his district in a very short time; and yet another one reports that in three places alone in his district there are about 15,000,000 feet available.

The Minister has directed that this information shall be at once conveyed to the Commercial Agent.

The following extracts from a report are interesting:—

- "Referring to your circular letter dated 26th November, 1904, asking to be furnished with a report on the statement made to the Commercial Agent in London that it would take twelve months to supply an order of 200,000 feet of Rosewood, Black Bean, &c., I have the honour to report that the statement is not correct, as on Forest Reserve No. 32,130, county of Buller, there is an area of 4 miles by 3 densely covered with the best kinds of Rosewood, containing at the very lowest estimate 3,000,000 superficial feet of matured timber.
- "In the parishes of Gore, Acacia, and Koreela, county of Buller, there is an estimated quantity of matured Rosewood of 9,000,000 superficial feet, and in the parish of Beauiry, county of Buller, 3,500,000 superficial feet, to say nothing of numbers of other parishes all along the Eastern Fall that contain quantities of this timber.
- "I forward an offer from the manager of the Federal Sawmill Company of New South Wales to deliver, f.o.b., at Brisbane, 250,000 feet per annum, and if any inducement were offered, two further mills could be erected and each supply the same annual output near the Queensland border at a railway station named Dugandan, in Queensland.
- "In addition to Rosewood, I estimate that 20,000,000 feet of the following matured timbers could be supplied for export purposes at the Queensland border, viz.:—Silky Oak, Tulipwood, Red and Black Bean, Native Guava, White Cherry, Bonewood, Onionwood, Maiden's Blush, Tamarind, Cudgerie, Teak, Yellow-wood, Stavewood, Coachwood, &c., to say nothing of Cedar and Hoop Pine.
- "It only requires some inducement to open up an enormous trade with the world in these excessively valuable timbers, which would find enormous employment and revenue to the State."

The following letter is written by a well-known timber expert:—

I have pleasure in assuring you that the supply of this particular ornamental and valuable timber (Rosewood) is practically unlimited, extending over almost all the high land in the Eastern Division of this State, and I have little doubt when its undoubted value becomes known abroad, Rosewood will be found to be one of the largest exported of softwoods from New South Wales. At present the price given for Rosewood is too low to pay teamsters to haul it; but I can assure you there is a plentiful supply to be got, and no doubt the price will be given later on, when it has proved its great value abroad.

Following is the opinion of a Forest Officer:—

All that is required to find custom for this lovely wood is to dispatch a million or so of superficial feet of thoroughly matured timber to London or Germany; no other introduction is required. Its fame will soon be established

for all time, and the Coast sawmills will be kept in motion cutting Rosewood day and night for years to come. I sincerely trust no allied species will be exported; if so, our trade may get disturbed, and the genuine material imperilled. The virtues of Rosewood cannot be overrated; and no one knows this better than yourself.

Again:—

There is a tremendous feature for this wood, and it is worthy of careful nursing and protection, more especially as Red Cedar is now nearly extinct (in New South Wales). Rosewood alone is a most valuable asset to the State, and I would go so far in championing its claims as to suggest special legislation for its protection, *i.e.*, have special Forest Reserves set apart for it where abundant,—treat it and guard it as if it were one of the precious metals.

Surely something is economically wrong when we have a timber like this, admittedly possessing properties which render it valuable, which has to be destroyed because cut-throat competition prevents timber-haulers and sawyers getting a living wage for hauling and cutting it.

Responsible buyers of New South Wales timbers in other countries have told me, in practically these words: "You New South Wales people are a pack of fools to give away your timber for the price you do; your timber merchants are using its plentifulness for the purpose of cutting one another out in foreign markets."

This is strong language, and it is for students of political economy to suggest a remedy. Certainly the timber-fellers and haulers, and the owners of country mills, do not reap much advantage from many kinds of colonial timber.

EXPLANATION OF PLATE 85.

- A. Flowering branch.
- B. Flower, showing—(a) Calyx, (b) Corolla, (c) Staminal tube, (d) Stigma.
- C. Flower opened out, showing—(a) Corolla, (b) Staminal tube 8 to 10 toothed, (c) Tubular disc, (d) Pistil.
- D. Anther.
- E. Pistil.
- F. Fruits.
- G. Ripe capsule, showing four deep-orange coloured seeds.
- H. Part of capsule showing seed with arillus and manner of attachment.

THE RED BEAN.

Dysoxylum (Dysoxylon) Muelleri, Benth.

Botanical Name.—*Muelleri*, in honour of the late Baron von Mueller.

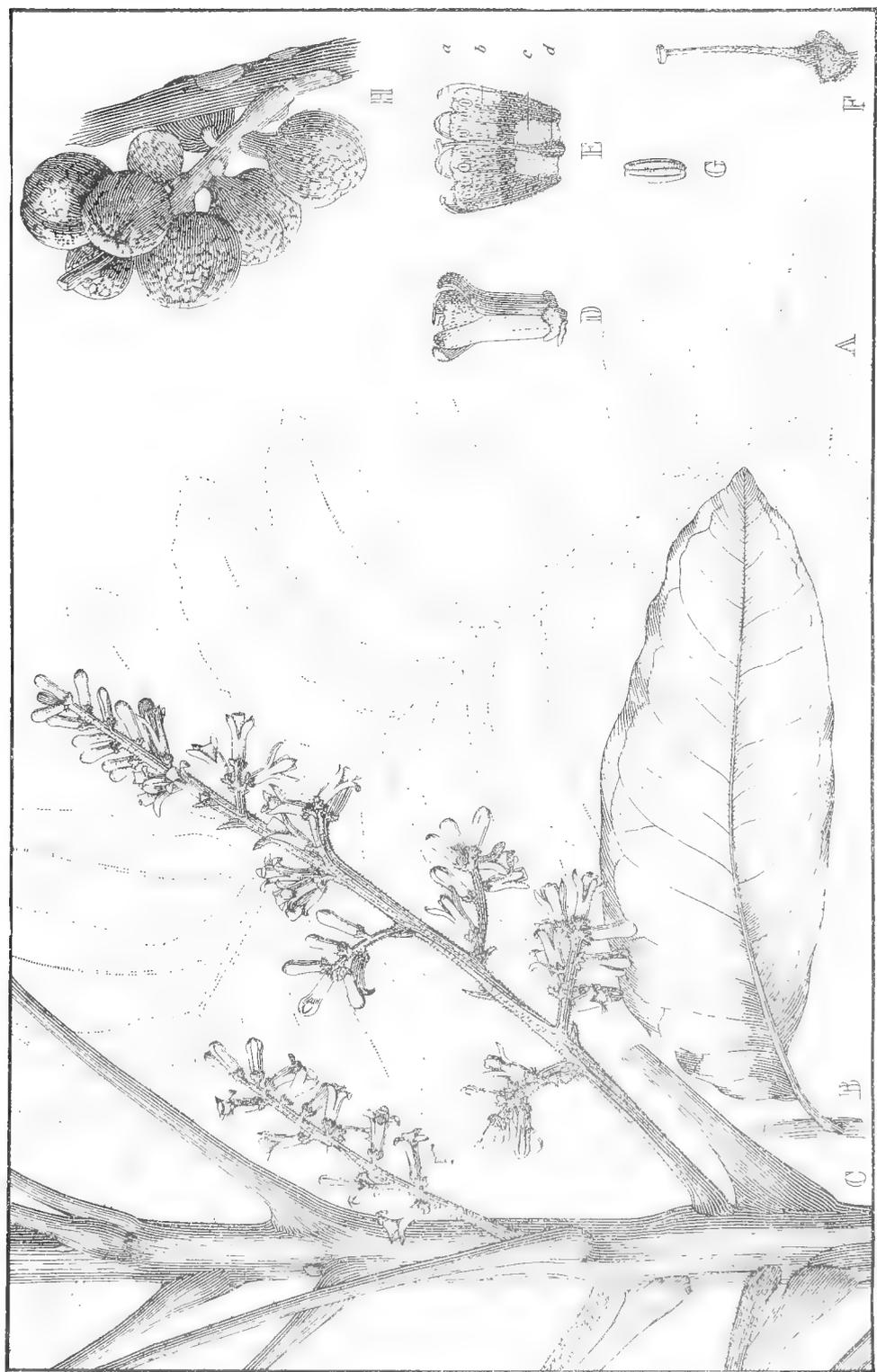
Vernacular Names.—It bears various names, *viz.*, "Pencil Cedar" and "Turnip Wood," both given from the smell of the wood. "Red Bean" is, however, the commonest name, and one not applied to any other tree, so far as I know. It gets its name because it is supposed to resemble the timber of the Black Bean (*Castanospermum australe*) except in colour, which is red, but the name is a little far-fetched.

Timber.—Red Bean may be described as a scentless Rosewood, of a red colour, and possessing a neat figure. Both bark and sapwood have a strong, turnip-like odour when fresh; it departs on drying. It is often sold in Sydney as Cedar or Bastard Cedar, but it is heavier than that wood, and



DYSOXYLON FRASERANUM, Benth. (Rosewood.)





DYSOXYLON MUELLERI, Benth. (Red Bean.)

is of sufficient excellence to stand on its own merits. It is good furniture wood, and has a quiet yet handsome figure that looks well under polish. It can be put to most of the uses that Spanish Mahogany is put. I have heard that it is considered valuable for the naves of wheels in the districts in which it grows.

Following is an extract from a letter written by the late Mr. Thomas Bawden, of Grafton, to me in 1891. He sent me twigs of *D. Muelleri*:—

“There are many other valuable timbers in the Dorrigo brushes, amongst others the Pencil Cedar, a use for which I learnt, previously unknown to me: I was shown a pair of old dray wheel naves made of Pencil Cedar, some twenty-five years ago. Hitherto I have thought Apple-tree was the most suitable timber we had for that purpose, but this piece would serve to show that the Pencil Cedar is equally as good.”

Locally it is used for cabinet-work, flooring, lining, and ceilings of houses.

Habitat.—It is a brush tree belonging to the coastal districts, and probably extending a good deal into the rich brush forests in the upper parts of the rivers. It is a native of our Northern Rivers, particularly the Clarence, Richmond, and Tweed. As regards Queensland, Mr. F. M. Bailey, in his Queensland Flora, gives “Brisbane River, Moreton Bay, and other southern parts.” John Dallachy found it on the Herbert River, so that its range may be defined from the Clarence to Central Queensland. As regards New South Wales, it should be looked for on the Bellinger, Macleay, and Hastings Rivers.

EXPLANATION OF PLATE 101.

- A. Leaf reduced in size one half.
- B. Leaflet, natural size.
- C. Part of flowering branch.
- D. Flower. (N.B.—Staminal tube yellow outside in a fresh state.)
- E. Flower, opened out, showing—(a) Corolla, (b) Staminal tube, (c) Tubular disc (orange-coloured in fresh state), (d) Pistil.
- F. Calyx and pistil.
- G. Anther.
- H. Fruits.

Owenia cepiodora, F.v.M.

THE ONION WOOD.

Botanical Name.—*Owenia*, in honour of the late Sir Richard Owen, the great comparative anatomist of the British Museum; *cepiodora*, from two Latin words—*cepa* (caepa), an onion, and *odor*, a smell or odour.

Vernacular Name.—“Onionwood” or “Bog Onion.” The timber smells like decayed onions, though often a newly-cut plank has a smell resembling watermelons.

There is often a gradation of “pleasant” and “unpleasant” odour in the same plant. The matter seems worthy of chemical investigation. The onion smell is not always present in this species, being replaced by a melon or pumpkin odour.

Aboriginal Name.—Called “Ingmunyon” by the aborigines, “Bog Onion Tree” by the white settlers (Mueller, in original description). The late Mr. Alfred Cadell once sent me specimens of this tree with a message

that the aboriginal name was Boggunyan." I would suggest that neither "Ingmunyon" nor "Boggunyan" are true aboriginal names, but were used by the blacks in imitation of the settlers' names of "Onion" or "Bog Onion."

Timber.—This is a useful wood of the cedar class—the wood, in fact, being often sold as Bastard Cedar. The name (Onionwood) is owing to the smell of the wood, which is fugitive, and therefore not offensive. Used for the same purposes as Cedar.

Size.—A medium-sized tree. Average height 100 feet, with a diameter of 18 inches (Forester Pope). Mr. W. Baeuerlen, then of Tintenbar, gives the height at 40 to 50 feet, with a stem-diameter of 1 foot.

Habitat.—This tree is confined, so far as is at present known, to the brushes of Northern New South Wales and Southern Queensland.

Very little in Clarence River district, but plentiful in the Richmond River district. Found scattered about in nearly all the brush forests of the Tweed, wherever the soil is inclined to be rich. (Forester Pope.) It grows plentifully in Forest Reserve 1,120 (Casino district).

What the southern limit of this tree is we do not know. It appears to become scarce south of the Clarence. It extends into Queensland, Mr. F. M. Bailey giving the locality simply as "southern scrubs."

EXPLANATION OF PLATE 115.

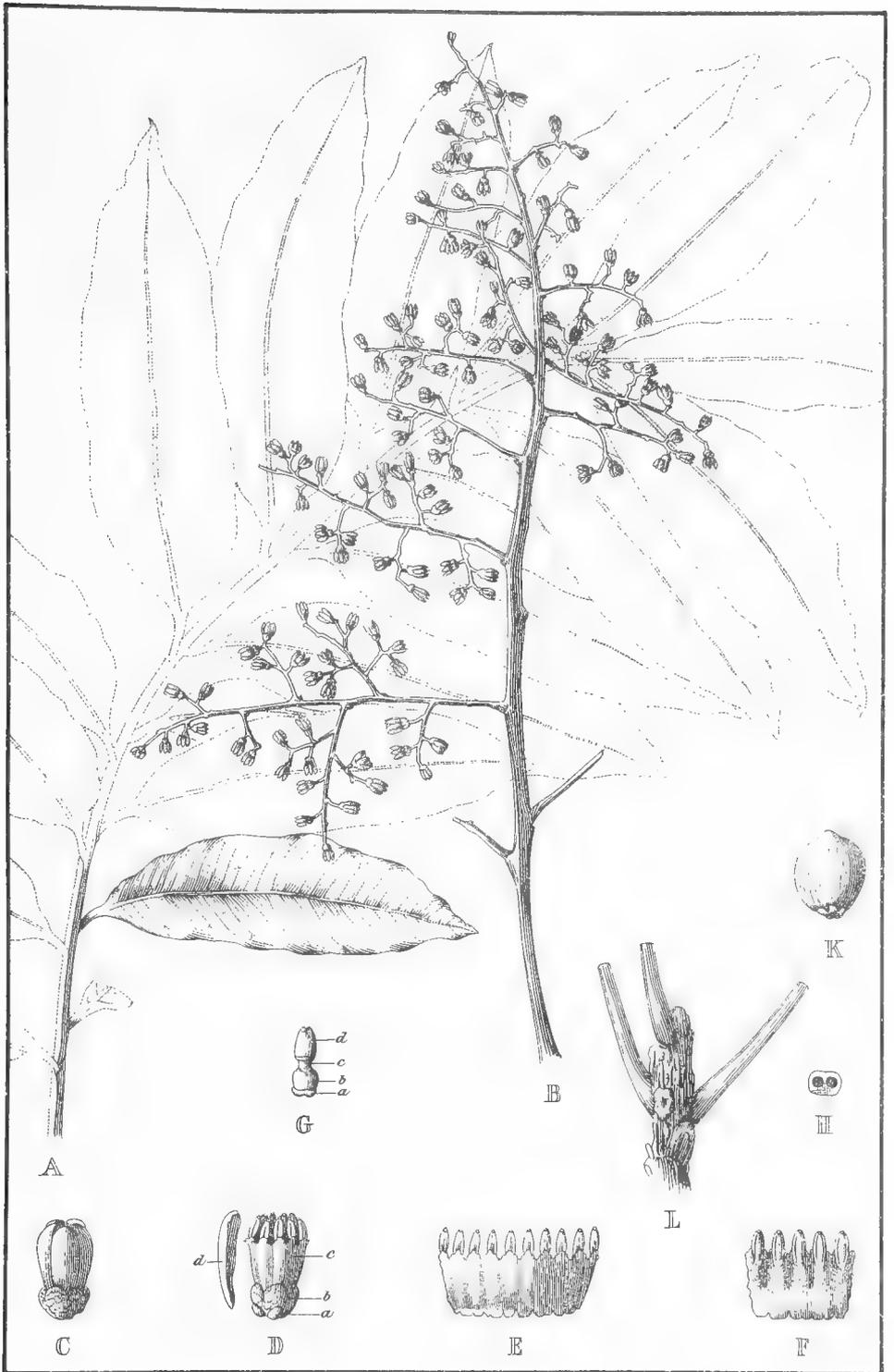
- A. Leaf, shown in outline, one leaflet showing venation.
- B. Panicle of flowers.
- C. Young flower.
- D. Flower, the petals (5) removed, showing— (a) Bracts, (b) Calyx, (c) Staminal tube, bearing 10 anthers, (d) Petal.
- E. Staminal tube, opened out (outside).
- F. Portion of staminal tube, opened out (inside).
- G. Pistil—(a) Disc, (b) Ovary, (c) Style, (d) Stigma.
- H. Transverse section of ovary.
- K. Fruit.
- L. Portion of stem, showing leaf scars.

Melia Azedarach, L. var. *australasica*, C. DC.

THE WHITE CEDAR.

Botanical Name.—*Melia*, the Greek name of the Manna Ash (*Fraxinus Ornus*), and applied to this tree because of a supposed resemblance of its leaves to those of the Ash; *Azedarach*, from the Persian "Azad-darkht," the name more strictly applied to *M. Azadirachta*, the common Indian "Neem" tree, but applied by Linnaeus to a closely-related congener.

Vernacular Names.—Universally known in Australian as "White Cedar." In other countries it has other names. In India it is known as "Persian Lilac," also as "Bastard Cedar" and "Bead Tree" (the last because the fruits, with the pulp removed, are strung together as beads, and for rosaries).



OWENIA CEPIODORA, F.v. M. (Onion Wood.)

Flowers.—It bears a profusion of fragrant lilac-coloured flowers, hence one of its vernacular names.

Fruit.—On the 22nd October, 1888, the honorary secretary of the Adelong School Board wrote:—

Recently a pupil of the Adelong Public School was taken suddenly and seriously ill, apparently having eaten something of a poisonous nature. She stated to her doctor that she ate some berries that grow on the White Cedar trees in the playground.

I would invite my readers' attention to the following data collected by me and published in the *Agricultural Gazette* under the heading "The alleged poisonous nature of White Cedar berries."

Here is quite a recent report:—

Penrith.—Three pigs belonging to Mr. W. Magrath, of Emu Plains, have been poisoned through eating White Cedar berries. Several other pigs died some months ago from the same cause.—(January, 1906.)

At the same time the cedar berries are not always poisonous to pigs—either because pigs do not often eat them, or because they do not feed solely upon them. I believe that if pigs are not allowed to get too hungry there is not the slightest danger to be feared from this tree. At the same time, I admit that it would be desirable to make a careful inquiry in regard to this very common tree, under the superintendence of a veterinary surgeon.

The *Garden and Field* of Adelaide, for September, gives the following, which occurred in South Australia:—"A White Cedar tree requiring pruning, the surplus branches were cut off and thrown over the fence into a paddock. Several pigs and cows picked off and ate the berries. The result was that the pigs died and the cows became very ill, but recovered after three or four days—one effect being a falling off in milk in the one day from half a bucket to a cupful. Mr. Bagshaw was at first unable to account for the sudden death of his pigs, but on cutting them open found the berries in their stomachs. Mr. Hackett states that in some places pulp of the berries of the White Cedar is used for poisoning dogs, being mixed with fat for the purpose." (*Agric. Gaz. N.S.W.*, Nov., 1893, p. 853.)

Dr. Burton Brown records a case in which a European girl ate the berries, became insensible, and died. Descourtiz says that six to eight seeds cause nausea, spasm, and cholera symptoms, sometimes followed by death. (*Dictionary of the Economic Products of India*.)

Waring (*Pharmacopœia of India*) says:—"Poisonous properties have been attributed to the fresh berries and leaves."

Mr. Thos. Loxton, Lower Portland, writes:—"Re article in July number of the *Gazette*, entitled 'Alleged Poisonous Nature of White Cedar Berries,' it may interest you to know that the farmers of the Hawkesbury River have no doubt at all that the White Cedar berry poisons pigs. I have myself lost the best one of three sows this season, and the verdict of my neighbours is that she was poisoned by cedar berries, which were lying thick on the ground. She was the greediest feeder of the three, but the other two, which were removed at once from the run, showed no symptoms of poisoning. One farmer says that the seed forms a hard lump or lumps in the bowels, and thus kills. They do not seem to hurt birds, some varieties of which are very fond of them, notably the green pigeon of the Richmond River, which, when these berries are ripe, gets so fat and lazy as to be very easily shot."

Mr. S. Pegum, Camperdown Farm, Brownlow Hill, Camden, states:—"Referring to the poisonous nature of the berries of the White Cedar, noted in the July number of the *Gazette*, an instance occurred here not long since causing the death of twenty-seven fat pigs. A mob of pigs en route to Sydney, having been three days on the road from Upper Burragorang, while waiting to be trucked at Camden, were driven into a paddock close to the station, so

that they might rest under the shade of some White Cedars growing there. Some of the pigs lay down to rest, else all might have died; others commenced feeding on the berries scattered around under the trees, with the result that twenty-seven were dead next morning when the train arrived in Sydney. The dead pigs belonged to different owners, some to the man in charge, who was wanting in neither experience, forethought, nor intelligence, having shipped some thousands of pigs to Sydney at different times, and though reared almost within sight of these cedar trees was not aware of the poisonous nature of their berries, and I think very few are; so to let the fact be well known would undoubtedly be a public service. As they form desirable shade trees, with pleasing foliage and flowers, and are quick growers, farmers and municipalities, unaware of the toxic properties of their berries, may be induced to plant them, and injury result." (*Agric. Gaz. N.S.W.*, Sept., 1896, p. 564.)

In connection with the "Alleged Poisonous Nature of White Cedar Berries," we have just received the following letter from Mr. Edward Gibson, of Figtree, near Wollongong:—"I saw a question asked in the last *Agricultural Gazette* as to whether any of your readers had ever had any pigs poisoned with White Cedar berries. About twelve years ago, when I lived at Dapto, I had thirty or forty store pigs in the pig paddock. The gate into the pig paddock was by some means left open, and the pigs got into an adjoining paddock where there were a lot of White Cedar trees, the seeds of which were lying thick on the ground. When I went to fetch the pigs home, five or six died on the way, and six more died when they came to the house. We did not know at all what was the cause of the mortality at the time, so I opened one of them and found its stomach full of the berries. After that we ringbarked the trees and destroyed all the berries on the ground, with the result that although the pigs were running in the paddock afterwards we never had any more deaths from that cause." (*Agric. Gaz. N.S.W.*, Oct., 1896, p. 662.)

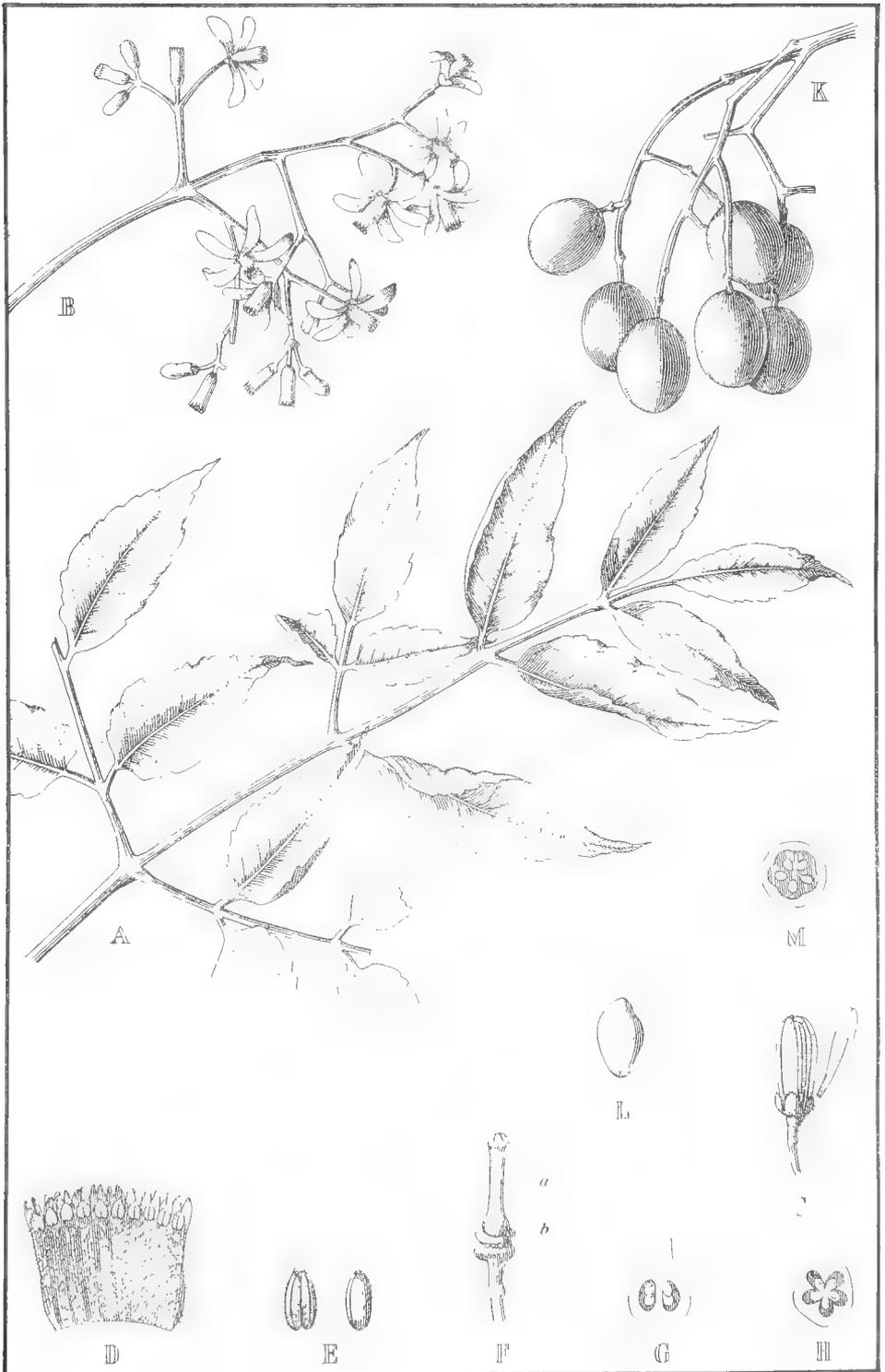
Mr. S. Pegum, of Camperdown Farm, Brownlow Hill, Camden, writing on this subject, says:—

"Three small pigs ate some White Cedar berries. They soon after became very ill, unable to stand or move, heart beating feebly, with occasional spasmodic shudderings, apparently in a forward direction: limbs cold, eyes well open, but not fixed or staring. Being of opinion that they were poisoned by the prussic acid contained in the kernels of the berries, for experiment, I took one of the pigs who seemed at the time in *extremis* (could not raise a squeak even), and treated him accordingly, viz., put him at once into a warm bath, and as soon as it could be got ready, gave the whites of two eggs beaten up and a full teaspoon of baking soda in some warm milk and ginger. Then put him into a sugar bag with a warm brick and left him for the night well covered up, nice and snug, in a warm place. All this time, if he was not 'as dead as Julius Cæsar,' he was quite as unable to stand or move, being quite passive to all the treatment, which did not take many minutes, neither squeaking nor kicking. I do not know how long it took him to get well, but in the morning he was quite recovered, and what with the bath, &c., he looked none the worse for the trouble, being able to run about and eat as usual. The other two pigs died. Examination showed that they had eaten about a small pannikinful of the berries, which were crunched and scarcely at all digested." (*Agric. Gaz. N.S.W.*, Oct., 1897, pp. 700-1.)

Mr. P. H. Morton, M.P., has informed me of two separate cases of the death of pigs (one lot travelling) through eating White Cedar berries in the Muswellbrook district. (*Agric. Gaz. N.S.W.*, July, 1898, p. 741.)

Timber.—This timber is coarse, soft, and easily worked, but not in very good repute. At the same time, it is used in country districts. For example, it has been used for pedestals of tables at Taree; also for mouldings and architraves. It was at one time used for shingles, which are, however, of an inferior kind.

The rings in New South Wales specimens are very distinct, and their markings give the timber a rich, wavy appearance, which is best exhibited in a vertical section. The wood is a pale yellowish-brown, which appears of a rich warm brown under polish.



MELIA AZEDARACH, L. (White Cedar.)

Following is Indian testimony concerning it:—

“Beddome, Brandis, and Kurz all say it warps and splits, but Mr. Halsey, of Madhopur, writes to say it is equally useful green or seasoned. Our specimens split only very slightly, and we are inclined to think it is better than it is supposed to be. It is handsomely marked, and polishes well. Its weight is from 30 to 38 lb. per cubic foot.” (Gamble, *Manual of Indian Timbers*.)

Gamble, in his 2nd Edition, says:—

The wood was used at the Imperial Forest School for museum cases and other furniture, and behaved quite well.

I trust that through trials of this timber will be made in New South Wales, and that the results will be published. The tree belongs to the Cedar class, a very useful group of woods. Perhaps in New South Wales it is despised because it grows so readily.

Size.—Height from 40 to 60 feet, with a diameter of 2 to 3 feet. A fine umbrageous tree.

Habitat.—It is not rare in moist places in northern brush forests, and in good land in more open forests. It extends from the Illawarra, New South Wales, along the coast and coast districts to North Australia. Its precise southern range I do not know. In sending specimens for record, it is of course necessary to exercise caution that they are taken from naturally-grown trees, since the species is so often cultivated.

Propagation.—This is one of our few native deciduous trees. It is so hardy and such a rapid grower that it is one of the native trees most cultivated in its own country. Although a native of the coast districts, it will grow inland to a considerable distance, being very resistant to drought. It is a charming shade tree, and if any pains were taken with its cultivation (which is not often the case), it would be more admired than it is. It is so tolerant to bad usage that it gets plenty of it.

EXPLANATION OF PLATE 96.

- A. Portion of leaf, showing leaflets.
- B. Flowering branch.
- C. Bud, one petal removed to show staminal tube.
- D. Staminal tube, opened out.
- E. Stamens.
- F. Portion of flower, showing—(a) Pistil, (b) Disc.
- G. Vertical section of ovary.
- H. Transverse section of ovary.
- K. Fruits (natural size).
- L. Seed.
- M. Transverse section of seed.

The Pines.

1. *Araucaria Cunninghamii* (Richmond River Pine).
2. *Callitris* (Cypress Pines).
3. *Podocarpus elata* (She Pine).

Araucaria Cunninghamii, Ait.

RICHMOND RIVER OR HOOP PINE.

Botanical name.—*Araucaria*, from *Araucanos*, the name of one of these Pines (*A. imbricata*) in Chili; *Cunninghamii*, after Allan Cunningham, who held the appointment of King's Botanist in Australia, and whose services to Australian botany and geographical exploration are alike immortal. An obelisk to his memory is to be seen in the Sydney Botanic Gardens, of which he was at one time Superintendent.

Vernacular Names.—It is almost universally known in the Sydney market as "Colonial Pine," so we cannot disturb the name now. Another name is "Moreton Bay Pine," because large quantities used to be shipped from southern Queensland (or Moreton Bay, as the settlement was called). In northern New South Wales the timber often goes under the name of "White Pine" or "Richmond River Pine." For the origin of the term "Hoop Pine," often applied to it, see Bark (below).

Leaves.—The leaves are prickly and small, say a quarter to half an inch long. They are crowded in dense spires.

Flowers.—The flowers are usually dioecious—that is to say, having the males and females on distinct plants. The male amenta (catkins) are stalkless, cylindrical, very dense, from 2 to 3 inches long, and from 3 to 4 lines in diameter. What a catkin of this particular tree is like may be seen from the drawing. It will be observed that they form the thickened, club-shaped ends of the twigs. A catkin, in botany, is a form of spike in which the flowers are incomplete (to use a botanical expression), wanting either stamens or pistil—of course, the latter in the present instance.

Fruit.—This is a cone, and it is somewhat egg-shaped (ovoid), about 3 inches long and 2 inches in diameter, containing numerous, closely overlapping scales. This swollen egg-shaped portion reminds one of a fuller's teazle, and contains the seeds (very much smaller than Bunya Bunya seed, *Araucaria Bidwilli*); this, of course, represents the female portion of the plant. The seeds are flattened, and contained in the scale. The appearance of the cone and scale can be readily made out from the drawing.

Bark.—The bark is brown to black, not thick, and has circular horizontal markings. It peels off horizontally in tough, fibrous flakes. Owing, in some measure to the resin it contains, and also to its tough nature, it does not readily decay on exposure. The timber itself is peculiarly liable to decay under such circumstances, and so it happens when a tree is felled in the

forest and chopped into lengths, if allowed to remain, all the wood disappears, leaving the bark as a "hoop" or natural pipe, reminding one of a pipe for water supply. Hence the name "Hoop Pine" often given to this tree.

Timber.—This is so well known to the people in the coastal districts of the State that it would almost seem unnecessary to describe its appearance. It is our principal cheap softwood, taking the place of the Deal of Europe for packing-cases and other rough purposes. It is strong and durable when dry, and lasts well for such purposes as punt-bottoms when kept constantly wet, but it will not stand being kept alternately wet and dry. It is extensively used for flooring and lining boards, and for the various purposes to which softwoods are usually put. It is apt to get of a dirty colour with age.

Most planks of Colonial Pine show more or less of what may be compared to a bird's-eye maple figure; in fact, the presence of these markings is a ready diagnostic test of the timber, as a rule. In selected planks they are very numerous, and bring this wood into the category of ornamental timbers. Selected Colonial Pine of this character looks really well when made up into bedroom furniture, linen presses, &c. A piece of Colonial Pine was thus described in the report of the London International Exhibition of 1862:—"A noble specimen, which is remarkable for the peculiar figure set up, by a series of remote, small, pea-shaped, pale, clouded knots, arranged in quincunx order, somewhat like drops of rain in general effect, and not easily described."

It does not seem to be generally known how excellent a material for carving this wood is. It is, of course, somewhat brittle, but when seasoned this is reduced to a minimum. I had in my keeping a large carved bracket of Acanthus leaves in Colonial Pine, and it showed no trace of warping.

Colonial Pine used at one time to be in great request for spars for ships, as it was readily obtainable in lengths from 80 to 100 feet, but it is rather brittle for this purpose.

Pine for Butter-boxes.—I wrote, many years ago:—

There is one use, and an increasingly important one, to which Colonial Pine may be put, and I ask our Richmond and Clarence River millers to take it to heart. I allude to butter-boxes. An enormous quantity is required every year for New South Wales butter, and yet this colony, with all its pine forests, fails to supply timber to case its own butter. I believe the wood to be a suitable one for the purpose, but some of our northern saw-millers hardly realise that they are allowing a good trade to slip away. Colonial Pine is very light when well seasoned, and it may be cheaply coated with a thin layer of paraffin, if necessary.

In August, 1905, the Minister for Agriculture, of Queensland, received a report from Mr. Thomson, Government Dairy Expert, on the allegations made in the Southern States that Queensland Pine (the same as our Richmond River or Hoop Pine), when used as boxes, tainted the butter. The report contains the following conclusions:—1. The charges against Queensland Pine for butter-boxes have been disproved by practical and scientific examination, and the results show that the Pine is admirably adapted for the export butter trade. 2. The practical tests carried out at the Queensland Meat Export Works, Pinkenba, were of great severity, and any weakness in the Pine would have been conveyed to the butter before the expiry of the investigation. 3. A searching examination of the export butter, conducted by the grading inspectors of the Department of Agriculture, has not revealed the slightest suspicion that the wood contains injurious properties. 4. The best results in the experiments were obtained from wood treated with paraffin wax and single parchment.

In December of the same year the *Sydney Morning Herald* had the following statement:—

The controversy concerning the merits of Queensland Pine for butter-boxes still continues, and no practical progress has been made towards a settlement of the question. The authorities in Queensland declare that the Pine is eminently suitable, and that it does not import any taint to the butter. On the other hand, factory managers and directors in New South Wales have stated that a taint in butter put up in this timber is common, while some butter men who buy in the Sydney market unhesitatingly reject butter which is so packed. It is, however, pretty well known that butter packed in Queensland Pine often opens without any taint, and some people in the trade are beginning to believe that the real cause of the trouble is that the Pine on low-lying ground taints the article, while that on higher levels does not do any injury. A test was recently instituted by the Chief Dairy Expert, and yesterday two boxes of butter were examined at the Government Cold Storage Depot in Pyrmont. These boxes were taken from the same churning at a Hunter River factory, one being of Queensland and the other of New Zealand timber. The butter was placed in cold storage for a time, and was taken out two days before the examination, so that it might be in about the same condition in which butter usually appears on the grocer's counter. Yesterday the boxes were brought out with the outsides covered so that the wood could not be recognised. Mr. O'Callaghan and an expert in the trade then made a very careful examination, driving the trier down several times beside the wood and withdrawing samples. The butter was then turned out of the boxes, and again examined very carefully. Each of the experts detected a slight woody flavour in one box, but it could not be described as a taint, and was not sufficient to affect the sale of the butter. The box turned out to be that made of Queensland Pine, but the experts were satisfied that if both butters were offered for sale there would not be a hair's difference in the price. So far as it goes the test proved that butter put up and kept under ordinary conditions in Queensland Pine was not depreciated in value; but whether this result can be safely taken as a guide to what would happen if large quantities were packed in this wood is problematic.

