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NOTES ON

The Tannin Resources

OF

Western Australia.

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THE TANNIN RESOURCES OF WESTERN AUSTRALIA.

The following information has been extracted from a comprehensive report on "A Tannin Survey of Western Australia," prepared as a result of investigations which are still proceeding in the Forest Products Laboratory of the Commonwealth Institute of Science and Industry. The total number of possible tanning materials examined is over two hundred. Of the species examined, one-fifth were shown to carry a tannin content in some part of their structure of over twenty per cent., and in a few cases the tannin content was found to be as high as fifty per cent. It is desired to interest overseas tanners, particularly British firms, in Western Australia's undeveloped resources.

The information given below is not an exhaustive account of the tannin-bearing species of the Western Australian Forests, but refers to those groups of associated species which offer the greatest attraction for the investment of capital in the manufacture of tannin extract on a commercial scale. Reference to the attached map will show the approximate distribution of the various groups.

Full details of the results of analyses of the tannin-bearing material of the species included in this pamphlet is given in the tabulated statements on pages 9 and 10.

Marri Forest.

Marri (*E. calophylla*).—Tannin from *Kino*, the average tannin content of which is 68 per cent. Tree of 100ft. in height, with an average girth of 9ft. b.h.: known as redgum in certain districts. Occurs in timber forest, mixed with jarrah and karri, in a belt of country in the extreme South-West of the State, 360 miles long by 60 miles wide in the north, and 200 miles wide in the south. Although a large tree the timber is of little value, owing to numerous gum veins. Kino exudes from the Marri tree through insect boring or other wounds, and can be collected by scraping it from the bark to which it adheres in a so-called crystalline form, owing to apparent oxidation on exposure. Experiments are being carried out to determine whether an artificial flow of Kino can be obtained by tapping. It would seem probable that collection can be thus systematised and the quantity of clean kino obtainable per acre increased. As the removal of the Kino does not impair the health of

the tree, a constant supply is assured. The actual tanning material is very similar to the extract obtained from Quebracho wood. The preparation of the extract from the crude Marri Kino is a most economical process, as the Kino is obtained mixed with fragments of bark, and has not to be leached out of the actual fibre, thus eliminating the first process necessary in the preparation of most tannin extracts, and enabling a more concentrated solution to be used in the working with sulphites.

Bullich (*E. megacarpa*).—Tannin from *wood*, which has a tannin content of 11 per cent. Tree 60ft. high, with an average girth of 6ft. b.h. It occurs throughout the Karri forest and in some of the swampy flats of the Jarrah forest.

Karri Forest.

Karri (*E. diversicolor*).—Average tannin content of *Bark* 20 per cent. Tree up to 270ft. in height, with average girth of 15ft. b.h. Occurs in dense forest in the extreme south-west corner of the State. The bark is thick, and large quantities are regularly available from logging and milling operations, and can be cheaply collected. At least 30 tons of bark per day is available at two mills within 25 miles of one another, and this quantity should make possible a daily output of a minimum of 7.5 tons of 55 per cent. tannin extract. Leather from Karri bark tannin is a pale cream colour, and the rate of penetration of the tan liquor is rapid.

Tuart Forest.

Tuart (*E. gomphocephala*).—Tannin from *wood*. Tree 70ft. in height with average girth of 10ft. b.h. A fairly dense forest within its restricted habitat, along the coastline, south of Perth. Although the bark of Tuart is comparatively rich in tannin content, the ratio of tans to non-tans is too low for the bark to be suitable for tannin extraction. The tannin content of the wood is from eight to 10 per cent. of readily soluble tannin, and the ratio of tans to non-tans is satisfactory for the purpose of extract-making. Considerable quantities of small size wood and sawdust following on logging and milling operations are available. The estimated quantity of material available, which at present represents mill waste from the saw mill operated by the Forests Department, is estimated at 11,500 tons annually.

Wandoo Forest.

Swamp Yate (*E. occidentalis*).—Average tannin content of *Bark* 25 per cent. Tree of 50ft. in height, with an average girth of 5ft. b.h. Occurs in large patches, and is particularly abundant to the south-east of Wagin.

