SOME NEW SOUTH WALES TAN-SUBSTANCES.

Part II.

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[*Read before the Royal Society of N.S.W., August 3, 1887.*]

Notes—(First Supplement).

1. Only that vernacular name which a tree bears in the locality from which the bark &c. has been obtained, is, and has been given in each case. That is to say, the practice of giving a list of vernacular names used in different places (in exceptional cases amounting to a dozen or more) has not been followed.

2. Botanical names are the same in the "Flora Australiensis," and "Census of Australian Plants," (Mueller) unless the contrary is indicated.

3. The diameters of trees are taken at a height of three feet from the ground.

4. The results afforded by the few Eucalypts (taken almost at random) which have now been examined, prove that the barks of this genus are worthy of earnest consideration by the tanner. These barks should be made to yield their tannin in the form of extract. Where trees have to be felled and burnt, the bark can be removed, and boiled down in water kept heated by the burning of the tree which yields the bark. The only cost would be the work of supervision. The extract could be sent to market or exported in kerosene tins, which are usually abundant enough. These should of course be soldered down.

5. The desirability of looking farther afield for fresh tan-substances is illustrated by the scarcity of good wattle barks. The bark of *Acacia decurrens* is the great stand-by of tanners in New South Wales, Victoria, and Tasmania, but I can show barks so similar in appearance as to deceive an expert, and the difficulty is of course immensely increased when the bark is chopped and powdered. In the latter case, barks of wattles next to worthless for tanning purposes are added to increase the bulk.

6. For reference, I give percentages of tannin of the following renowned tan-substances of the Old and New Worlds:—

Oak bark	8 to 13
Hemlock bark *(Abies canadensis)*	10 to 12

7. In the report of the Board of Enquiry on Wattle Bark, appointed by the Victorian Government (1878), allusion is made to the character of the soil on which the wattle trees grow. It is shown that (as far as the experiments go) limestone country produces wattles comparatively weak in tannin. The subject is interesting, and should be followed up. I have therefore put the geological formation in each case.

8. The tabular form for the presentation of qualitative results has been adopted for two reasons. Firstly, unnecessary repetition of the names of re-agents &c., is avoided, and secondly, the work of comparing the various barks will be greatly facilitated.

9. Mr. W. Bauerlen has collected the material from the Southern and Mr. K. H. Bennett from the Western Districts. Mr. H. G. Smith has afforded me much assistance during the progress of my work.*

14. ANGOPHORA INTERMEDIA, *DC.*, N.O. Myrtaceæ, B. Fl. iii., 184.

Found in Victoria, New South Wales and Queensland.

Vernacular Name—"Apple-tree" (in common with other species of the same genus).

Locality whence this particular specimen was obtained—Colombo, near Candelo, N.S.W.

Geological Formation—Granite.

Part of Tree Examined—Kino.

Particulars of the trees whence it was obtained—Height 30 to 50 feet, diameter 2 to 4 feet.

Collected 30th June, 1887. Analysed 13th to 22nd July, 1887.

A kino of a reddish-brown colour, and of a brittle nature. From this circumstance, the small masses in which it is obtained speedily lose their bright fresh appearance. It forms a dull-looking powder.

Extract.—Dissolves in water at 100° C. to the extent of 90·7 per cent., leaving a residue of a yellow-ochre colour. The solution becomes turbid on standing. On again raising the temperature, the suspended matter gradually aggregates, until, when the boiling point is reached, it collects into a few large flocculent masses, which eventually re-dissolve in the boiling liquid, though with difficulty.

* These series of notes, as also the qualitative ones, are jotted down as they occur to me, and, except a particular reference is made, are intended to apply generally to the substances referred to in the papers.

Kino-tannic acid—46·95 per cent.

NOTE.—Mr. Kirton states that a single tree of this species will yield as much as two gallons of liquid kino.

15. EUCALYPTUS MACRORRHYNCHA, *F.v.M.*, N.O. Myrtaceæ, B. Fl. iii., 207.

Figure Dec. 1 of Baron Mueller's "Eucalyptographia."

Found chiefly in Victoria, but also in Southern New South Wales.

Vernacular Name—"Stringybark." The wood is used for fencing and wheelwrights' work locally.

Locality whence this particular specimen was obtained—Amboyne, Delegate, 22 miles from Bombala, N.S.W.

Geological Formation—Limestone.

Part of the Tree Examined—Kino.

Particulars of the trees whence it was obtained—Height 80 to 100 feet, diameter 2 to 4 feet.

Collected 25th May, 1887. Analysed 4th to 18th July, 1887.

Kino of a rich ruby colour. It is readily friable, and for this reason usually appears of a dull colour, unless it has been very little handled. It reminds one somewhat of some specimens of seed lac. It appears only to differ from *E. hæmastoma* kino in its greater friability. The samples taken for analysis have been freed from woody matter, as far as possible, by hand-picking.

Extract.—Dissolves in water at 100° C. to the extent of 97·54 per cent., leaving 2·46 per cent. of a dark garnet-coloured resin.*

Kino-tannic acid—78·72 per cent.