The "White Pine," or "Kahikitea," of New Zealand, largely used for butter packing is known to botanists as *Podocarpus dacrydioides*, A. Richard.

The latest information I have on the subject is as follows:—

We do not know of any butter factories in New South Wales that are using local or Queensland timbers in butter-boxes.

The same trouble of years ago exists to-day,—that is, boxes from our Pine impart a strong woody or unpleasant flavour to the butter packed in them. The same remarks apply to New Zealand White Pine that has not been properly seasoned, and in this respect we have had a great deal of trouble lately. (The Manager, N.S.W. Fresh Food and Ice Co., Ltd., Sydney, in letter to me dated 23rd September, 1908.)

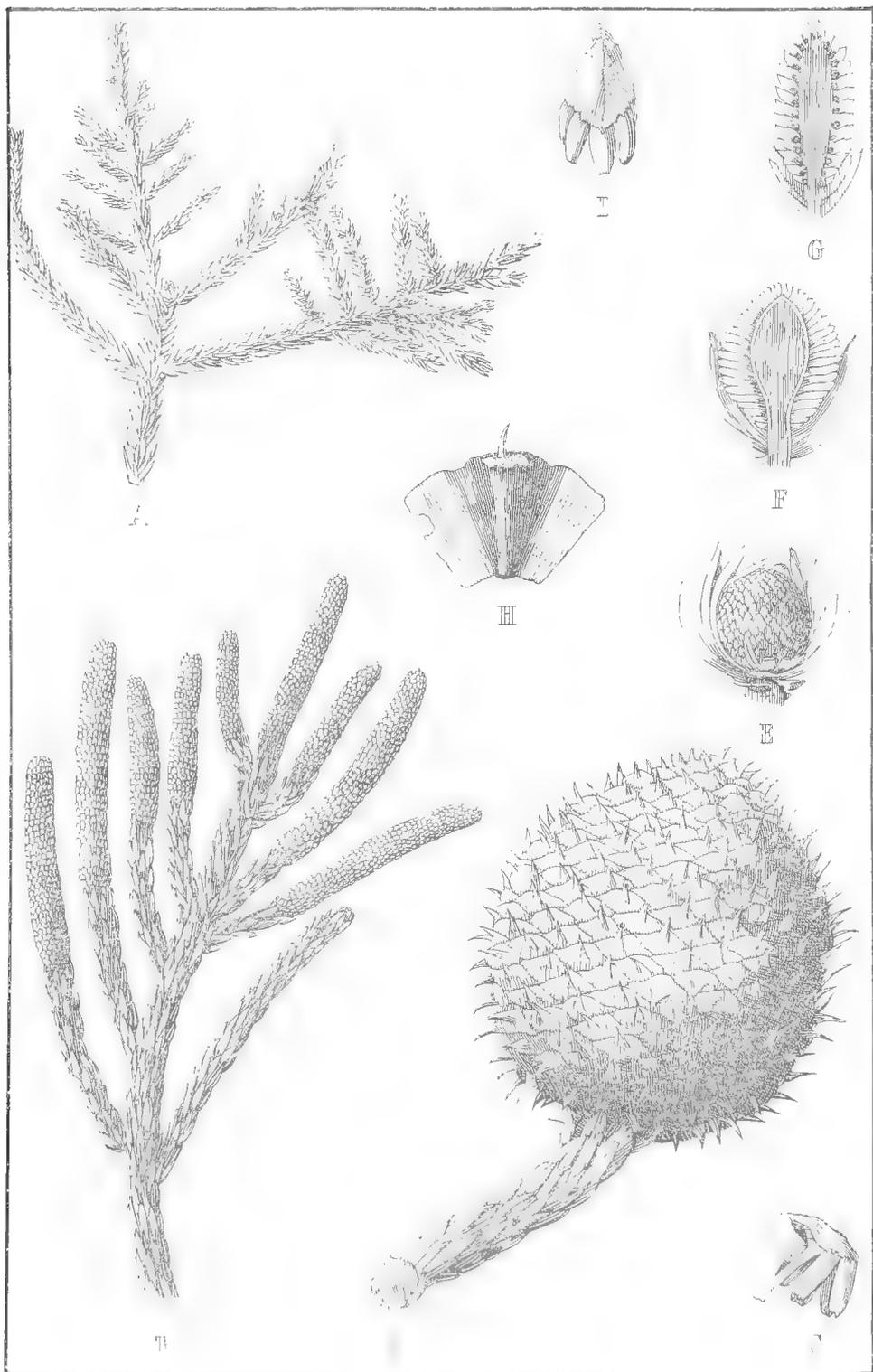
No wood should be used unless it is properly seasoned.

Size.—Up to 150 feet high, and a diameter of 4 or 5 feet on the Richmond River, where it attains its greatest development. It is much smaller on the Clarence and Bellinger.

Habitat.—It occurs from the high country north of the Hastings River, along the ranges which skirt the coast, and also in brush land on the Clarence, Richmond, &c., and so on into Queensland.

Colonial Pine is no exception to the very general rule that the timber obtained from high lands is far superior to that obtained from the low-lying lands of the coast. As regards the range of this tree, the Hon. W. Pettigrew, M.L.C., formerly a timber merchant, says:

This useful tree grows over a large extent of country. It grows up to Cardwell, in Queensland, in the 18th degree of latitude. It grows in a



ARAUCARIA CUNNINGHAMII, Ait. (Richmond River or Hoop Pine.)

great variety of soils—some on sand, as at Tin-can Bay; on the Brisbane slate, as at the upper part of the North and South Pine Rivers, Ithaca Creek, and Enoggera Creek; on the Devonian slate, as at Moggill Creek; and on basalt covering coal-shale, as at the Rosewood Scrub to the west of Ipswich. When this Pine grows on anything like level ground, farmers know they can grow maize, sugar-cane, &c., and, therefore, many pine-scrubs are cleared for cultivation, to the injury of the country from the timber-merchant's point of view.

The Catalogue of the Queensland Forestry Museum (1904) says:—

Abundant in many of our coastal scrubs from the Macpherson Range in the south to Gladstone; also in the Ipswich, Toowoomba, Warwick, Nanango, Mackay, and Bowen districts.

It has been found to occur in Papua, at an elevation of 10,000 feet.

Propagation.—From seed, which, however, soon loses its germinating power, and in order that it may travel long distances safely, it is safest to either sow it in Wardian cases, or to pack it in charcoal. It is cultivated for ornamental purposes, and Mr. Walter Hill thus enthusiastically speaks of it:—"This majestic tree is, without exception, the most ornamental and useful tree in Queensland. Its beautiful regular pyramidal form, and the sombre green of its awl-shaped foliage, command general admiration."

It is, indeed, in my view, handsomer than the Norfolk Island Pine (*A. excelsa*), which is much more cultivated, but it does not appear to be so hardy under cultivation as that species, and is much more liable to suffer by the wind.

See p. 903 of my article on Conifers in the *Agricultural Gazette of N.S.W.* for December, 1907.

EXPLANATION OF PLATE 131.

- A. Twig, young growth.
- B. Twig bearing stamiferous flowers (male amenta or catkins).
- C. Stamens, with 4 or 5 anther-cells.
(N.B.—A stamen can only have one anther; the anther has in Phanerogamæ generally 2 cells, but in Coniferæ from few to numerous cells.)
- E. Unfertilized fruiting cone.
- F, G. Vertical sections of two different unfertilized fruiting cones.
- H. Seed, adnate to the scale.
- I. Mature cone.

THE CYPRESS PINES OF NEW SOUTH WALES.

Genus Callitris.

Habitat.—As a very general rule the trees are of a neat pyramidal shape, *c.g.*, *C. robusta*. Sometimes they are of a more or less pendent habit at the top, *e.g.*, *C. cupressiformis*. *C. verrucosa*, is also without a main stem, forming a congeries of thin stems from a woody stock, somewhat after the fashion of a mallee.

Fruits.—They vary much in size; those of *C. cupressiformis* are the smallest, while those of *C. verrucosa* and *C. propinqua* are the largest. They usually persist on the branches for many years. *C. robusta* and *C. cupressiformis*, for example, appear to be an exception in this respect. In these species one can always find large numbers under the trees and on the young wood, but in some other species, *e.g.*, *verrucosa* and *propinqua*, they are always on old wood.

The fruits can be provisionally classified according to the columella, viz.:—

Columella, a single triangular pyramid: *verrucosa*, *robusta*, *columellaris*, *propinqua*, *Muelleri*. Columella, more than one, and irregular in shape (perhaps formed of aborted ovules): *calcarata*, *cupressiformis*, *Macleayana*.

Some of the fruits have points on the scales or valves. For example, *C. calcarata* was specifically named because of these points. They are marked in *C. cupressiformis*, particularly in the variety *mucronata*. The fruits of *C. verrucosa* are covered with rounded wart-like swellings, as has already been stated.

Bark.—Messrs. Baker and Smith have drawn attention to the astringent properties of the bark of the Cypress Pines, and are endeavouring to develop the industry of employing it for tanning. Previously it was rejected as useless.

Timber.—The following notes are of a general character; others will be found under each species:—

Characteristics.—Its pleasant odour—camphoraceous, or sometimes reminding one of sandal-wood. Its great power of resistance to insect pests—it is said to be absolutely resistant to white ant, but that is overstating the case. Messrs. Sulman and Power, architects, in 1893 showed me a piece of Cypress Pine that had been undoubtedly attacked by white ants. Nevertheless, Cypress Pine is about the very last timber that white ants will attack. It lasts well in the ground, yet it is not the most durable timber for posts in parts of our western districts, but its great practical advantage is the facility with which it splits. Some of the species, the Red or Black Pine in particular, produce very showy timber; in fact, many of the planks are so gorgeous in appearance that care is required in using it for decorative purposes lest it should have too overpowering an effect. At the same time, much of the timber is of a quiet, handsome character. The prevailing colour of the figure is brown of various shades. Drawbacks to Cypress Pine timber are its brittleness; it has none of the soft yielding characters of Baltic Deal or Californian Redwood. It will therefore stand but little transverse strain, and a nail can hardly be driven into the wood without previous boring, for fear of splitting the timber. Another drawback is its great inflammability. It may readily be dressed up to a smooth and glossy surface.

Principal Uses.—It is extensively used in buildings liable to attack by white ants; and I think if its value were better known in the coast districts it would be employed to a greater extent. It is used to an enormous extent a couple of hundred miles or more back from the coast for house-blocks, linings, and ceilings of houses. Land carriage would effectually stand in the way of our profitably shipping this timber, even if an outside demand were to spring up for it, of which we have no evidence at present. It is one of the most luxurious firewoods I know of; it burns well, and in burning emits a delicious fragrance very generally admired. My idea is that the small pieces produced in sawmills would sell at a remunerative price, as a superior kind of fuel for drawing-rooms, &c., if people could only readily obtain it. This may appear to be only a trifling matter, but I think that minor uses of our timbers (and above all, utilisation of waste) should be looked to. In developing such enterprises of magnitude as the wood-block trade, or the getting out of railway sleepers and timbers for bridge work, we should not lose sight of the smaller possibilities of some of our timbers. Nevertheless,

Mr. Forester J. G. Postlethwaite, of Grenfell, a man of great experience with western timbers, being asked to give a list of the best six fuel woods of his district, adds this caution:—

I do not give Pine as a good fuel wood for general use, as it is too dangerous, throwing out sparks and burning too fiercely, but it is the best for heating boilers and bakers' ovens.

The ordinary "Colonial Pine" of the Sydney market is the Richmond River Pine, called also Hoop Pine, White Pine, or Maryborough Pine (*Araucaria Cunninghamii*). Cypress Pine is often known as Colonial Pine in the districts in which it grows, and confusion has arisen, ere now, in interpreting "Colonial Pine" in contracts.

White Ants and Cypress Pine.—I have already referred to the fact that while this pine is very resistant it is not absolutely so. Following is some evidence in the matter:—

If only fully matured timber be used, that is the dark yellow-coloured wood, ants will not touch it. It is only the light yellow-coloured timber (which is cut from trees not fully grown or matured) that the ants will attack. I find from inquiries that white ants attack this timber either growing or when fallen, so far as the sapwood and bark is concerned. They will also attack the fresh cut timber before the sap dries. There are four varieties recognised in the western districts. (J. V. de Coque.) These are white, red, and yellow (see *C. robusta*), and black (*C. calcarata*), which last timber Mr. de Coque issues a warning against.

Both Black and White Pine are of a very durable quality, and are extensively used in the building trade, for which they are much prized on account of their white ant resisting qualities. I have examined pine timber that has been in use in buildings for forty years, and find it still perfectly sound. I consider it is a great oversight that this timber is not introduced by the building trades into Sydney, where the white ant is so destructive. (Forester Condell, Narrandera.)

A house in my district is built of hardwood, with the exception of the ceilings and lining-boards. A set of pigeon-holes, 3 feet x 4 feet, made out of imported pine, in one of the rooms, is, together with all the wood in the building, excepting our own colonial pine cut in the district, showing signs of white ants. The palings round this building are also of imported pine, and although only of seven years' standing they have now to be pulled down on account of the white ants eating the boards, and replaced by palings made out of the locally-grown pine. Other houses in the same town, with palings of Colonial Pine, standing over fifteen years, show no signs of white ants. (Forester Harris, Gunnedah.)

Exudation (Australian Sandarac).—It was a specimen of resin from the Oyster Bay Pine of Tasmania (*C. cupressiformis*, var. *tasmanica*), sent to the Exhibition of 1851, which first drew the attention of experts to the possibilities of Australian Sandarac.

This is one of the most valuable of Australian vegetable products; a market is ready for it, and it seems strange that it should have been so much neglected. There are no statistics available in regard to the importation of Sandarac into these colonies, but to bring it here at all is a veritable "carrying coals to Newcastle."

It is a matter of common observation, that a number of raw vegetable products of more or less importance are going to waste in Australia, simply because our people are ignorant of their properties and value. I can hardly cite a better instance than that of Australian Sandarac. Here we have a product absolutely and entirely identical in chemical and physical properties with a well-known article in regular demand. The price of this article

at London auction sales is shown by figures readily accessible, while its cost in Sydney is very much enhanced; and yet we actually import from Algeria, *via* London, at this high price, what is common enough in parts of New South Wales, and to be had for the gathering.

The collection of Australian Sandarac is one of those minor industries which could be readily undertaken by a family of children. As the resin flows from the Cypress Pines it could be accumulated in clean dust-proof tins until a sufficient quantity was obtained to be sold to the local storekeeper, who would again sell to the wholesale chemist, or wholesale oil and colourman of Sydney. Sandarac is usually graded. There would be no difficulty in grading locally our local product, while any surplus available for export could be shipped without grading if found expedient.

I have no means of getting at the consumption of Sandarac in this State, but we ought to be able to supply the local demand, and have a good surplus for export.

The mealy appearance on Sandarac resin which has remained too long on the trees is well known, and can be easily removed by a weak solution of potash, as suggested by Mr. R. Ingham Clark. Samples thus treated take on a bright, fresh appearance, as if freshly exuded.

It may be pointed out that the solution in weak potash of this external coating would be utilised by soap-makers. Nothing need be wasted.

Another method which may be suggested is to treat the Sandarac with rectified spirit. The resin at once assumes a beautifully fresh appearance, while both the spirit and the dissolved resin may be readily recovered, as every soap or varnish maker knows.

Picking and grading can be done by children with facility into two or three sorts; and Mr. Ingham Clark's advice not to neglect this should be borne in mind, for it will pay. In a mixed parcel the price tends to that of the most inferior portion of it.

Callitris Macleayana, F.v.M.

Botanical Name.—*Macleayana*, in honour of the late William Sharpe Macleay, of Sydney. It was described by Mueller in February, 1857, during a brief visit to the Sydney Botanic Gardens, and plants in the Gardens were raised from seed collected by Mr. Macleay at Tacking Point, Port Macquarie.

Vernacular Names.—"Stringybark Pine," "Port Macquarie Pine," "Mountain Pine," or "Turpentine Pine" are names by which it is known on the Dorrigo.

It is known locally simply as pine, and by no other name, without any distinguishing characteristic such as red or white. (District Forester Hardiman, Taree.)

Leaves.—The dimorphism of the branchlets has already been referred to. The top of the leaf-scale appears to be rounder than in other species.

Bark.—This is friable-fibrous or stringy, different in texture to that of any of the other species, which are hard, and more or less furrowed. When young, before it becomes properly fibrous, it is almost silky in appearance and to the touch.

Timber.—It is a pale-coloured fissile, easily-worked timber, with little figure or colour, and but slightly aromatic. It is said to be white-ant resisting. It is used for indoor purposes, for weatherboards, deals, battens, and other small scantlings. It is light and useful, and was much used for shingles in the early days.

Size.—Up to a height of 40 or 60 feet, with a trunk diameter of 1 to 2 feet, in the Ellenborough Falls country. A tree was measured with a girth of 12 feet 3 inches (3 feet from the ground). Growing 1,800 to 2,000 feet above sea-level on Bulga Mountain, head of Ellenborough River. "It was a splendid tree, 150 feet high, and full of vigour."—(G. S. Hill, Bungay, Wingham, 27th November, 1906.) Mr. Hardiman says that in the Comboyne it grows to an average height of 30 feet, and a diameter of 2 feet.

Habitat.—Eastern Australia from the Stroud district, New South Wales, to Northern Queensland. I have received it from near Cairns from Mr. S. Dixon. It is found quite close to the coast and westerly to the coast range.

Callitris verrucosa, R.Br.

Botanical Name.—*Verrucosa*, Latin, "full of warts," referring to the tubercles or swellings at the back of the fruits.

Vernacular Name.—"Mallee Pine" is a name given to it in western New South Wales.

Fruit.—The tubercles on the backs of the valves are a characteristic which renders this species easy of determination. These tubercles vary in size a good deal. In some fruits they are few; in others as crowded as it is possible for them to be.

I might mention a peculiarity of this pine is that the cones are borne in thick clusters for the most part directly on the larger limbs instead of towards the end of smaller branches as in the common (White) pine. (R. O. Moore, Coan Downs).

The same observation as to fruiting on old wood has been made by Mr. Boorman in regard to this species.

Timber.—This species is too small for timber. I have a note that a sample of "Rock Pine" from the Daubeney Ranges, where the trees are 20-25 feet high, and 6-12 inches in diameter, is a splendid working timber, close-grained, and very showy. I have not seen twigs for many years, and perhaps a reader may forward me cones to see if the "Rock Pine" be identical with the "Mallee Pine" or no.

Size.—A shrub 10 to 12 feet high, with spreading horizontal branches resembling a Cypress.—(J. Duff.)

Small stunted pine, similar in growth to mallee, growing among mallee on Bygo Run, 10 feet high, spreading. (Forester Taylor, Wagga Wagga.)

Its manner of growth appears to be much after the style of Whipstick Mallee, *i.e.*, it has practically no trunk, the branches all springing from a bole or stump close to the ground, and being of a decidedly spreading nature. (Mr. R. O. Moore, Coan Downs, Mount Hope.)

Size (and Habitat).—

This tree differs somewhat from a Mallee (*Eucalyptus*) in its form of growth, as it usually has a *trunk*, though at times only a few inches in length, and seldom more than 6 inches. Often it begins to spread level with the surface of the ground, but it always had the appearance of *branching* rather than sending up separate stems like a Mallee.

Among the Mallee about here (Mount Hope to Parkes) there is often a spreading Pine (*Callitris verrucosa*, R.Br.), which grows with a short stem, and branches out almost from the ground. The fruits are larger than those of *C. robusta*, and are covered with pimples or warts full of a resinous substance. South of the Lachlan this tree is sometimes called Turpentine. (R. H. Cambage.)

Mr. Boorman's description of the plants at Nymagee is much the same.

Range.—It is a dry country species, found in the interior of New South Wales, Victoria, and South Australia, and also reaching the coast in Western Australia.

The type locality is "interior of New South Wales, between 24° and 38°." The specimens were collected in the same district (by Allan Cunningham in Oxley's Expedition) as *C. calcarata* were (see *C. calcarata*, p. 167), and Nymagee and Coan Downs may be fairly looked upon as co-type localities.

Found amongst mallee scrub on the Coan Downs, Roto, and other stations, Lachlan District. (J. Duff.)

Mallee Pine grows in scattered patches in the mallee on this and neighbouring stations. It is usually found just on the fringe of the mallee, or on low sand rises in the mallee. (R. O. Moore, Coan Downs.)

A correspondent informs me that it occurs about 1 mile west of Lake Cudgellico, on the road to Welsh's selection, but I have not seen it. The above are New South Wales localities.

Warialda, N.S.W. (Rev. H. M. R. Rupp). Fruits covered with tubercles, but tubercles smaller than in the type. Specimens like this show the difficulty of classifying *Callitris*.

EXPLANATION OF PLATE 46.

Callitris Macclayana.

No. A and A₁. One form of foliage, natural size, and about three times natural size. B and B₁, the second form of "foliage" (branchlets) common in this species. B enlarged and B₁ greatly enlarged. c is a fruit. c₁ seeds, and c₂ of the clusters of central columellas or aborted ovules of each fruit.

Callitris verrucosa, R.Br. (specimens from near Nymagee, N.S.W.).

A. Twig bearing male flowers. B. Branchlets bearing male flowers. c. Stamen (with anthers). d. Cluster of fruits. d₁. Very young fruits. e. Single fruit, opened, showing central column. f. Seeds. g. Fruit, from near Karrakatta, W.A.

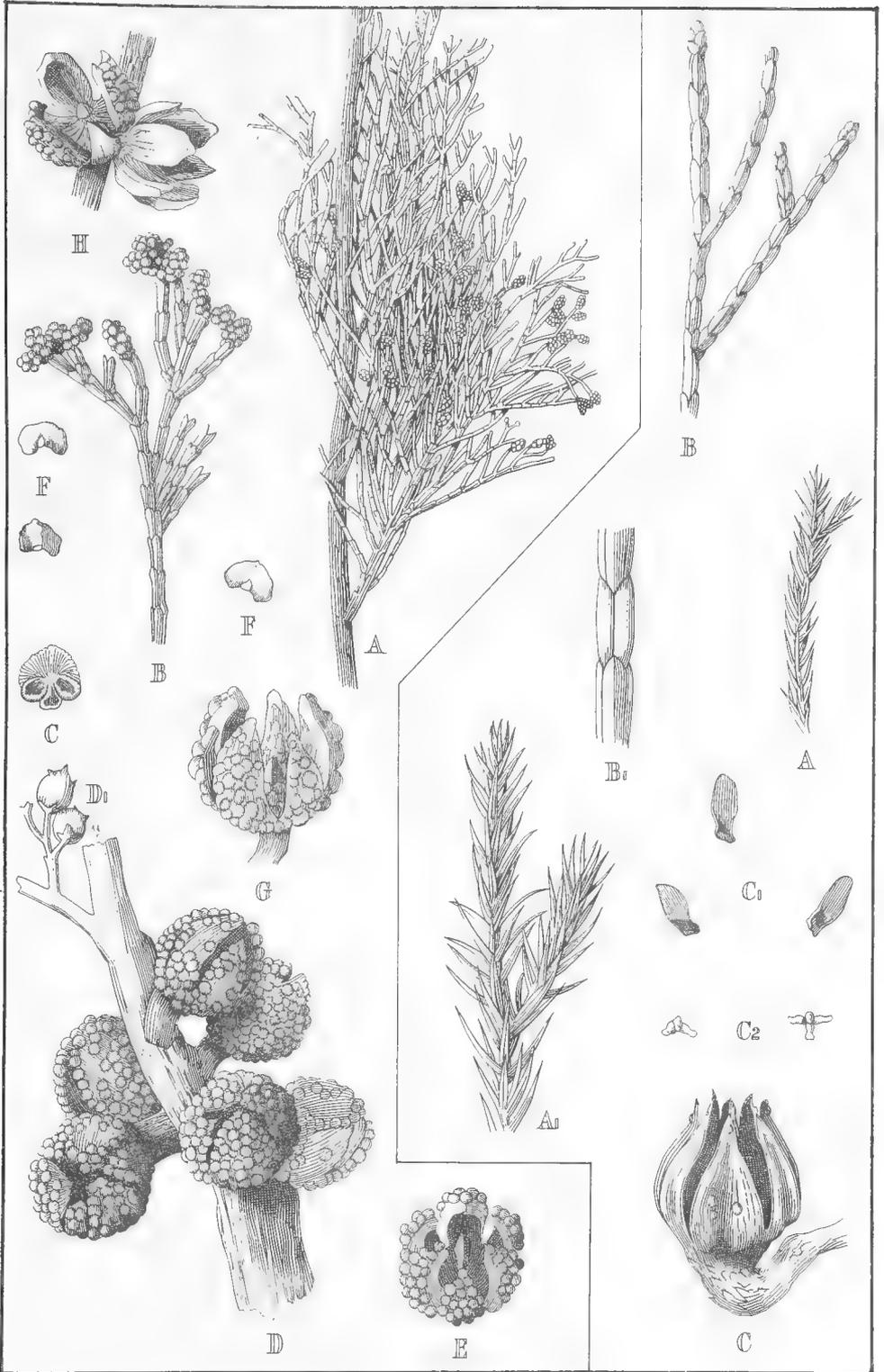
H. A very warted fruit of *Callitris propinqua*, R.Br., showing close affinity to *C. verrucosa*. For remainder of *C. propinqua*, see Plate 47.

Callitris robusta, R.Br.

Botanical Name.—*Robusta* (Latin), in allusion to the sturdy growth of the species.

Vernacular Names.—"White or Common Pine." It is often named after a locality, thus—"Murrumbidgee or Lachlan Pine." Other names will be alluded to later on.

The "Mountain Cypress Pine" of Weddin, near Young, grows on hilly country, and as a rule is not of a very sound nature, having dry rot at the heart; used for saw-milling and fencing purposes. There is very little of this pine in the Grenfell district. (District Forester A. Osborne.)



CALLITRIS VERRUCOSA, R.Br. } (The Warted and Stringybark Pines.)
 ,, MACLEAYANA, F.v.M. }

There is a variety here (Parkes) known as "Ridge Pine," which may be either figured or plain, but is so called because it grows on the sides of hills. Sawyers will not take it if they detect it, as in many cases, though apparently sound at both ends, is pithy in the middle, and thus cuts up badly. Generally speaking, the best timber has a rather smooth bark. That with rough curly bark generally indicates a rough curly-grained timber. (Forest Guard P. J. Holdsworth.)

Mr. Osborne's "Mountain Pine" is *C. robusta*. Mr. Holdsworth does not send specimens of his "Ridge Pine," but it would appear to include *robusta*, and also the Red or Black Pine (*calcarata*), and it is perhaps a name given to inferior timber of both kinds.

Timber.—The name White Pine has been attached to this tree because of its glaucous foliage. Sometimes its timber is nearly destitute of figure. I have "Mountain Pine" from the Acting Forester at Thackaringa, near Broken Hill, whose timber is but small and of a rich colour.

The white is the one most used for all building and fencing purposes. How it comes to be called "white" I cannot explain, as the sap-wood only is white, while the heart-wood is invariably in lighter or darker shades of red. (Forester Kidston, Condobolin.)

White the durable timber; Black Pine no good. (A. Murphy, Murrumbidgee, Dubbo.)

The white, red, or yellow varieties, as far as I can gather, are of one species; the branchlets are light in colour of bark, also the fruit-cones as compared with the Black Pine. These three distinctions are made owing to the respective colours of the lines running through the timber, but no difference exists as to their durability in works. The white, red, and yellow varieties are in great demand throughout the Western district for house-building. It seems to dry quickly, and has some wonderful records for durability. For example, I have a reliable record of a White Pine post, 20 inches in diameter, put into the ground near Wellington, infested with white ants. It was removed after thirty years, and was quite sound except sap-wood, and of the consistency and colour of iron. It is a capital timber for house-building purposes, but is rarely used in Sydney owing to the expense of bringing it so far by rail. I failed to find a single instance recorded in the Western districts where white ants attacked the timber after it was dry, and the majority of the houses, &c., around the towns of Dubbo and Wellington are built of this timber. It is also forwarded for upwards of 100 miles by rail for building purposes, and invariably gives satisfactory results as long as the black variety is not used. (J. V. de Coque.)

The pine timber is the most useful timber here for buildings, telegraph-posts, and posts for wire fencing, and is not so liable as other timber to the attack of white ants. It takes a good polish, and I have seen shop-counters made from the same. It is also much used for ceilings, and looks remarkably well, and remains sound under the ground for many years. (Forester Payten, Corowa.)

The White Pine is a valuable timber, and is used extensively for building, fencing, and telegraph-poles. It stands well in the ground, especially if the bark is left on the part that is put underneath the surface. For building purposes it is indispensable, and nearly all the wooden buildings in town and country are made from this wood. It keeps sound for a long time, but houses made of this timber will not bear moving, as it splits and breaks very easily while being taken to pieces, so they cannot be erected again with any degree of neatness. (Forester Postlethwaite, Grenfell.)

This is one of the most useful trees, used mainly for saw-milling and fencing purposes, and is of hardy growth. (District Forester Osborne, Cootamundra.)

This timber is very free from knots, and easily worked, and is considered by builders and carpenters as the best of our pine, and is used for all building purposes. It takes a very fine polish, and is very handsome in the grain. This pine is proof against white ants. I have often seen them moving over it to attack other timber, and would not attempt to touch the pine. (Forester Smith, Dubbo.)

Cypress Pine (*Callitris robusta*, R.Br.) which I have used, and find it is of very little use for house-blocks, as it is subject to dry-rot; but will withstand white ants, and is good for flooring-boards and house-building, when not exposed to the weather or damp, the house being built on blocks. Have also used it for wire-mattress frames, 3 ft. x 2 ft. doors, lining boards (it polishes well), picture frames. (R. J. Dalton, Tinapagee, Wanaaring.)

Size.—Height, 50-60 feet.—(Forester Taylor, Wagga). It sometimes reaches a diameter of 18 or 20 inches.—(Forester Postlethwaite, Grenfell.) Attaining a height of 70 or 80 feet, with a diameter of 2 feet, the logs now being brought in to the mills running from 30 to 50 feet.—(Forester Smith, Dubbo.)

Habitat.—In all the State except Tasmania. It is usually gregarious, forming scrub forests on sandy barren lands.

NEW SOUTH WALES.

It is abundantly distributed in the dry country west of the Dividing Range of this State. It is unnecessary to enumerate all the localities in the National Herbarium, but following are some notes, chiefly by foresters, some of them made some years ago, and now published for the first time:—

There is no pine growing in any of the reserves in my district, which extends to the edge of the pine country about Wagga and Old Junee. I have searched the country between Old Junee and Wagga for pine, and have only found a few poles, and they chiefly in alienated lands. From Old Junee and Wagga towards Narrandera, you get into the pine-country which is out of my district. I have seen a little pine in the Camping Reserve at Alfred Town, on the banks of the Murrumbidgee, but no quantity, and also a small quantity between Upper and Lower Tarcutta, but very small. (Forester Mechem, Tumut.)

Native Pine grows in the hills, and the soil is of a rocky and stony nature. On Poolamacca Pastoral Holding, 6 miles south of Torrawangee, they are very scarce, only an odd pine-tree here and there. (W. N. Baker, Acting Forester, Torrawangee.)

There is a great scarcity of matured pine timber in this district. The whole of the matured trees have been felled before the present reserves were proclaimed, and great waste of valuable timber took place, the greater portion being allowed to rot on the reserves. The following are the principal pine reserves in my district, within the county of Townsend, and are all fairly well-timbered with young pine, in all stages of growth. Nos. 1,901, 1,902, and 3,156, situated on Puckawidgee Run; Nos. 1,879 and 1,880, Steam Plains; No. 7, Conargo; No. 1,404, Deniliquin; and part of No. 1,458, Warwillah Run. All these reserves, with the exception of No. 1,458, have under my supervision been thinned, and all scrub and undergrowth cut and burnt off by the lessees of the runs. The timber has wonderfully improved since the clearing, and will become very valuable in time. The only other pine reserve in my district of importance is No. 3,103, situated on Chah Ling River, county of Wakool. This reserve is timbered with good pine; most of the trees are now suitable for telegraph-posts. Bush fires in this district have tended to destroy hundreds of acres of splendid young pine forests, both on freehold and Crown lands; very little fire destroys the young timber. There are several other reserves in my district that contain small patches of pine. The total area of pine timbers, including all the reserves in my district, I would estimate at about 10,000 acres. (Forester Wilshire, Deniliquin.)

There are about 20,000 acres of land upon the reserves in my district, well timbered with pine. (Forester Payten, Corowa.)

The number of reserves (pine) in my district is 101, and the area which they cover is 467,625 acres. There is a plentiful supply of pine distributed over these reserves in various stages of growth, from trees of half an inch in circumference up to 4 feet. This pine* is of two varieties, known locally as "Black and White Pine." (Forester Condell, Narrandera.)

* This is *robusta* and *calcarata* but the former largely preponderates.

As near as I can calculate, there are about 92,000 acres of White Pine on the timber reserves in my district, exclusive of a proposed reserve in the county of Gipps, which I believe has not yet been gazetted, containing about 2,000 acres of pine. Though pine timber is found upon the area above-mentioned, it is principally of a small description, the larger trees having been already felled for various purposes, and there are probably at the present time not more than one-third of that number of acres carrying matured trees. The White Pine thrives best on sandy ridges, and is generally found with other timbers, such as Bull Oak and Box. The former is occasionally found in considerable numbers on the Weddin Forest Reserve, for instance, there are hundreds of acres of this class of timber which grows to a greater size here than upon any other reserve that I know of. (Forester Postlethwaite, Grenfell.)

To be found on nearly every reserve throughout the Lachlan and Murrumbidgee districts, especially on stony ridges. (Forester Taylor, Wagga Wagga.)

There is a large quantity of pine timber, the White or Yellow Pine being mostly used; the great bulk of pine now being cut by mills in Dubbo, Narromine, Trangie, and Wellington, being obtained from Crown lands between the railway line and the Bogan River, the belts of timber running from timber reserve No. 2,727 to close to Peak Hill, with very little break. The trees being very sound and large, I have already recommended this country be reserved so that the young timber could be protected, which is very necessary, and which if done would give a lasting supply to the mills named. I would estimate the output of pine in this district at nearly 3,000,000 feet per annum, and this could be maintained if more of the young pine were protected, as near towns small trees are cut and brought in to save carriage. There is also a large quantity of pine, on Crown lands within my district, being carted to towns outside, such as Parkes, Mudgee, Coonamble, &c., the quantity of which I could not form an estimate. The White Pine is found in large quantities growing amongst the scrub, and if the scrub were cleared there would very soon be good pine in its place. The White Pine is the most plentiful in this district. (Forester Smith, Dubbo.)

The White Pine is found growing in the thickest scrubs, and is considered good timber for all purposes; saplings run up straight, with little taper, and are used for rafters, ridging, and bush carpentry in general. (District Forester Marriott, Dubbo.)

Mr. Marriott's Red Pine is also *C. robusta*; his Black Pine is (as is usually the case) *C. calcarata*. I see no marked difference in the colouration of these three Dubbo timbers. If anything, the Black Pine is the lightest; but the two *robustas* (White and Red Pine) have a clear band of pale sapwood, while in the Black Pine the band is far less marked. Commenting on this, Mr. Marriott reports: "The Red Pine is considered to be if anything the best timber for milling purposes." The White and Red Pine found on the level country constitute the pine of the plains. Sometimes the Red Pine is called Yellow Pine. For other notes on the subject see "Timber," p. 157.

White Pine is more or less plentiful thence to the north-west railway line.

White Pine is found growing on light loams and sandy loams, chiefly bad country. It is one of the most common tree growths in the district. (District Forester Bishop Lyne, Narrabri.)

The principal reserves in and around Gunnedah comprise 56,613 acres, chiefly composed of pine. Breeza, Doona, Tulcumbah, and Denison may be taken as the largest, but with the exception of the last-named there is no pine left of the required size. Breeza reserve, situated 25 miles from Gunnedah, and comprising 19,070 acres, is completely cut out of pine. Thousands of logs have been taken from this reserve for the past twenty-five years. Doona and Tulcumbah reserves may be classified as the same, and unless proper measures are taken the young pine now maturing will be stunted and knotty. Denison reserve is, however, a valuable one as far as pine is concerned, the reserve,

comprising 29,500 acres, growing an average of eight matured trees per acre, over an area of 20,000 acres. This reserve could also be improved, as far as the young pine is concerned. If it were attended to, it should be able to produce a constant supply of pine yearly. At a rough estimate, there is in my district 163,000 acres growing, on an average, five matured pine-trees per acre, and the young pine saplings, in a healthy state, might be averaged at the same, with an average of more than double. (Forester Harris, Gunnedah.)