Wandoo (E. *redunca, var. elata*).—Average tannin content—*Bark* 20 per cent., *wood* 11 per cent. Tree of from 50 to 60ft. in height, with an average girth of 6ft. b.h. Wandoo Forest occurs in the South-West corner of the State, occupying the low-lying country to the east of the Jarrah belt, and to a certain extent in portions of the Jarrah forest. Abundant supplies are available, as both bark and wood are suitable for tannin extract manufacture. In addition to the species listed hereunder there are associated with Wandoo the following trees mentioned elsewhere, viz., Manna Wattle and the Mallets. The bark of all the species mentioned in the Wandoo forest group could be utilised for the manufacture of a mixed tannin extract with that of the Wandoo.

Powder Bark Wandoo (*E. accedens*).—Average tannin content of *Bark* 19 per cent. Tree of 70ft. in height, with an average girth of 6ft. b.h. This tree is not very plentiful but occurs mixed with Wandoo on the Darling Range between Perth and York.

Prickly Hakea (*Hakes glabella*).—Average tannin content of *Bark* 19 per cent. Shrub of from 10 to 15ft. in height, with an average girth of 20 inches b.h. Occurs scattered throughout the Wandoo, Jarrah and Tuart forests, being most plentiful in a narrow strip along the railway between York and Katanning.

The Savannah Forest of the Southern Portion of the Interior of the State.

This formation covers an extensive tract, as can be seen from the attached map. The average height of the forest is from 50 to 70ft., and in places it is comparatively heavily stocked. At present the firewood companies, who supply the gold mines, are removing over 300,000 tons of wood for mining timber and fuel annually from the forest of this formation within 100 miles of Kalgoorlie. The bark is of no value to these companies, and its collection, where so much wood is being cut, would appear to offer considerable possibilities.

The chief tannin-bearing species of this group are listed hereunder:—

White Mallee (*E. erythronema*).—Average tannin content of *Bark* 30 per cent. Shrubby tree of 20ft. in height with several stems. Average girth of each stem 20 inches b.h. Occurs in large patches. The tan produces a pale coloured leather.

Silver-topped Gimlet (*E. campaspe*).—Average tannin content of *Bark* 26 per cent. Tree of 35ft. in height, with an average girth of 30 inches b.h. Occurs in fairly large patches in the vicinity of the Eastern Goldfields.

Gimlet (*E. salubris*).—Average tannin content of *Bark* 18 per cent. Trees may develop occasionally to 60ft. in height, with a diameter of 5ft. b.h., but generally they are smaller than this. Gimlet occurs plentifully, mixed with Salmon Gum and Morrell, and regenerates very freely.

Red Flowering Gum (*E. torquata*).—Average tannin content of *Bark* 18 per cent. Tree of 30ft. in height, with average girth of 3ft. b.h. Occurs sparsely on limited area.

Redwood (*E. transcontinentalis*).—Average tannin content of *Bark* 11 per cent. Tree of 60ft. in height, with an average girth of 5ft. b.h. A common tree of the Goldfields forest.

Salmon Gum (*E. salmonophloia*).—Average tannin content of *Bark* 11 per cent. Tree from 60 to 70ft. in height, with an average girth of 7ft. b.h. In the past this tree occurred over a large area of the southern portion of the State, but as its occurrence is generally an indication of good soil, it has been heavily cut in the agricultural areas.

Morrell (*E. longicornis*).—Average tannin content of *Bark* 11 per cent. Tree of 70ft. in height, with average girth of 7ft. b.h. Occurs plentifully, mixed with Salmon Gum and Gimlet.

Mallet Forest.

The mallets and associated tannin-bearing species occur over a comparatively narrow strip of country on the west side of the York-Albany railway line, and over a strip of 150 miles in width on the east side of the line. A great deal of this country has been cleared for farming, and the mallets owe their existence to the fact that they do not grow on first-class agricultural land.

Brown Mallet (*E. astringens*).—Tannin content of *Bark* 40—57 per cent. Tree growing to about 50ft. in height, with an average girth of 6ft. b.h. It occurs in dense formation in patches of limited extent. Brown Mallet has a thin bark, which is easily stripped. Between 1903 and 1923, Western Australia exported 127,273 tons, valued at £1,009,491. The average price over this period was less than £8 per ton, whereas £11 to £12 a ton was the average price of Wattle Bark on the Melbourne market. Had tannin extract works been established in the State a greater return would have been obtained for Western Australia, and the value of the commodity better appreciated. Brown Mallet has been ruthlessly exploited, and no considerable quantities exist to-day, but a mixed extract from this bark and the bark of the other tannin-bearing species listed hereunder, occurring in the mallet country, has commercial possibilities. In fact, the commercial mallet bark as exported from Western Australia has frequently been a mixture of the bark of all these species.