16. EUCALYPTUS HÆMASTOMA, *Smith, var.*, N.O. Myrtaceæ, B. Fl. iii., 212.

Figure Decade ii., of Baron Mueller's "Eucalyptographia."

Found from Eastern Gippsland through Eastern New South Wales to the littoral portion of Central Queensland.

Vernacular Name—"Rough or Small-leaved Stringybark." This is the variety with persistent stringy bark. It also differs in the leaves and kino from the *E. hæmastoma* found further north. The wood is used for slabs and fencing purposes about Colombo (Candelo).

* I am not dealing with these insoluble residues in this series of papers, preferring to keep closely to my subject. I hope, however, to report on these substances later on.

Locality whence this particular specimen was obtained—Colombo, near Candelo, N.S.W.
Geological Formation—Granite.
Part of the Tree Examined—Kino.
Particulars of the trees whence it was obtained—Height 40 to 60 feet, diameter 2 feet.
Collected 24th December, 1886. Analysed 4th to 15th July, 1887.

This kino is of a rich ruby colour. When freshly exuded it is of a clear light ruby colour, becoming more or less opaque, and of a Vandyke-brown colour, if it remains sufficiently long on the trees. It is clean to handle, powders fairly readily, forming a light purplish-brown powder. The resemblance to the kino of *E. macrorrhyncha* is most marked when they are both in powder. This kino has been freed, as far as possible, from woody fibre by hand-picking.

Extract.—95·53 per cent. of this kino is soluble in water at 100° C., leaving 4·47 per cent. of residue, chiefly consisting of a dark coloured resinous substance.

Kino-tannic acid—54·12 per cent.*

17. EUCALYPTUS ROSTRATA, *Schlecht.*, N.O. Myrtaceæ, B. Fl. iii., 240.
Figure, Decade iv., of Baron Mueller's "Eucalyptographia."
Found in all the Colonies.
Vernacular Name—"Red Gum," (the "Red Gum" *par excellence*, and so called from the colour of the wood).
Locality whence these particular specimens were obtained—Colombo, near Candelo, N.S.W.
Geological Formation—Granite.
Part of the Tree Examined—Insect galls from saplings, causing the abortion of leaf-buds and flower-buds. None of these are the ordinary leaf-galls, in which cases the leaf-tissue is more or less developed.
Collected 28th June, 1887. Analysed 13th to 23rd July, 1887.

These galls are more or less perforate, the perfect insect having in most cases taken its departure. They are all more or less weather-worn and pulverulent. The colour is from yellowish to a dirty yellowish-brown. Average diameter about $\frac{1}{2}$ inch. Owing

* In the Catalogue of Queensland Woods Exhibited at the Colonial and Indian Exhibition, 1886, this kino is said to yield 64·51 per cent. of tannin but no particulars in regard to it are given.

to the lengthened period they have been on the trees, they contain but a small proportion of essential oil.

Extract.—Dissolve in water at 100° C. to the extent of 70·22 per cent., leaving 29·78 per cent., of residue of an umber colour. The colour of the extract is the same as that of *A. decurrens*, with an olive shade added. I would direct attention to the great difficulty of removing the last portions of extractive matter from these galls, by means of boiling water—a period of from three to five days being necessary for the purpose.

Kino-tannic acid—43·4 per cent.

18. Eucalyptus Gunnii, *Hooker, fil. var.*, N.O. Myrtaceæ, B. Fl. iii., 246.

Figure, Decade iv., of Baron Mueller's "Eucalyptographia."
Found chiefly in Tasmania, but also in Eastern Victoria, and in New South Wales, as far as Berrima. Always found in more or less damp situations.
Vernacular Name (of this variety)—"Flooded Gum," or "Bastard Gum." Timber brittle, not used.
Locality whence this particular specimen was obtained—Delegate, near Bombala, N.S.W.
Geological Formation—Mudstone (Silurian).
Part of the Tree Examined—Bark.
Particulars of the trees whence it was obtained—Height 60 to 80 feet, diameter 2 to 3 feet.
Collected 8th May, 1887. Analysed 5th to 18th July, 1887.

A dark grey or nearly black, deeply fissured bark. Portions of the outer bark are almost as hard as those of some Ironbarks, others, however, are flaky and friable. Inner bark or bast thick but short and brittle, therefore useless as a fibre. Average thickness of bark $\frac{3}{4}$ inch. This bark is remarkable for the essential oil it contains, which causes it to be exceedingly fragrant. It forms a dull light-brown powder. Colour of residue (after treatment with water to extract soluble portion), light brown. The solution has a whitish appearance, owing to the presence of essential oil in a fine state of division.

Extract.—19·4 per cent. to water at 100° C.

Kino-tannic acid—9·45 per cent.*

* Baron Mueller gives (Decade iv., "Eucalyptographia.") 3·44 per cent. of tannin for *E. Gunnii* bark, as the result of "a solitary experiment." My lowest percentage with the Delegate variety was 9·44 per cent., with the Bombala variety 11·2. These analyses are all reconcileable doubtless, and afford another instance of the necessity for full particulars to accompany tan-analyses.