Mr. Harris' district contained both White Pine and also Black Pine, *C. calcarata*.

Callitris columellaris, F.v.M.

Botanical Name.—*Columellaris* (Latin), *columella* (a little column), in allusion to the triangular pyramid in the inside of the fruit emerging from the base. The *columella* in this species is as long as it is ever found in *Callitris*.

Timber.—Highly figured and very aromatic.

When residing here, for over nineteen years, I was always given to understand that the timber of the Cypress Pine was touched neither by the white ant nor by the cobra. (S. Sohn, Wardell, Richmond River, N.S.W.)

The root of this tree is valued by cabinetmakers for veneering purposes and largely employed in this way some years ago; but for some cause, not explained, it seems to have fallen into disuse. (C. Moore, in *Paris Exh. Cat.*, 1855.)

A bone-dry specimen, weighed by me, gave a weight of 44 lb. 7 oz. per cubic foot.

Used for telegraph poles in the Rockhampton district.—(A. Thozet.)

This is the only timber used here (Northern Territory) for buildings, as it resists the white ants perfectly. (N. Holtze, speaking of *F. robusta*, var. *intratropica*.)

Size.—"Only a few specimens may be found girthing 6 feet at 3 feet from the ground."—(S. Sohn, Richmond River.) It has been recorded at 80 feet high with a diameter of 2 feet near Ballina; height of 30 feet with a diameter of 15 inches at Byron Bay.—(District Forester Pope.) From 50-60 feet at Moreton Island (Queensland).

Range.—"To this belong most of the Northern specimens, also Richmond and Clarence Rivers."—(B.Fl. vi, 237.) Near Wardell, it grows in a close sand formation.—(Sohn.) Near Ballina (Richmond River), I have seen it growing in pure sand—coastal sand-dunes. There are groves of it near the Brunswick Heads, on the Mullumbimby road. Near the Clarence Heads it is common. District Forester Pope says that it occurs near Byron Bay, close to the sea-shore, in small patches, always in sandy country.

It grows in great quantities upon Moreton Island, near the entrance to the Brisbane River.—(C. Moore.) Forms vast tracts along the coast of Queensland, growing on barren sandy soils.—(W. Hill.)

Callitris Muelleri, Benth. and Hook. f.

Botanical Name.—*Muelleri*, after the late Baron von Mueller, Government Botanist of Victoria.

Vernacular Names.—This tree is usually known as Cypress Pine. The names "Port Jackson Pine" and "Illawarra Mountain Pine" should be received with caution, as *C. cupressiformis* may be included.

Fruit.—The fruit resembles that of *C. propinqua* a good deal, but is, apparently, never tuberculate. That this species runs into *C. propinqua* I have no doubt.

Timber.—A figured Cypress Pine timber of no special character. It is not very abundant, and since it comes into competition with excellent hardwoods it is not often used.

Size.—Usually a small tree, but I have seen it up to, perhaps, 40 feet in height, with a trunk of 12 inches.

Habitat.—Port Jackson, also South Head (Port Jackson). I look upon this species as confined to New South Wales (Central and South Coast and the Dividing Range). It is usually found in rocky (sandstone) situations.

Going north, I have it from Brisbane Water (not to be confused with Brisbane River) at "Woy Woy, on the tops of the high table-land, some of them grow to a fair-sized tree—very handsome."—(A. Murphy.) South, I have collected it near Eden, on the Victorian border. Berrima (Woolfs).

On the Blue Mountains it is not rare, and the most westerly locality known to me is Rylstone.

Callitris propinqua, R.Br.

This is a species which of late years has been confused with *C. Muelleri* on the one hand, and *C. verrucosa* on the other. One must keep to the type, especially as I have prominently drawn attention to the somewhat arbitrary boundaries of most of the species. From *C. Muelleri*, *C. propinqua* may be separated by the perfectly smooth cones and coarse angular branchlets of the former. It has the smooth branchlets often seen in *C. verrucosa*, and it has often a few warts on the valves; its affinity to *C. verrucosa*, a species name which has by Mueller been used somewhat as a drag-net, is evident. The stout peduncles, and the way in which the cones remain on the old wood for years, separate this species and *verrucosa* from *robusta*.

Range.—The type came from Kangaroo Island, South Australia. The species extends to the mainland, being found in South Australia. Going west we find it in Western Australia, and eastward it occurs in Victoria and New South Wales.

NEW SOUTH WALES.

I am of opinion that the Cypress Pine of Quiedong, Bombala, belongs to this species. This is limestone country, and the trees, which have been carefully examined by me, have branchlets very close to those of *C. verrucosa* (as, indeed, other specimens of *propinqua* have).

Specimens from Acting Forester J. Bear, of Wentworth, "growing on sandy ridges, and the only Pine in the district," connect with the South Australian specimens, and appear to be also referable to *propinqua*. The Quiedong and Wentworth specimens have cones larger than those of *propinqua* usually are.

EXPLANATION OF PLATE 47.

Callitris robusta, R.Br.

- A. Twig bearing male flowers and cones. A'. Portion of branchlets enlarged.
- B. A cone opening.
- C. A cone further advanced, showing the prominent central columella. (Letters A-C from Dubbo, N.S.W.)
- D. Cone of "Murray Pine" from Mildura, Vic., furrowed at the valves.
- E. Young cone of Red Pine from Dubbo, showing long stalk, and cone somewhat pointed.
- F. Branchlet (enlarged) bearing male flowers.
- G. Scale with anthers.
- H. Fruit, bearing a few small warts or tubercles.
- J. Seeds. (F-J from Mount Lofty, near Adelaide.)

Callitris propinqua, R.Br.

- K. Branchlet (enlarged) bearing male flowers, Bremer Bay, W.A.
- L. Portion of branchlet bearing male flowers, much enlarged.
- M. Stamen with anthers.
- N. Cone, showing columella.
- O. Seeds. (L-O from Quidong, near Bombala, N.S.W.)
- P. Portion of branchlet (enlarged) from Sandy Creek, near Gawler, S.A. (The fruit, being identical with that of Quidong, has not been also drawn.)
- Q. Cone a little pointed and sparingly tuberculate, from Wentworth, N.S.W.
- R. Cone from type locality (Kangaroo Island, S.A.). For another fruit of *C. propinqua*, see letter H of Plate 46.

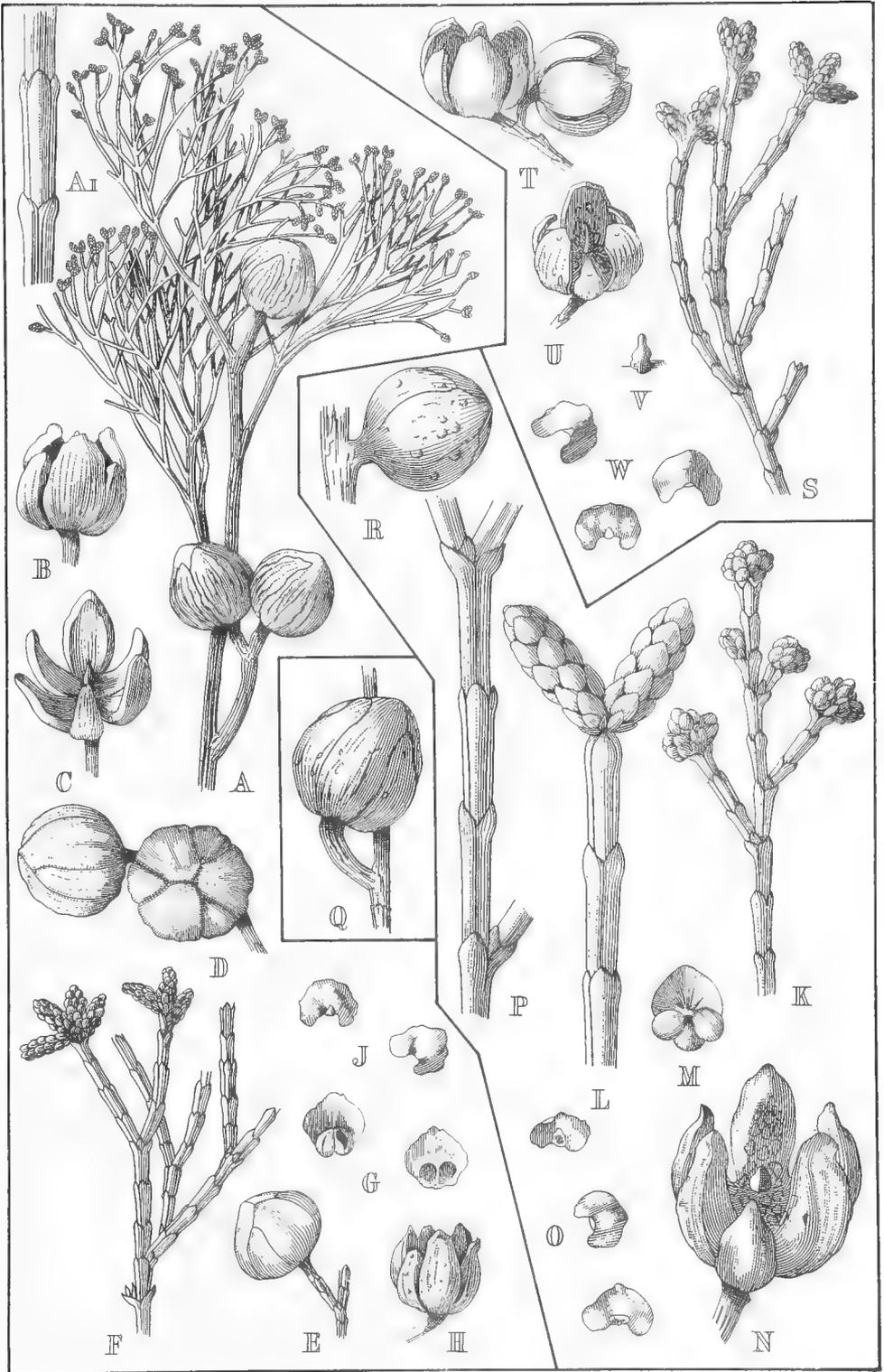
Callitris columellaris F.v.M.

- s. Branchlet (enlarged) bearing male flowers.
- t. Cones, opening and shedding seeds.
- u. Cone showing the prominent columella, from which the species was named.
- v. A single columella.
- w. Seeds. (All from type locality, Richmond River, N.S.W.)

Callitris calcarata, R.Br.

C. calcarata and *C. Muelleri* are often confused. In the latter there is but one columella, in the former several, of irregular form. In *calcarata* the space between the leaf-scales is smaller than in *Muelleri* and the branchlets are much less coarse.

C. calcarata, the Black Pine, and *C. robusta*, the White Pine, are often confused in general descriptions, and the following notes bring out their chief points of difference. The Black Pine has usually bright green foliage, while that of the White Pine is silvery. The cones of the Black Pine have usually stiff points on them; this is only exceptionally the case with White Pine. The stalk of the fruit is usually slender in the case of White Pine. In the case of Black Pine the cones persist on the old wood for many years; White Pines have usually many fallen cones under each tree. Usually the seeds of the Black Pine are reddish-brown in colour, while those of the White Pine are of a pale brown.



CALLITRIS ROBUSTA, R.Br. }
 " COLUMELLARIS, F.v.M. } (The White and other Cypress Pines.)
 " PROPINQUA, R.Br. }

Botanical Name.—*Calcarata*, Latin, *calcar*, *calcaris*, a spur, in allusion to the points on the back of the valves. Allan Cunningham was the first to give the specific name (as *Frenela*) in his MS. Journal, under date 25th May, 1817. He was then in the Lachlan district with Oxley's expedition.

Squamæ of the strobile calcarated near the apex, which is longer than *C. glauca*, Arbuscula, 25 feet.

Vernacular Names.—Most commonly known as "Black Pine," but also as "Red Pine."

The Red Pine occurs on the ridges, where it is also called Mountain Pine. It is generally stunted and does not produce timber of any commercial value. It is also subject to dry-rot and doziness. (Forest Cadet H. Swain, Cootamundra-Grenfell district.)

The darker is called indiscriminately Red or Black Pine. (District Forester Osborne, Cootamundra.)

Leaves.—Mr. Bäuerlen informed me that the twigs of this tree are used in northern Victoria and southern New South Wales for mixing with fodder, to expel worms in horses. There is no reason to suppose that any merit there may be in this remedy is not shared by all the other species. *Boronia rhomboidea* is also put to a similar use.

Fruit.—The points or spurs on the fruits, while commonest in this species, are also occasionally found on some other species, e.g., *robusta*.

Timber.—This species yields, perhaps, the handsomest timber of this class, although not the most durable. It is beautifully mottled and striped with black, white, and yellow; it is much used and valued for the interior lining and roofing of houses, mantelpieces, skirting-boards, &c. Slabs of wood of this tree were used by Sir Thomas Mitchell for sleepers when crossing the Yarran Swamp.

The timber is soft, easily worked, and durable. I was shown a stable at Cooma, built of this pine, which had been erected for 30 years, and the timber still appeared perfectly sound. It is also largely used as a top rail for stone and wire fencing. The value of this timber in a country like the Monaro, where timber suitable for any purpose but rough fencing and firewood is so scarce, cannot be over-estimated. (Forester Benson, Bega.)

Black Cypress Pine grows on sandy and hilly country, and is used for saw-milling and fencing purposes. (District Forester A. Osborne, Forbes.)

Red or Black Cypress Pine, called Black Pine, when growing on the lowlands in conjunction with White Pine (*robusta*), where it produces timber of good quality, but heavier and penetrating odour than the latter. It is also much darker, and the grain is of a more streaky, parallel, or concentric design of reddish and other brown colouring, gorgeous in effect. The annual rings are very fine. Its uses are the same as the White Pine, except that its more streaky grain renders it a fit wood for ornamental fittings or cabinetmaking. (Forest Cadet H. Swain, Cootamundra-Grenfell.)

As the timber is very little used in this neighbourhood, not much value is placed upon it. It does not stand in the ground as well as the white variety, and there are too many knots in it to make it useful for sawing or building. (Forester Postlethwaite, Grenfell.)

This tree does not grow nearly as large as the White Pine, is of a darker colour, and is not much used, being more brittle and liable to split. The knots are more numerous than in White Pine and have a great tendency to fall out when the timber is seasoned. Builders will not use this pine at any time when the white is available. (Forester Smith, Dubbo.)

A distinguishing feature of this pine is the large quantity of resin which gathers in the interstices of the bark; it shows a decided increase of girth at the butt. Less durable than the other pines, being spongy, subject to dry-rot, and is in consequence little used. (District Forester Marriott, Dubbo.)

The Black Pine, a decidedly inferior timber, spongy, and of no durability. The timber is dark, also the branchlets and fruit-pods, which are quite black. It decays in the ground in two years. It can be distinguished from the other varieties for weeks after it is cut, as it glistens along the face of the timber like thousands of minute diamonds. The knots of the Black Pine are not so large, but are much more plentiful throughout the tree; again, the Black Pine invariably grows on the southern and western slopes of the mountains. It is also much more highly scented than the other pines when being cut. (J. V. de Coque, speaking chiefly of the Western Pine.)

It seems to stand fairly well in the ground when used for verandah posts in out-buildings, the rule being to erect them with the bark on, which, I am informed, gives them greater durability. When required for building purposes here, it is brought from the Tamworth and Gunnedah districts, but it is not used to any great extent, although highly useful and ornamental for inside purposes in buildings. (Forester Siddins, Armidale.)

Some Black or Mountain Pine from the Inverell district (District Forester Stopford) belonging to this species has but little figure. As it approaches the tableland it appears to lose much of that richness of colour that this species possesses on the western plains. Locality has, of course, much to do with the physical properties of timber.

Size.—It is a small tree, seldom exceeding 30 feet in height and 18 inches in diameter.—(Forester Benson, Bega, speaking of Monaro.) 50-60 feet.—(Forester Taylor, Wagga Wagga.)

It is of a stunted habit, and though it attains a height of 50 feet, a tree can seldom be found of more than 8 inches in diameter, 3 feet from the ground; thus it is practically useless for milling purposes. (Forester Siddins, Armidale.)

This species has an extensive range in New South Wales. It is found over enormous areas west of the Dividing Range, and also in rocky declivities and cañons in the southern and northern tablelands. It also occurs in Victoria and Queensland.

Abundant on the reserves and alienated lands bordering on the Snowy River, county of Wellesley. (Forester Benson, Bega.)

Red or Mountain Pine, Wagra, Upper Murray. Small stunted Black Pine, from a hill near Wagra, Murray River. (These specimens belong to *C. calcarata*.) Soil stiff, red, and sandy. (Forester Taylor, Wagga Wagga.)

Pine is also to be found in the Killimicat Ranges, between Tumut and Gundagai. A large quantity of it, but no trees of any size, and growing on very rough barren country. (Forester Mecham, Tumut.)

There are probably between 8,000 and 10,000 acres of Black Pine found upon the timber reserves in this district. It is found principally in rough, rocky country, on gravelly soil. (Forester Postlethwaite, Grenfell.)

On shallow soils; on stony or rock ridges. (District Forester Marriott, Dubbo.)

Mitchell (*Tropical Australia*, p. 93) made sleepers of *C. pyramidalis*, 14 feet long and 2 feet wide, to carry his drays over the Yarran Swamp.

It is not plentiful; the most common is the Western Pine, but it does not thrive well, owing, I believe, to the cold preventing its proper development. It rarely reaches 2 feet in girth, the average size of the largest being about 18 inches in circumference. On the eastern side of the Main Range, I have not seen any; if there is, it is in small quantities, and in remote places. (Former Forester Siddins, Armidale.)

No Cypress Pine is found on the New England table-land, though it comes well upon the western slope. Black or Mountain Pine is obtained near Inverell, in which locality there is a large quantity of this kind of pine. It grows almost exclusively in the roughest country, in granite or poor white sandy soil, and very often forms a scrub of small saplings of from 1 to 5 inches in diameter. (The late District Forester Stopford, Armidale.)

It is not easy to define what New England really is. I have attempted to define it in my Presidential Address before the Linnean Society of New South Wales, vol. xxvi, 766 (1901), and the following note from Mr. Stopford is interesting. The cañons of eastern New England are full of this pine, but it hardly comes on to the comparatively flat tableland.

With reference to the growth of pine on the falls of New England, I always consider that New England commences on the south, about Walcha, and extends to Deepwater on the north, at both of which places ravines come up; from Tamworth and Apsley Falls on the south, and from Bolivia on the north, the same country and conditions prevailing all along the western falls. It is in these places that pine is found, but I do not think it is found, or at least can generally be considered to be on the true tableland; at any rate, I do not know of it, upon what I would call this class of country.

Thirty-five miles from Grafton, near Dalmorton, on the Little River. Plenty on the rocky banks. Sent to the mill at South Grafton (J. L. Boorman and J.H.M.); Howell (R. Hart); Warialda (H. M. R. Rupp, J. L. Boorman, J.H.M.); Acacia Creek, Macpherson Range (W. Dunn).

Pokolbin, a few miles south-west of Maitland (R. H. Cabbage) is the most easterly locality in that district known to me.

Callitris cupressiformis, Vent.

Botanical Name.—*Cupressiformis*, Latin, cypress-like.

Vernacular Name.—"Port Jackson Pine" (with *Muelleri*); "Oyster Bay Pine" of Tasmania.

Timber.—Not a highly figured Cypress pine timber; none of the coastal-grown pines appear to have much figure. "Wood soft, not supposed to be durable." (Sir William Macarthur, speaking of the Sydney district.) Timber from the Dorrigo is of very little figure, nearly as plain as that of *C. Macleayana*, and but slightly aromatic. Backhouse (*Narrative*, p. 142) speaks of it as affording narrow-plank and small timber, which is useful in building, but not easy to work, being liable to splinter; it has an aromatic smell.

The Tasmanian timber (Oyster Bay Pine) is used for telegraph poles. The bark must always be stripped as soon as cut, otherwise insects get in and destroy the timber. The above notes I obtained at Oyster Bay.

Wood of little use, said to be obnoxious to bugs, from its resinous odour. (Fl. Tas.)

Timber strong and durable, used for furniture, planks, weatherboards, battens, &c. (*Cat. Col. and Ind. Exh.*, 1886.)

Size.—Usually a tree of 30 or 40 feet in height, with a stem diameter of about a foot. The largest tree measured by District Forester Rotton at Tomerong, N.S.W., was 15 inches in diameter.

Habitat.—Found in New South Wales, Victoria, South Australia, and Tasmania. Usually it is found in rocky situations not far from the coast. It would appear that its most inland localities are in Victoria.

Specific localities in New South Wales are the Dorrigo district (head of the Bellinger River—here it is somewhat scattered and limited in quantity, according to District Forester F. H. Wilshire; Kinchela, Port Macquarie, Port Jackson (including the site of the present Government House), George's River, Port Hacking, and the National Park. The most southerly locality known to me is that recorded by District Forester Rotton, at Parma Creek, near Tomerong, Shoalhaven district.

EXPLANATION OF PLATE 48.

Callitris Muellcri.

- A and A¹. Dimorphic foliage, Eden, N.S.W.
- B. Branchlet (enlarged) bearing male flowers.
- c. Fresh cones (B and c from Port Jackson).
- D. Cone, Wentworth Falls, Blue Mountains, N.S.W.
- E and F. Cones in different stages.
- G and G¹. Central columella in plan and elevation.
- H and H¹. Showing method of attachment of seeds around the central columella.
- J. Seeds (E-J from Mount Wilson, N.S.W.)

Callitris calcarata, R.Br.

- K. Seedling.
- L. Fragment of branchlet.
- M. Young cone.
- N. Cone opened, showing the multiple columellas or aborted ovules.
- N¹. A few specimens showing the great variation in the columellas.
- O. Branchlet (enlarged) showing female flowers. (K-O from Dubbo, N.S.W.)
- P. Branchlet (enlarged) bearing male flowers, from Jennings (N.S.W.-Queensland border).
- Q. Cone, and Q¹, seeds from Cocma, southern N.S.W.

Callitris cupressiformis, Vent.

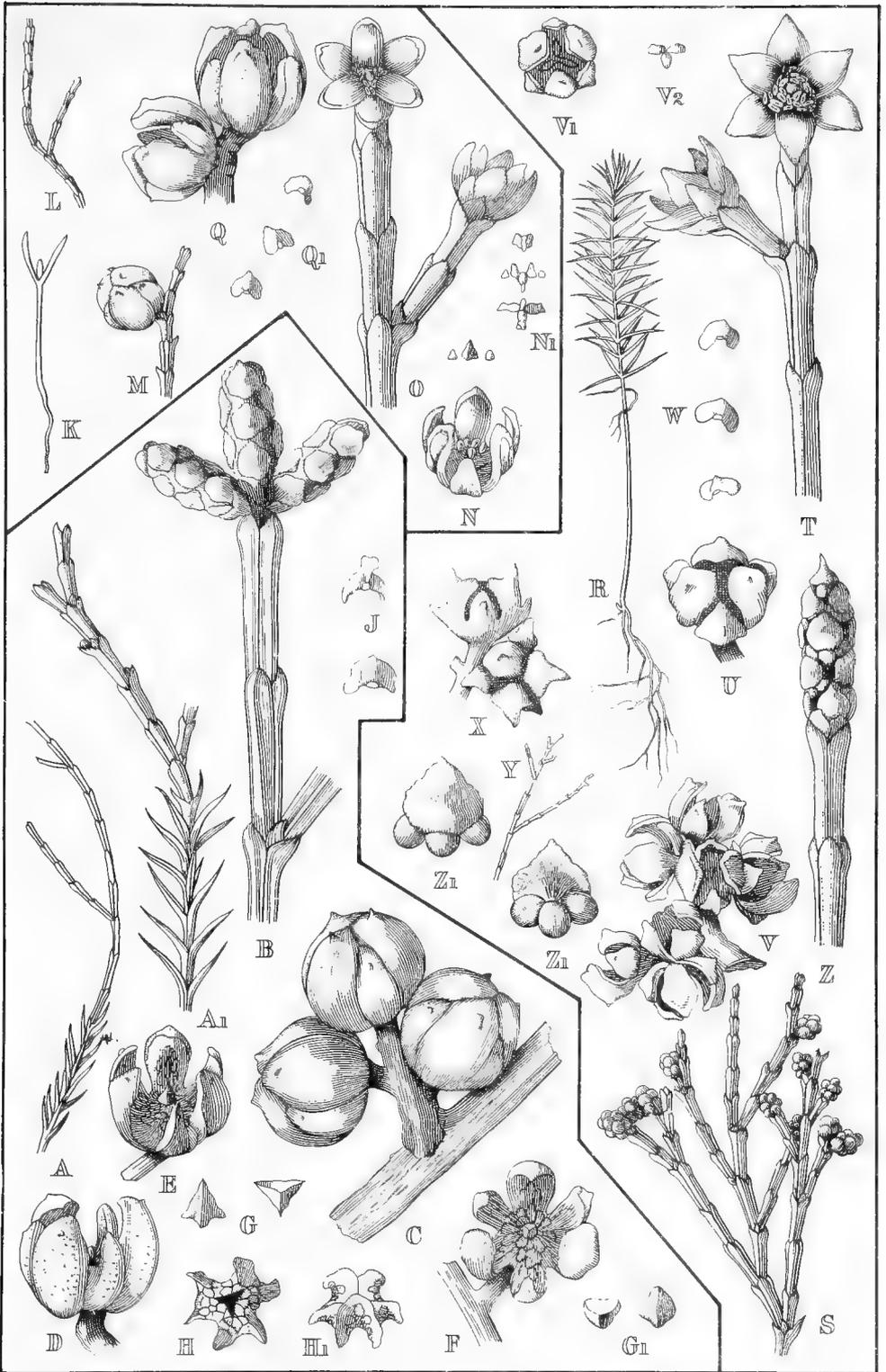
- R. Seedling plant.
- S. Branchlet (enlarged) bearing male flowers.
- T. Branchlet (enlarged) bearing female flowers.
- U. Cone, just opened (R-U from Port Jackson.)
- V. Cluster of fruits.
- V¹. Single fruit.
- V². Central columellas.
- W. Seeds. (V-W from Kinchela, Port Macquarie, N.S.W.)
- X. Cones of variety *macronata*, Grampians, Vic.
- Y. Portion of branchlet.
- Z. Portion of branchlet (enlarged) bearing male flowers; note the pointed terminal scale.
- Z¹. Front and back views of stamen, with anthers.
- Nos. Y-Z from var. *tasmanica* (Gunn's No. 1,017, Flinders Island, Tasmania).

Podocarpus elata, R.Br.

THE BROWN OR SHE PINE.

Botanical Name.—*Podocarpus* (from two Greek words—*pous*, *podos*, a foot, and *karpos*, a fruit), referring to the thick, fleshy fruit-stalk of these plants; *elata*, Latin, lofty, referring to the tallness of this particular tree.

Vernacular Names.—In a general way the name Pine is given to that group of plants known to botanists as Conifers. The exceptions are rare, but a few brush trees in Australia go by that name. Our tree is known as "Pine," "She Pine, and "Brown Pine," and, to a less extent, "White Pine," but the last designation had better be left for *Araucaria Cunninghamii*, the "Hoop Pine," called also "Plum Pine" and "Berry Pine," in allusion to the fruits; and also "Brush Pine," because of the situation in which it grows. It is also known as "Native Deal."



CALLITRIS MUELLERI, Benth & Hook, F., CALLITRIS CALCARATA, R. Br.
 CALLITRIS CUPRESSIFORMIS, Vent. (Black and other Cypress Pines.)

Fruit.—The fruits are called by Sydney boys “plums,” “damsons,” or “cherries.” The fruit, which ripens in autumn, consists of an astringent, aromatic, resinous drupe, egg-shaped, and something like a sloe, sitting upon a fleshy substance of a purplish or damson colour, which is the “damson.” I have measured them up to $\frac{5}{16}$ inch long (they are depressed) and $\frac{3}{8}$ inch in diameter, and they are probably larger. The “sloe” cannot be eaten, but aborigines and small boys are fond of the “damsons,” which have no stones, and consist of a pleasant but rather insipid mucilaginous substance, the thin skin being slightly astringent. They rank among the best of the indigenous fruits. When ripe they stain the mouth and fingers like black cherries do.

Timber.—The timber is used for miscellaneous purposes, like “Colonial Pine” (*Araucaria Cunninghamii*), but its most valuable property is its resistance to white ants and *Teredo*. Round piles of this timber with the bark on are all but proof against the attacks of *Teredo* (cobra) even in brackish water; in fact, some saw-millers say that its power of resistance to marine borers is absolute, but I doubt this, although it is rarely touched. It used to be employed in the Port Macquarie district for staves for tallow casks, and was then called “Stave-wood.” In the Gloucester district it has the reputation of shrinking a good deal and being knotty. Locally, it is used for flooring and ceiling boards and dray bottoms.

Another report says:—“Timber light and durable when used for any inside work; it takes a fine polish.” We know but little of the uses of this timber, except for piles. Mr. F. M. Bailey says that it is excellent for the spars and masts of vessels.

Brown Pine, said to be an excellent timber for flooring boards and house-building. (District Forester Wilshire, Grafton.)

The genus *Podocarpus* is far more developed in New Zealand than it is in Australia, and the uses and properties of the better known New Zealand timber trees will suggest uses and properties probably possessed, in a greater or less degree, by their Australian congeners. The Totara stands in the very first rank of New Zealand trees; it is one of the best timbers in the world to withstand marine borers; in fact, some comparative tests between this timber and the Western Australian Jarrah, made a few years ago by the Engineer to the Auckland Harbour Board, tend to show that Totara possesses greater resistant power than Jarrah. Other *Podocarpus* timbers of note from the sister colony are the Matai (*P. spicata*), which is practically imperishable, the Miro or Black Pine (*P. ferruginea*), all the above being grand timbers. There is still another New Zealand *Podocarpus* (*P. dactyloides*), the White Pine or Kahikatea, which by no means bears so good a name for durability as those already mentioned. It is, however, largely used in the manufacture of butter-boxes, for which it is very suitable.

The genus to which our Brown Pine belongs is even more developed in Asia (chiefly in the tropics) than it is in Australasia. A few species are found in tropical America and in the West Indies, in mountainous districts. It also follows the Andes south into Chili and Peru for a considerable distance. It is also found in South Africa.

Size.—It grows to a height of 90 or 100 feet, with a diameter of 2 or 3 feet.

Habitat.—It extends from the Illawarra to Northern Queensland, being confined to the coast district. It usually occurs in brushes or good soil, and often on the banks of watercourses.

Following are specimen reports of its occurrence in a few localities:—
 “In New South Wales it is fairly plentiful in the Tweed district.” “There is abundance of Brown Pine on the north shore of Port Macquarie, say 25 to 30 feet high, and from 15 to 18 inches in diameter.” On the Gloucester River I observed some fine trees of *Podocarpus elata*, which I was informed is very common on this and other rivers and creeks in the district.

Trees in the islands of the Clarence River, small, with clean barrels about 30-40 feet. (District Forester Wilshire.)

Not plentiful; occasional trees are found on Beech Mountain, and in some of the coastal scrubs in Southern Queensland. (*Cat. Forestry Mus., Queensland, 1904.*)

EXPLANATION OF PLATE 14.

- A. Branch with male (staminiferous) flowers.
- B. Amentum, partly magnified, showing the scales at the base.
- C. Staminiferous flower shedding pollen.
- D. Pistilliferous (female) flower.
- E. Branch with ripe fruits, showing drupaceous seed and the fleshy receptacle.
- F. Seed.
- G. Vertical section of seed.
- H. Horizontal section of seed.



PODOCARPUS ELATA, R.Br. (White or She Pine.)

The Silky Oaks.

(PROTEACEÆ).

1. *Grevillea robusta* (Silky Oak).
2. *Grevillea striata* (Western Beefwood).
3. *Stenocarpus salignus* (a Beefwood).
4. *Macadamia ternifolia* (Queensland Nut).

Grevillea robusta, A. Cunn.

THE SILKY OAK.

The genus *Grevillea* is a very large one, approaching 200 species. It is almost peculiar to Australia, seven or eight species occurring in New Caledonia. It includes many beautiful flowering plants; occurs in the dry interior and the moist coast districts. Most of the species are small shrubs. *G. robusta* is the largest of the genus.

Botanical Name.—*Grevillea*.—Robert Brown dedicated the genus to the Right Hon. C. F. Greville, an active patron of botany at the beginning of the 19th century. *Robusta* (Latin), strong and firm, in allusion to the size of this species, unusual for a *Grevillea*.

Vernacular Names.—Hooker (*Bot. Mag.*, t. 3184) says: "From its deeply dissected foliage and the silkiness of the underside, it has obtained the name of 'Silk Oak' among the pine-cutters of Moreton Bay." When split on the quarter this timber shows a handsome oak-like grain, the prefix "silky" being either because of the silky underside of the leaves, or on account of the bright appearance of the freshly split wood. Hooker's statement, written in 1832, may be the true explanation of why the name was originally applied. On the northern rivers I have known it to be called "White Silky Oak" and "Black Silky Oak," though I have not been able to clearly understand the difference.

Leaves.—The graceful fern-like foliage of this plant causes it to be cultivated as a pot plant for table adornment. In Ceylon the tree is much planted, and the *Tropical Agriculturist* says:—

We have just heard from a mid-Dimbula planter of *Grevillea* leaves being used as a substitute for paddy straw, as a bedding for cattle, sheep, pigs, and even for horses. The trees are lopped up, the branches carried to the store, where the leaves speedily drop off and are used for bedding for cattle, &c., with satisfactory results, especially in an economical point of view.

With us in New South Wales the tree is semi-deciduous.

Flowers.—The tree bears a profusion of orange-yellow flowers which, like those of most members of the family to which it belongs, are rich in honey, and hence are sought after by bees. They add greatly to the ornamental character of the tree, which, in full bloom, is a striking object.

Fruit.—This is sufficiently described by the plate. The winged seeds are very light, are suddenly released from the follicle, and are blown away by the wind. As the trees are a considerable height it is not always easy to collect the seed just as it ripens, and hence it is always expensive.

Is the Sap an Irritant.—In Part XX (vol. ii), p. 183, of my "Forest Flora of New South Wales," I drew attention to Leichhardt's observation of the acrid secretion from the seed-vessels of a *Grevillea* in the Northern Territory.

Dr. E. Mjöberg, the leader of the Swedish Scientific Expedition of 1910-11 to north-west Australia, informed me that the sap of two species of *Grevillea* is used by the natives to scarify their bodies, forming the scars they deem to be ornamental.

Following is an extract from a letter from Mr. Fellows, Curator of the Public Gardens, Albury, N.S.W.:—

I have a man working here, who, whenever he has to work much in the trees of *Grevillea robusta*, gets inflammation of the eyelids; have you met with a similar case, or can you account for it in any way? No other tree causes him this inconvenience. I have asked our doctors about it, but none can account for it. By working in the trees I mean in the top of the tree, lopping or thinning out branches of the older trees. The sap is the trouble. We have some of these trees in the streets in this town; the trees made good growth here.

I have not heard of *Grevillea robusta* in this connection before. It is far better known as a planted tree (both in Australia and out of it) than in its native forests, and I would ask correspondents whether they have heard of its acidity.

I would invite attention to what I have said in regard to Irritant Woods in Part xlix, p. 174, of my "Forest Flora of New South Wales."

Timber.—Its chief characteristic is its fissility. It is light in colour, and has a handsome oak-like figure.

Although distinctly a pretty wood, yet on account of its lightness of colour it has not the same rich appearance as many proteaceous timbers. It is moderately hard, and works well.

We have much to learn in regard to the behaviour of our commonest trees, and bushmen should not be too diffident in reporting peculiarities of our trees and timbers.

Perhaps the New South Wales timber which has been spoken of more than any other for wine casks is the silky oak. Mr. Thomas Hardy, of South Australia, placed shavings of this wood in light wines for two months without affecting the taste and colour of the latter. He pronounces the wood suitable in other respects, and therefore suitable for casking wine, and the opinion of an authority so eminent must carry great weight. Silky oak would not leak when split on the quarter, and Mr. Hardy has been instituting inquiry as to whether the staves would leak when the wood was cut across the grain. Silky oak appears too porous to hold such liquids as spirits.

Formerly it was used to a large extent on the northern rivers of our own State, and still in Northern Queensland, for tallow casks. It has also been largely used for butter-kegs. It does not appear to be affected by long immersion in brine, nor does butter placed in contact with it for any reason—

able period acquire any appreciable taste of the wood. For all these purposes it must be cut or sawn on the quarter, to avoid leakage or soakage. In the old days, before the advent of galvanized iron, it was almost exclusively used in the Northern districts for milk-buckets and dairy utensils, for which purpose it gave great satisfaction. The extension of the use of butter-boxes is causing butter-kegs to be superseded, and therefore increased attention should be given to the utilisation of this timber for dairy appliances of various kinds, *e.g.*, hands, pats, and rammers for butters. If our timber merchants would study the special requirements of butter factories and firms and companies which deal wholesale in or export this important commodity, they would find that it would be to their advantage.

Its pretty grain renders it a suitable wood for certain picture frames, and Mr. R. D. Hay suggests that it is specially suitable for engravings and photographs.