White Mallet (*E. falcata var. ecostata*).—Average tannin content of *Bark* 30 per cent. Tree of 40ft. in height, with an average girth of 4ft. b.h. Occurs scattered in mallet patches. It has a thin bark, often containing Kino.

Blue Mallett (*E. Gardneri*).—Average tannin content of *Bark* 26 per cent. Tree of 35ft. in height, with an average girth of 30 inches. Occurs in close formation on patches of limited extent, being always mixed with the Brown Mallet.

Swamp Mallet (*E. spathalata*).—Average tannin content of *Bark* 26 per cent. Tree of from 20 to 30ft. in height, with an average girth of 3ft. b.h. Occurs in scattered patches in the South-West corner of the Savannah Forest. It has a thin bark, which is easily stripped.

Manna Wattle (*Acacia microbotrya*).—Average tannin content of *Bark* 23 per cent. Scrubby tree of about 15-20ft. in height, with an average girth of 27 inches b.h. Occurs in dense patches with Salmon Gum and Jam (*Acacia acuminata*), and extends northwards as far as Geraldton. Experimental tests show that the bark from this tree produces a good coloured leather, and that the rate of penetration is rapid.

Mangrove Formation.

Mangroves occur around the Western Australian coast, from near Carnarvon to the northern limits of the State. To the south of Broome the Mangrove fringe is composed of shrubby species, which are only plentiful in the creeks and estuaries, but to the north of Broome a well-defined Mangrove forest occurs, which attains its greatest proportions north of Collier Bay. The following species together form the Mangrove forest and are suitable as raw materials for the manufacture of a mixed tannin extract.

Red Mangrove (*Ceriops candolleana*).—Tannin content of *Bark* 40.2 per cent. A small species averaging 15 feet in height, with a girth of 18 inches b.h. It is perhaps the commonest of the mangroves, and has a very wide distribution.

Black Mangrove (*Bruguiera gymorrhiza*).—Tannin content of *Bark* 30.2 per cent. Average height 35 feet; girth 24 inches b.h. Occurs with the above but in denser formation. The species is very common to the north of Port Hedland.

Black Mangrove (*Rhizophora mucronata*).—Tannin content has not yet been determined but it is believed to be high. Average height 25 feet, girth 24 inches b.h. The species is common in the larger creeks and estuaries to the north of Broome, and the supply is very plentiful.

Together with those enumerated above, other tannin-bearing plants occur which have not been analysed locally, but which are used as tanning materials in other countries.

Ridge Gum Country.

Ridge Gum (*E. alba*). Average tannin content of *bark* 30 per cent. Tropical tree of 40ft. in height, with an average girth of 4ft. 6in. b.h. Its distribution is not accurately known but it is said to be plentiful throughout the East Kimberley district, associated with other known tannin-bearing materials, *e.g.*, Bloodwood and Freshwater Mangrove. The Department of the North-West is using this bark on the Aborigines Station at Moola Bulla, south of Wyndham. Although the plant is primitive and unskilled native labour is used, excellent leather, of good colour and substance, has been turned out.

Moort Forest.

Moort (*E. platypus*). Average tannin content of *bark* 25 per cent. Small tree of from 20 to 30 feet in height, with an average girth of 30 inches b.h. Occurs in dense thickets in the southern parts of the State between Albany and Esperance. Associated with this species are the Mallees, and to a lesser extent Morrell and Salmon Gum, and the Mallets. Leather tanned from this material is very light in colour.

Micum Country.

Micum (*E. pallidifolia*). Average tannin content of *bark* 25 per cent. A tree of 30ft. in height with an average girth of 30in. b.h. Occurs in scattered patches in the North-West.

The Government of Western Australia is desirous of encouraging the development of secondary industries of the State which promise to exploit natural resources which are at present either destroyed or ignored.

Application for exclusive permits for the removal of any class of forest produce listed in this pamphlet from a reasonably large area of Crown lands, to warrant the investment of the necessary capital, will receive consideration if addressed to—

Conservator of Forests,

Perth,

Western Australia,

from whom also further information concerning results of tests or supplies available may be obtained.

Intending applicants will be required to give guarantees concerning their capability of establishing in Western Australia extract plants capable of working the area applied for within reasonable time.