19. EUCALYPTUS GUNNII, *Hooker, fil. var.* [For particulars as to Natural Order &c., see *E. Gunnii* (Delegate variety).]
Vernacular Name (of this variety)—"Red Gum." Timber considered by most people in the neighbourhood to be the very best for standing under ground, and therefore preferred to any other for posts and piles, and especially for house-blocks. It is also used for fencing, slabs, &c.
Locality whence this particular specimen was obtained—Bombala, N.S.W.
Geological Formation—Granite.
Part of the Tree Examined—Bark.
Particulars of the trees whence it was obtained—Height 80 to 100 feet, diameter 3 to 4 feet.
Collected 6th January, 1887. Analysed 13th to 23rd July, 1887.

There are several differences between the two varieties of *E. Gunnii* which have yielded the barks examined in this paper. The variety from Delegate occurs near creeks and swampy places, the trunk is apt to branch out at no great altitude from the ground, and the timber is universally condemned as entirely useless for technical purposes; it is soft, brittle, and lighter in colour than the variety from Bombala. The latter variety grows in higher and drier situations, has a pretty straight trunk; the timber is rather hard to cut, and of a reddish colour. There is great diversity of opinion as to the value of this timber; while some consider it one of the most durable timbers to stand in the ground, others consider it of no use. It may be that some of those people who consider it one of the best timbers to stand in the ground confuse it with the Red Gum *(E. rostrata)* of the coast country. The bark now under examination is less deeply fissured than that from Delegate, and the fibre is more curled and interlocked. Both barks possess the odour of essential oil,—a most unusual circumstance for Eucalypt barks. This bark gives a solution of a much deeper colour (reddish-brown), than does the variety from Delegate. Colour of residue, dark brown.

Extract.—Soluble in water at 100° C. 20·84 per cent.

Kino-tannic acid—11·35 per cent.

20. ACACIA COLLETIOIDES, *A. Cunn., var.*,* N.O. Leguminosæ, B. Fl. ii., 325. Figure, Dec. i., "Iconography of Australian Acacias," (Mueller).
Found in New South Wales, Victoria, South Australia, and recently, in Western Australia.

* This variety only differs from the normal form in the flower-heads not being strictly globular.

Vernacular Name—"Wait-a-while," (a low-spreading bush, which has been suggested as suitable for hedge planting. The vernacular name is a delicate allusion to the predicament of a traveller desirous of penetrating a belt of it.)

Locality whence this particular specimen was obtained—Ivanhoe, viâ Hay, N.S.W.

Part of the Tree Examined—Bark.

Particulars of the trees (shrubs) whence it was obtained—Height, a few feet; diameter 3 to 4 inches.

Collected 2nd October, 1886. Analysed 5th to 23rd July, 1887.

Bark from a very old tree. Yields abundance of a light-coloured fibre. The description of the bark of *A. rigens* will apply here, with the following differences. Average thickness of bark $\frac{1}{4}$ inch. Colour lighter and of a yellowish tint. Yields a brightish yellow powder admixed with a few brown particles. Affords a pale yellow-coloured solution. This circumstance, in the case of a Wattle would of course pronounce it obviously worthless for tanning purposes.

Extract.—Dissolves in water at 100° C. to the extent of 10·56 per cent.

Catechu-tannic acid—4·4 per cent.

21. Acacia rigens, *A. Cunn*, N.O. Leguminosæ, B. Fl. ii., 337. Figure, Dec. ii., of Baron Mueller's "Iconography of Australian Acacias."

Found in South Australia, Victoria and New South Wales, chiefly in arid country.

Vernacular Names—"Nealie" or "Needle-bush."

Locality whence this particular specimen was obtained—Ivanhoe, viâ Hay, N.S.W. Very plentiful in some places.

Part of the Tree Examined—Bark.

Particulars of the trees whence it was obtained—Height 12 to 15 feet, diameter 6 to 8 inches.

Collected 6th September, 1886. Analysed 5th to 20th July, 1887.

This bark is obviously from a very old tree, and consists almost entirely of fibre, the whole bark separating with the slightest effort into ribbons of coarse tying material. It is deeply fissured, and the prevailing colour of the outside is a dirty grey. The bark possesses so little coherence that an exact determination of its thickness would be extremely difficult; its average thickness may be set down at $\frac{1}{2}$ inch. When finely divided it has the appearance of chopped hay, interspersed with reddish-brown particles.

Extract.—Soluble in water at 100° C. to the extract of 19·05 per cent.

Catechu-tannic acid—6·26 per cent.

22. Acacia vestita, *Ker.*, N.O. Leguminosæ, B. Fl. ii., 375.

Found in the Southern portion of New South Wales, and recently in Northern Victoria.

I know of no vernacular name for this Wattle.

Locality whence this particular specimen was obtained—Quiedong, near Bombala, N.S.W.

Geological Formation—Limestone.

Part of the Tree Examined—Bark.

Particulars of the trees whence it was obtained—Height 20 to 25 feet, diameter 10 to 18 inches.

Collected 9th April, 1887. Analysed 5th to 13th July, 1887.

Very similar in appearance to the well-known bark of *A. decurrens*, being only a little lighter in colour, and having the inner bark redder. Average thickness $\frac{1}{4}$ inch. Affords a flesh-coloured powder. Forms a solution of an exceedingly rich, deep red colour. The extract contains so great a quantity of colouring matter as to clog the filter-paper during the operation of filtering, making this one of the most tedious of Acacias to subject to that operation.