Now that *Grevillea robusta* is getting scarce, I would like to draw public attention to what I believe to be a perfect substitute for it. The commonest tree in the Dorrigo Forest Reserve is one known to botanists as *Orites excelsa*, and its wood usually passes as silky oak. I examined the timber carefully in the forest, and brought a few pieces to Sydney. Everybody I have shown them to pronounces them to be silky oak. At the present time, if there is any difference between the *Orites excelsa* timber and that of *Grevillea robusta*, I do not know what it is, and it is evidently not of a superficial character. I was pleased to make this discovery, as there is a perfect mine of the silky oak in the Dorrigo. There are millions upon millions of feet of it, and at one time not a stick was used. But even if it be not used for wine casks, the time will come when it will be used for butter or tallow casks, or for some other humbler yet useful purpose.

The Dorrigo is not the only place on the Northern rivers, by any means, in which this second silky oak can be abundantly obtained. The difficulty in the way hitherto has been the cost of carriage, but roads into these places are being gradually opened up. (Written in 1893.)

The following is an extract from the *Tropical Agriculturist* of Ceylon:—

But we were greatly interested in a stable door composed of fine planks of a *Grevillea* tree, certainly not more than sixteen years old (if that), which had been cut down and converted into timber. Made into the door when freshly sawn, this valuable wood had subsequently seasoned without in the least warping. Such being his experience we were not surprised to learn that the owner intended to cut down some of the older *Grevillea* trees which can be spared from the large number at Lorne, to be converted into floor boards.

Size.—It rarely attains a height of more than 60 feet to 80 feet, and a stem diameter of more than 2 feet or 3 feet. But its sapwood is small, and there is little waste. Given even moderately favourable conditions it is a very rapid grower, at all events for the first few years. I do not think it is a long-lived tree, at all events as regards cultivated specimens, usually exhibiting signs of senile decay after fifty years.

Habitat.—In the brush forests of the Clarence River northwards up to Northern Queensland, but not extending many miles back from the coast.

Under cultivation, not only in our own State, but in other parts of the world, it has shown that it is drought-resistant to an extent that would hardly be supposed from consideration of the localities with ample rainfall

in which it is indigenous. This affords an illustration of the fact that in acclimatisation experiments one must not adhere too slavishly to the climate and soil conditions of a plant in its original habitat.

The *Tropical Agriculturist* states that, "certainly for beauty of foliage, for tenacity of vitality (it scarcely ever fails in planting), for fair rapidity of growth and value of timber at a comparatively early age, it is one of the most valuable gifts which Australia has bestowed on Ceylon. It flourishes from sea level to 6,000 feet, and we do not wonder at its popularity and wide diffusion. If a *Casuarina* or a *Frcncla* is allowed to grow somewhat big in the nursery it almost infallibly dies when planted out, while the *Grevillea* flourishes equally as a seedling, a well-grown plant, or as a stump.

The faith felt in the beneficial influence of Grevilleas, planted along with tea especially, continues to gather strength among Ceylon planters. These trees afford shelter from the wind, supply an ample litter with fallen leaves, and the roots penetrate and open up what is often a hard sub-soil."

EXPLANATION OF PLATE 1.

- A. Flower-bud.
- B. Expanded flower—(a) Corolla, (b) Ovary, which is stipitate, (c) Style.
- c. Petal (Bentham's perianth-lobe), with sessile anther.
- d. Stigma.
- e. Pedicel with ovary, the corolla removed—(a) Pedicel, (b) Stipitate ovary. (c) Semiannular disc.
- f. Follicles showing the dehiscence.
- g. Seed, winged all round.

Grevillea striata, R.Br.

WESTERN BEEFWOOD.

Botanical Name.—*Striata* (Latin), channelled, fluted; in botany, striate, in reference to the longitudinal markings of the leaves.

Vernacular Names.—"Beefwood" is a name of well-nigh universal application in the districts in which it is found. The appearance of the fresh timber resembles that of raw beef a good deal. I have known it to be called "Silvery Honeysuckle" by reason of its glaucous or silvery foliage when young.

Leaves.—The long leaves are eaten by stock, including horses; but the foliage is rather sparse and woody, and it cannot be regarded as a very good fodder plant. (Peacock.)

Flowers.—The long spikes of creamy, yellow flowers are very handsome. It often flowers in December.

Timber.—Its appearance has already been described. It is the best fencing timber in much of the country in which it grows. It is very durable, and it never rots, according to some authorities. It is better, however, in split, rather than in round posts.

Mr. R. J. Dalton, of Wanaaring, says of it:—

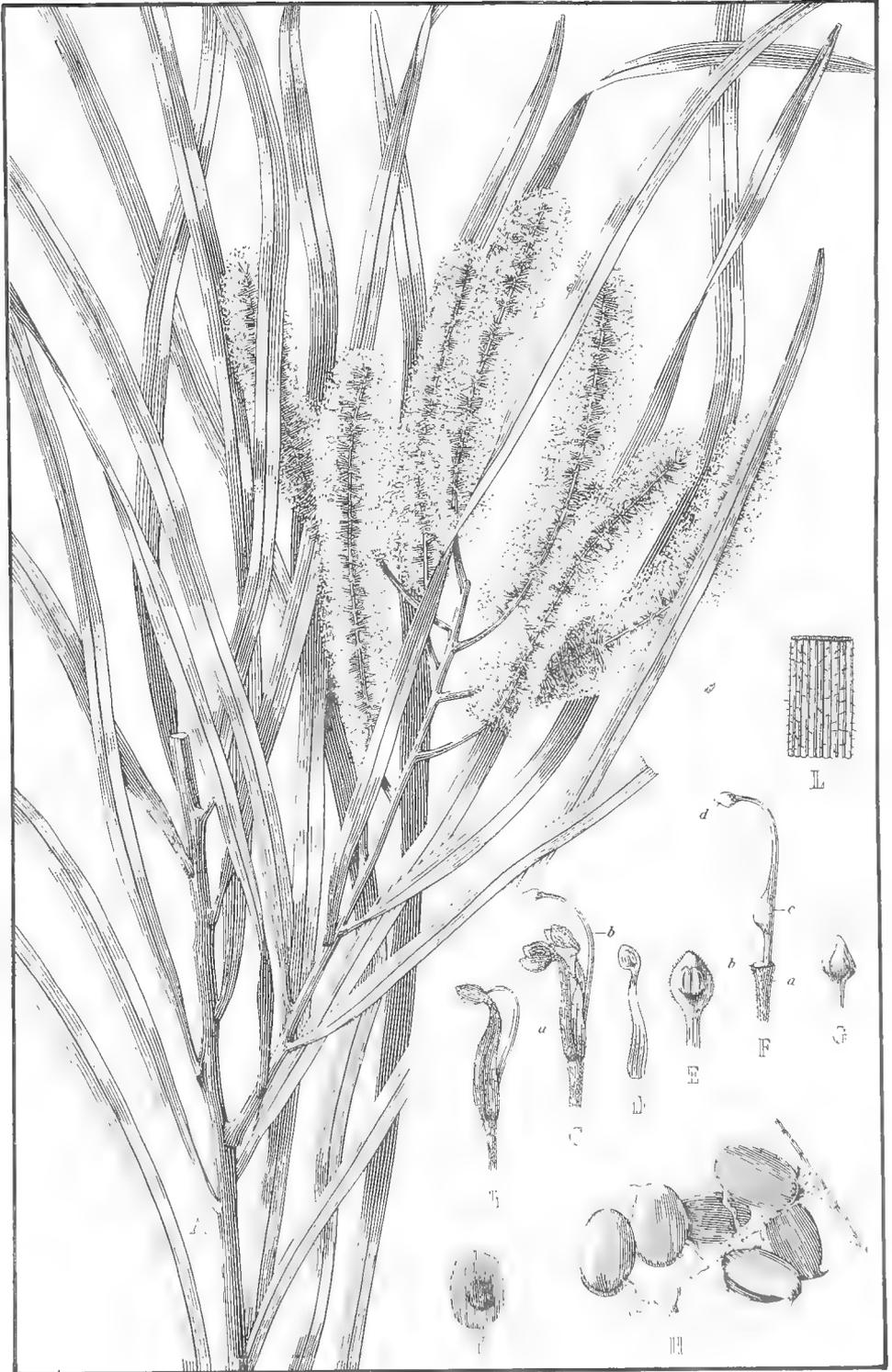
Very useful, as it stands well in the ground. Have used it for house-blocks, posts, furniture, strong flooring, well-slabs, picture-frames. It is not much good for bullock-yokes, although extensively used, as it is very liable to split. It should be very good for railway sleepers, as it lasts well in the ground. Have also seen it used for roofing shingles, as it is a fine splitting wood. No good for firewood.

The timber is used for gate-making, and also for panelling of various kinds.



GREVILLEA ROBUSTA, A. Cunn. (The Silky Oak.)





GREVILLEA STRIATA, R Br. (Western Beef-wood.)

Size.—This is a tree which attains a height of 30 or 40 feet or more. A trunk diameter of 2 feet is by no means uncommon.

Habitat.—The following localities are quoted in the *Flora Australiensis*:—

N. Australia.—Victoria River (*F. Mueller*); Islands of the Gulf of Carpentaria (*R. Brown*).

Queensland.—Wide Bay (*Bidwill*); Port Denison (*Fitzalan*); Kennedy district (*Daintree*); Flinders and Dawson Rivers (*Sutherland*); in the interior (*Mitchell*).

New South Wales.—Darling Desert (*Victorian Expedition*); Bogan River (*C. Stuart*).

S. Australia.—Cooper's Creek (*Howitt's Expedition*).

It is an interior species as far as New South Wales is concerned. We have it from such localities as Ivanhoe, *viâ* Hay, Nyngan, and Coolabah, White Cliffs, Narrabri. It extends over enormous areas, but has been much cut down during the last twenty-five years for fodder and other purposes.

EXPLANATION OF PLATE 155.

- A. Branch with flowering spikes (Coolabah, N.S.W.).
- B. Unopened flower.
- C. Expanded flower, showing—(a) Four-lobed corolla with stamens, (b) Pistil.
- D. Corolla-lobe, with stamen.
- E. Part of corolla-lobe larger, showing stamen (sessile anther) on the concave laminae.
- F. Showing (a) Pedicel, (b) Disc, (c) Stipitate ovary, (d) Stigma.
- G. Stigma.
- H. Follicles (Coolabah, N.S.W.).
- K. Seed, winged all round.
- L. Portion of leaf enlarged, showing nine veins.

The specimen figured is the common New South Wales tree, but it is not typical *G. striata*; it is that form described by Brown as *G. lineata*.

Stenocarpus salignus, R.Br.

A BEEFWOOD.

Botanical Name.—*Stenocarpus*, from two Greek words—*stenos* (narrow) and *karpos* (a fruit), in reference to the narrowness of the fruit (follicle); *salignus* (Latin), Willow-like, but hardly an appropriate name, as a general rule, yet descriptive of some specimens.

Vernacular Names.—This is often called "Silky Oak," and this term is very widely in use. In some districts in which *Grevillea robusta* and *Orites excelsa* also occur, our tree goes by the name of "Red Silky Oak" in order to distinguish it. Further allusion to the redness of its timber is in the name of "Beefwood," which is in very frequent use, the appearance of the fresh wood being remarkably like raw beef in colour.

Flowers.—White or greenish-white, small and inconspicuous in comparison with those of *S. sinuatus*. They are somewhat fragrant.

Timber.—A reddish, fissile timber, used locally for furniture, veneers, staves, gun-stocks, walking-sticks, picture-frames, &c. This timber is an efficient substitute for the northern silky oaks (*Grevillea* and *Orites*); in fact, it has long been used by the Illawarra dairy-farmers for such purposes as butter-kegs. In the old days it was used to a limited extent for shingles. Mr. Forester Brown told me it had been used for gun-stocks at Taree.

A Beefwood formerly grew at Milton, which I believe to be this species. The bar fittings in the "Termeil Hotel" are made from timber of the species procured at Milton. (R. H. Cambage.)

I saw this work in 1892, shortly after its completion by Mr. Bevan, the proprietor of the hotel, who was also a carpenter and joiner, and it looked handsome. The timber is *Stenocarpus salignus*.

"A slab of this timber is of extreme beauty for the uniformity of the pale, red-brown, mottled colour, with an undulating figure perfectly uniform, of hard texture, easily worked. Altogether one of the most beautiful woods in the Exhibition, and of the highest merit." (*Jurors' Reports, London International Exhibition of 1862.*) As it ages it sobers down to a reddish-brown colour, with a tendency to uniformity of colour throughout. Proteaceous timbers are very characteristic in appearance, and this is no exception.

A drawback to fissile timbers such as this is their fissility, and they sometimes tear when in use.

As to the beauty of this timber there can be no difference of opinion. I would like to see it more frequently utilised for furniture, as it is a really handsome furniture wood.

Size.—Usually 40 or 50 feet, with a stem diameter of 1 or 2 feet; but I have seen trees twice as large or larger.

Habitat.—New South Wales and Queensland, extending from the Illawarra to Southern Queensland. The precise southern range of the species is unknown to me, and I should be glad of information on the subject.

EXPLANATION OF PLATE 23.

- A. Flower before expansion.
- B. Expanded flower.
- C. Flower, petals (perianth), with stamens removed—(a) Hypogynous disc, (b) Stipitate ovary, (c) Stigmatic disc.
- D. Petal (perianth segment), with sessile anther.
- E. Stigmatic disc.
- F. Fruits (follicles).
- G. Seeds, showing the thin lamellæ separating them.

Macadamia ternifolia, F.v.M.

THE QUEENSLAND NUT.

Botanical Name.—*Macadamia*, in honour of John Macadam, M.D., of Victoria, Hon. Sec. of the Philosophical Institute of Victoria at the time the plant was described before that body; *ternifolia* (Latin), *terni* (three together), the leaves being commonly in threes. They, however, sometimes form a whorl of four, and in very rare instances, even five.



STENOCARPUS SALIGNUS, R.Br. (A Beef-wood.)



MACADAMIA TERNIFOLIA, F.v.M. (The Queensland Nut.)

Vernacular Name.—The name Queensland Nut is in universal use, owing to the tree having been first discovered in the Northern State. It was subsequently found in New South Wales also, but the first name is firmly fixed, and is likely to remain so.

Leaves.—The variation in the number of leaves in the whorl and of the margin is very considerable.

Fruit.—This tree bears an edible nut of excellent flavour, relished both by aborigines and Europeans. As it forms a nutritious article of food to the former, timber-getters are not allowed to fell these trees. It is well worth extensive cultivation, for the nuts are always eagerly bought. It is said to take seven years from the time the nuts are planted before the tree reaches maturity and bears fruit.

See an illustrated article by W. J. Allen, in *Agricultural Gazette, New South Wales*, October, 1905, p. 1026.

Timber.—Wood firm, fine-grained, and ornamental, as all Proteaceous timbers are, and takes a good polish. It is of a reddish colour, and is stated to be occasionally used for staves, cabinet-work, veneers, shingles, and bullock-yokes. It seems a pity to use our best nut trees for any such purpose. It ought to be strictly protected by law, as a food-tree.

Size.—Rarely more than 30 feet high, with a stem diameter of 8 inches. Forms a fine bushy tree under cultivation.

Habitat.—Found in most of the brush country on the Tweed and Richmond Rivers, N.S.W. It comes as far south as near Camden Haven, which I believe is the most southern limit. The Queensland localities given in the *Flora Australiensis* are Pine River and Moreton Bay (W. Hill); Dawson and Burnett Rivers (Leichhardt); with the leaves less toothed, and the flower rather larger.

EXPLANATION OF PLATE 40.

- a. Perianth, opened out.
- b. Sessile ovary, with long straight style, clavate at the end.
(a) Hypogynous glands united in a ring round the ovary.
- c. Anther.
- d. Fruit, showing exocarp and putamen.
- e. Vertical section showing two fleshy cotyledons.

The She Oaks.

(CASUARINA).

1. *Casuarina lepidophloia* (Belah).
2. *Casuarina glauca* (Salt-water Swamp Oak).
3. *Casuarina suberosa* (Black She Oak).
4. *Casuarina Cunninghamiana* (River Oak).
5. *Casuarina stricta* (Drooping She Oak).
6. *Casuarina Luehmanni* (Bull Oak).
7. *Casuarina torulosa* (Forest Oak).

GENERAL REMARKS ON SHE OAKS.

Vernacular Names.—*Origin of the Term "She Oak."* Casuarinas are known as "Oaks" or "She Oaks." Various species go under the name of "Forest Oak," "River Oak," "Swamp Oak," "Bull Oak," "Black Oak," "Belah" or "Belar," "Beefwood." These are the principal names, but there are a number of others, which will be given as the various species come under review.

The origin of the name "She Oak" has from time to time given rise to discussion, but it is quite clear.

The aborigines name the Casuarina She-look, which has probably been corrupted by the early settlers into She Oak. (George Bennett, *Ind. Progress of N.S.W.* (1870). Art. Oranges, p. 675.)

I cannot accept this.

In his "Flora of Tasmania," i, 340, Dr. (now Sir) Joseph Hooker says:—

She Oak, a name I believe adapted from North American "Sheack"; though more readily allied botanically to the Northern Oaks than any Tasmanian genus except *Fagus*; they have nothing to do with that genus in habit or appearance, nor with the Canadian "Sheack."

Following are extracts from letters to me concerning the origin of the name "She Oak" from the late Prof. E. E. Morris, of Melbourne. Unfortunately his notes were not printed:—

I have just received a second letter from Sir Joseph Hooker, in which he abandons any defence of his well-known explanation I have, as far as one can prove a negative, disproved the existence of the American tree. I am now putting together my notes on the subject, and should they be printed, I will send you a copy.

Personally, I do not think we need look for any far-fetched derivation of the term "She Oak." There is evidence that it reminded the early settlers of oak.

The best kind is a tree with a pine top, but it is very hard, and in grain not unlike the English Oak. (Letter of Major Ross from Sydney, 10th July, 1788. *Hist. Records, N.S.W.*, Vol I, Part 2, p. 172.)

See also an even earlier comparison of the wood to English Oak by Governor Phillip, *infra*, p. 182.

The similarity of the timber of the Sydney species (e.g., *C. glauca*, *suberosa*, *torulosa*) to that of *Quercus* (Northern Oak) is, of course, obvious. As regards the use of the prefix "she," to denote paleness of colour or inferiority, this is an Australian practice which has long been established, and which is open to no doubt. Bushmen continue to use the term daily, thus we have "She Beech," "She Pine," "She Ironbark."

Branchlets.—The "foliage" consists of long fine apparently leafless verticillate branches. Leaves are really present in Casuarinas, but are reduced to minute whorled teeth or bristles forming the top of a cylindrical joint. These branchlet-joints are formed by the concrescence of leaves, each tooth being merely the apex of a leaf. The transit of such diminutive or rudimentary leaves to those of more developed form can be traced in the allied Family *Coniferae* from Cypresses to Pines.

The branchlet-joints are sometimes more or less furrowed, but, as a rule, the furrows are not evident in living specimens, but become visible on drying.

Timber.—Casuarina timbers vary so much in depth of tint, in the extent and distribution of the blotchy grain (medullary rays) to which the wood owes so much of its beauty, that it is difficult to describe it by any brief general description. Some of the deep-red kinds imported into England at one time very largely, Mr. Holtzapffel, the well-known authority on turnery, describes as—

In general colour resembling a full red mahogany, with darker red veins; the grain is more like the Evergreen Oak (*Quercus Ilex*, a Mediterranean species) than the other European varieties, as the veins are small, slightly curled, and closely distributed throughout the whole surface. Some specimens are very pretty.

Most of our She Oaks are very fissile, and show a handsome blotchy oak-like grain, often different, however, in colour. The timber is hard and heavy, and that of some kinds very tough.

The principal use of She Oak timber is for fuel, for which purpose it is excellent. It is also used for shingles, and at one time largely for staves, though far less at the present time. It is excellent for ornamental turnery work generally, and for cabinet work, for which it is generally used in veneers. Then we have such uses as veneer for the backs of brushes, and for what is known at Tunbridge ware. For all the above uses (except shingles and staves), I am of opinion that there might be created for various She Oak timbers a very large demand in Great Britain and the continent of Europe. Some of them, e.g., River Oak and Swamp Oak, are much prized for bullock-yokes, as their timber is comparatively light and tough, and the bolts do not work loose. The She Oak timber makes excellent mauls, tool-handles, and very ornamental walking-sticks, good screws of hand-screws; in fact, one species or another may be put to very many useful purposes.

This timber was called into requisition early in the history of Australian colonisation, and was beginning to get scarce immediately round the settlement in Sydney Cove only four months after the landing. Governor Phillip (quoted by G. B. Barton) at that date says:—

The timber which in its growth resembles the fir-tree warps less (than gum timber), but we are already obliged to fetch it from some distance, and it will not float.

Two months later Phillip wrote:—

The barracks and all buildings in future will be covered with shingles, which we now make from a tree like the pine-tree in appearance, the wood resembling the English Oak. (Barton's *History of N.S.W.*, i, 301.)

This is the earliest record of "She Oak" for shingles, a use to which it is extensively put up to the present day.

A Plea for the Cultivation of She Oaks.

I would draw attention to the merits of this tree as a substitute for the everlasting *Pinus insignis* of California, which seems to be grown immoderately in New South Wales. *C. suberosa* grows in the poorest soil, provided it be stony and well drained. It has a pine-like habit, and is even more graceful than most pines, does not attain a very large size, and forms a copse or an avenue which has a very pleasing appearance.

I go further, and say that if Australians would only take it into their heads to grow their She Oaks (and we have species for salt-water, fresh-water, for arid situations, and sterile places) they would be charmed at the result. A well-grown She Oak is one of the most beautiful trees in Australia, and affords a pleasing contrast to the trees mostly grown, and in most cases suits our climatic conditions far better than the imported pines. The seed is very cheap (anyone can gather a few cones, place them on a sheet of newspaper and let them shed their seeds), the seed readily germinates, the trees are remarkably free from disease, grow rapidly, and their timber, apart from other uses, forms the best fuel we have.

Casuarina lepidophloia, F.v.M

THE BELAH.

Botanical Name.—*Casuarina*, owing to the resemblance of the branches to the feathers of the Cassowary (*Casuarus*); *lepidophloia*, Greek *lepis*, *lepidos* (= Latin *squama*) a scale; *phloios*, the inner bark or smooth bark of a tree, hence scaly-bark.

Vernacular Names.—This tree is rarely called by any name other than its aboriginal one (Belah). In some districts, e.g. (Grenfell) it is known as "Bull Oak," but this should be reserved for *C. Luehmanni*.

Following is confirmation of the statement that the "Belah" is also known as "Bull Oak" by some people:—

In pointing out that "Belah" and "Bull Oak" are really different trees, Mr. Dalton, of Wanaaring, states: "The Belah is always called about Wanaaring by the name of Belah, and the only time I have heard it called 'Bull Oak' is by people coming from inside districts."

The name "Black Oak" is in use at Mount Lyndhurst, S. A. (M. Koch).

Aboriginal Names.—"Belah," or "Belar," is the name almost universally in use. At the same time, I am unable to say what tribe in Belah country used it. Mr. Bailey quotes Mr. Watkins as giving "Billa" in use for *C. glauca* by the Stradbroke Island (Brisbane) aborigines. It is therefore possible that "Billa" or "Belah" is an aboriginal name for *Casuarinas* in

general. Sir Thomas Mitchell gave "Ngeu" as the aboriginal name, in use at "Regent Lake," Lachlan River, for a *Casuarina* (probably the Belah). "Gooree" was an aboriginal name at Terry-hie-hie, New England, New South Wales; "Alkoo," of Mount Lyndhurst, South Australian blacks (M. Koch).

Leaves (Branchlets).—

Chiefly used for feeding stock in dry times, and is considered one of the best Oaks for this purpose. (District Forester C. Marriott, Dubbo.)

The Belah is sometimes eaten by stock, is very woody and astringent, which is claimed for all the Casuarinas in this (Coolabah) district. If fed to stock for any length of time the results are disastrous. (R. W. Peacock.)

Stock will eat Belah in times of drought if hard pushed, but the settler does not fell Belah for fodder when he has Mulga, Leopardwood, Rosewood, Kurrajong, Supple Jack, &c., of a more nutritious character. (H. V. Jackson.)

Valuable for fodder in S.A. (M. Koch.)

Timber.—The character of this timber is its absence of figure, most remarkable for a She Oak. The outer portion (not the sap-wood, which is very narrow) is pale-coloured, while the inner portion is of a rich, reddish-brown, or even chocolate colour.

Hard to cut or saw, but splits freely with the grain. (District Forester C. Marriott.)

A first-class fuel wood.

It is very easily killed by ringbarking, never suckers, and burns very readily. Timber is rather straight and tough, but most liable to split with the weather. (R. W. Peacock.)

Timber very hard, and if split it makes good rails, but it decays rapidly in contact with the ground. (R. Kidston, Gondobolin.)

Split Belah makes good posts, and stands fairly well in the ground, but cannot be compared to Mulga and Gidgee. Round sappy posts soon rot in the ground. (H. V. Jackson.)

The timber is excessively hard, but brittle; it is much used for fencing posts. (K. H. Bennett, Ivanhoe, *via Hay*.)

The tree is a quick-growing, fast-decaying one, and it begins to die frequently before it has ceased growing. It is a rare thing to cut down a tree thoroughly sound throughout. The decay begins at the tap-root in the form of a white mould; this works up into the heart, which becomes dry and hollow, and in course of time the whole tree becomes a pipe. The inside of this is excessively hard, and under the axe flies to pieces like glass. It is useless as a building timber, but the trees being straight they are much used for log fencing and building rough stockyards. (Richard Bennett.)

Good for firewood; sometimes used for bullock-yokes, but liable to split. No use for post or outside work. (R. J. Dalton, Wanaaring.)

See a valuable note on Belah, by Mr. Gordon Burrow, in Part 60 of my "Forest Flora of New South Wales."

Habitat.—The Belah is the commonest Casuarina of the interior, and it and Pine (*Callitris*) are almost the only timber trees found there—in depressions of the land or actually moist localities. These big trees require more moisture than shrubby species, because the roots must go down deep to water. In this connection the following reply (based on Schimper) to a correspondent, who wrote to me asking why the great plains of New South Wales are apparently devoid of timber, may be of some interest:—

The great grass-land plains of Australia are, when xerophilous, technically *steppes*, and xerophilous grass-land containing isolated trees is *savannah*. I take it that you are referring both to steppe and savannah country, for there is no hard-and-fast line between them.

Now, in a tree, the transpiring surface (the leaves) is at a greater distance from the water supply in the soil than it is in the shrub or herb; besides this, the strata of air surrounding that transpiring surface have properties different to a certain extent from those nearer the soil; finally, at least in many cases, the transpiring surface of the tree is larger when compared with the corresponding surface of the ground than it is in the shrub or herb.

What is essential to the existence of trees is the continuous presence of a supply of water within reach of the extremities of the roots, and therefore at a considerable depth in the soil. It is immaterial during what season this supply is renewed. In our treeless plains it is (usually) the case that the supply of water several feet below the surface is wanting, or at all events is too intermittent to permit the continued existence of tree-life. The winds are also an important factor, inasmuch as they agitate the air and greatly increase the transpiration of the leaves. The water transpired can only be drawn up from below, and finally a balance is reached between the efforts of the wind to dissipate the moisture of the leaves and those of the tree roots to keep up the supply. Thus the winds may result in the death of trees and of the tendency of the country to form plains or savannahs or steppes.

The Belah prefers fairly good, slightly undulating, or rather flat land, liable to inundations.

Generally found in gilgal country. Plentiful in this district. (District Forester Marriott, Dubbo.) Acacia Creek, Macpherson Range. (Forest Guard W. Dunn.)

Following are some localities for Belah, represented in the National Herbarium, Sydney:—

NEW SOUTH WALES.

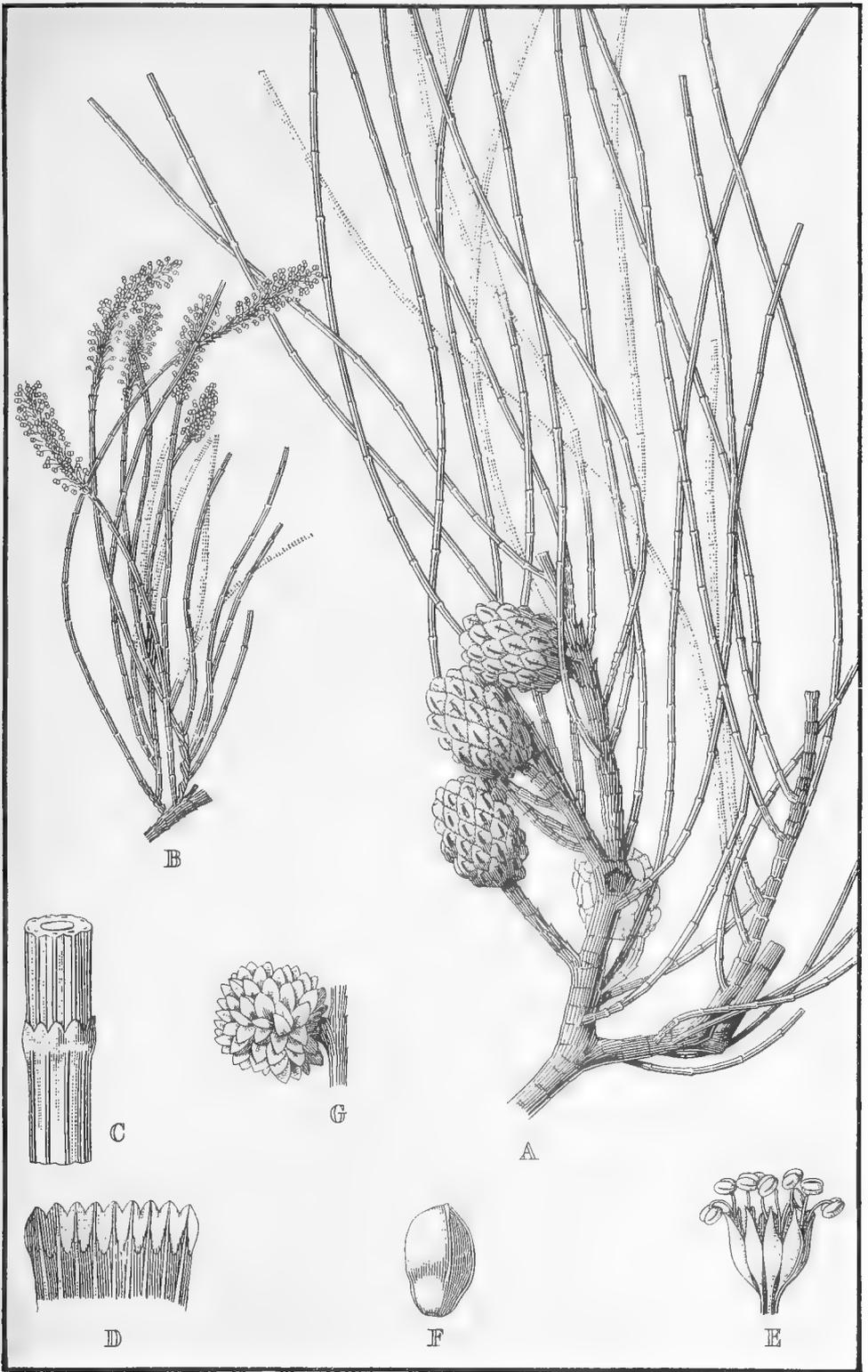
Denilinquin (District Forester O. Wilshire); Balranald; Gunbar, 50 miles from Hay, "Belah or Scrub Oak"; none within 20 or 30 miles from Hay (D. A. Wilson, Acting Forester); common near Moama (District Forester O. Wilshire); Wagga Wagga; Cootamundra; West of Grenfell (District Forester Osborn, J.H.M.); Cowra; Forbes district (J. B. Donkin, R. H. Cambage); Condobolin (J.H.M.); on rich, dark, loamy soil, in the immediate neighbourhood of Myall and Salt-bush plains (R. Kidston, Condobolin); "between the Upper Bogan and Lachlan" (Mr. L. Morton); Dandaloo, Bogan River (R. H. Cambage). This is near the place where Richard Cunningham, the Botanist and Superintendent of the Botanic Gardens, lost his life in 1835. The Belah is

"The gloomy Casuarina trees that witnessed the bloody deed" of Richard Cunningham's murder (Mitchell, *Trop. Aust.*, 24); Coolabah and the Bogan generally (J.H.M.); East Nymagee (R. H. Cambage); Bourke (J.H.M.); also on the Hungerford-road (see photo.); Nyngan (J.H.M.); Dubbo (District Forester Marriott); Coonamble; Curlewis; Moree (W. S. Campbell); Narrabri (J.H.M.); Porcupine Ridge, Gunnedah (W. W. Froggatt); Warrarah, on sandy ridges (Jesse Gregson).

Found also in Victoria and South Australia.

EXPLANATION OF PLATE 51.

- a. Type specimen (fruit). 1, Young cone; 2, Ripe cone; 3, Winged nut, containing seed. "Between the Bogan and Lachlan Rivers."
- b. Type specimens (staminiferous flowers). Between the Upper Bogan and Lachlan."
- c. Part of a branch showing portions of two joints.
- d. Whorled bracts representing leaves, opened out.
- e. A single staminiferous flower, consisting of a single stamen between two floral bracts.
- f. Winged nut, containing seed, much enlarged.
- g. Ripe cone.



CASUARINA LEPIDOPHLOIA, F.v.M. (Belah.)

Casuarina glauca, Sieb.

THE SWAMP OAK.

Botanical Name.—*Glauca* (see the original description), in reference to the glaucousness of the branchlets.

Vernacular Names.—The commonest and most expressive name is "Salt-water Swamp Oak," to distinguish it from the "Fresh-water Swamp Oak" (*C. Cunninghamiana*). Sometimes it is simply called "Swamp Oak," or merely "River Oak," but "River Oak" is a far better name for *C. Cunninghamiana*, as the rivers on the banks of which *C. glauca* is found are only tidal. I recommend the name "Swamp Oak" for this tree, and shall recommend the name "River Oak" to be reserved for *C. Cunninghamiana*.

Aboriginal Names.—The late Sir William Macarthur gives, in the Exhibition Catalogue, Paris, 1855, the name "Oomburra," and in the Exhibition Catalogue, London, 1862, the name "Comburra," for the "Salt-water Swamp Oak," a "tall-growing species, found only near the margin of salt water; its wood not much valued." He gives the name "Coomban" for the "Forest Swamp Oak"—"usually found in groups or small detached dense thickets in moist places, or 'open forest ground.' Wood much used for purposes in which lightness and toughness are required."

I am inclined to think that the names are really identical, his own, or printer's errors having contributed to the confusion. Perhaps even now the correct name or names may be obtained and recorded. Mr. F. M. Bailey ("Queensland Flora," p. 1490) quotes Mr. Watkins, who gives "Billa" as the aboriginal name of this tree at Stradbroke Island.

Leaves (Branchlets).—I have seen cattle leaving fair grass for branchlets of this plant, and probably they will feed more or less on the "leaves" of all *Casuarinas*.

Timber.—It is of a pale brown colour, redder when fresh, drying to an oak-brown. A specimen of "Salt-water Swamp Oak," collected by the late Sir William Macarthur, is so light, and has so little figure, that a second glance is necessary to be quite sure that it is *Casuarina* wood at all. Sir William says of it: "Tall-growing; found only near the margin of salt water. Wood not much valued."

The timber is strong and tough, and is used for staves, shingles, &c., also for rails, but not for posts. It is beautifully marked, close in the grain, and rather tough; brittle. It might be useful for cabinet-work.

A specimen from Gosford (Swamp Oak) is tough and difficult to dress. The heart-wood is of a purple colour.

It is used at Cooranbong for bullock-yokes, and at Taree for chisel-handles and walking-sticks.

Mr. District Forester Rotton, of Nowra, reports:—

The heart (red wood) of this tree makes the very best caulking mallets for shipbuilding purposes. It is also used for bullock-yokes, and handles of every description. The saplings are suitable, and have been proved to be excellent and very durable for rafters to buildings.

On part of the Berry Estate they have been used, and after over fifty years' use are as sound as the day when they were cut. This timber must be kept dry, and not exposed to the influence of the weather.

At Sussex Inlet, St. George's Basin, I have seen a barn, 28 years old (1917), entirely constructed of this timber, ground-blocks and all. It has never had a coat of paint, and is fairly sound.

Size.—This is a rather erect tree, usually not much above 50 feet high, and with a trunk diameter of 2 feet. It has not a deeply furrowed, but a more or less cracked or flaky bark.

Habitat.—In coastal New South Wales and Queensland, where, indeed, it is sometimes known as "Coast Swamp Oak," it is usually found in sandy and in low, black-mould, swampy places, and tidal creeks, sometimes growing in salt water.

In Eastern Australia I have seen it from the Shoalhaven River, New South Wales, (in the south) to Rockhampton, Queensland (in the north), and I should be very glad if observers would look out for it beyond those limits.

It does not always grow on flats near the water's edge. For example, the clump of She Oaks, in a dry situation, near Governor Bourke's Statue, in the Outer Domain, at Sydney, was not planted by the hand of man, and it is in a high and dry situation, many feet above high-water mark. The Sydney Botanic Gardens contains natural clumps of this species, which is still abundant in Port Jackson, and must have been very plentiful there at one time.