Table I.

Data showing average analyses on air dry material and colour estimations of the tannin-bearing species arranged in the groups set out in the attached pamphlet.

(Bark if not otherwise stated.)

Name of Species.	Tans.	Non-Tans.	Moisture.	Colour on 0·5 solution.	
				Reds.	Yellows.
Marri (*E. calophylla*)	60–70	17–20	10–12	...	...
Bullich (*E. megacarpa*)	10·6	2·1	12·0	3·0	5·0
Karri (*E. diversicolor*)	20·0	5·7	10·7	7·1	14·2
Tuart (*E. gomphocephala*)—Wood ...	8·8	2·4	11·0	...	...
Wandoo Group—					
Swamp Yate (*E. occidentalis*) ...	24·2	8·7	10·2	...	...
Wandoo (*E. redunca, var. elata*) ...	19·2	6·6	10·2	17·0	28·0
Wandoo (*E. redunca, var. elata*—Wood	11·3	3·3	12·1	3·6	8·0
Powder Bark Wandoo (*E. accedens*)	18·6	9·8	16·8	4·8	8·1
Prickly Hakea (*Hakea glabella*) ...	18·4	6·0	12·3	...	...
The Savannah Forest of the Southern Portion of the interior of the State—					
White Mallee (*E. erythronema*) ...	30·4	12·1	8·2	7·5	20·0
Silver-Topped Gimlet (*E. campaspe*)	25·6	15·3	8·0	9·2	4·0
Gimlet (*E. salubris*)	17·5	9·5	9·5	9·7	21·8
Red Flowering Gum (*E. torquata*)	17·6	6·8	9·9	12·5	22·0
Redwood (*E. transcontinentalis*) ...	10·9	3·8	10·0	...	...
Salmon Gum (*E. salmonophloia*) ...	10·7	5·7	11·7	12·6	28·4
Morrell (*E. longicornis*)	10·6	4·4	10·4	...	...
Mallet Group—					
Brown Mallet (*E. astringens*) ...	46·8	9·5	11·5	5·8	16·3
White Mallet (*E. falcata, var. ecostata*)	32·3	6·8	13·5	10·6	17·7
Blue Mallet (*E. Gardneri*)... ...	26·0	9·0	11·4	8·3	20·5
Swamp Mallet (*E. spathulata*) ...	25·9	9·0	9·7	...	...
Manna Wattle (*Acacia microbotrya*)	22·8	4·7	10·2	...	...
Mangrove Group—					
Red Mangrove(*Ceriops candolleanna*)	40·2	6·6	11·1	...	...
Black Mangrove (*Bruguiera gymorrhiza*)	36·2	...	...	...	...
Black Mangrove(*Rhizophora mucronata*)	...	...	...	...	...
Ridge Gum (*E. Alba*)	31·7	11·3	9·4	6·8	23·0
Moort (*E. platypus*)	25·0	7·2	8·3	5·5	19·0
Micum (*E. pallidifolia*)	27·7	9·2	10·0	...	...

Table II.

Tannin bearing Species arranged in Groups and in Order of Total Extract Content within each Group.

Name of Species.	Yield of solid extract with 15 per per cent. moisture from air-dry raw material with 10 per cent. moisture.	Calculated theoretical maximum possible percentage of tannin in such an extract.
	per cent.	per cent.
Karri	30·5	66·0
Tuart (Wood)	15·3	65·8
Wandoo Group—		
Swamp Yate	38·8	62·6
Wandoo	30·5	63·1
Wandoo (Wood)	17·4	66·2
Powder Bark Wandoo	36·1	55·5
Prickly Hakea	29·4	64·3
The Savannah Forest of the Southern Portion of the interior of the State—		
White Mallet	49·0	60·9
Silver-Topped Gimlet	47·0	53·2
Gimlet	31·4	55·4
Red Flowering Gum	28·5	61·1
Salmon Gum	19·5	55·8
Morrell	17·6	60·3
Redwood	17·2	63·3
Mallet Group—		
Brown Mallet	67·3	70·7
White Mallet	47·8	70·4
Blue Mallet	42·0	63·0
Swamp Mallet	40·9	63·1
Mania Wattle	32·5	70·6
Mangrove Group—		
Red Mangrove	75·8	73·1
Black Mangrove	...	...
Do.	...	...
Ridge Gum	50·1	60·1
Moort	37·1	65·9
Micum	43·4	63·8

The data is based on the ratio of tannin to non-tannin. It does not take into account of those substances soluble in hot extract and insoluble in cold, of which certain proportions are removed from most raw tannin material, and therefore represents the ideal when no such difficultly soluble bodies are present and where there is no such production during concentration in the evaporator.