Extract.—Soluble in water at 100° C., 50·82 per cent.

Catechu-tannic acid—27·96 per cent.

23. Acacia pendula, *A. Cunn.*, *var. glabrata*, *F.v.M.*, N. O. Leguminosæ, B Fl. ii., 383.

Found in New South Wales and Queensland.

Vernacular Name—"Yarran."

Locality whence this particular specimen was obtained—Ivanhoe, viâ Hay, N.S.W. Plentiful

Part of the Tree Examined—Bark.

Particulars of the trees whence it was obtained—Height 10 to 15 feet, diameter 3 to 4 inches.

Collected 25th Sept., 1886. Analysed 5th to 23rd July, 1887.

A moderately deeply fissured bark from rather an old tree. Contains abundance of a poor fibre. Colour dark grey. Average thickness $\frac{1}{3}$ inch. Does not form a self-coloured powder as it is composed of nearly all tints from yellow to dark brown.

Extract.—Dissolves to the extent of 17·91 per cent in water at 100° C.

Catechu-tannic acid 7·15 per cent.

24. Acacia binervata, *DC.*, N.O. Leguminosæ, B. Fl. ii., 390.
Found in New South Wales and Queensland.
Vernacular Name—"Black Wattle."
Locality whence this particular specimen was obtained—Cambewarra, (between Moss Vale and Shoalhaven) N.S.W.
Geological Formation—Sandstone.
Part of the Tree Examined—Bark.
Particulars of the trees whence it was obtained—Height 25 to 30 feet, diameter 1 foot.
Collected 10th August, 1886. Analysed 12th to 23rd July, 1887.

Colour of bark dark brown to black, but apparently deepened in tint through a bush fire having affected it slightly at some remote period. Inner bark warm red-brown. Outer bark deeply fissured or flaky, (usually the latter, which makes it more or less pulverulent). Inner bark contains abundance of strong fibre. The bark becomes exceedingly hard when dry. Average thickness $\frac{1}{4}$ inch.

Extract.—Dissolves in water at 100° C. to the extent of 58·03 per cent.

Catechu-tannic acid—30·4 per cent.

Note.—"Bark not so rich as that of *A. decurrens.*" (W. Dovegrove, quoted by Baron Mueller). Nevertheless it is a most valuable bark, and presses *A. decurrens* hard for the premier position in point of yield of tannin.

25. Acacia longifolia, *Willd.*, N.O. Leguminosæ, B. Fl. ii., 397.
Found in all the Colonies except Western Australia.
Vernacular Name—"Golden Wattle."
Locality whence this particular specimen was obtained—Cambewarra, (between Moss Vale and Shoalhaven) N.S.W.
Geological Formation—Sandstone.
Part of the Tree Examined—Bark.
Particulars of the trees whence it was obtained—Height 12 to 15 feet, diameter 4 to 6 inches.
Collected 20th August, 1886. Analysed 13th to 23rd July, 1887.

Colour of bark varies from a dark grey (with light grey or whitish patches) to dirty brown or nearly black. Usually almost smooth, but those portions of the bark deepest in colour are generally more or less furrowed, though never deeply so. Thickness from one-sixteenth of an inch to one line. Full of fibre of an average tenacity (for Acacias). Inner bark warm brown.

Extract.—Dissolves in water at 100° C. to the extent of 30·35 per cent. Solution becomes turbid on cooling.

Catechu-tannic acid—18·93 per cent.

NOTES.—The only allusions to analyses of this bark that I can find are, "The bark of *A. longifolia* is only half as good as that of *A. decurrens*." (Mueller.)

"It yields 12·67 per cent. of tannin." (Catalogue of Queensland Timbers, Colonial and Indian Exhibition, 1886).

The much-branching variety *Sophoræ* (= *A. Sophoræ*, Labill.) is frequently found on the coast and is very useful for binding sea sand. A convenient Sydney locality for good specimens is Lady Robinson's Beach.

26. ACACIA GLAUCESCENS, *Willd.*, N.O. Leguminosæ, B. Fl. ii., 406.
Found in New South Wales and Queensland, and recently in Victoria.
Vernacular Name—"Myall," (this name is of course shared by other species).
Locality whence this particular specimen was obtained—Quiedong, near Bombala, N.S.W.
Geological Formation—Limestone.
Part of the Tree Examined—Bark.
Particulars of the trees whence it was obtained—Height 20 to 25 feet, diameter 6 to 12 inches.
Collected 8th April, 1887. Analysed 5th to 23rd July, 1887.

A deeply fissured bark of a dark grey colour. Inner bark bright reddish-brown. Contains abundance of a light coloured tough bast, which would serve excellently as a coarse tying material for local use. Average thickness $\frac{1}{3}$ inch. Powder very like that of *A. rigens*, but a little brighter in colour (perhaps accounted for by its more recent collection).

Extract.—Soluble in water at 100° C. to the extent of 14·29 per cent.

Catechu-tannic acid—8·10 per cent.