There is a very fine row of this species along the creek (which I am informed is brackish) at Edensor Park (Mr. William Harris), $4\frac{1}{2}$ miles from Liverpool, on the road to Badgery's Creek.

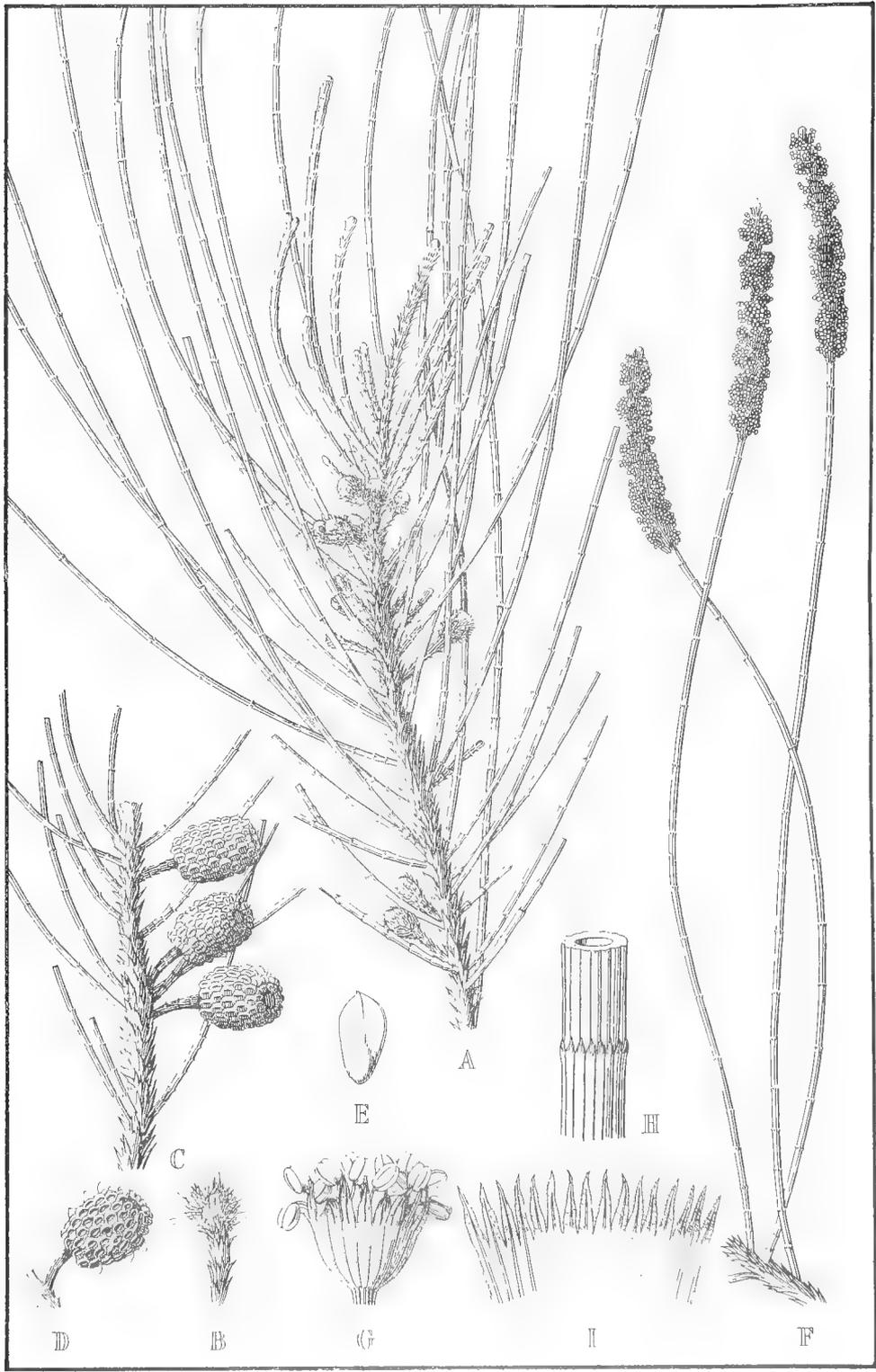
I also found this species on the road from Liverpool to Bringelly, near Cabramatta (the old village of that name, now called Rossmore). The water here is also brackish in a dry time. Here we have localities at a considerable distance from the sea-shore, or tidal water, showing that the species is not exclusively confined to the coast. It has also been proved to be an inland species in New South Wales, and much more inland than in Western Australia. It would appear, therefore, that both in New South Wales and in Western Australia the vicinity of brackish water is necessary for the existence of this species.

Acting District Forester W. F. Crowley has sent this "Swamp Oak" to me from Bodalla and Bermagui, the latter being the most southerly locality known to me.

As regards Victoria, Mueller ("Key to the System of Victorian Plants," ii, 12) records it from the north-west of that State only. All the specimens I have seen from the north-west are *C. lepidophloia*, but I think collectors will probably find it near the sea in Eastern Victoria.

Coming to South Australia, Tate ("Flora of S. Australia," p. 220) shows *C. glauca* from "South of central district, extending from Lake Torrens to the Barrier Range, and the plain of the lower Murray River," also *C. lepidophloia* from the plain of the Lower Murray. I have not hitherto seen *C. glauca* from South Australia, and am, indeed, by no means certain of the identification.

In Western Australia, its occurrence in both coastal and interior localities has been proved, as I have already shown at some length, and I expect that collectors will find it, not only in South Australia, but also in Western New South Wales and Queensland.



CASUARINA GLAUCA, Sieb. (The Swamp Oak.)

EXPLANATION OF PLATE 55.

- A. Twig, with young pistilliferous flowers and cones.
- B. Pistilliferous flower.
- C. Twig, with cones.
- D. Ripe cone.
- E. Winged nut containing seed (enlarged).
- F. Branchlets, with staminiferous flowers.
- G. Staminiferous flowers.
- H. Portion of branchlet in transverse section, showing portions of two joints.
- I. Portion of branchlet, opened out, *i.e.*, whorled bracts representing leaves.

Casuarina suberosa, Otto et Dietr.

THE BLACK SHE OAK.

Botanical Name.—*Suberosa*, Latin (corky), in allusion to the appearance of the bark. The name is not specially appropriate.

Vernacular Names.—On this tree a number of appellations have been bestowed, viz.:—“Erect She Oak” (a name which refers to the general habit of the tree); “Forest Oak” (a name which had perhaps better be left to *C. torulosa*) is in common use for it over large areas of country.

In Tasmania it goes by the name of “Swamp Oak” and “Marsh Oak”; other species pass under these names on the mainland. On the mainland *C. suberosa* is not a moisture-loving species. In Tasmania it was pointed out to me as “Bull Oak,” but here, again, another species is so-called in Australia. In Tasmania it is also called “He Oak.” I propose the name “Black She Oak” for the species, because of its dark aspect. It is fairly appropriate, and has not been adopted for any other species.

Leaves.—The “leaves” (branchlets) are sometimes used to a small extent for fodder, but this species is one of the least valuable of the She Oaks for that purpose.

Bark.—The bark of this tree is rugged-looking, with hard, corky layers. The inner bark is reddish-brown, and displays on its inner surface the lenticular appearance characteristic of the genus. One analysis of the bark gave 13.5 per cent. of tannin, but many more experiments require to be made before its value as a tanning material can be assessed with certainty.

Timber.—It is a red timber when fresh, and has the peculiar blotchy markings common to most timbers of the *Casuarinæ*. It is very fissile, and hence is used for shingles. It is used to some extent for brush-backs and for Tunbridge ware generally. It is useful for screws of handscrews, for making gauges, rails, &c., of chairs, and for clean turnery. Other uses are for bullock-yokes, mauls, and tool-handles. The Yarra (Victoria) blacks are said to have made boomerangs of it. Its chief drawback is its tendency to warp in drying, hence it is often used in veneers. It makes excellent fuel. It is often used, unsawn, for rafters.

Mr. District Forester Rotton, of Nowra, says it is used for shingles and bullock-yokes. Settlers sometimes use this timber for rough furniture such as tables and stools. It is also used for pick and hammer handles; is excellent fuel, and is often used by bakers, as it sends out great heat and leaves little ash.

Size.—It is not a large tree. It rarely attains a larger size than a height of 40 feet, and a stem-diameter of 1½ to 2 feet.

Habitat.—It occurs in all the States except Western Australia. It is not found in the centre of Australia; but, although its natural habitat is the coast and coast mountain ranges, on poor, rocky soil, it is found in mountainous country many miles west of Sydney.

It is very common in Tasmania. It is found all over Victoria except in the north-west.

In South Australia Prof. Tate gives the range as south of the Murray Desert, embracing the 90-mile Desert and the Tatiara.

It is found from south to the extreme north of Queensland.

In New South Wales it is very widely diffused. In the coast districts it is found from the Victorian to the Queensland border. It is common in the tablelands from end to end of the State. Its westerly range appears to be the Castlereagh River.

EXPLANATION OF PLATE 72.

- a. Branch with pistilliferous flowers.
- b. Twig with cones.
- c. Winged nut containing seed.
- d. Branch with stamiferous flowers.
- e. Stamiferous flowers.
- f. Portion of branchlet, showing portions of two joints.
- g. Whorled bracts representing leaves, opened out.

Casuarina Cunninghamiana, Miq.

THE RIVER OAK.

Botanical Name.—*Cunninghamiana*, in honour of Allan Cunningham, King's Botanist, and formerly Superintendent of the Botanic Gardens, Sydney.

Vernacular Names.—"River or White Oak." This is the commonest tree on the banks of the most of our fresh-water rivers, and therefore the name "River Oak" is specially appropriate. *C. glauca* is the River Oak found on the margins of tidal rivers.

Leaves (Branchlets).—This is a tree whose branches were felled in enormous quantities for stock-feeding during the late drought. In many districts the mortality amongst sheep and cattle would have been far greater than it was had it not been for this valuable tree.

Fruits.—This species is the smallest fruited of all the New South Wales She Oaks.

Timber.—Sap-wood white. Wood red (not deep), with a purplish cast. It dries to a brownish-purple. Some of it has a handsome figure. It is used for bullock-yokes (District Forester Stopford, Armidale), shingles, and staves. This and other *Casuarinas* burn well, and their ashes retain the heat for a long while. I look upon it as a valuable timber, and it can be obtained of large size. Wood strong, light, very tough when dry; excellent for many purposes requiring lightness and strength; stated by some to be not durable if exposed to the weather.

One of the most durable oaks, is suitable for bullock-yokes, handles, &c. (District Forester Rotton, Nowra.)

I should like to obtain additional evidence as to the durability of River Oak when exposed to the weather.

The River Oak, it will be noticed, is of a much paler colour than the Bull Oak or Belah, and although it has many uses, yet, owing to the limited supply it is not much used. In fact, landowners who have it growing on their property fronting the river or creeks object to it being cut down, as it assists to keep the banks together as well as providing a shade. It is, in my opinion, a much better timber than any of the oaks I have mentioned. (District Forester Osborne, Cootamundra.)

Size.—The largest of all Casuarinas. I have seen it probably near 100 feet high, and with a trunk diameter of 6 feet, and perhaps more.

Habitat.—Widely distributed over New South Wales along river banks, and in shingle beds. It is found in warm coastal districts, in the cold mountain districts, *e.g.*, Blue Mountains, Orange, and New England, and in the western country beyond Dubbo. It can be readily recognised from the figure, and I ask correspondents to give me specific localities south of the Shoalhaven River, and west of Dubbo, Narrandera, and Grenfell. It extends to Queensland, Bentham having received it from the Gilbert River, but its range in that State requires to be defined.

The River Oak as a Bank Protector.—It is a tree which is readily propagated, and it should be faithfully conserved, for besides its value as a stock food in time of drought, it is one of the best trees we have for protecting the friable banks of rivers. The banks had in the course of ages acquired an equilibrium which has been largely destroyed by the white man. He has ruthlessly cut down the River Oaks to obtain more ready access to the river frontage, and to enlarge the area of cultivated land, but the latter aim has often been defeated through the consequent falling in of the banks. Perhaps I may at this place be permitted to make quotations from a paper written by me:—

The paddock is the unit in considering the effects of erosion. Much of the mischief has already been done, but intelligent conservation of existing and future trees has vast possibilities for good. It ought to be made penal to ringbark up to a certain distance from a watercourse, or to cut down a River Oak on any of the rivers (watercourses), except under a special license only to be obtained after due enquiry. The reason of the suggestions is because improper ringing or felling affects the riparian owner lower down, and he has quite enough difficulties to contend with which are beyond human control, to be victimised by the ignorant act of his fellow-man higher up the stream. I could give an instance where a man cut down River Oaks to make culverts; the River Oak timber is now perished, and if he had gone but a few yards away he could have got almost imperishable ironbark. He has now to repair his culvert, but his River Oaks are gone, his banks are falling away where he removed them, and a larger culvert is now required. In the case of a casual labourer this would have been termed living from hand to mouth. In the present instance it is miserable expediency and opportunism unworthy of thinking men. If the results of acts like this would alone affect the doer, we could view the matter with complacency.

Natural Bank Protectors.—Let us observe the interlacing and ramification of the roots of trees in good soil (such as these flats and river banks). It is very extensive, and their mechanical action in arresting washaways is obvious. One can see evidence that the banks of the Upper Hunter streams were much more lined with trees than at present. In many parts of the Hunter and its tributaries one sees large River Oaks (many of them past their prime) leaving no descendants to continue their work of bank preservation. The young seedlings are palatable to stock, and hence they are eaten out if they have free access to them. This points to the necessary precaution that stock should not have unfettered access to the bed of a stream, as if it were a public highway.

The seedling oaks should be carefully conserved until they are out of reach of stock. Great numbers of River Oaks have been cut down this year (1902) for fodder alone.

One lays special stress on the value of the River Oak for purposes of bank protection, for the reason that it has been for ages the natural bank protector of these streams, and has become largely adapted to its environment. At the same time the acquisition of these lands by the white man, and his method of dealing with the banks and adjacent country, constitutes a marked change in the conditions, and it may be that other trees are even better than the River Oak for purposes of bank conservation. River Oaks have not a large tap-root; they have rather flat, spreading roots, which penetrate the rich soil and silt on the bed of gravel already alluded to. When this gravel becomes bared, as it does in so many places, the River Oak heels over and falls into the stream just as a boulder does.

EXPLANATION OF PLATE 59.

- A. Branch bearing pistilliferous flowers.
- B. Pistilliferous flower, enlarged.
- C. Branch bearing fruits (cones).
- D. Young cones.
- E. Winged nut, containing seed.
- F. Branch bearing stamiferous flowers.
- G. Stamiferous flowers.
- H. Part of branch showing portions of two joints.
- I. Whorled bracts, representing leaves, opened out.

Casuarina stricta, Ait.

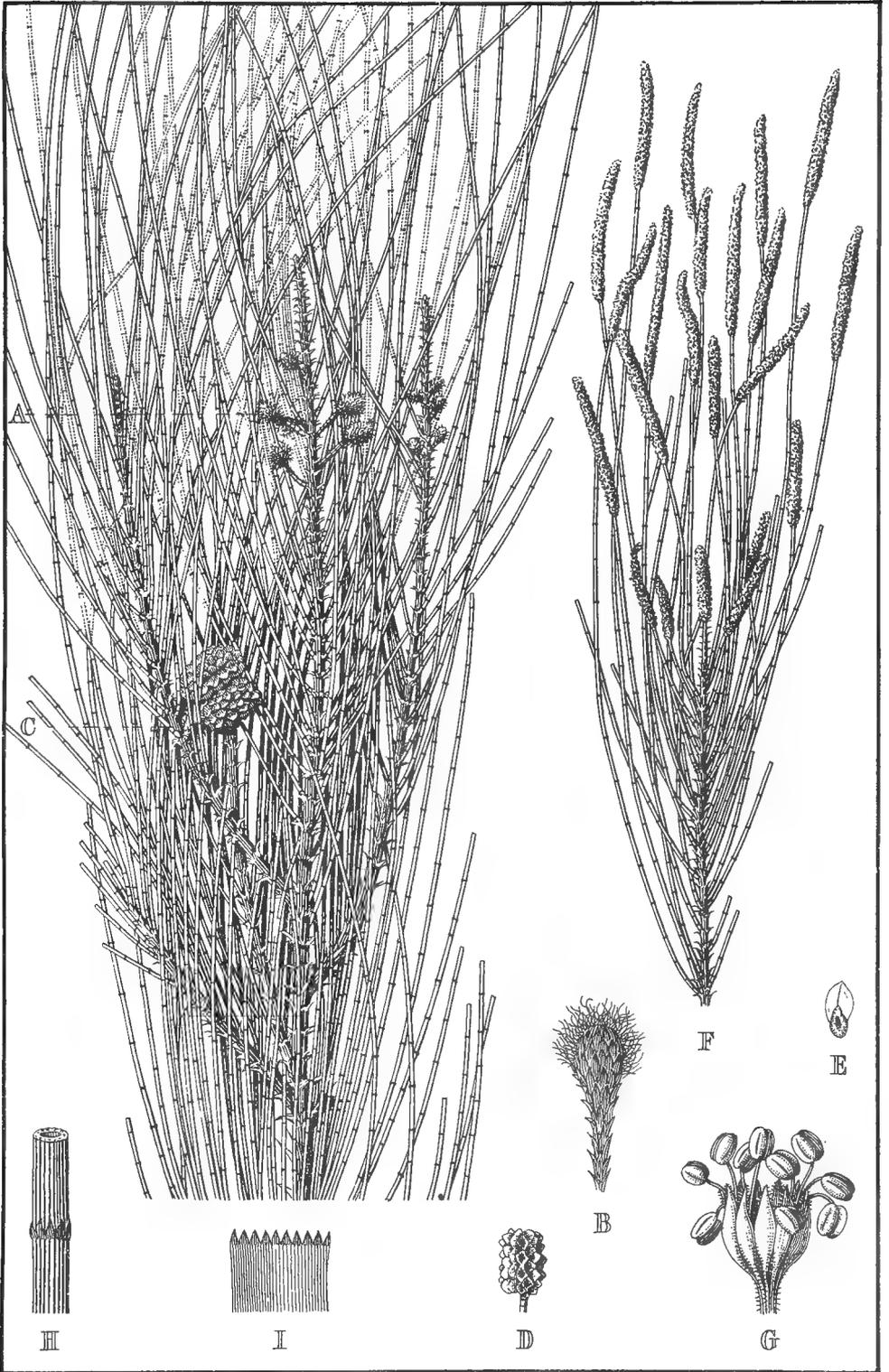
THE DROOPING SHE-OAK.

Botanical Name.—*Stricta*, Latin (drawn out, *i.e.*, into a narrow bundle); hence, speaking of the branches of a plant, rigid or erect. Aiton, in his original description of this species, speaks of it as the "Upright *Casuarina*." As Bentham has already pointed out, its branches are only exceptionally rigid. But the "Mountain Oak" of the Dubbo district, for example, is very erect in habit, and a similar habit has been noted from other localities. The female trees are more strict (erect) than the males, and often quite the reverse of drooping.

Vernacular Names.—The commonest name of this tree is simply "She-Oak." It is often called "Mountain Oak" in the western districts, for obvious reasons. It is not easy to submit a suitable vernacular name, especially as few people give it any particular designation, and it bears the somewhat unfortunate botanical name, "*stricta*." I submit the name "Drooping She-Oak," which is not a new one, and which is fairly descriptive, for general acceptance. I have known it called "Black Oak" at Deniliquin, "Bull Oak" at Wybong, and "Sour Oak" (because of the taste of the branchlets) at Denman close by.

Leaves (Branchlets).—In cases of severe thirst, relief may be obtained from chewing the foliage of this and other species, which being of an acid nature, produces a flow of saliva—a fact well known to bushmen who have traversed waterless portions of the country. This acid is closely allied to citric acid, and may prove identical with it. The branchlets of this species appear to be more sour than those of any other. (Children chew the young cones, which they call "oak apples.")

This is a useful fodder tree in South Australia, Victoria, and southern New South Wales. Mr. S. Dixon states that in Port Lincoln (S.A.) the



CASUARINA CUNNINGHAMIANA, Miq. (The River Oak.)

fallen catkins (male inflorescence) form the chief sustenance in winter on much of the overstocked country. He adds that this tree is too sour to be very useful to ewes rearing lambs; but if sheep had only enough of it, the "break" or tenderness of fibre would often be prevented in our fine-wool districts, and much money saved by the increased value a sound staple always commands.

The foliage is eagerly browsed upon by stock, and in cases of drought these trees are pollarded for the cattle. Old bullock-drivers say that cattle prefer the foliage of the female plant.—(J. E. Brown.) *Casuarina* foliage has a pleasant acidulous taste, but it contains a very large proportion of ligneous matter.

Used for stock feeding in dry time and considered fair feed. (Dist. Forester Marriott.)

When these trees are lopped for stock feed, the following year they send out a profusion of young foliage, and are very pretty in appearance. (Forest Ranger Taylor, Wagga Wagga.)

For those who desire further particulars in regard to this, the most valuable fodder tree of all the She-Oaks, see Mr. Feld's experience as related in Part 60 of my "Forest Flora of New South Wales."

Fruits.—This species yields the largest fruits of any *Casuarina* in New South Wales. Mr. Cambage has measured them $2\frac{1}{8}$ inches long. I have received cones from South Australia (Mr. Walter Gill) $2\frac{1}{2}$ inches long and up to $1\frac{3}{4}$ inches broad.

Timber.—The wood is hard, rather pale when fresh, and with prominent red medullary rays. It dries to a reddish colour, and has dark bands running through it, chiefly in a longitudinal direction, which gives to the polished wood a fine mottled appearance, rendering it very suitable for the manufacture of furniture. It is also used in turnery, and for such articles as bullock-yokes, wheel-spokes, axe-handles, staves, shingles, &c. As fuel, it can hardly be excelled (Mueller and J. E. Brown). The appearance of this handsome wood is very difficult to describe, its heart-wood is darker and less handsome than the other portions. It works up splendidly. It is, however, too small to be used for large articles of furniture. In western New South Wales it is not used except for fuel.

Size.—It is a small tree, say, of 20 or 30 feet, and diameter up to 18 inches.

Habitat.—It occurs in every State of the Commonwealth except Queensland, and even in that State I should not be surprised to hear of it being found.

It is one of the *Casuarinas* found both on the coast and in the interior, and therefore it is probable that a certain percentage of salt in the soil is necessary for its healthy existence.

New South Wales.—Of coastal localities we have Twofold Bay (already quoted), Jervis Bay (J.H.M.); tops of hills between Otford and Stanwell Park (E. Betcher and J.H.M.); and Newport (R. H. Cambage). The two last localities are very instructive. When Mr. Cambage found this at Newport he remarked to me, "This is on the Narrabeen shale,* and I intend to go to Otford to see if the species is found where the same formation

* The Narrabeen shale outcrops around Narrabeen and thence to near Kin-cumber, Broken Bay district. In the south it occurs at Otford. It does not extend, on the surface, far inland.

reappears." I replied that I had personally collected it in that locality. In this particular locality it is confined to the slopes near the top of the ridges, and is never seen on the flat terraces or strands close to the water's edge. Near Otford its fellow trees are *Banksia integrifolia* and *Eucalyptus botryoides*. Mr. A. G. Hamilton informs me that it occurs 100 feet higher than the pit-mouth at Mount Kembla, on the Narrabeen shale formation. This is an instance of the way in which vegetation may be representative of geological formations. We have but few observations on the subject at present, but it affords a most fascinating field for inquiry, to which two well-qualified observers, Messrs. R. H. Cambage and E. C. Andrews, are giving attention.

On the coast, and particularly in the southern States, this species grows on sandy land quite close to the sea.

The following interesting note refers to its occurrence in the interior:—

They grow in company or close clumps, upon decomposed slate or trap-rock formation, also on granite outcrops, and in some cases on sand ridges, but in every instance the situations are very dry and of a barren appearance, always on high, steep ridges.

The He-Oak, or male tree, always occupies the high side of the ridge, overshadowing the She-Oak, so that the slightest breeze shakes the pollen on the female tree. The male tree is a very compact round-topped tree, with a good shape, and with a much brighter green than the opposite sex.

The She-Oak is of a more spreading and drooping habit, spare of foliage, and wanting in symmetry or defined outline. (Forest Ranger Taylor, Wagga Wagga, September, 1892.)

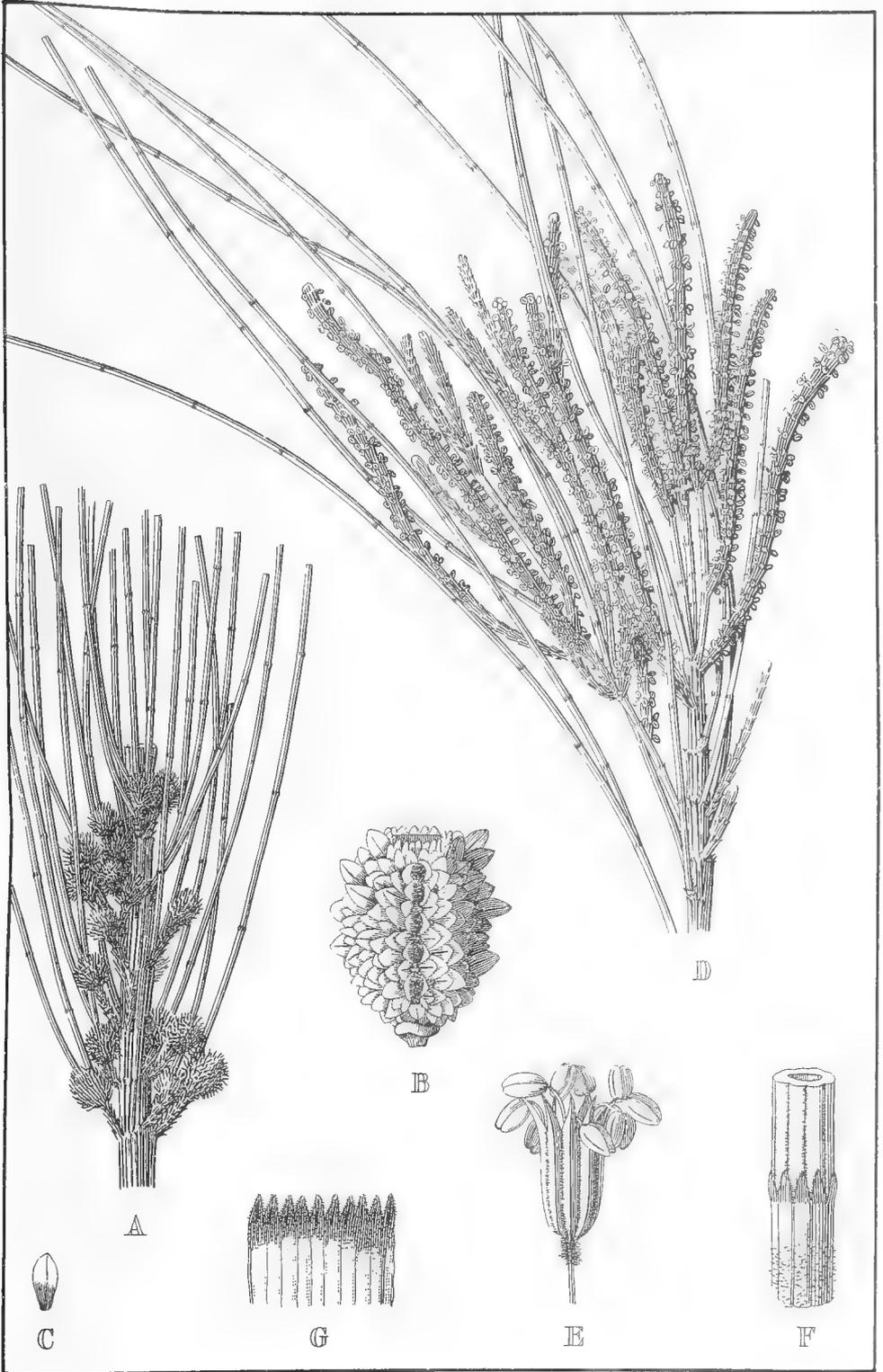
Mr. R. H. Cambage also speaks of its occurrence on igneous hills, although, as he points out, it is not restricted to one formation.

Representative localities in the National Herbarium include Deniliquin (Forester Wilshire), where it is known as "Black Oak"; Wanganella, near Hay (E. C. Officer); Weddin, near Young (J.H.M.). Going more west we have Condobolin (J.H.M.) and Dubbo (District Forester Marriott), where it is known as "Mountain Oak." Going north, we find it in various localities in which characteristic western vegetation is found considerably to the east, e.g., "Bull Oak" on stony hills, Wybong (A. Rudder), "Sour Oak" on the southern slopes of the hills around Denman (J.H.M.), and at Mount Dangar (J. L. Boorman).

Propagation.—From seed. It is an excellent tree for sea-side planting, and should be extensively propagated for that purpose. Some of the handsomest trees in the coastal belt of Victoria and South Australia are of this species. One of the most beautiful trees I have seen is in a street at Port Fairy, Victoria, beautifully symmetrical, and affording plenty of shade. The wind, so detrimental to the shape of trees in exposed situations as a rule, does not appear to affect the beauty of this species, and I would therefore recommend that She-Oaks for sea-side planting be added to the scanty list of those trees whose merits for the purpose have been well ascertained.

EXPLANATION OF PLATE 65.

- A. Branch with pistilliferous flowers.
- B. Ripe cone.
- C. Winged nut containing seed.
- D. Branch with stamiferous flowers.
- E. Stamiferous flower.
- F. Portion of joint of branchlet showing point of insertion into whorl.
- G. Whorled bracts representing leaves, opened out.



CASUARINA STRICTA, Ait. (The Drooping She-Oak.)

Casuarina Luehmanni, R. T. Baker.

THE BULL OAK.

Botanical Name.—*Casuarina*, already explained, *Luehmanni*, in honour of Johann Georg Luehmann, successor of Mueller in the post of Government Botanist of Victoria, and who died in 1904.

Vernacular Names.—"Bull Oak" is certainly its commonest name, being in use over extensive areas in New South Wales and South Australia.

In South Australia it is often called "Swamp Oak," according to Mr. Walter Gill, for it often grows in land liable to inundation.

Leaves.—It is an erect species with rather wiry branchlets, which sometimes take on the habit as if they were electrified, and endeavour to stand apart from each other. This habit, it will be understood, is different from that of most species of the genus, whose branchlets are more bunched and compact.

In times of drought used for feeding stock, but is very binding when used to any extent by itself. (District Forester Marriott, Dubbo.)

Fruit.—The fruit in this species is so exceptional in shape that it appears desirable to draw special attention to it.

Timber.—Of a red colour, and of rather a coarse grain; one of the species whose medullary rays stand out prominently, rotting last, when a tree is felled.

This timber appears to be of little merit. It is small as a rule, and is used for firewood locally.

District Forester Marriott, of Dubbo, says of it:—

This Oak is chiefly used for firewood in this district, and is considered one of the best timbers for this purpose. Used for rails and fencing purposes.

Mr. Walter Gill, Conservator of Forests, Adelaide, says of it:—

Timber of rather large figure; durable for fencing-posts.

Size.—It is a tree of small or medium size, say up to 40 feet in height, with a stem diameter of a foot.

Habitat.—This species occurs in New South Wales and Queensland; also in South Australia and Victoria.

NEW SOUTH WALES.

In this State it belongs to the drier parts, *e.g.*, the western plains and western slopes, while some eastern localities, *e.g.*, Singleton, &c., are interesting because they represent districts in which the western or Eremæan flora has descended to comparatively near the coast.

Following are some localities represented in the National Herbarium, Sydney:—Deniliquin (Forester O. Wilshire); Barham, Murray River (Assistant-Forester Chanter); Balranald (Forester G. S. M. Grant); "West of Grenfell" (District Forester Osborne).

This is the Forest Oak of the Wellington country, and is a tree very similar in appearance to the Swamp Oak (*C. glauca*, Sieb.) of Port Jackson. It is a tree of about 50 feet in height, and of a stiff and by no means ornamental appearance. November, 1851. (The late C. Moore.)

Minore, near Dubbo (J. L. Boorman); Dubbo district (District Forester C. Marriott); Castlereagh River (? Collector); between Gilgandra and Gummin Gummin (W. Forsyth); Narrabri (J.H.M.); Gulgong (J.H.M. and J. L. Boorman).

Emmaville.—Trees 20-40 feet high, 8-12 inches in diameter. Fairly plentiful in one particular district only, *viz.*, Kennedy's Paddock. (J. L. Boorman.)

Yagobie, Moree-Inverell line (R. H. Cambage); Warialda (J.H.M. and J. L. Boorman), some miles to the east of the preceding locality; Deepwater (E. C. Andrews); Minembah, Whittingham, near Singleton (Roderick Browne), most eastern locality recorded.

I have also notes that I have received it from Tocumwal, Narrandera, Ivanhoe, *viâ* Hay, Wagga Wagga, and Cowra, but as there are no specimens from these localities in the National Herbarium, I ask my many friends to make up the deficiency.

The following notes of some localities of the species, written by Mr. R. H. Cambage in 1901, are very interesting. Of course, the species has been found over a greatly extended area since then.

Near here, Eremeran Homestead, also is *C. Luchmanni*, Baker (Bull Oak), the first met with in coming from Bourke. This tree has an extensive range, and is very common in the Forbes to Dubbo districts. Although it does not appear to grow in the direct line between Bourke and Euabalong, yet to the east of this line it extends north and south, covering a strip of country at least 100 miles wide, and finally going north-west to Barrington (R. T. Baker) on the Queensland border. Its easterly course is stopped as soon as the cold highlands are approached, it being a distinctly warm-country species. The most eastern points are reached by its creeping up along the valleys of the large rivers. Near the Lachlan there are a few trees on Neila Station, 6 miles south-east of Cowra. Along the elevated parts of the Macquarie it may be found in limited quantities, between Hill End and Bathurst, but its highest point is reached above the latter place, at one mile east of O'Connell; on the south side, and close to the Fish River, there are about a dozen stunted trees growing on a granite bluff. The specimens collected had only fruit in a very young stage, but the whole of the evidence available, including bark and wood, points to the conclusion that they have been properly identified. The land around is occupied, and it is likely that before long the species will be extinct in this locality. In no other place have I found it growing at an altitude exceeding 2,000 feet above sea-level, and seldom above 1,500 feet. The fact of these trees being stunted may be accounted for by their being in a climate too cold for them; but whether they are the remnants of a former luxuriant growth in this locality, or simply a few stragglers outside their regular limit, are questions which cannot be answered without considerable investigation. It is fully 25 miles down the river from O'Connell before any other trees of Bull Oak are found, though possibly others may have existed before the country was cleared.

Other New South Wales localities, by Mr. Cambage, will be found in two papers "On the Botany of the Interior of New South Wales," in the *Proceedings* for 1902, Vol. xxvii.

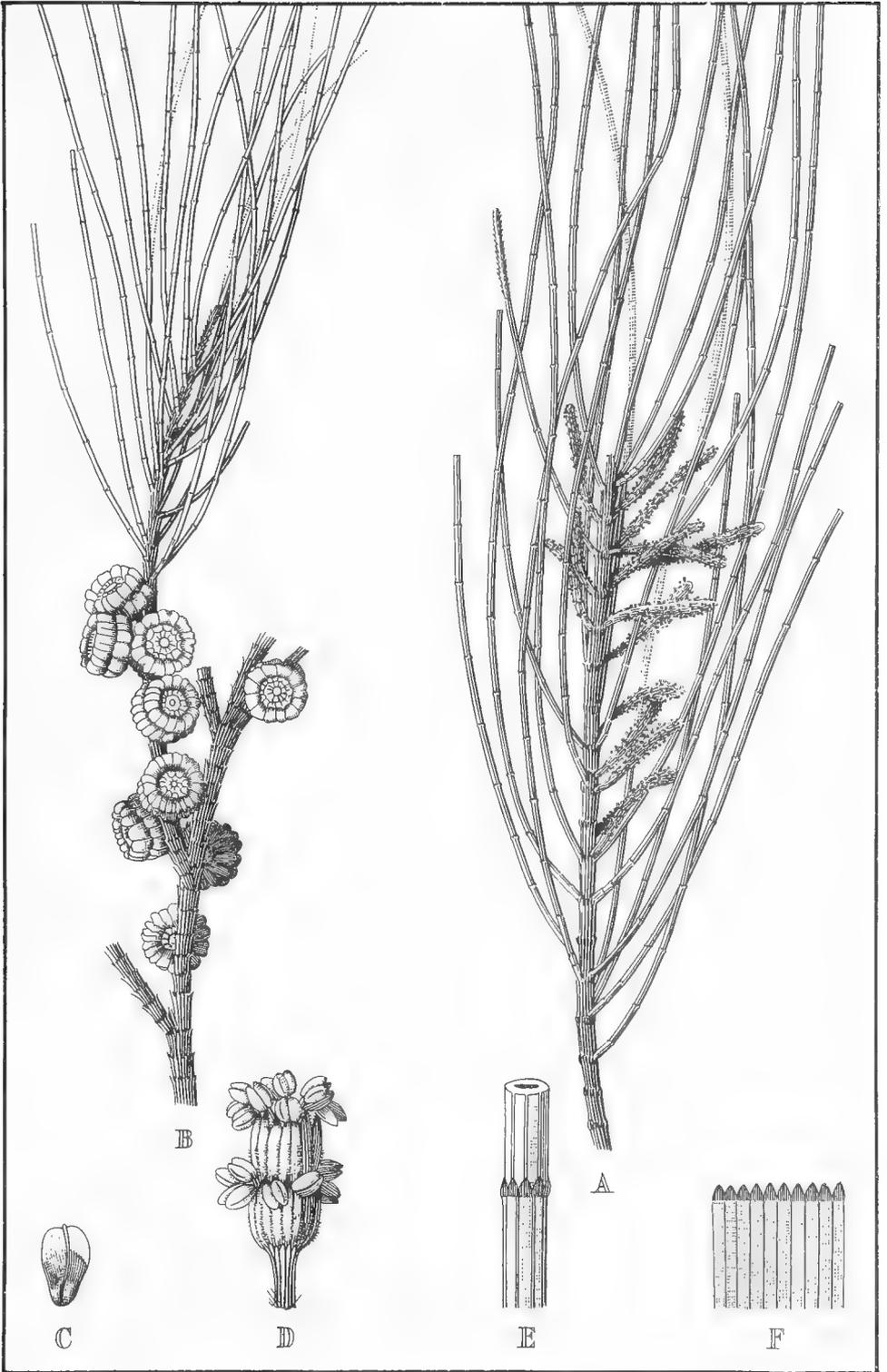
EXPLANATION OF PLATE 76.