Speaking generally, the actual percentage of tannin is likely to be at least some 5 per cent. below the ideal figures for the particular extract.

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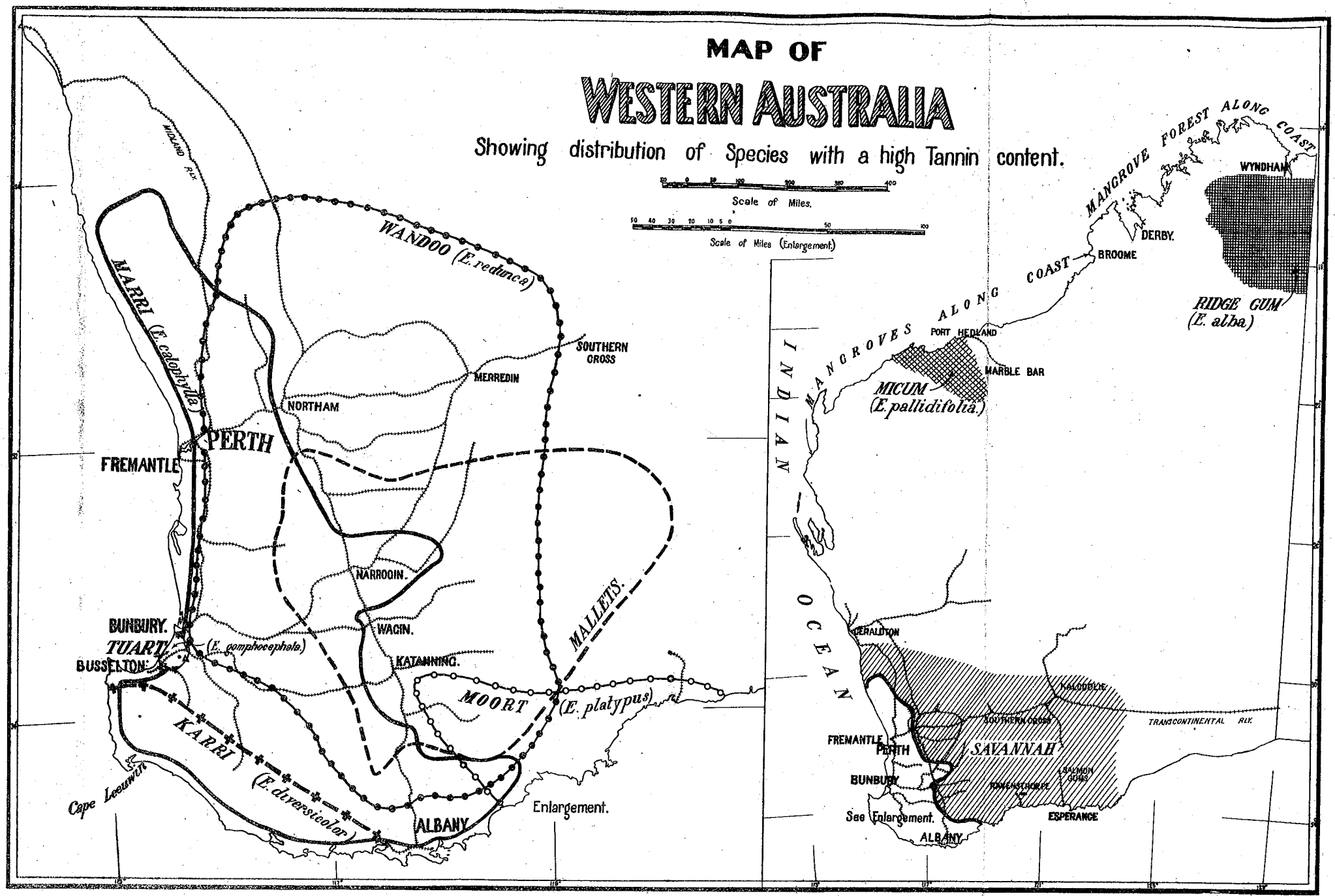
MAP OF
WESTERN AUSTRALIA

Showing distribution of Species with a high Tannin content.



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