27. ACACIA DEALBATA, *Link.*, B. Fl. ii., 415. *A. dealbata*, Link, Baron Mueller's Census, p. 47. *A. decurrens*, Willd., var. *dealbata*, F.v.M., Mueller's "Select Extra-tropical Plants," N.S.W. Edition.
Found in all the colonies except Western Australia. *A. dealbata* having recently been found in Queensland, it

has approximately the same geographical range as *A. decurrens*. These two species are so closely allied that it is only within the last three or four years that Baron Mueller has conceded specific rank to *A. dealbata*. This similarity does not extend to the barks, in the learned Baron's opinion, for he says, (Select Extra-tropical Plants,) "The bark of this variety *(dealbata)* is much thinner and greatly inferior to the Black Wattle *(A. decurrens*, and var. *mollissima* presumably) in quality, yielding only about half the quantity of tanning principle." This can only allude to the higher percentages of tannin obtained by the Baron for *A. decurrens*, for as the result of perhaps 30 analyses of the barks of *A. dealbata* and *A. decurrens*, made by me, I find not such a great disparity between them. The matter can scarcely be settled until the barks of two trees of the two species similar in every respect, and treated in precisely the same manner shall have been analysed.

It may be convenient to give the following comparison of the barks (as far as they are represented in the Technological Museum), since their botanical affinities are so close :

A. decurrens	*A. dealbata.*
1. Smooth, or with very slight longitudinal flutings.	1. Furrowed, flaky, and rugged looking.
2. Thickness about half that of *A. dealbata.*	
	3. Yields a purplish extract to water, much more intense than that of *A. decurrens.* The residue is exceedingly like spent logwood in appearance.

These particulars must of course be compared in connection with the information given in this paper in regard to the tree whence the bark of *A. dealbata* was obtained, and in the paper for June in regard to *A. decurrens.*

Vernacular Name—"Silver Wattle."

Locality whence this particular specimen was obtained—Quiedong, near Bombala, N.S.W.

Part of the Tree Examined—Bark.

Particulars of the trees whence it was obtained—Height 20 to 30 feet, diameter 12 to 18 inches.

Collected 1st March, 1887. Analysed 5th to 23rd July, 1887.

A very rugged bark, both from longitudinal and transverse fissures. Colour dark grey to black. Inner bark tough and of a reddish-brown colour. Average thickness of bark barely $\frac{1}{4}$ inch. Yields a dark reddish-brown powder.

Extract.—Soluble in water at 100° C. to the extent of 29·86 per cent.

Catechu-tannic acid—21·22 per cent.

28. ACACIA DECURRENS, *Willd.**

Vernacular Name—"Green Wattle."

Locality whence this particular specimen was obtained—Ryde, Parramatta River, Sydney, N.S.W.

Geological Formation—Sandstone.

Part of the Tree Examined—Bark.

Particulars of the tree whence it was obtained—Height 15 feet, diameter 3 to 4 inches.

Collected 29th May, 1887. Analysed 5th to 18th July, 1887.

Extract.—Dissolves in water at 100° C. to the extent of 48·74 per cent.

In the report of the Board of Enquiry on Wattle Bark, appointed by the Victorian Government, (Melbourne, 1878) the following percentages of extract are given for *A. decurrens* bark grown in different localities :—29, 34, 40 and 45.

Catechu-tannic acid—

The bark now under examination yields 32·33 per cent., and is more than ordinarily uniform in quality.

Notes on A. decurrens.—The variety growing about Sydney is *A. decurrens* var. *normalis*, Benth. The Victorian and Tasmanian variety is *A. decurrens* var. *mollis*, Lindl., or *mollissima*, and corresponds to *A. mollissima*, Willd., vide B. Fl. ii., 415. In the *Flora Australiensis* these varieties (and others which occur) are merged in the one species *A. decurrens*. Baron Mueller does not alter this arrangement in his Census. The Baron experimented on the bark of the *mollissima* variety, ("Select Extra-tropical Plants," N.S.W. Edition, page 3) and obtained "from 30 to 54 per cent. of tannin in bark artificially dried." In my experiments the variety *normalis* has been used, but the two varieties are so closely allied botanically that it is not likely that any great difference will be found to exist in the barks. In the Catalogue of Queensland Woods at the Colonial and Indian Exhibition the percentage of tannin in a (presumably) Queensland grown bark of *A. decurrens* is given at 15·08, but no further particulars are given. But it is a well-known fact that the tannin in this species diminishes as the climate grows warmer and drier.

* See p. 33, Proc. R. S. (N.S.W.) 1887, for particulars of natural order, locality &c., of this species. The bark now experimented upon differs from the former specimen in being blacker on the outside, of a lighter colour inside, and in being slightly thicker.

Since the above was written, I observe that Baron Mueller has promoted the *mollissima* variety of *A. decurrens* to the rank of a species. (*The Chemist and Druggist of Australasia*, May 2nd, 1887). Speaking of the typical *A. decurrens*, the Baron points out that (within Victoria territory) it is limited to North-eastern regions; that the branchlets from the decurrence of the leaf-stalks are still more angular than those of *A. mollissima* and *A. dealbata;* the leaflets are conspicuously longer, and the flowering-time is different from either of the two; moreover, the bark is considered for tanning purposes not quite so powerful as that of *A. mollissima*.