- A. Branch with pistilliferous flowers.
- B. Branch with ripe cones.
- C. Winged nut, containing seed.
- D. Branch with stamiferous flowers (from type specimen).
- E. Part of branch, showing portions of two joints.
- F. Whorled bracts representing leaves opened out.

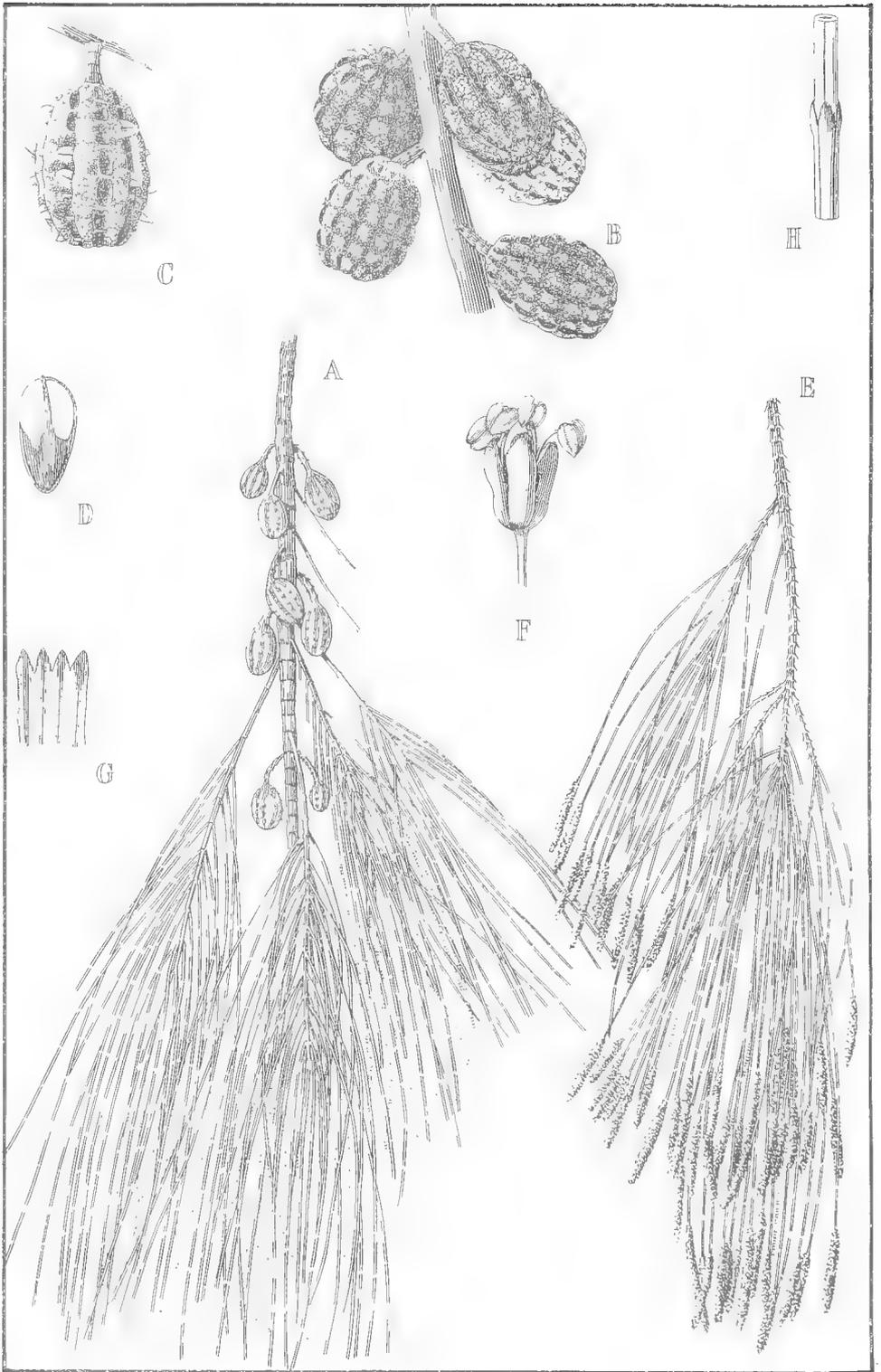
Casuarina torulosa, Ait.

THE FOREST OAK.

Botanical Name.—*Torulosa*, Latin, *torulus* (diminutive of *torus*), a little rope or cord; in botany=moniliform (Greek=*monile*, a necklace), applied to a cylindrical body when it is swollen at regular intervals. In reference to the branchlets, which have a more or less torulose appearance, particularly on drying.



CASUARINA LUEHMANNI, R. T. Baker. (The Bull Oak.)



CASUARINA TORULOSA, Ait. (Forest Oak.)

Vernacular Names.—Called “Cork-bark’d Casuarina” in the original description. Its usual name is “Forest Oak,” though this is not specially appropriate, since *C. suberosa* equally deserves such a name. Nevertheless it will be a convenience to adhere to “Forest Oak” for *C. torulosa*. Mr. District Forester Stopford states that it is known as “Forest or Bull Oak” in New England. We have another Casuarina to which the name “Bull Oak” is commonly applied. I have heard it called “Mountain Oak,” but this is not entirely appropriate. It is sometimes called “Beef-wood,” because of the rich dark colour of the timber. In Queensland it is sometimes known as “Red Oak.”

Bark.—The bark of this tree is very deeply furrowed.

Timber.—Much used for fuel. The wood is close, and prettily marked, yielding handsome veneers. It has a rich red colour, and the medullary rays are very large. This handsome wood has a marking peculiarly its own. The line of demarcation of the heart-wood is well defined. It is used for cabinet-work, and produces very superior shingles. It is used for gun-stocks at Taree. It is one of the best woods for oven fuel.

Mr. District Forester Rotton speaks of it:—

Timber excellent for shingles; also used for bullock yokes and ladder rungs. It is not suitable for handles, unless kept from the influence of the weather, as it is very liable to split when exposed to the influence of the sun. It has been found suitable for chair legs, and is an excellent firewood. It generally grows on high good land.

Mr. District Forester Stopford, of Armidale, reports:—

Known locally as Forest or Bull Oak, and is, I believe, *torulosa*. The timber, though not used in this district, should from its quality be classed as a commercial timber. It grows in this district to a height of about 30 feet, and a girth measurement of from 3 to 4 feet.

Fruits.—The fruits are unique. (See figure.)

Size.—Of medium size, say, 40 feet feet, with a diameter of 1-2 feet.

Habitat.—This species appears to be confined to New South Wales and Queensland. In New South Wales it extends from south of Sydney (I do not know the precise southern boundary, but I have received it from Mr. District Forester Rotton from Appin and Picton) to Central Queensland (I do not know the most northerly locality).

Westerly it is found near the Jenolan Caves; in the Liverpool Ranges, New England, &c. It grows in the most sterile, stony land.

Terry’s Paddock, Eastwood, is the nearest locality to Sydney known to me.

It is found at Acacia Creek, Macpherson Range, according to specimens received from Mr. Forest Guard W. Dunn, who says it “attains a height of 25 or more feet.”

EXPLANATION OF PLATE 63.

- A. Branch with young cones.
- B. Ripe cones.
- C. Ripe cone, shedding the seed (winged nuts).
- D. Winged nut, containing seed.
- E. Branch with stamiferous flowers.
- F. Stamiferous flower.
- G. Whorled bracts, representing leaves, opened out.
- H. Portion of branchlet, showing portions of two joints.

The Teak Group.

1. *Flindersia australis* (Native Teak).
2. *Flindersia Bennettiana* (Crow's Ash or Bogum-Bogum).
3. *Flindersia Oxleyana* (Yellow-wood).
4. *Flindersia Schottiana* (Cudgerie).

Flindersia australis, R. Br.

THE NATIVE TEAK.

Botanical Name.—*Flindersia*, in honour of Captain Matthew Flinders. Brown's words are as follows:—

The examination of Broad Sound (where the species was collected) was completed at the same time (September, 1802) by Captain Flinders, to commemorate whose merits I have selected this genus from the considerable number discovered in the expedition, of which he was the able and active commander. *Australis*, Latin, Southern (Australian).

Vernacular Names.—"Teak" is the common name—that or "Native Teak." The confusion of this species with *F. Bennettiana* will be dealt with below.

"Crow's Ash" in Queensland, according to F. M. Bailey. I have not heard such a name applied to *F. australis* in New South Wales. *F. Bennettiana* is sometimes known by that name.

Teak and Cudgerie.—The present affords an excellent opportunity of drawing attention to the pioneer work which even yet remains to be done in regard to some of even the most important of our trees. *Flindersia Bennettiana* has been called Teak for many years, and the statement has long been allowed to go unchallenged. On working up the genus, for the purposes of the "Forest Flora," I found, however, that Teak is really the product of *F. australis*. Furthermore, "Cudgerie" has for many years been looked upon as the vernacular for *F. australis*, but inquiry shows that the Cudgerie is properly *F. Schottiana*. The confusion, which is now cleared up, appears to have originated in Exhibition catalogues, and is not surprising. The fruits have been wrongly matched, and anyone who has had experience of the difficulties of botanising in the rich brush forests of this State knows how very easy it is to attribute to a monarch of the forest, with its towering leafy top, the wrong flowers or fruits, which are usually only obtained lying on the ground, blown off by the wind or torn off by a parrot or cockatoo.

As the matter of distinguishing between *F. australis* and *F. Schottiana* is of importance, I would emphasise the following:—They can be readily distinguished by the leaves; the leaflets in *F. Schottiana* are sessile or nearly so, with a broad very oblique base, except the terminal odd one; in *F. australis*, they are narrowed into a conspicuous petiole and scarcely oblique at the base.

Leaves.—Attention is specially invited to the amended description of the leaves already given. The drawing of *F. australis* leaves in *Flinders' Voyage* is an admirable one.

Fruit.—The natives of the Moluccas use the rough tuberculated fruits as rasps for preparing roots, &c., for food (*Treasury of Botany*). The species referred to is *F. amboinensis*, Poir. It is very possible our aborigines have put the fruits of *F. australis* (known as Rasp-pod) to a similar purpose. They very probably ate the seeds of this and other *Flindersias*, but I cannot find any record of their having done so.

The overlapping part of the fruit-valves of *F. australis* is muricate or rough in this species and smooth in all others, and is a useful diagnostic character.

Bark.—The bark is an important character, and serves to distinguish it from the other *Flindersias* with which it might be confused. It is dark brown and rough scaly, all the other species with which I am acquainted having a smooth bark.

Timber.—Of the first rank, one of the best, indeed, that New South Wales produces. Not only is it extensively used in this State, but it was largely exported to Germany. It is close-grained, heavy, difficult to work, and cracks somewhat unless carefully dried. The colour is yellowish-brown, and it has no figure. It is so hard that it will break the axe in chopping unless great care be exercised. While it is very strong, it has a somewhat short fibre, like beech, hence it cannot be used for wine casks, a use which was proposed.

It is a splendid building timber. At first sight when cut into boards it is scarcely distinguishable from Hoop Pine (*Araucaria Cunninghamii*). It is cut in large quantities, especially for flooring boards, and defies the white ants for a long time. It is excellent for outside walls, where it will last forty or fifty years. It is the best timber for slabbing a well, as it does not turn the colour of the water like any of the other timbers. It is durable in or out of the ground. Teak is superior to ironbark for some purposes. It is used for gearing wheels, and it does not splinter in the pressure of one tooth against another. It is considered to be the best all-round firewood on the Richmond, only excelled by "pine-knots." As firewood it can be used quite green, and if a freshly-felled log be set fire to it will burn clean away. It is more inflammable when green than when dry.

A large and fairly tall tree, with deciduous bark. Wood bright-yellow, of a distinctive odour; elastic, very oily, hard, strong, and durable. Iron fastened into it will not rust, as is the case with nearly every other kind of timber.

Useful for general building purposes, especially verandah flooring-boards (it having of late years taken the place of Beech, being much more plentiful and cheaper), coach-building, railway-carriage, and coopers' work. It makes an excellent substitute for brass plummer blocks, in which (without oil) shafting may be run at a fairly high rate of speed. In this way it has been found especially suitable for the shafts or spindles of heavy grindstones. It is one of our most useful and durable timbers. (*Cat. Queensland Forestry Mus.*, 1904.)

Size.—It attains a height of 100 to 120 feet, and a diameter of 3 to 4 feet.

In the Sydney newspapers of 14th May, 1906, the following paragraph appeared:—

Murwillumbah.—Mr. J. Riley, of Mooball, brought the largest teak log ever drawn in the district into the local station. It was 16 feet 6 inches in girth, being portion of a log containing 10,000 feet, estimated to be worth over £30."

Habitat.—It is confined to northern New South Wales and to Queensland. The type came from near Upper Head, Broad Sound, a little north of Rockhampton. It is a brush tree, and is not rare in south coastal Queensland. In New South Wales it is "one of the principal, if not the principal, timbers of the district, being unlimited in supply" (Forest Guard W. Dunn, Acacia Creek, Macpherson Range). "It is found on the Tweed" (Forest Guard S. R. Charles). It grows in the Big Scrub near Lismore, and in the scrubs (brushes) all through the Richmond district. Enormous numbers of this valuable tree have been destroyed in the process of clearing land for cultivation, and it is equally certain that much of this timber has been unnecessarily destroyed. In any scheme of forestry this is one of the trees it should be the endeavour of the forester to conserve.

EXPLANATION OF PLATE 67. (FLOWERS.)

- A. Flowering branch.
- B. Expanded flower—(a) Petals, (b) Staminodia, (c) Stamens, (d) Disc, (e) Ovary.
- C. Vertical section of flower showing—(a—e as in B).
- D. Back of flower.
- E. Flower more advanced, showing young cone with stigma.
- F. Stamen.
- G. Young cone.
- H. Vertical section of young cone.
- K. Part of outside of young cone showing hairs.
- L. Part of stem, showing articulation of petiole.

EXPLANATION OF PLATE 68. (FRUITS.)

- A. Leaf (with numerous leaflets).
- B. Capsule about to open.
- C. Deciduous placenta with winged seeds (two on each side of the placenta).

Flindersia Bennettiana, F.v.M.

THE CROW'S ASH OR BOGUM-BOGUM.

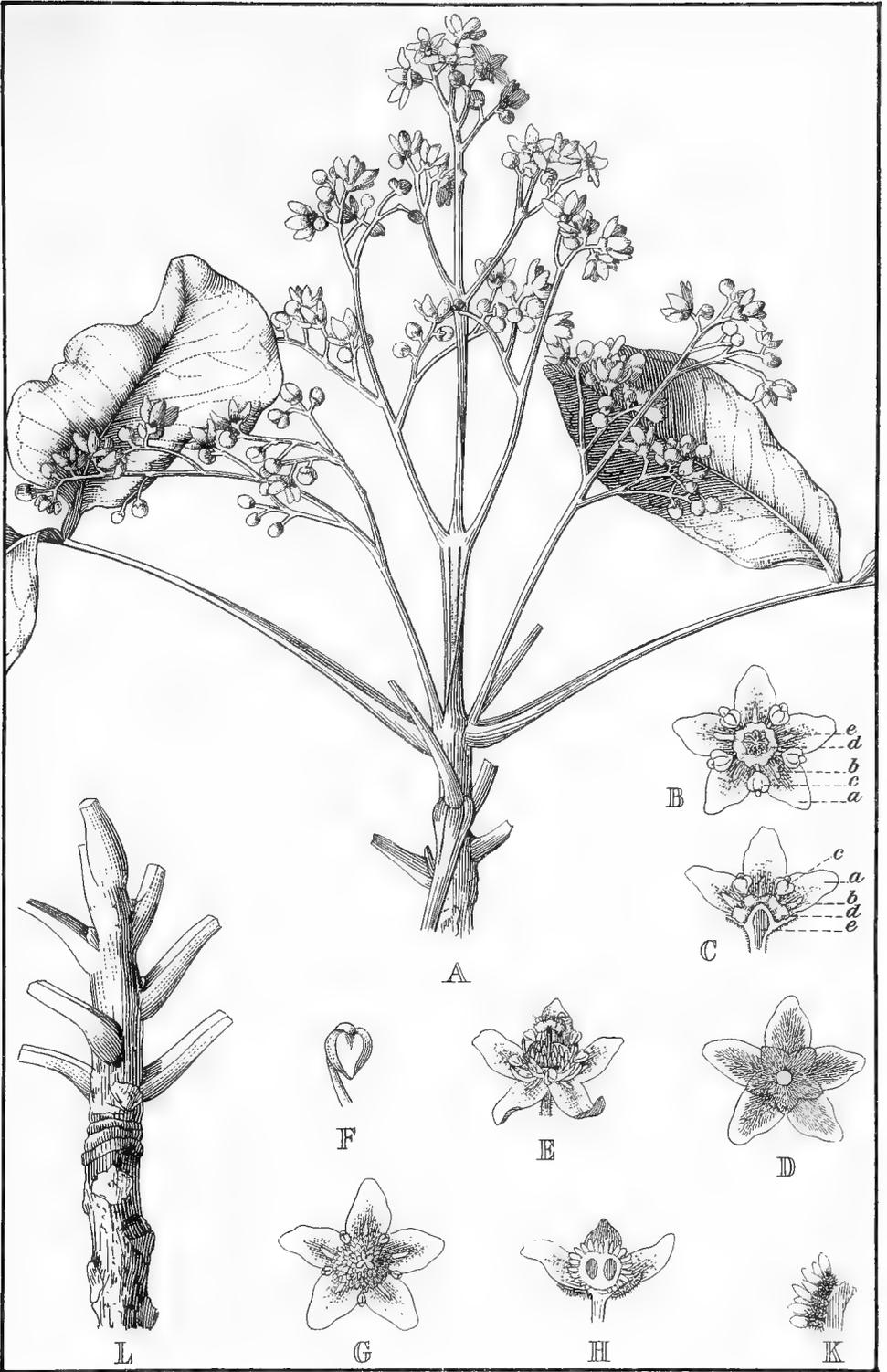
Botanical Name.—*Bennettiana*, in honour of the late Dr. George Bennett, of Sydney (1804-1893).

Vernacular Names.—The origin of the name "Crow's Ash" or "Crow's-foot Ash" is one concerning which there is room for conjecture.

It may be that a timber-getter, in felling a *Flindersia*, found in a fork the remains of crows eaten by some birds (perhaps hawks), the feet alone being left behind.

Mr. W. Dunn, however, points out another explanation. He states that crows are as fond of the winged seeds as cockatoos are, and thinks it is quite possible the name may have originated in that way.

The name "Crow's Ash" is one given by some Queenslanders and Richmond River people to Teak (*F. australis*). It has also been sent to me as a name for *F. Bennettiana*, a closely-allied species. As Teak is a fixture for *F. australis*, I think it is desirable to encourage the name "Crow's Ash" for *F. Bennettiana*, which is one of the high trees in which crows build.



FLINDERSIA AUSTRALIS, R.Br. (The Native Teak.)



FLINDERSIA AUSTRALIS, R.Br. (The Native Teak.)

Aboriginal Name.—"Bogum-Bogum" of the aborigines of the Richmond River, New South Wales. See No. 1 of Moore's "List of Northern Timbers for the London Exhibition of 1862."

Leaves.—The leaflets are the largest of those of any species of *Flindersia*.

Fruit.—The fruit is smaller than that of *F. australis*, nor are the edges of the valves rough as in that species.

Bark.—Somewhat resembles that of *F. australis*, which has doubtless tended to add to the confusion between the two species.

Timber.—The following account of this tree was written by the late Mr. Charles Moore for the "Catalogue of N.S.W. Exhibits at the London Exhibition of 1862":—

This tree is very abundant in the coast brush forests, there attaining a height of 80 feet, and 2 feet diameter. Comparatively rare and of small size on the Clarence. Its large, bright, glossy foliage, and masses of terminal white flowers render it a conspicuous object wherever it grows. The wood is seldom used by the settlers, but as it splits well, might probably be valuable for staves.

For many years the Teak (*F. australis*) went under the name of *F. Bennettiana*, and a caution is given on the subject. We know very little about the "Crow's Ash" (*F. Bennettiana*). It is certainly a much rarer tree than the Teak. We know that it is pale-coloured, and that it is fissile (it is used for staves); but what else do we know about it? What are its properties as compared with Teak and Cudgerie?

Size.—Moore says it attains a height of 80 feet, and a diameter of 2 feet.

Habitat.—The localities given in the "Flora Australiensis" are:—

Queensland.—Wide Bay (Bidwill); Brisbane River, Moreton Bay (A. Cunningham, Fraser, W. Hill).

New South Wales.—Clarence River (Beckler).

It is a brush tree, and we know very little about its distribution. We do not know its precise southern range, nor are we able to say, with a close approximation to accuracy, its relative abundance on any particular area.

It is represented in the National Herbarium, Sydney, from the following localities:—

New South Wales.—Tweed River (Mrs. Grime); Lindendale, Lismore, "10-15 feet," also Lismore, "40-60 feet, 9-18 inches diameter" (W. Baeuerlen); Experimental Farm, Wollongbar; Richmond River (J. A. Henderson); Reserve, Dalwood, Richmond River (W. W. Watts); Three-mile Scrub, Byron Bay (W. Forsyth); Stroud district (the late Augustus Rudder), no specific locality given, and, therefore, doubtful.

Queensland.—Brisbane (J. L. Boorman); Eumundi (F. M. Bailey); Gympie (F. Hamilton-Kenny).

Further information in regard to this tree is desirable.

† *Propagation.*—It is readily cultivated from seed.

But if we knew little of this tree in the forest, it is the best-known of all the *Flindersias* in cultivation in Sydney. It is a handsome avenue tree. Its large glossy leaflets, with a profusion of large white masses of smallish flowers, borne on a neat, erect trunk, render it a valuable addition to any garden of trees. It appears to be perfectly hardy in the Sydney climate.

EXPLANATION OF PLATE 77 (FLOWERS).

- A. Flowering branch with the flowers of natural size.
- B. Flower (enlarged).
- C. Expanded flower showing—(a) Petals, (b) Stamens, (c) Staminodia, (d) Disc, (e) Ovary, (f) Stigma.
- D. Part of flower showing—(a) Stamens, (b) Staminodia, (c) Disc, (d) Ovary, (e) Stigma.
- E. Stamens.
- F. Staminode.
- G. Transverse section of ovary.
- H. Calyx.

EXPLANATION OF PLATE 78 (FRUITS).

- A. Leaf (with leaflets) or portion of stem showing articulation of petiole.
- B. Fruit.
- C. Capsule opening septicidally.
- D. One valve of capsule.
- E. Seed, winged all round.

N.B.—The fruits were drawn from specimens attached to leaves, and therefore their botanical origin is not open to doubt.

Flindersia Oxleyana, F.V.M.

THE YELLOW-WOOD.

Botanical Name.—*Oxleyana*, in honour of John Oxley, Surveyor-General of New South Wales, who, with Messrs. Uniacke and Lieutenant Stirling, discovered the Brisbane River (the locality where this species was first found) in the year 1823.

Vernacular Names.—"Yellow-wood," or perhaps "Light or Pale Yellow-wood," is its commonest name.

"Long Jack" is a name frequently used in northern New South Wales for this tree, in reference to its great height.

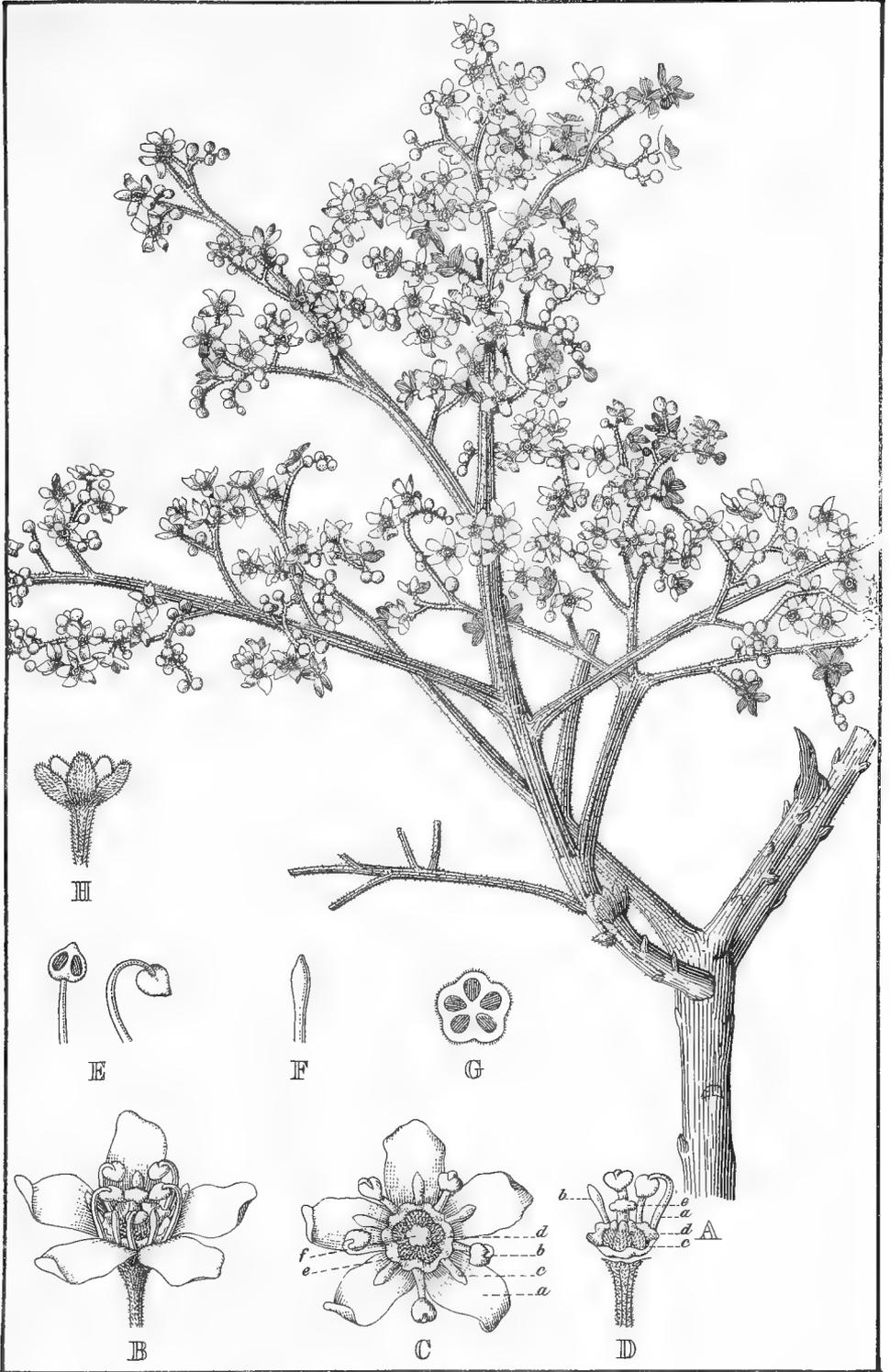
Leaves.—The leaflets are softly tomentose underneath, and more readily wilt than those of any other species. The common rachis is also tomentose. Sometimes the venation on the under side of the leaf is very conspicuous.

The leaflets are not always strictly opposite.

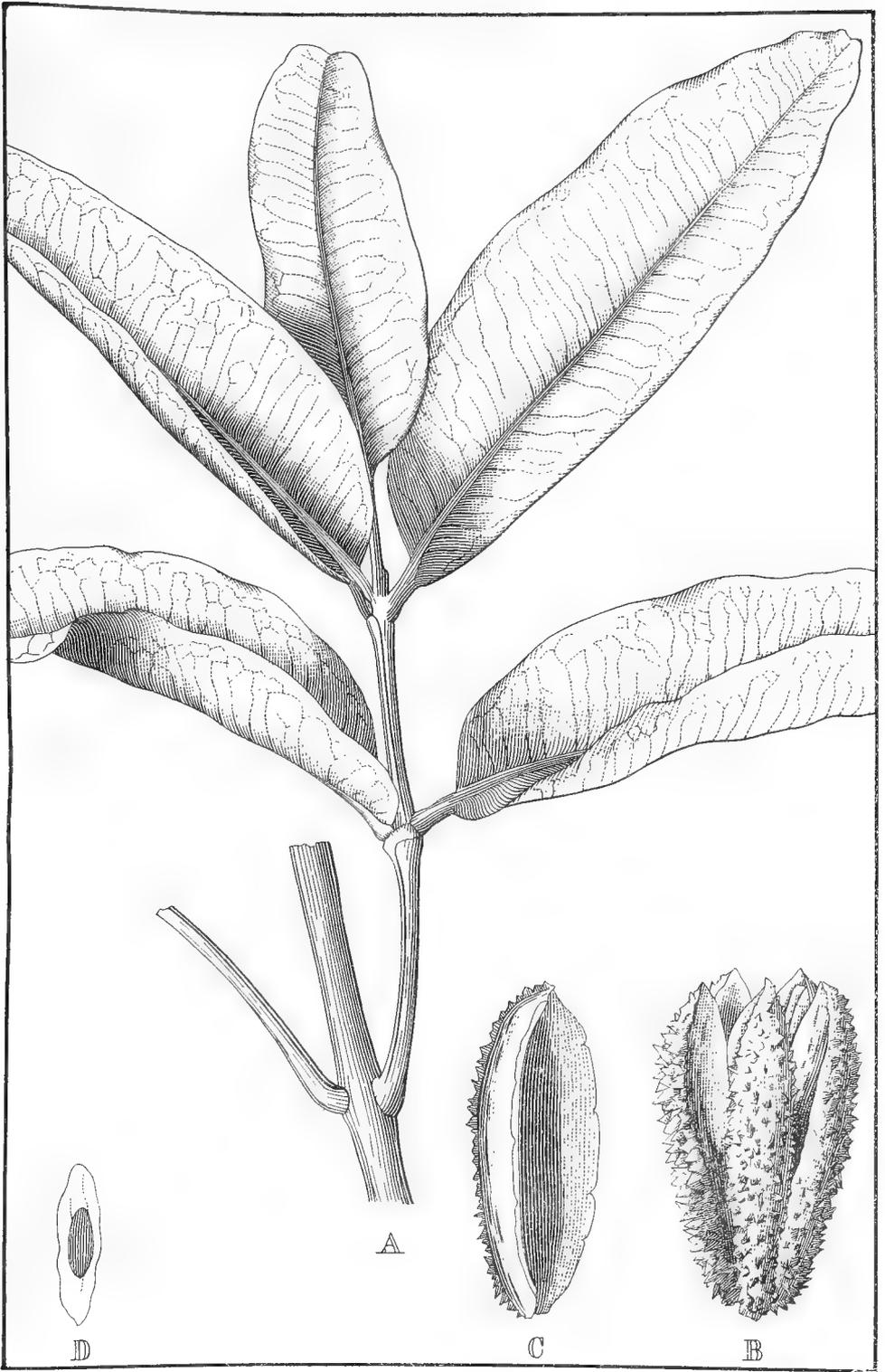
The articulation of the leaves is usually rounded. It has no sharp edges.

Mr. W. Dunn says that the foliage, in mass, reminds him of that of the Teak (*F. australis*), but the leaves are shorter and hairy.

Bark.—Smooth in young or medium trees; patchy in appearance, but not flaky, in older trees. A bushman's description is, "It has a cracked sort of bark, a little resembling that of Teak, but less rough, and not flaky."



FLINDERSIA BENNETTIANA, F.v. M. (Crow's Ash, or Bogum Bogum.)



FLINDERSIA BENNETTIANA, F.v.M. (Crow's Ash, or Bogum Bogum.)

Timber.—A fissile, pale yellow timber, with no figure to speak of. It has certainly no dyeing properties.

It was first collected in 1828 by Charles Fraser, Superintendent of the Botanic Gardens at Sydney, and Allan Cunningham, King's Botanist, on the Brisbane River. Hooker, in describing it, says: "Its timber is found to be very useful in various kinds of carpentry, and in the building of boats, &c." (*Botanical Miscellany*, Vol. i, p. 247). So that it had acquired a good reputation at an early date.

Mr. District Forester Pope, Casino, says of it:—

It is not much used either locally or for export, but I am convinced it is a most valuable timber. It is very tough, and of a light yellow colour.

Mr. W. Dunn, Forest Guard, Acacia Creek, Macpherson Range, says:—

The wood cuts soft like *Cudgerie* (*F. Schottiana*). The timber is long in the grain and strong, and inclines to be yellow in colour towards the centre of the tree; of course, we have other varieties of timber here much yellower in colour than this timber referred to. It is a really valuable timber.

The official catalogue of the Queensland Forestry Museum, 1904, says:—

A large tree, with light-coloured, rough bark. Wood of a pale yellow colour, and a distinctive odour. Chief uses for coach-building, railway-carriage framework, boring-rods, and purposes for which strength, combined with lightness, are required; also cabinet-making, joinery, turnery, and picture-frames. It is very elastic, bends well, and is consequently very suitable for casks.

The timber is stated to be very durable and is tough; it is used for making shafts, swingle-trees, and yokes. It is often mistaken for Beech, and is sometimes supplied for that timber. It is an excellent carving wood, as a beautiful specimen of carving in the Technological Museum, Sydney, by the late Mr. W. Ockelford, testifies.

A full account of this timber, chiefly from the point of view of the railway carriage-builder, will be found in MacMahon's "Queensland Merchantable Timbers," p. 53. Here it is stated that:—

"It is largely used in the framing of carriages and waggons. It holds paint well, and nails may be driven into it without splitting, close up to the end of the scantling. In the works of the Brisbane Tramways Company this timber is a prime favourite; it is used for body-framing, pillars, and finishing; it is found to answer remarkably well for portions of the structure of a tramcar, which it is necessary to bend by steam, and has, in fact, supplanted entirely the more expensive blackwood for this purpose. For an entirely all-round timber it cannot be spoken of too highly, and quite fills the place of English and American ash. A departmental board of the Commonwealth Military Forces has recently decided that this is the most suitable wood in Australia for ammunition boxes."

Size.—Height 80 to 100 feet, with a barrel of 4 to 8 feet in diameter in Macpherson Range. (J. L. Boorman.)

Habitat.—This tree is confined to the rich brush forests of northern New South Wales and Queensland. What its precise southern and northern limits are I do not know, and inquiries such as these are the legitimate and even necessary duty of a Botanical or Forest Survey.

I have specimens in the National Herbarium from the Richmond and Tweed Rivers, New South Wales, and also one labelled "Stroud district" from the late Mr. Augustus Rudder, but I probably misunderstood him as regards the locality. As regards Queensland, its range appears to be hardly better known than at the time of its discovery ninety-six years ago.

Concerning New South Wales, Mr. District Forester Pope, of Casino, reports:—

It grows in most of the brush forests in this district, but appears to be favourable to red soil. There is a considerable quantity of it along the Teeterfield-road on Forest Reserves 2,425 and 1,120. It is fairly abundant in all the brushes of the Tweed and Richmond Rivers—evenly distributed. Does not attain such a size on Forest Reserves 2,425 and 1,120 as in other localities.

Mr. Forest Guard W. Dunn, of Acacia Creek, Macpherson Range, reports:—

This is the scarcest *Flindersia* here. It is very careful in selecting its habitation. My opinion is, it favours brush mountain regions with plenty of shelter.

Turning to Queensland, Hooker wrote in 1830, on C. Fraser's notes of his trip in 1828:—

The south side of the Brisbane, as far as Canoe Creek, is covered with forests of pine, or *Araucaria*, to a considerable extent. The north bank, as far as Glenmoriston's Range, is principally open forest, not reaching far beyond which it is clothed with pine brushes as on the south. These forests contain immense quantities of Yellow-wood (*Oxleya xanthorylla*) (*Botanical Miscellany*, Vol I, p. 246).