29. Fusanus acuminatus, *R. Br.*, B. Fl. vi., 215. Syn. *Santalum acuminatum*, A. DC., p. 64, Mueller's Census. N. O. Santalaceæ.

Found in all the colonies except Tasmania, chiefly in rather dry country.

Vernacular Name—"Quandong." The uses of the timber, fruit, and seeds are well known.

Locality whence this particular specimen was obtained—Ivanhoe, viâ Hay, N.S.W.

Part of the Tree Examined—Bark.

Particulars of the trees whence it was obtained—Height 10 to 12 feet, diameter 4 to 6 inches. Plentiful.

Collected 4th October, 1886. Analysed 5th to 23rd July, 1887.

Bark from almost smooth to moderately fissured, having the fissures as much as $\frac{1}{8}$ inch deep in some cases. Both outer and inner bark more or less flaky, and contain but little fibre. Colour of outer bark light or dark grey, of inner bark brown or warm red-brown. Average thickness of bark barely $\frac{1}{4}$ inch. Yields a reddish-brown powder, and an especially rich colour to water.

Extract.—Soluble in water at 100° C. to the extent of 39·46 per cent.

Tannic acid (closely allied to, if not absolutely identical with catechu-tannic acid)—18·84 per cent.

Qualitative Tests—Notes (First Supplement.)

1. In the list of re-agents for the qualitative tests I have substituted the *acetate* for the *sulphate* of *manganese* (12), and *ammonium nitromolybdate* for *hydrodisodic phosphate* (15), as I did not consider the precipitates with the latter re-agent sufficiently characteristic. I have added *Zinc acetate* (17) to the list of re-agents.

2. I have doubts as to the value of Ammonium sulphide as a re-agent for tans, and may reject it in future experiments. In addition, Manganese acetate, Chrome alum, Mercuric chloride, and Potassium ferro-cyanide give, in most cases, but poor reactions, while Tartar Emetic and Ammonio nitro-molybdate are not much better. Still, as most of these re-agents have been suggested by various authorities, I have up to the present followed suit.

3. The other re-agents yield precipitates more or less readily, many of which are characteristic.

4. I look upon the colour-reaction given by a drop of strong sulphuric acid (Column 10) as the most valuable, for practical purposes, of all. By the colours obtained affinities are indicated, and thus a rough classification of tans is at once feasible. The rich wattle-barks give rose-madder colours, and all give shades of colour proportionate in depth of tint (caused by *quantity* of colour) to the percentage of tannin. I showed the tile on which these colour reactions had been performed, to an assistant who had not been engaged with me upon tans, and who was perfectly ignorant of the percentages of tannin I had found in the species of Acacia referred to in this paper. Nevertheless, with but one slight mistake, he at once arranged the eight Acacia colours in the same order of tannin-yield, which by gravimetric processes I had proved them to occupy. I cannot but think that we have here a simple and excellent comparative method for the practical tanner.

5. The tans now under examination range themselves in three groups—*a. Acacia vestita*, *dealbata*, *binervata*, (the two former are very closely allied) *b. A. pendula*, *glaucescens*. *c. Eucalyptus hæmastoma*, *macrorrhyncha*.

6. The reactions yielded by *Acacia colletioides* are more or less unsatisfactory, owing to the exceptional poverty of the bark.

7. The extract of *Acacia rigens* contains a little mucilage, and to this circumstance, doubtless, some of the abnormal reactions of this species are owing.

8. The two varieties of *Eucalyptus Gunnii* bark show a marked difference in their behaviour with dilute ferric chloride.

9. Precipitates sometimes only form on standing. It is therefore necessary to allow a period of not less than two hours to elapse before completing the examination of a precipitate. In all cases, it is to be assumed that there is no change on standing, unless the contrary is stated.

10. The colour reactions have been given with much care and detail, as the description of these organic precipitates is frequently not unattended with difficulty.

Species.	1 Reaction.	2 Boiled with equal volume of Sulphuric Acid:	
		a—in the cold.	*b*—on boiling.
14. ANGOPHORA intermedia, DC. (Kino.)	Faintly acid	Light yellow ochre ppt, which rises to the top on standing.	Ppt for most part dissolves, what remains is of a pure orange colour.
15. EUCALYPTUS macrorrhyncha, F.v.M. (Kino.)	Distinctly acid	Copious dark salmon ppt.	Ppt re-dissolves with the exception of small reddish particles which aggregate and form a scum; the liquid returns to the rich ruby colour of the original extract.
16. EUCALYPTUS hæmastoma, Smith. (Kino.)	do.	Ppt of an almost pure salmon colour.	Ditto
17. EUCALYPTUS rostrata, Schlecht. (Leaf-galls.)	do.	Light olive-brown ppt.	Ppt darkens and almost entirely dissolves.
18. EUCALYPTUS Gunnii, Hook., var. (Bark from Delegate.)	do.	Yellowish cloudiness, ppt forms on standing.	Ppt becomes more dense, of an orange-brown colour.
19. EUCALYPTUS Gunnii, Hook., var. (Bark from Bombala.)	do.	Reddish cloudiness, ppt forms on standing	Ditto
20. ACACIA colletioides, A. Cunn., var. (Bark.)	Faintly acid	Cloudiness, slight flocculent ppt on standing.	Becomes almost colourless.
21. ACACIA rigens, A. Cunn. (Bark.)	do.	Flocculent brown ppt	No change.
22. ACACIA vestita, Ker. (Bark.)	Distinctly acid	Light reddish-brown ppt.	Darkens but does not dissolve ppt.
23. ACACIA pendula, A. Cunn., var. glabrata, F.v.M. (Bark.)	do.	Yellowish cloudiness becoming a little more dense on standing.	No change other than that of darkening slightly.
24. ACACIA binervata, DC. (Bark.)	do.	Dirty salmon ppt.	Nearly dissolves, and what remains turns a rich reddish-brown colour.
25. ACACIA longifolia, Willd. (Bark.)	do.	Ppt of a light yellow ochre colour, dense sage-green gelatinous ppt on standing.	Partially dissolves, and what remains becomes denser and of a deeper green colour.
26. ACACIA glaucescens, Willd. (Bark.)	do.	A small quantity of a light brownish ochre ppt, which becomes more copious on standing.	No change except a little darkening.
27. ACACIA dealbata, Link. (Bark.)	do.	Same as *A. vestita*, but perhaps a shade lighter.	Same as *A. vestita*.
28. ACACIA decurrens, Willd. See p. 33 for reactions not noted here.			
29. FUSANUS acuminatus, R. Br. (Bark.)	do.	Turbidity, slight ochrey brown ppt on standing.	Ppt entirely dissolves forming a rich reddish-brown liquid.

3	4		5
Bromine Water.	Dilute Feric Chloride.	Add Ammonia.	Baric Hydrate.
Light orange-brown ppt, almost sufficiently light to be a drab.	Dark bluish-black ppt with an indigo tint.	Deep purplish-brown ppt.	Dirty greyish-brown ppt.
Dense orange ppt, bordering on an ochre tint, with streaks or coagulated masses of a yellow colour which rise to the top like scum.	Purplish black ppt.	Ppt redissolves, and a dark brownish-purple liquid is formed.	Exceedingly dense purplish ppt.
Ppt a little lighter than that of *E. macrorryncha.*	Almost pure purple ppt.	Ppt redissolves, and a rich purple liquid is formed.	Ditto. but a little darker in colour.
No change.	Greenish-black ppt.	Slight brownish-purple ppt.	Dense dark brown ppt
Faint cloudiness, which increases on standing.	Greenish-black ppt.	Copious ppt of a dark purple colour.	Orange-brown ppt.
Ditto	Purplish coloured liquid, with only a trace of ppt.	No ppt, colour of liquid brownish-purple.	Ditto, except a little duller in colour.
Cloudiness, slight flocculent ppt on standing.	Slight dirty brown ppt, which increases on standing.	Becomes almost clear	No change; light brownish ppt on standing.
Yellowish gelatinous ppt which coagulates on standing.	Dark brown ppt.	Very dark brown ppt	Rich reddish-brown ppt.
Dirty light-brown ppt	Purple ppt.	Very slight brownish purple ppt.	A very dark greyish purple ppt.
Yellowish flocculent ppt.	Olive green ppt.	Ditto	Very slight light brown ppt which increases on standing.
Ppt like that yielded by *Angophora intermedia,* but slightly darker.	Dark purplish-brown ppt.	Brownish-purple ppt	Dirty dark greyish-purple ppt.
Bright yellow (chrome yellow) ppt.	Purplish-grey ppt.	Dark brown ppt.	Light orange-brown ppt.
Slight ppt of a dirty white colour.	Dirty olive-brown ppt.	Light brown ppt.	Orange brown ppt, something like *A. pendula.*
Ppt much like that yielded by *A. pendula* only a little darker, it becomes much more dense on standing.	Same as *A. vestita.*	Dark purple brown ppt.	Same as *A. vestita.*
Light orange-brown ppt which becomes much more dense on standing.	Brownish-black ppt.	Ppt redissolves and a rich ruby coloured liquid formed.	Rich purplish-brown ppt.