EXPLANATION OF PLATE 73.

- A. Flowering branch.
- B. Flower.
- C. Expanded flower, showing—(a) Petals, (b) Stamens, (c) Staminodia, (d) Disc, (e) Ovary, (f) Stigma.
- D. Part of flower—(a) Stamens, (b) Staminodia, (c) Disc, (d) Ovary, (e) Stigma.
- E. Stamens.
- F. Transverse section of ovary.
- G. Calyx.

EXPLANATION OF PLATE 74.

- A. Part of stem, showing leaflets and articulation of petiole.
- B. Capsule opening septicidally.
- C. Deciduous placenta.
- D. Winged seeds.

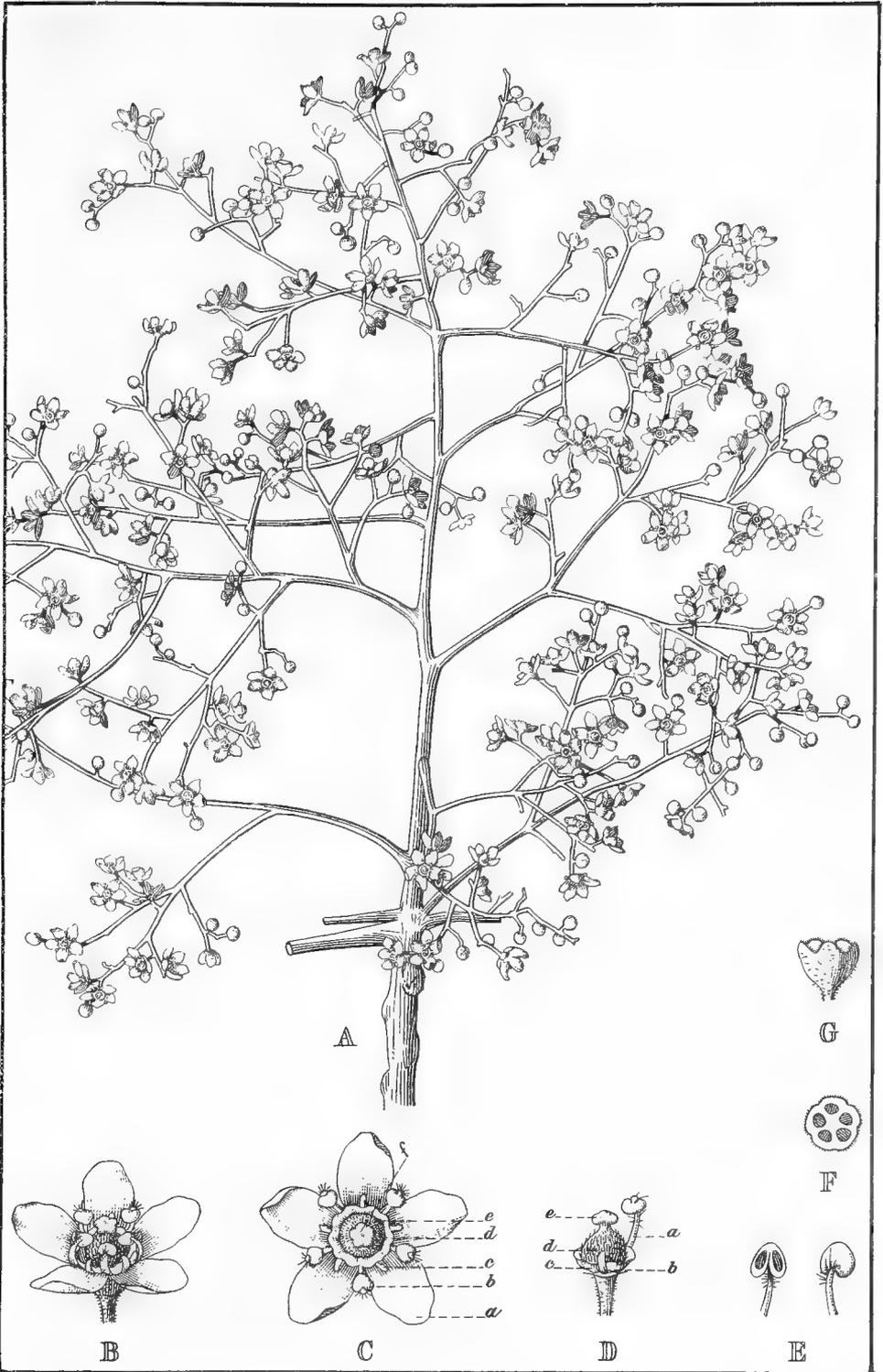
Flindersia Schottiana, F.v.M.

THE CUDGERIE.

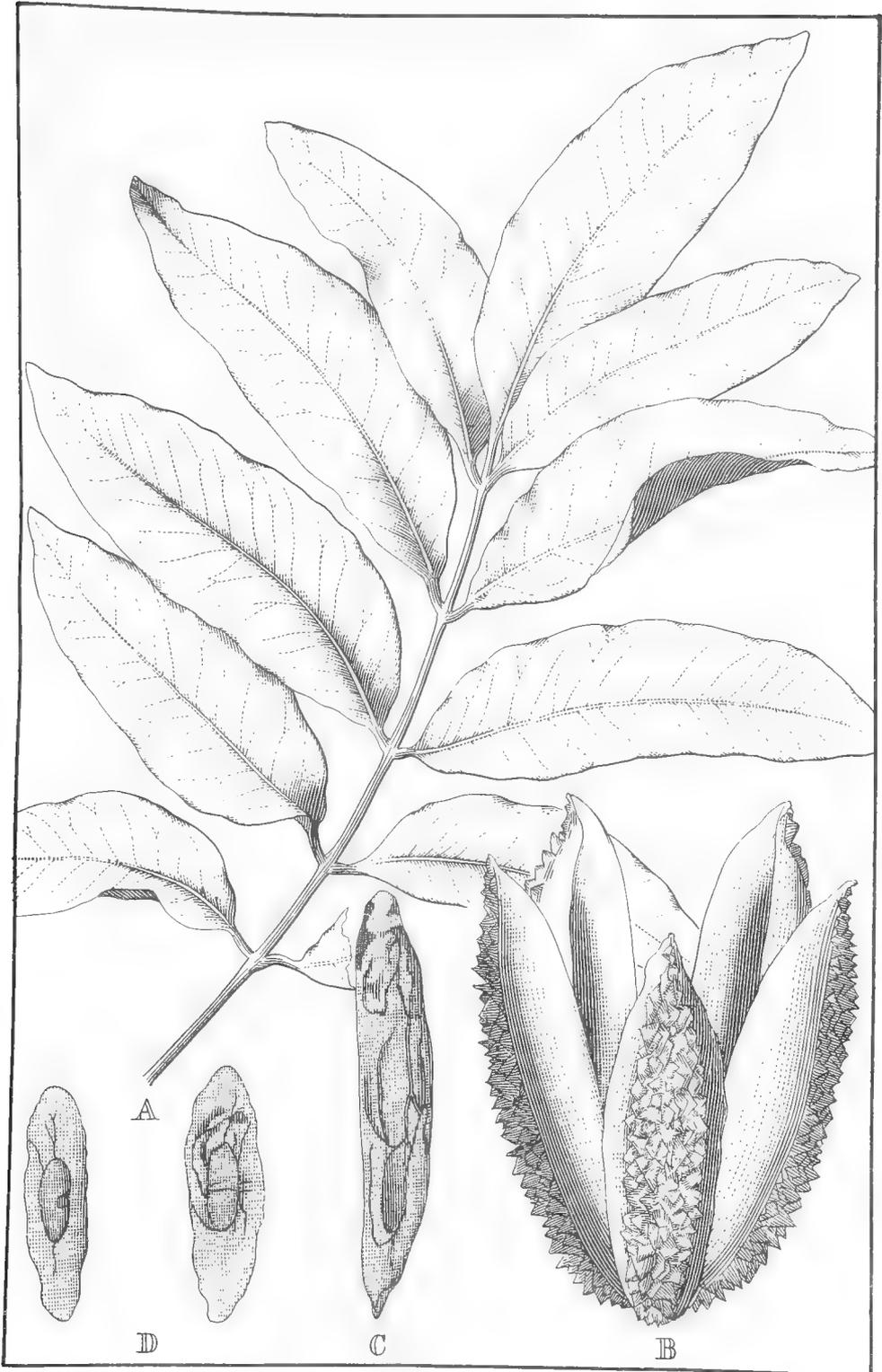
Botanical Name.—*Schottiana*, in honour of Heinrich Schott, Director of the Imperial Zoological and Botanical Garden of Vienna.

Vernacular Names.—The aboriginal name "Cudgeric" has become its common vernacular name. The late Mr. Augustus Rudder sent it under the names of "Ash" and "Stave-wood." "Mountain Ash" is not an uncommon name. I may say that a great many pale-coloured timbers, more or less fissile, go by the names of "Ash" and "Stave-wood," in Australia.

I believe is to be one of the trees which has passed under the name of "Flindosa." The origin of this name I have been unable to trace, and would suggest that it is a timber-man's rendering of *Flindersia*. We have the same word in "Flindosy Beech," sometimes applied to the tree.



FLINDERSIA OXLEYANA, F.v.M. (The Yellow Wood.)



FLINDERSIA OXLEYANA, F.v.M. (The Yellow Wood.)

Aboriginal Names.—"Cudgerie," or "Cudgery," of Northern New South Wales and Southern Queensland.

Cudgerie and Teak.—Under *F. australis*, I have already drawn attention to the confusion that has existed for so many years between "Cudgerie" (*F. Schottiana*) and Teak (*F. australis*).

Leaves.—Leaflets bright green and shiny in the upper surface; pale green and dead dull on the lower; nearly cordate at base sometimes, except the terminal one.

To look at the leaves on a growing Cudgerie in the distance, the leaves look larger than the Teak leaves, but upon obtaining them we find they are not larger. The leaves are a beautiful dark green, and have a pleasing appearance when on the tree, reminding one of Silky Oak (*Gracilica robusta*).—(W. Dunn.)

Fruit.—Attention has already been directed to Cudgerie fruits in comparison with Teak fruits. Besides the roughened edges of the valves of the latter, those of the former are flatter and less pungent.

Bark.—Smooth, and often glaucous.

Timber.—It is a pale-coloured (yellow when fresh, and drying to a white or cream colour), generally useful wood, which shrinks but little in drying. It is rather hard and tough, and is hence sometimes objected to on that score. A recent special use is for railway keys. It is often used as a substitute for Colonial Beech, which it resembles a good deal in outward appearance. It is used for shingles and staves, for flooring, and for general carpentry work. It is softer than Native Teak, and not so durable as that timber. The two timbers are really very different.

I look upon Cudgerie as one of the most valuable of New South Wales timbers; and one whose merits will be more appreciated as it becomes better known.

Size.—It attains a large size, up to over 100 feet in height, and a diameter of over 3 feet. I have alluded to its size, in comparison with Teak, in Part XVII, p. 152, of my "Forest Flora of New South Wales."

Habitat.—It is confined to Northern New South Wales and Queensland.

I do not know its northern limit in Queensland. Bentham records it from Wide Bay (Bidwill); Cumberland Islands (Herb. F. Mueller); Brisbane River (A. Cunningham). I have it from Cairns (E. Bêche); Gympie (Dr. Hamilton-Kenny); and other localities.

In New South Wales it does not appear to have been recorded south of the Hastings River. From thence it is not uncommon, in brush forests, to the Queensland border.

At Taylor's Arm there is a fair supply scattered in the brushes.—(District Forester T. H. Wilshire.) The same gentleman says:—

In speaking of the Ash from Mt. Yarrahappini, there is a fair supply to be had; the trees attain fair height with rather small barrels. It is not used much locally.

But S. G. F. Smith, Stewart's Pt., Macleay River, asserts that:—

There are about 1,000,000 feet of this (Mountain Ash) growing in one spot on Mount Yarrahappini; the barrels of some are 80 feet in length.

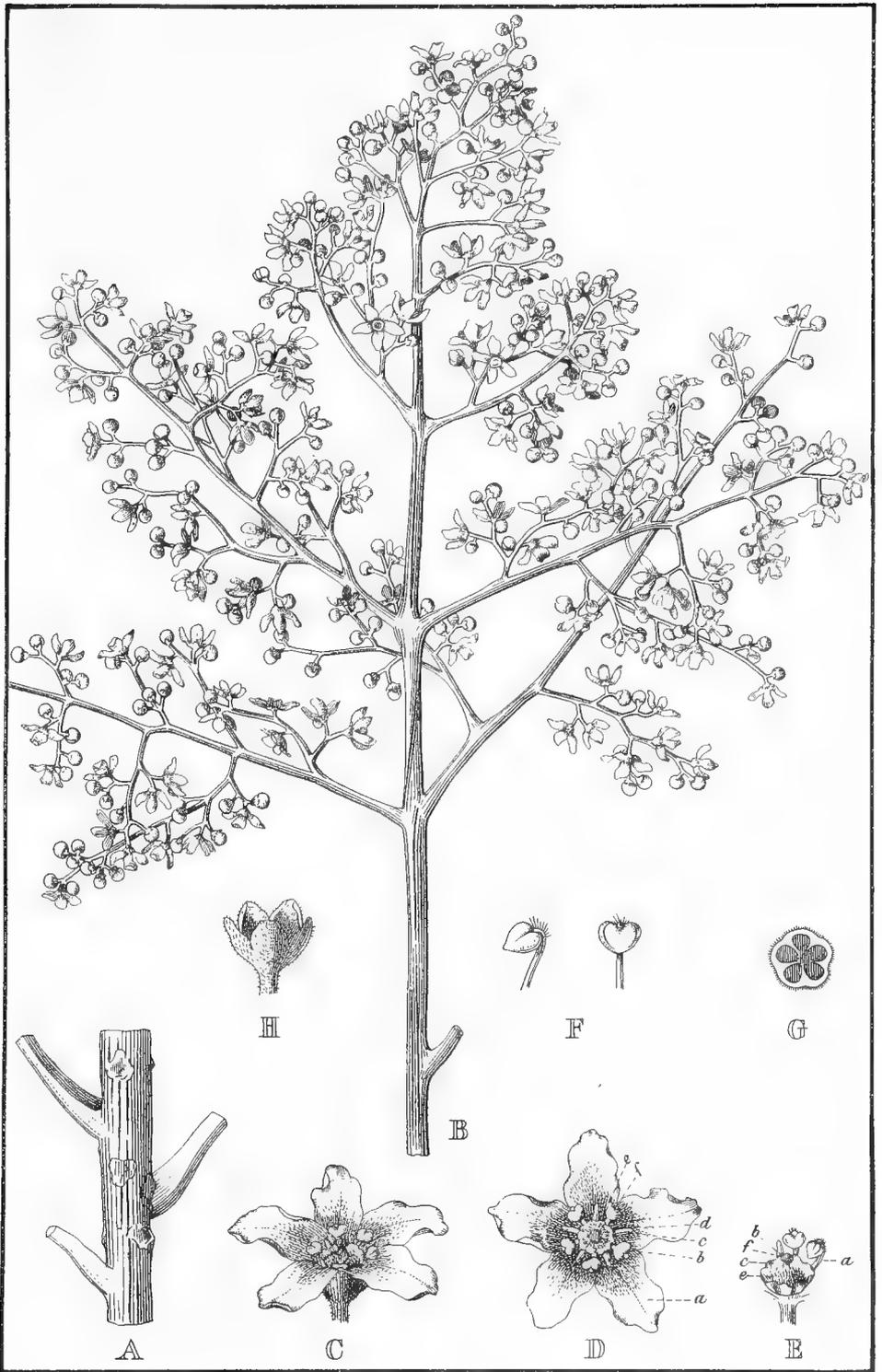
It is plentiful in the brush forests of the Macpherson Range (W. Dunn).

EXPLANATION OF PLATE 69. (Flowers.)

- A. Part of stem showing articulation of petiole.
- B. Flowering branch.
- C. Flower.
- D. Flower more expanded, showing—(a) Petals, (b) Stamens, (c) Stamিনodia, (d) Disc, (e) Ovary, (f) Stigma.
- E. Portion of flowers—(a) Stamens, (b) Stamিনodia, (c) Disc, (e) Ovary, (f) Stigma.
- F. Stamens.
- G. Transverse section of ovary.
- H. Calyx.

EXPLANATION OF PLATE 70. (Fruits.)

- A. Leaf (with leaflets).
- B. Capsule opening septicidally.
- C. Capsule reversed, the inside of the valves turned inside out in the process of ripening, to distribute the seeds. It would appear that this process of retroflexion, or turning inside out of the fruits, is unusual in the genus.
- D. Seeds (winged all round).



FLINDERSIA SCHOTTIANA, F.v.M. (The Cudgerie.)



FLINDERSIA SCHOTTIANA, F.v.M. (The Cudgerie.)

Miscellaneous.

1. *Gmelina Leichhardtii* (White Beech).
2. *Ceratopetalum apetalum* (Coach Wood).
3. *Doryphora sassafras* (Sassafras).
4. *Litsaea reticulata* (Bolly Gum).
5. *Castanospermum australe* (Black Bean).
6. *Alphitonia excelsa* (Red Ash).
7. *Ficus rubiginosa* (Rusty Fig).

Gmelina Leichhardtii, F.v.M.

THE WHITE BEECH.

Botanical Name.—*Gmelina*, in honor of George Gmelin, a German naturalist and traveller (Georg Friedrich), author of a botanical work published at Tübingen in 1699. *Leichhardtii* is also in honor of a German naturalist and traveller, an Australian explorer, whose name is ever before the people of New South Wales and Queensland.

Vernacular Names.—This tree is favoured by being universally known as Beech, or White Beech, and by no other names; but it should be borne in mind that hardly any term is more loosely known in New South Wales than that of Beech. We have a true Beech (the Negro-head, *Fagus Moorei*), and, in addition, She Beech, Blue Beech, Brown Beech, Bully Beech, and many other Beeches, most of which only resemble each other in all being totally dissimilar to the Beech of Europe.

Flowers.—They are very handsome, white with purple markings, as stated by Bentham, and sometimes almost entirely purple.

Leaves.—The leaves are rather large, and show handsome venation, particularly on the underside. Like many other verbenaceous plants, they readily fall off in drying.

Timber.—A very useful timber, strong, durable, and easily worked. It does not expand in damp or contract in dry weather if moderately seasoned, hence it is much prized for the decks of vessels and the flooring of verandahs. Speaking of this timber, Mr. Baeuerlen wrote to me:—

I have just seen a staircase, and eleven months ago the tree from which the wood was taken was growing in the forest. It was cut at once, green as it was, and up to the present no sign of shrinking or cracking can be seen.

It warps neither in plank nor in log. It is excellent for picture-frames, and is a wood frequently chosen where it would not be safe to trust a wood of which there might be doubts as to whether it would shrink or warp. It is used for the floats of mill-wheels, the jambs of windows, and for innumerable other purposes. It would be almost impossible to misplace it for ordinary indoor carpentry work. If I were asked to name the three most valuable timbers of New South Wales I would say, Grey Ironbark, Cedar, and Beech.

One drawback to this valuable timber is that where it is used for flooring which is exposed to the weather, around every nail there becomes a hole in the course of a few years. This is usually explained by ascribing to Beech some property which eats or rusts away the nails. For the same reason wine-casks of Beech can never be hooped with black iron. So far as I am aware, no chemist has ever examined Beech to see if it contains a trace of free acid or some salt which would explain the corrosion above referred to.

Beech is largely used for the manufacture of vats for wine, and I believe it is an admirable wood for the purpose. It is too short in the grain to split, so that split staves cannot be made of it.

As regards its use by coach-builders, Mr. S. Lownds, Teacher in Coach-building at the Technical College, informed me:—

This is a very useful timber for panels and thin boards. It is pretty durable, but rather soft, but its softness is, in some instances, an advantage. Where extreme heat or moisture has to be considered, as in bakers' carts, Beech will be found to withstand such influences better than most timbers. It paints and polishes well, is very easily worked, and does not readily split.

It is pale-coloured, white with a tinge of brown. As a very general rule, it is plain, but occasionally it shows a neat grain, which is ornamental. It is rather close-grained and excellent to work. If it be glued with Russian glue, mixed with sour milk, it will hold like solid wood when made into furniture. It is very extensively used for ships' blocks.

Up till a few years ago it was remarkable that no engineering tests had been made of such an universally-appreciated timber. Professor Warren has rectified the omission in his work on Australian timbers, published for the Chicago Exhibition. The timber referred to as White Beech is the one under discussion, the other Beech (Negro-head) is a *Fagus*. Professor Warren gives the weight of some Beech he tested as 49.1 lb. per cubic foot. I examined some which was bone-dry, having been seasoned over a quarter of a century; its weight was 36 lb. per cubic foot. On the average (as found in the market), its weight is between 40 and 50 lb. per cubic foot.

Mr. District Forester T. H. Wilshire, in reporting it from Kangaroo Creek, 30 miles from Grafton, says that a fair amount in log is shipped to Sydney.

As regards Queensland, the following is quoted from the official catalogue just referred to:—

This timber, being much prized, was extensively used in former years; the quantity remaining now being limited. Occasional trees are, however, met with in some of our coastal scrubs, north and south, but generally in such places as are difficult of access.

Size.—From 80 to 120 feet high, and a diameter of 2 to 4 feet. The *Sydney Morning Herald* of 16th August, 1898, says:—

An Enormous Beech Tree.—Mr. Nicholl's steamer, "Excelsior," which yesterday arrived in port, brought, as part cargo, an enormous beech tree from the Byron Bay district. The tree was cut into logs 9 feet in length, and averaged about 17 feet in girth. Only the main barrel of the giant was brought to Sydney, and this comprises 10,000 feet of timber, which filled one-half of the vessel's hold.

Distribution.—The north bank of the Shoalhaven is its southernmost limit in New South Wales; thence it extends along the coast, in brushes, to Southern Queensland. It is found in the Shoalhaven district and the Illawarra, but is not plentiful. It used to be found in Jasper's Brush, but



GMELINA LEICHHARDTII, F.v.M. (The Beech, or White Beech.)

not on the Cambewarra Mountain. Proceeding north, a few trees may be found in the brushes about Otford, Lilydale, &c., but I have not seen any. It skips the Sydney district and reappears in the Brisbane Water district, being cut at the present time, though to a small extent (as good trees are in almost inaccessible localities), about Wyong Creek, Cooranbong, &c. Then it is found here and there along the coast, but nowhere very plentifully. There is a good deal back from the Bellinger and Coff's Harbour. It occurs all through the Big Scrub, on the Richmond and Brunswick, and also in isolated patches of scrub on the Tweed. It is not a plentiful tree; it nowhere appears to be gregarious, but in isolated trees, far apart.

Following are a few specific notes:—

Never plentiful in my district; only a few trees left in very rugged places. (Forester Martin, Gosford.)

One or two saplings only in my district. (Forester A. Rudder, Booral.)

It is found on Tallowak Mountain (back of Failford), also at John's River, and at Pappinbarra Creek, 40 miles back from Port Macquarie. This timber is getting so scarce that notes of localities from which it is obtained at the present time are interesting. Lattice-laths of beech were being cut at Laurieton.—(J.H.M.)

Sparsely distributed throughout the brush portion of my district. Large quantities have been removed from this district years ago, particularly from the Allomera Forests and the Upper Nambucca; but not much remains in easily accessible districts. Probably from 20,000 to 40,000 feet might be readily obtained at an advanced price. (Forester MacDonald, Kempsey.)

Very little in my immediate locality. (G. M. McKeown, Wollongbar.)

A few trees are to be found on Reserves 4,353 and 10,723, county Rous; 14,150, county Buller; 1,120, counties Rous and Buller; on Crown lands, Haystack and Watershed between Koreela and Beaury Creeks, county Buller. (Forester Crowley, Casino.)

Propagation.—From the fruits (beech-nuts). Unfortunately, however, they are usually attacked by an insect as they approach maturity, and this, combined with the natural hardness of the seed, renders propagation of the Beech usually a difficult matter. This is to be regretted, as one sees so few seedlings and saplings of the White Beech coming forward in the brushes. The tree, therefore, is within measurable distance of extermination in readily accessible localities. It would be nothing less than a national calamity if this valuable tree were to practically die out. In most cases our trees propagate themselves readily, and what is chiefly required is to conserve the young growth, not to make artificial plantings; but in the case of the White Beech, I think an exception should be made, and artificial propagation resorted to in suitable localities. Indian Teak seeds are very similar to White Beech seeds, and indeed the two trees are closely allied, botanically. Both seeds take a long time to germinate under ordinary circumstances. The method of preparing Teak seeds for germination in India is to bury heaps of them in a shallow earthen pit which is covered over with soil and kept moist. When the seeds begin to germinate they are opened out and carefully planted.

EXPLANATION OF PLATE 33.

- a. Corolla, opened out, showing didynamous stamens.
- b. Exterior of corolla.
- c. Pistil, showing unequally two-lobed stigma.
- d. Stamen, with diverging anther-cells.
- e. Stamen, the anther discharging pollen.
- f. Fruits.
- g. Putamen (stone of seed), the mesocarp (succulent part) removed.

Ceratopetalum apetalum, D. Don.

THE COACH WOOD.

Botanical Name.—*Ceratopetalum*, from two Greek words, *keras* (a horn) and *petalon* (a petal), the petals being jagged, reminding one of a stag's horn, in the species (*C. gummiferum*) on which the genus was founded. *Apetalum*, without petals, this character being distinctive of the species.

Vernacular Names.—Its commonest name is "Coach Wood," so called because of the use of its timber in coach-building. It is also called "Leather Jacket" because of its tough, fibrous, closely-adherent bark. "Light Wood" is a common name for it (perhaps nearly as much in use as "Coach Wood," but an undesirable name as we have so many other light woods). It is so called because it is very light when properly seasoned, in fact, about 40 lb. per cubic foot would be a fair average.

Flowers.—The flowers are white and not very conspicuous, but as growth proceeds the calyx very largely increases in size, takes on a crimson or purple colour, and becomes very conspicuous, forming what is known to most people as the "flower."

Bark.—If the bark be wounded it gives off a perfume; its smell is like that of Tonka beans or new-mown hay, and is owing to the presence of a substance called "Coumarin." I have known a small slab of it to be useful for scenting linen-presses.

Timber.—The one great value of this tree is for its timber, and it would be far more used than it is were it not for the frequently inaccessible gullies in which much of the best timber is found. It is tough and is used for tool handles and for boat and coach building. It possesses a faint but pleasant odour. It is said to be peculiarly well adapted for sounding boards, for musical instruments, for stethoscopes, and such purposes. Its uses in that direction have, however, been little more than tentative.

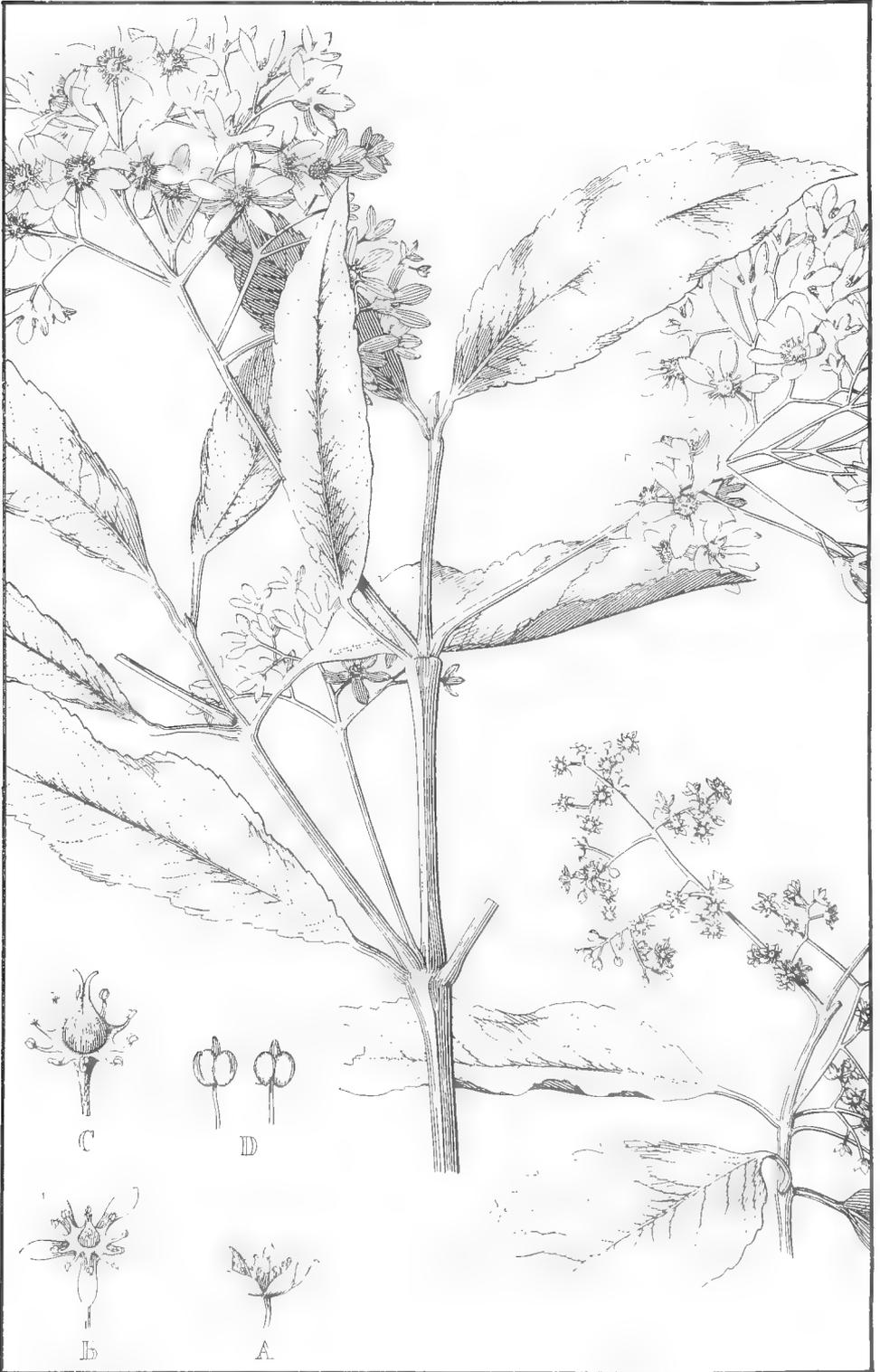
Planks of Coach Wood, both wide and thick, may be procured from the larger timber yards in Sydney, so that enterprising people can have no difficulty in testing it for special requirements. Much of what supplies the Sydney market comes from Gosford.

Its value as a coach-builder's timber is sufficiently great to be insisted upon.

It is a useful timber to the coach-builder for placing in clean, dry situations. Under such circumstances it is equal to English Ash. Its weakness is its liability to rot when left in damp or dirty places near the bottoms of carriages which are neglected and not kept clean. For very many years this timber has been in request for coach-building. An eminent coach-builder informed me that "it is the grandest Australian timber for coach-building." It is undoubtedly excellent for bodies, and a good all-round timber.

Size.—It commonly attains a height of 60 or 70 feet and even more, and a diameter of 2 or 3 feet.

Habitat.—This tree is almost confined to New South Wales. It extends into Queensland at the Macpherson Range. It is a gully tree, and common as it is, I believe I have never seen it out of such situations. It may be found in most of the Blue Mountain gullies, and also a considerable distance north and south of Sydney. The furthest southern locality I know for this tree is Milton; the furthest western, Mount Wilson; and the furthest northern, the Macpherson Range.



CERATOPETALUM APETALUM, D. Don. (The Coachwood.)

EXPLANATION OF PLATE 21.

The small twig at the right hand bottom of the plate shows the normal flowers.

The large twig, filling most of the plate, shows the enlarged calyx-lobes, forming the "flowers."

- A. Flower.
- B. Flower in more advanced stage—(a) Lobe of calyx, (b) Stamen, (c) Perigynous disc.
- C. Flower, further advanced with calyx removed—(d) Half inferior ovary, (e) Recurved styles.
- D. Stamen, front and back view of anther appendage.

Doryphora sassafras, Endl.

THE NEW SOUTH WALES SASSAFRAS.

Botanical Name.—*Doryphora* (Greek)—*Doru* (a spear), *phero* (I bear), perhaps in allusion to the long appendage to the anther; *sassafras*, because its odour is reminiscent of that of the well-known *Sassafras* of North America.

Vernacular Name.—*Sassafras*, or by ignorant people *Sassafrax*. Sometimes it is called Black *Sassafras*. I would suggest the name New South Wales *Sassafras* for *Doryphora*, as it is mainly developed in this State, *Atherosperma*, another *Sassafras*, being more abundant in Tasmania and Victoria, and *Cinnamomum Oliveri* in Queensland.

Leaves.—The tree has dense bright glossy foliage and aromatic odour, filling the brushes with a delicious fragrance.

Flowers.—The flowers are pure white and star-like, forming a beautiful display in contrast to the dark, shining foliage.

Bark.—This is our common New South Wales *Sassafras*, and tea is commonly made from its bark at the present day in the coastal districts. The aromatic flavour is not unpleasant, although it requires practice to really like it. Besides a mere beverage, it is also used as a tonic medicine. The odour is rather fugacious. It is taken in the form of an infusion. Dr. T. L. Bancroft, however, informs the writer, "I have tried the bark on frogs, and found it to be inert."

Timber.—If properly dried before being put into a building as a ceiling, lining, or flooring boards, it is a valuable timber, but it takes a long time to dry; it is not much used for joinery work, as it will not stand glueing. I know a chest of drawers the inside of which is made of it, and it is perfectly sound after thirty years; white ants will not touch it; it is now being tried as weather-boards, but I am afraid it will require a lot of paint, as it is so open-grained. It is sometimes used for packing-cases. It is of a canary-yellow colour when quite fresh, but it becomes dirty looking with age. It is fragrant, and disagreeable to vermin.

There is no question as to its durability in some situations. The following are extracts from three letters referring to it. In judging white-ant proof timbers one must bear in mind that white-ants, if put to it, will eat anything, but that they prefer some timbers to others, and will leave some timbers quite intact while eating those that are more palatable.

During the month of February, 1865, I laid a floor of this sort of timber in Booral. The situation was on a very low damp condition, and though the floor had been in contact with the hardwood slabs of the wall, and these so thoroughly worried with the white ants as hardly to be able to stand on end, and have had to be taken away, the floor boards have been but 3 inches above the

ground, and now, notwithstanding all these drawbacks, the boards when taken up are found to be as sound as ever; they were relaid again, and look as if they would last another twenty years. Now what insect can contend with the essential oil of this timber? Not one, I believe.

A Wollongong correspondent writes:—

To-day, whilst clearing out the storeroom a small case was shifted (it was resting on the damp floor); in doing so the bottom fell out. The white ants had eaten it out. I find the box to be made of deal sides, the ends of English elm or ash, and the partitions of Colonial sassafras.

The late Forester Benson wrote from Wyndham:—

The timber is very useful for indoor work. I was shown a large house on the creek where all the rooms were lined with it, and it seems equally as well adapted for that purpose as pine. The window-frames and some of the furniture are of mountain hickory, which appears to be a valuable timber for cabinet-making. I was informed that sassafras should be cut in the winter and stacked for some months, as it is liable to warp; also that it is free from the attacks from white ants.

Size.—It forms a large tree. Trees 60 to 80 feet high are quite common, and I have been given measurements from reliable people up to 120 feet high, and with a diameter up to 5 feet.

Habitat.—The Sassafras is confined to New South Wales and Queensland. The most southerly locality I have specimens from in this State is Myrtle Creek, Wyndham, County of Auckland. This is, of course, very close to the Victorian border, in which State it may be expected to be found. In Queensland it is as far north as the Logan River. It is found in brushes, hence in good soil in gullies throughout the coastal districts. It occurs for a considerable distance into the recesses of the mountain ranges of the Dividing Ranges and its spurs, but its precise range or "curving boundary" is unknown. I have it from as far west as Jenolan Caves, Mount Wilson, and the Bowman and Barrington Rivers. I shall be glad of notes of any localities further west than those stated.

EXPLANATION OF PLATE 7.

- A. Flower.
- B. Vertical section of flower.
- C. Flower without perianth.
- D. Stamen.
- E. Stammodium.
- F. Carpel.
- G. Fruiting carpels included in persistent perianth tube.
- H. Plumose awn, and style.

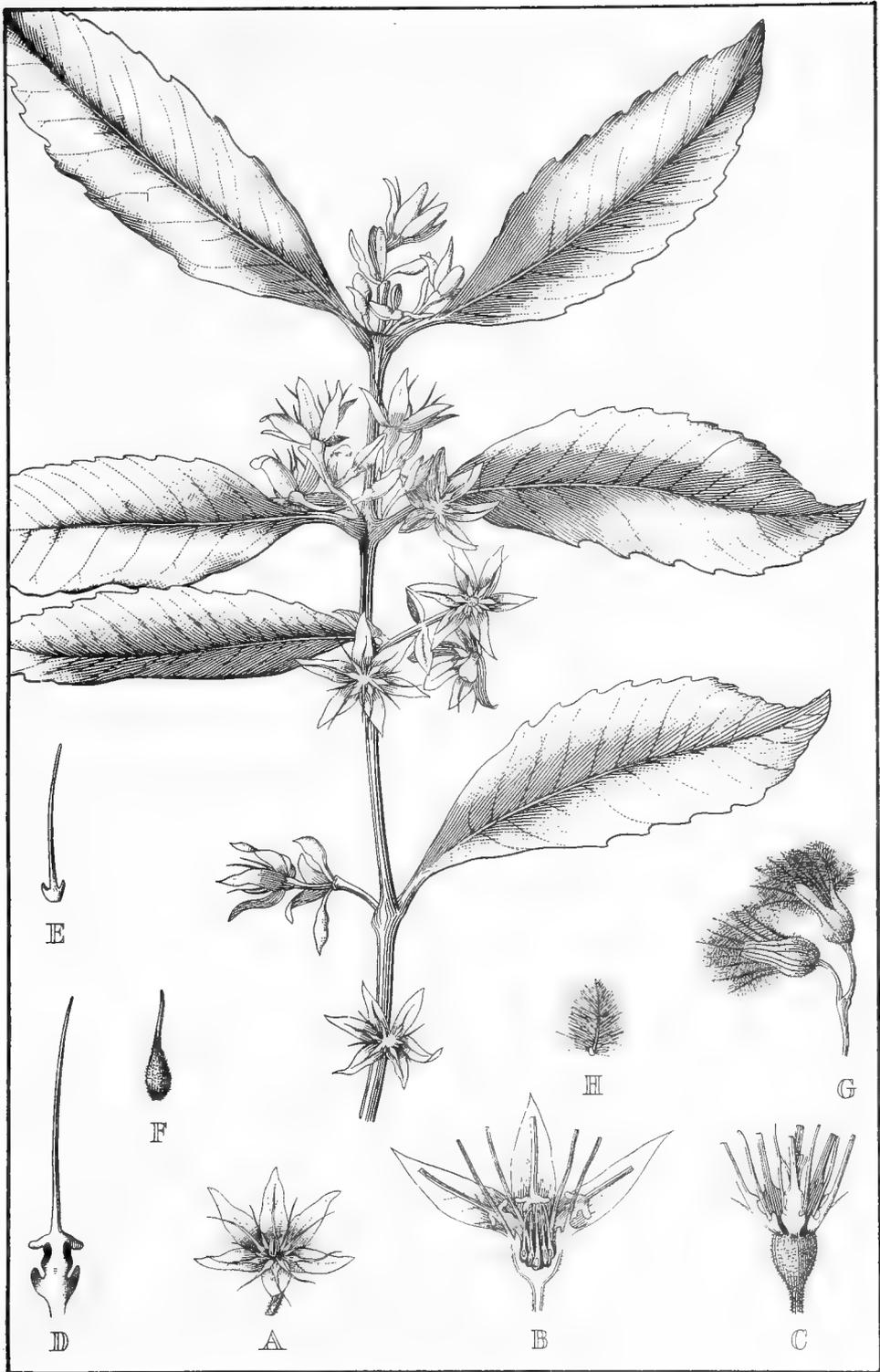
Litsæa reticulata, Benth.

SHE BEECH OR BOLLY GUM.

(Family *Lauracæ*.)

Botanical Name.—*Litsæa*, from the Chinese *Litsé*, the name of a Chinese species; *reticulata*, Latin (reticulated), in reference to the netted appearance of the venation of the leaves, as brought out in the figure.

Vernacular Names.—This tree is one of those which produces the timber known as Bolly Gum in commerce. The original specimen, the type, was called "White Sycamore" by Sir William Macarthur, and it also goes under the name of "She Beech." Mr. Forester G. R. Brown, an excellent observer, called it "Scaly or Yellow Beech."



DORYPHORA SASSAFRAS, Endl. (The New South Wales Sassafras.)

The following note by Mr. R. T. Baker in regard to timber passing under the name of "She Beech" will be found useful:—

There has long been a doubt as to the exact botanical determination of the marketable timber passing under the name of "She Beech." Many authors have referred it to, *Cryptocarya glaucescens*, R.Br., and specimens of timber exhibited in International Exhibitions, and now in the Technological Museum, were labelled with the latter name queried; but I think now the matter can be definitely settled, as I have acquired botanical (timber and flowering) specimens from Gosford, Port Macquarie, and Lismore, and without doubt "She Beech" is *Tetranthera reticulata*, Meissn.

The timber of *Cryptocarya glaucescens* is quite distinct, being much lighter in colour, more durable, and with little or no figure, as against the rich brown colour and large figure of *T. reticulata*.

"She Beech" timber is, I find, also being sold in the Sydney market under the name of "Bully" or "Bolly Gum," so that we have the timber merchants selling to an unsuspecting public apparently two distinct timbers, but which are in reality from one and the same species, *i.e.*, *T. reticulata*. (*Proc. Linn. Soc. N.S.W.*, Vol. xxii, 1897, p. 235.)

Leaves.—Attention is drawn to the somewhat rigid, leathery leaves.

Bark.—Slightly rough and cracked, otherwise a smooth-barked tree as are most of the Lauraceæ.

Timber.—Pale coloured, very fissile, tough, with almost a fibrous fracture; rather hard when fresh; exhibits a neat grain.

Sir William Macarthur's original description of the tree (from Brisbane Water) was:—"A magnificent tree, producing a soft, white, but useful wood."

The Queensland Forestry Museum catalogue gives its chief uses as: Joinery, cabinet-work, packing-cases, staves (for which it is extensively used), and for inside work of buildings as a substitute for Pine.

Mr. G. R. Brown says that, in the Port Macquarie district, it is used for lining boards, like sassafras (*Doryphora*).

See also under "Vernacular Names."

Size.—A rather large tree. Trees 60 to 80 feet in height, with a diameter of 2 to nearly 3 feet, are not uncommon.

Sir William Macarthur gave the height of trees at Brisbane Water as 70 to 80 feet, and a diameter of 2 feet.

Propagation.—Like most of the *Litsæas*, a beautiful shade tree for the warmer, moister parts of this State; it requires shelter and good soil.

Habitat.—This is a coastal brush tree, occurring from Rockingham Bay, Queensland, to the Hawkesbury River, New South Wales. Further search will doubtless extend the recorded range.

In the "Flora Australiensis" B.Fl. v, 306, we have the following:—

Queensland.—Rockingham Bay (Dallachy); Sydney woods (probably from Brisbane River, should be "Water"), Paris Exhibition, 1855 (Macarthur, n. 24, 192.)

I have it also in the Herbarium from the following intermediate localities going north:—

Tuggerah Lakes (F. Gordon); near Tinonee, height 60 feet, diameter 20 inches (Augustus Rudder); Port Macquarie, "Scaly or Yellow Beech" (G. R. Brown); Woolgoolga Creek (E. H. F. Swain).

EXPLANATION OF PLATE 170.

- A. Flowering twig.
- B. The flower-head with 4 bracts—the 2 outer ones (*aa*) are glabrous, or nearly so, the 2 inner ones (*bb*) are villous.
- C. Male flower.
- D. Male flower opened out, showing—(*a*) Calyx (6 perianth-segments, (*b*) 6 stamens of the outer series, (*c*) 3 stamens of the inner series, each with a gland on each side near the base.
- E. Rudimentary pistil.
- F. Female flower opened out, showing—(*a*) Calyx (6 perianth-segments, (*b*) 6 staminodia of the outer series, (*c*) 3 staminodia of the inner series, with glands.
- G. Pistil.
- H. Portion of fruiting twig showing the persistent calyx.

Castanospermum australe, A. Cunn.

THE BLACK BEAN.

Botanical Name.—*Castanospermum*, from the Latin *castanea* (a chestnut), and *spermum* (a seed). The tree is confined to Australia, and in non-Australian descriptions of it the name is usually explained on the ground that “the seeds are roasted like chestnuts.” This matter is alluded to later on. *Australe*, Latin Southern, and hence Australian.

Vernacular Names.—Because of the seeds, which are very large beans, this tree goes under the name of Bean Tree; and because of the dark colour of the wood, and partly by way of distinction from the Red Bean (*Dysoxylon Muelleri*), it is usually known by timber merchants as Black Bean. Moreton Bay Chestnut is an old name for the tree, because it was first found in the Moreton Bay district (Queensland).

Flowers.—The flowers are borne on the last year’s wood, bear a general resemblance to pea-flowers, though more solid and fleshy, and in colour vary from yellow, through all stages of orange, to coral red. They are very handsome, though not available for cut flowers. There are two forms, as has already been pointed out.

Fruits.—Mr. C. Fraser, Superintendent of the Botanic Gardens, Sydney, “being directed to establish a public garden in Brisbane Town,” carried out this task in 1828, and was accompanied by Allan Cunningham. They discovered this tree, and Fraser says:—

“By the natives the fruit is eaten on all occasions; it has, when roasted, the flavour of a Spanish chestnut, and I have been assured by Europeans who have subsisted on it exclusively for two days, that no other unpleasant effect was the result than a slight pain in the bowels, and that only when it was eaten raw.”

Later on, Mr. C. Moore stated:—

“The beans are used as food by the aborigines, who prepare them by first steeping them in water from eight to ten days; they are then taken out, dried in the sun, roasted upon hot stones, pounded into a coarse meal, in which state they may be kept for an indefinite period. When required for use, the meal is simply mixed with water, made into a thin cake, and baked in the usual manner. In taste, cakes prepared in this way resemble a coarse ship biscuit.”

Dr. T. L. Bancroft, of Brisbane, has examined the beans, and is very emphatic in regard to their deleterious properties as far as man is concerned. He states that if a small piece of the bean be eaten it causes severe



LITSEA RETICULATA, Benth. (Bolly Gum.)

diarrhœa, with intense griping, and he says it does this whether it was previously soaked in water or even roasted. He states that no poisonous principle is removed by water, and no part of the plant is bitter.

Having considered these seeds as food for human beings, let us consider them as food for domestic animals.

Stock-owners have long waged war against this tree, owing to the fact that cattle and horses are poisoned through eating the seeds.

The leaves also are found to be injurious, and animals which take to eating them become very fond of them, and when taken away return long distances to these trees, and according to some accounts become affected similarly to animals which eat the Darling pea, and, if not carefully looked after, they will pine away and die. Following are some interesting notes in regard to bean poisoning on the Richmond River:—

1883 was a dry season, and grass scarce. ——— informed me that he had lost over 100 head of cattle by bean-poisoning. Next day my attention was drawn to a few cattle in the stockyard said to be poisoned by eating beans. I inquired of the stockman if he had any proof that they had eaten beans, when he pointed to a beast that had died the day before, and beans had been taken from its stomach. In reply to my question he said he expected some of the cattle in the yard to recover. They appeared much purged, discharging thin watery fœcal matter. Cattle seem to be attracted by the bright green appearance of the beans as they lie upon the ground. Many cattle and horses on the Richmond have been lost from bean-poisoning. ——— lost a valuable entire horse and cattle in this way, and many others have similar experience. It appears to attack horses in a different way from cattle. ——— informed me that while removing horses from a paddock in which the bean-tree was growing two of them died without previously showing any symptoms of poisoning.

The seeds are also rapidly fatal to pigs in some cases, probably when devoured on an empty stomach. Opossums are stated to be fond of them.

“I consider the presence of a saponin in the beans undoubtedly proved, and the toxic effects of the bean are due to this glucoside.”—Brunnich.

There is an interesting paper entitled “The Poisonous Effects of the Black Bean (*Castanospermum australe*) on Cattle,” by S. T. D. Symons, M.R.C.V.S., Chief Inspector of Stock, in *Agric. Gaz. N.S.W.*, March 1911, p. 196.

Timber.—It is easiest described by stating it strongly resembles walnut. I have always endeavoured to urge moderation in advocating the claims of colonial timbers, feeling sure that our timbers have received a good deal of harm from indiscriminate praise; but, having kept Black Bean under observation for a number of years, and having caused large quantities of it to be worked up into various articles, I think very highly of it. I look upon it as scarcely inferior to walnut. People sometimes complain of it that it warps and splits a little, but it does not do this if it receives the seasoning that cabinet woods receive in the northern hemisphere. Let Black Bean be felled when the sap is down, and given a reasonable amount of seasoning, and I do not hesitate to say that it may be pitted against walnut without disgrace. Black Bean is easier to dress than even cedar; in fact, it is almost perfection as regards the ease with which a surface can be got on it. It polishes readily, but the grain is inclined to rise under polish. This timber often shows a beautiful figure; planks which have the figure in bands, like the marking of an agate, are really gorgeous.

Size.—A fair average height for the bean tree would be 60 feet or 70 feet, with a trunk diameter of 2 feet or 3 feet. At the same time it frequently attains a height of nearly double this, with a diameter of 5 feet or 6 feet.

Habitat.—It is usually found growing in brush land of the very richest soil, usually near the banks of rivers in the Clarence, Richmond, and Tweed River districts, but frequently in the scrub, a considerable distance from creeks and rivers. It comes as far south as the well-known Don Dorriggo Forest Reserve, in the Bellinger River district. It is also found in Queensland, extending a considerable distance along the coast districts, right into the tropics.

Propagation.—The tree is propagated from seed, the large “beans,” and can be supplied by every nurseryman. The leaves are pinnate, as shown in the drawing, and in a mass are of more than ordinarily handsome appearance. The foliage is dark, and the whole tree shapely, quite justifying Cunningham’s laudatory remarks in regard to it. Those who are not familiar with the tree in its native habitat may see some magnificent specimens in the Sydney Botanic Gardens. It is one of our most beautiful native trees, always admired, and it should be more freely planted.

EXPLANATION OF PLATE 25 (FLOWER).

‘ Flowers on last year’s wood, leaflets.

PLATE 26 (FRUIT).

A. Legumen (pod).

B. The same, after dehiscence by both dorsal and ventral sutures.

Alphitonia excelsa, Reissek.

THE RED ASH.

Botanical Name.—*Alphitonia*, from the Greek *alpliton* signifying “baked barley-meal,” in allusion to the mealy nature of the epicarp which is around the seed; *excelsa*, Latin, signifying “high,” in allusion to the size of the tree.

Vernacular Names.—“Red Ash,” “Leather Jacket,” and “Coopers’ Wood.” In the Illawarra district of New South Wales it is called “Humbug.”

Its general name is “Red Ash,” owing to the frequently bright red appearance of the heart-wood. Occasionally also it is called “Mountain Ash.” For obvious reasons it is sometimes known as “Coopers’ Wood,” while its smooth compact bark is alluded to in the name of “Leather Jacket.” Known as “White Leaf” on the Richmond River.

Fruit.—The colour of the fruit is a dull bluish-black, which contains shiny reddish-brown seeds embedded in a brown powdery substance.

Leaves, &c.—The following letter shows the tree to be a fodder plant:—

During the late drought it was found that horses and cattle ate every leaf within reach, and, at Bungawalbin, where there is a regular scrub of it, during the drought the country was quite clear just as high as animals could reach. Its qualities in this respect was not suspected locally, before this. It grows on the very poorest sandy country, and seems to have some value as a fodder plant. (A. W. Deane, L.S., Lismore, 30th August, 1904.)

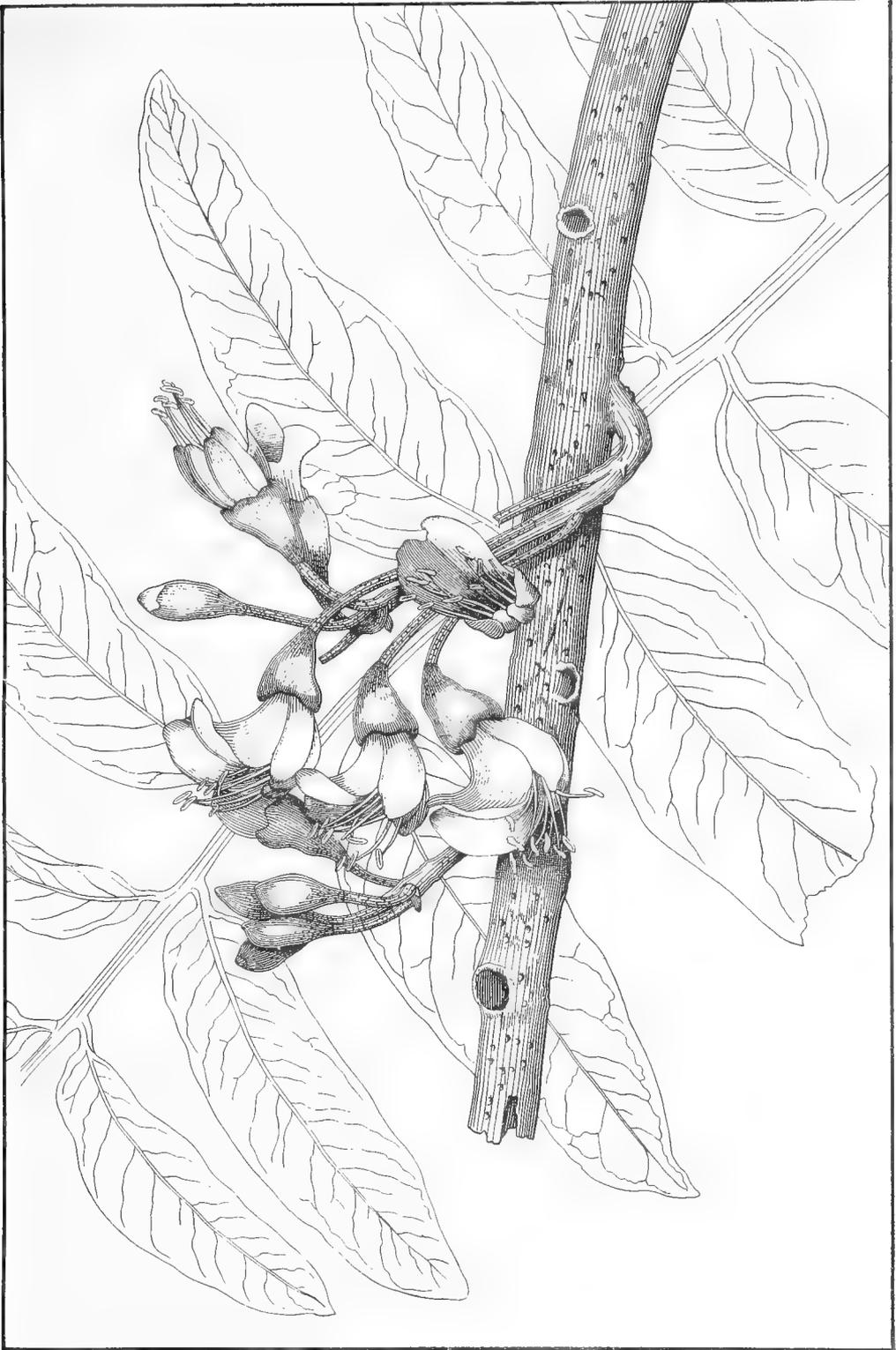
Bark.—

The Technological Museum,

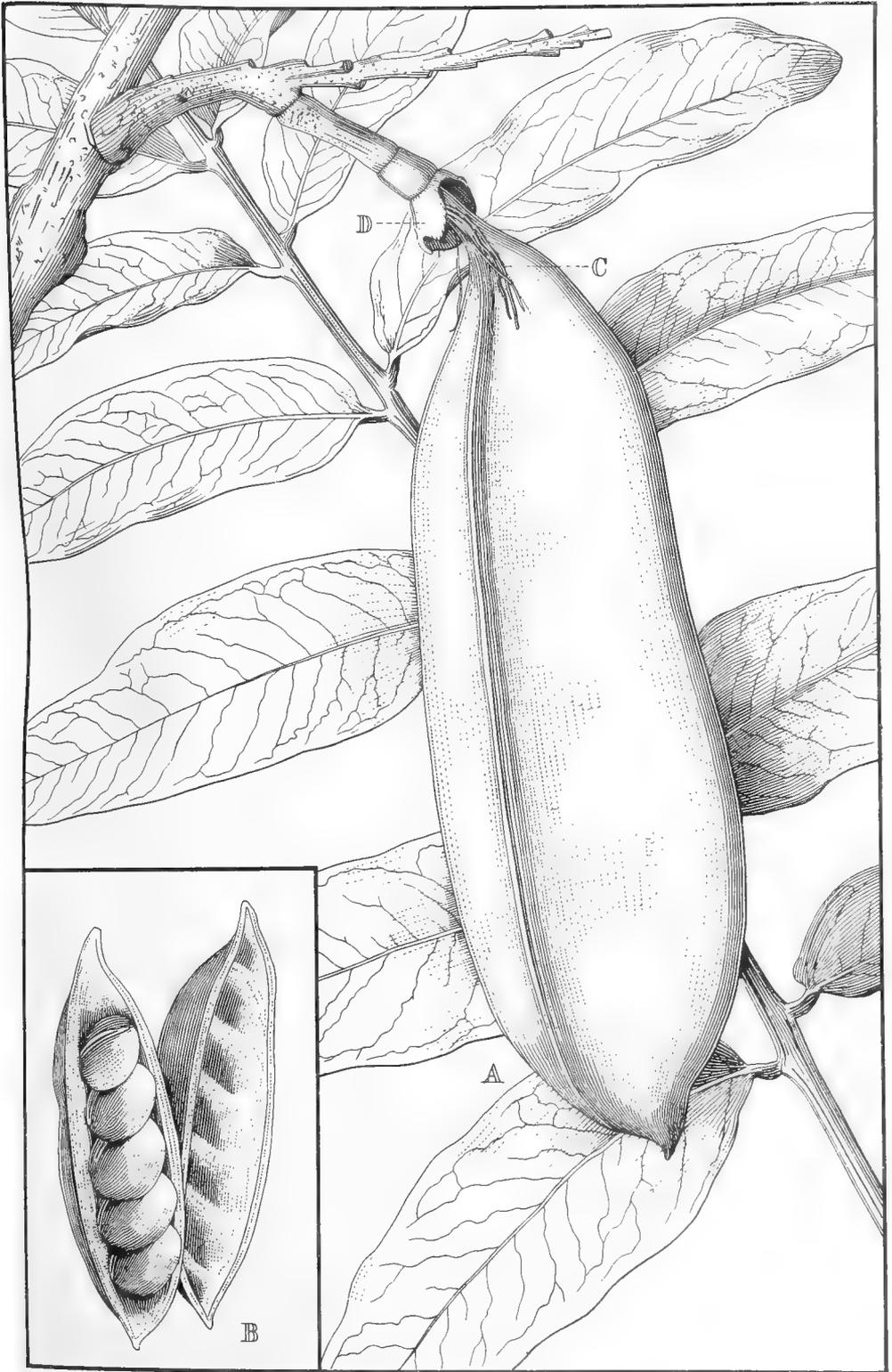
23rd May, 1905.

Dear Mr. Maiden,

Some time ago a letter from Mr. J. Byrnes, of Macksville, Nambucca River, was received through you, asking for particulars as to the tanning qualities of a certain bark. The sample received was that of *Alphitonia excelsa*, and an analysis shows it to be a fair sample, containing about half the amount of tannin usually occurring in the best wattle barks. The tannin is good, quick in its action, and might be used for local tanning.



CASTANOSPERMUM AUSTRALE, A. Cunn. (The Black Bean Flowers.)



CASTANOSPERMUM AUSTRALE, A. Cunn. (The Black Bean Fruits.)

On the anhydrous bark the following results were obtained:—

Total extract, 23·1 per cent.
Non-tannin, 5·1 per cent.
Tannin, 18·0 per cent. absorbed by hide powder.

If these results are calculated in ordinary air-dried bark containing 13 per cent. of moisture, the statement would be:—

Total extract, 20·1 per cent.
Non-tannin, 4·4 per cent.
Tannin, 15·7 per cent. absorbed by hide powder.

Yours, &c..

R. T. BAKER, Curator.

Timber.—When a log is freshly cut it is of a pale colour, and looks simply like Ash. It is straight in the grain, works easily, and is somewhat tough. But in the course of a few weeks or months the heart-wood darkens, the sapwood retaining its original pale colour. According to age of tree, length of exposure or seasoning, this heart-wood may change to brown-reds of all depths of tint and even to bright red of a very ornamental character. The meaning of the name "Red Ash" is thus explained. When I first gave attention to this timber some years ago, I had a piece so fiery red that I did not believe the colour was natural, and planed the surface, only to find the colour was skin-deep, but it returned, in course of time, to its original deep colour. This colouration has not yet been carefully examined, and we are, therefore, unable to give a satisfactory explanation of it. The colouring of Red Ash, like the colouring of a meerscham pipe, takes time, and this is, of course, a drawback. I know of no other New South Wales timber which has such a striking colour. Another drawback is, of course, its superficial nature. For instance, when used for furniture, if it be touched with a plane the pale-coloured timber is exposed, making the timber look patchy, until, after the lapse of months, the timber becomes of a uniform deep red colour.

Following are reports on this timber made by some New South Wales foresters a few years ago:—

Used only in a small way here for staves. (Mr. Forester Martin, Gosford.)

Timber pinkish, sometimes with beautiful figure, hard and tough and very lasting, even on exposure to the weather. The surface of the heart-wood turns quite red after short exposure to the sun. It is not very generally known. I have seen it used for ribs of vessels. I believe it to be excellent for coach-building, and generally well adapted for cabinet work. (Mr. Forester Rudder, Booral.)

This is a very handsome timber, splits well, and is durable and tough. It makes good staves, axe-handles, &c., also palings, shingles, and besides, lasts well in the ground. It takes a very fine polish, and is often used for cabinet work, as it shrinks very little. It makes a good lining for a house. I have been shown a house twenty years old lined with this timber sawn green. The wood has not shrunk, and is still sound. It has a pleasant smell when fresh cut. It is a splendid firewood. It was used by the aborigines for light spears. (Mr. Forester Deverell, Glen Innes.)

Mr. Walter Hill, of Queensland, says of it:—

The wood is hard, close-grained, durable, and will take a high polish. It is suitable for gun-stocks, and a variety of other purposes.

Size.—Height, 40-80 feet; diameter, 20-30 inches, in the Gosford district.

On the coast up to 2 feet in diameter; height, up to 60 or 70 feet; very exceptional up to 3 feet in diameter. (Mr. Forester Rudder.)

Habitat.—Found in the coast and mountain brushes from the Shoalhaven northwards from south to north of Queensland. In New South Wales the most westerly localities known to me are Boggabri (J.H.M.) and Attunga, 12 miles north-west of Tamworth (R. H. Cambage). These are both west of the Dividing Range; it is usually found east. It extends to Queensland, New Guinea, and the Islands.

Following are some notes by foresters:—

Not plentiful in my district; found only in brush forests on Jilliby, Wyong, and Mount Cook Creeks. (Mr. Forester Martin, Gosford.)

Habitat east of Dividing Range, chiefly skirts of brushes, brushes bordering streams and water-courses, sometimes in the open and sandy lands; in a dwarf form more on land on scrubby mountain tops and slopes. (Mr. Forester Rudder, Booral.)

A plentiful scrub wood, Kempsey district. (Mr. Forester Macdonald, Kempsey.)

Grows on igneous formation at Milton, the most southerly locality known to me. (R. H. Cambage.)

Occurs at Warialda. (W. Macdonald, C.P. Inspector.)

Tree about 20 feet in height. Wood is of a light colour, and soft. Generally found at the edge of the scrubs. (Forest Guard W. Dunn, Acacia Creek, Macpherson Range.)

EXPLANATION OF PLATE 6.

Flowering twig, also cluster of fruits, showing the rim or cupule.

- A. Flower—(a) Sepal, (b) Petal, including the stamen (c), (d) Disk, filling the calyx-tube, (e) Lobed style.
- B. Vertical section of flower—(a) Sepal, (b) Petal, including the stamen (c), (d) Disk, filling the calyx-tube, (e) Lobed style.
- C. c'. Different views of stamen.
- D. Petal, including the stamen.
- E. Fruit dissected to show the two nuts or cocci.
- F. The nuts or cocci, showing the method of attachment.
- G, H, I. Views of Seeds.

Ficus rubiginosa, Desf.

THE RUSTY FIG.

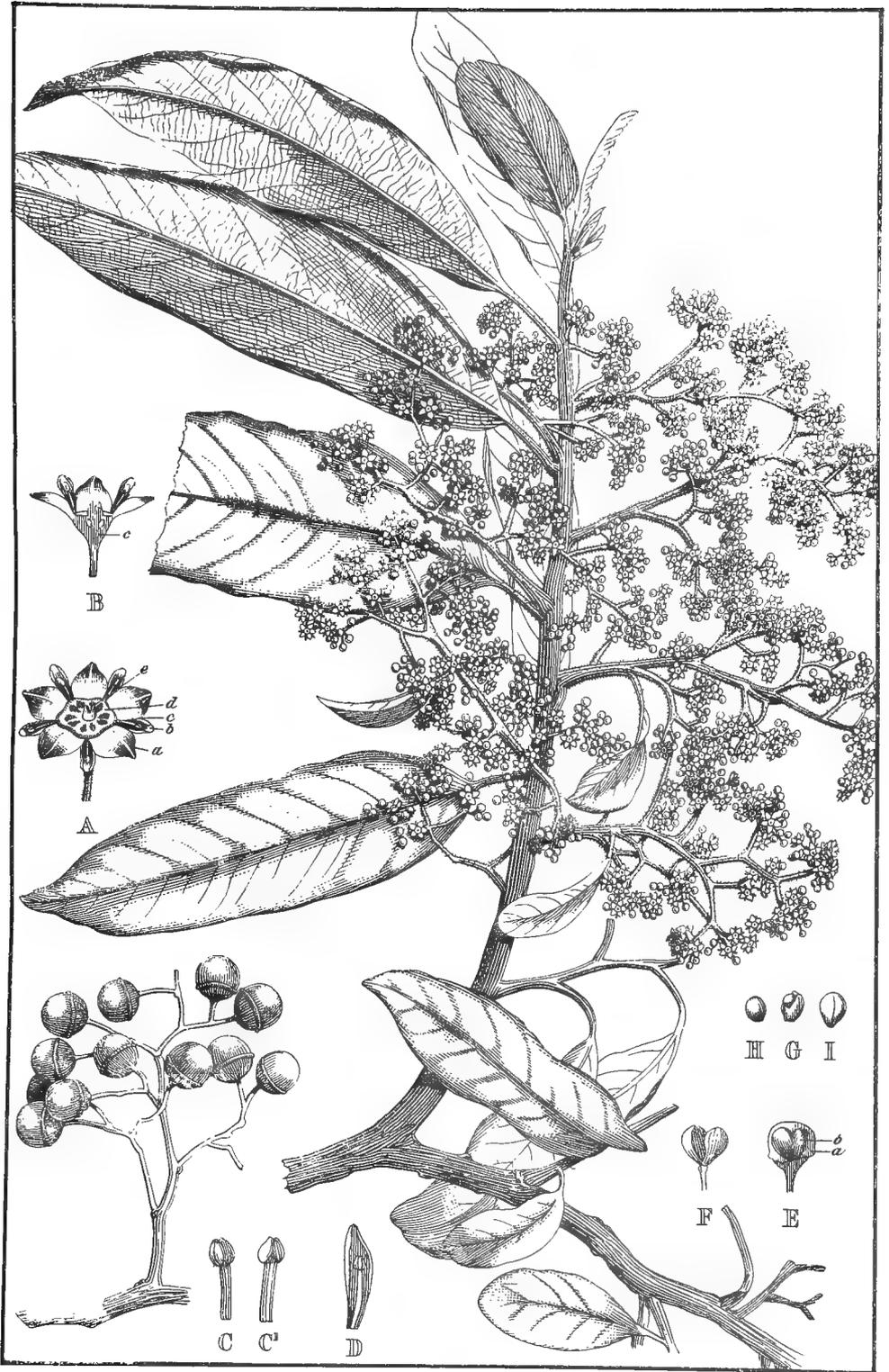
Botanical Name.—*Ficus* (Latin), a fig or fig-tree; *rubiginosa* (Latin), rusty.

Vernacular Names.—"Port Jackson Fig," "Illawarra Fig," from the best known localities. "Rusty Fig," because of the ferruginous appearance of the young shoots, &c. "Narrow-leaved Fig," "Small-leaved Fig," in comparison with the "Large-leaved Fig" (*F. macrophylla*).

Synonyms.—By nurserymen this tree is commonly known as *F. australis*.

The species is very largely cultivated in New South Wales, and the plants display a considerable amount of variation. For example, there is an entirely glabrous form in the Sydney Botanic Gardens, which has been labelled *F. lucida* for many years. I can find no authority for this name, and it should be called *F. rubiginosa*, Desf., var. *lucida*, Hort. Syd.

Leaves.—The Moreton Bay Fig (*F. macrophylla*, Desf.) is an excellent fodder plant, cattle and horses eating the leaves, young twigs, and figs with great zest. For further particulars, see *Agricultural Gazette*, 1893, page 609, and 1894, page 206.



ALPHITONIA EXCELSA, Reissek. (The Red Ash.)

The Small-leaved Fig (*F. rubiginosa*, Desf.) is less used for this purpose, probably because it is less frequently planted, but it appears to be of equal value as a fodder plant, and doubtless other of our native figs may be put to similar uses. I have known cows fed all the year round on leaves and figs which dropped from these trees.

Flowers.—The structure of the inflorescence of *Ficus* can be ascertained by the student by reference to most text-books in which the common edible fig (*Ficus Carica*) is dealt with. There are excellent figures, for example, in Kerner and Oliver, ii, 157.

Fruits.—At page 8 Bentham calls the fruit of a fig a Synoecium, Kerner and Oliver a Synconium, Prantl and Vines and Warming and Potter a Synconus. The "Fig" consists of the fleshy axis of the inflorescence, which is deeply concave, and on the inner surface of which the minute flowers (which later on develop into achenes or "seeds"), are borne. The cavity at the end of the fig farthest away from the stalk is enclosed by small bracts. The name Receptacle seems to be as descriptive and as convenient as any to apply to the "fig." The fruits of *F. rubiginosa*, which are full of seed, were an article of food of the Port Jackson natives, but the early colonists found them "very nauseous." Mr. C. Hedley states that they are eaten by the Port Curtis (Q.) blacks.

Fibre.—The fibre of the root of this tree is of great durability, and is used by the aborigines in the fabrication of their scoop fishing-nets. The inner bark forms a loose fabric taken off carefully. A similar fibre is produced, and more abundantly, by *F. macrophylla*.

Trunk.—This and other figs in our northern forests have plank-like or buttress-like expansions of the stem, near the root, which are sometimes as deep as horse-stalls. The following description of certain trees in the Malay Archipelago will directly apply to our fig:—

Others, again, and these are very characteristic, send out towards the base flat and wing-like projections. These projections are thin slabs radiating from the main trunk, from which they stand out like buttresses of a Gothic cathedral. They rise to various heights on the tree, from 5 or 6 to 20 or 30 feet. They often divide as they approach the ground, and sometimes twist and curve along the surface for a considerable distance, forming elevated and greatly compressed roots. These buttresses are sometimes so large that the spaces between them, if roofed over, would form huts capable of containing several persons. Their use is evidently to give the tree an extended base, and to assist the subterranean roots in maintaining in an erect position so lofty a column, crowned by a broad and massive head of branches and foliage. ("Tropical Nature and other Essays," Wallace, page 31.)

Timber.—The timber is soft, brittle, and spongy; it is, however, sometimes used for packing-cases. It is light in colour as well as in weight, and although sometimes it shows a pretty grain, it would be waste of labour to spend much time upon it. A well-seasoned slab of wood had a weight which corresponds to 28 lb. 8 oz. per cubic foot.

Roots.—Everyone has noticed the long, slender, aerial roots that hang from the branches, and which are more abundant and robust in warm, moist localities. In Lord Howe Island a fig looked upon by some botanists as specifically identical with our Port Jackson fig is called the Banyan, as its aerial roots descend to the ground and form secondary stems, just as in the case of the well-known Banyan of India.

On the Northern Rivers these fig-trees often begin life on the moist bark of another tree, and their aerial root system attains great development. It

is a common thing to see a huge tree being completely enveloped in the aerial roots of a fig, which finally smother the host tree out of existence so completely that it would not be known that the fig is taking the position of another unless the process of strangling had been observed.

Even in colder New England Mr. A. R. Crawford noticed trees sending down aerial roots 30 feet distant from the main stem, some nearer forming new stems, others 30 feet in height descending along Angophora stems, enclosing and suffocating them.

Size.—Planted trees as ordinarily seen are not large; but in its native forests this species may attain a great size, up to 100 and even 150 feet, and with a trunk diameter of 6 feet and more. There are some fine specimens near Dapto; but it attains its greatest dimensions on the Northern Rivers.

Habitat.—Chiefly in the coastal districts, but extending as far west as near Narrabri, Tamworth, and Jenolan Caves. Northerly it extends into Queensland, southerly to Bateman's Bay; but its range in that direction is not defined. Westerly we require more localities before we can define its "curving boundary."

EXPLANATION OF PLATE 2.

- A. Gall flower.
- B. Female flower.
- C. Male flower.
- D. A receptacle (fig.).
- E. Longitudinal section of the same.



D



C



B



A

FICUS RUBIGINOSA, Desf. (The Rusty Fig)

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