QUALITATIVE TESTS, (Dilute Extract)—*continued.*

Species.	6 Ammonium Sulphide.	7 Potassic Dichromate.	8 Tartar Emetic.
14. ANGOPHORA intermedia, DC. (Kino.)	Turbidity.	Very dark-brown ppt	Very slight light-brown ppt
15. EUCALYPTUS macrorrhyncha, F.v.M. (Kino.)	No change.	A brown gelatinous mass with a slight yellowish tinge; the tube can be inverted without disturbing its contents.	Turbidity; a considerable purplish gelatinous ppt on standing
16. EUCALYPTUS hæmastoma, Smith. (Kino.)	ditto	ditto	ditto
17. EUCALYPTUS rostrata, Schlecht. (Leaf-galls.)	Turbidity	Slight orange-brown ppt	No change
18. EUCALYPTUS Gunnii, Hook., var. (Bark from Delegate.)	ditto	Very slight brownish ppt, which increases on standing	ditto
19. EUCALYPTUS Gunni, Hook., var. (Bark from Bombala.)	ditto	ditto	ditto
20. ACACIA colletioides, A. Cunn., var. (Bark.)	ditto	No change	ditto
21. ACACIA rigens, A. Cunn. (Bark.)	ditto	Cloudiness; slight brownish ppt on standing	No change other than separating into two layers, a brownish and a colourlesss one, the line of demarcation disappearing on standing
22. ACACIA vestita, Ker. (Bark.)	ditto	Chicory coloured ppt on standing	No change
23. ACACIA pendula, A. Cunn., var. glabrata, F.v.M. (Bark.)	ditto	Like *A. vestita*, but a little darker in colour	ditto
24. ACACIA binervata, DC. (Bark.)	ditto	Same as *A. vestita*	ditto
25. ACACIA longifolia, Willd. (Bark.)	ditto	Brown ppt	ditto
26. ACACIA glaucescens, Willd. (Bark.)	ditto	Very slight brownish ppt, which increases on standing	ditto
27. ACACIA dealbata, Link. (Bark.)	ditto	Same as *A. vestita*	ditto
28. ACACIA decurrens, Willd. See p. 33 for reactions not noted here.			
29. FUSANUS acuminatus, R. Br. (Bark.)	No change	Purplish-brown ppt	ditto

QUALITATIVE TESTS, (Dilute Extract)—*continued.*

	9		10
Add Ammonic Chloride	Copper Sulpate.	Add Ammonia.	One drop of strong sulphuric acid to one drop of extract on a white glazed tile.
Ppt rendered paler in colour and more copious	Dirty ochre brown ppt	Dark brown ppt	Yellowish brown colour
Dense dirty salmon ppt	No change, dirty brown ppt on standing	Brownish-black ppt	Reddish-brown color
Ppt a shade darker than *E. macrorrhyncha*	ditto	ditto	ditto
Olive green ppt	Light olive-brown ppt on standing	Dark olive-brown ppt	Pure yellow colour
Slight turbidity; forms a yellowish ppt on standing	Turbidity; slight brownish ppt on standing	Light brown ppt	Light yellowish-brown colour
ditto	ditto	ditto	Light reddish-brown colour
No change	No change; slight light brown ppt on standing	No change	Slight brownish colour
Reddish-brown ppt	Dense brown ppt	Dark-brown ppt	Same as *E. Gunnii*, (Bombala)
Dark salmon ppt	Pure purple brown ppt	Purple brown ppt	Rose-madder colour, fading to a brown on standing
Very slight turbidity copious light brown on standing	Turbidity	No change	Slightly darker than *E. Gunnii* (Delegate)
Salmon coloured ppt	Light purplish-brown ppt	Same as *A. vestita*	Same as *A. vestita*
No change, copious flesh coloured ppt on standing	Dirty flesh-coloured ppt	Pure dark brown ppt	Brown colour
No change, orange-brown ppt on standing	No change; slight light-brown ppt on standing	Lightish-brown ppt	Same as *A. pendula*
Same as *A. vestita*	Same as *A. vestita*, but perhaps a shade lighter	Same as *A. vestita*	Same as *A. vestita*
No change, abundant bright reddish-brown ppt on standing	Turbidity	No change	Burnt Sienna colour

QUALITATIVE TESTS, (Dilute Extract)—*continued.*

Species.	11 Lead Nitrate.	12 Manganese Acetate.	13 Chrome Alum.
14. ANGOPHORA intermedia, DC. (Kino.)	Drab ppt	Dirty drab ppt	Turbidity; faint light brown colour on standing
15. EUCALYPTUS macrorrhyncha, F.v.M. (Kino.)	Light reddish brown ppt inclining to salmon	No change; slight dark brown gelatinous ppt on standing	No change; turbidity on standing
16. EUCALYPTUS hæmastoma, Smith. (Kino.)	ditto	ditto	ditto
17. EUCALYPTUS rostrata, Schlecht. (Leaf-galls.)	Light olive-brown ppt	Copious olive-brown ppt	Slight olive-brown ppt
18. EUCALYPTUS Gunnii, Hook., var. (Bark from Delegate.)	Slight light-brown ppt	Slight ppt of an ochrey brown colour	Turbidity; slight ppt on standing
19. EUCALYPTUS Gunnii, Hook., var. (Bark from Bombala.)	ditto	ditto	No change; turbidity on standing
20. ACACIA colletioides, A. Cunn., var. (Bark.)	Turbidity	No change; slight ppt on standing	ditto
21. ACACIA rigens, A. Cunn. (Bark.)	Orange brown ppt	No change; slight reddish-brown ppt on standing	Slight reddish-brown ppt
22. ACACIA vestita, Ker. (Bark.)	Very dark purplish-pink ppt	No change; slight pink-brown ppt on standing	Very slight purplish ppt
23. ACACIA pendula, A. Cunn., var. glabrata, F.v.M. (Bark.)	Ppt lighter in colour than *A. rigens*	No change; slight ppt on standing	No change
24. ACACIA binervata, DC. (Bark.)	Brownish-pink ppt	Same as *A. vestita*	Turbidity
25. ACACIA longifolia, Willd. (Bark.)	Same as *Angophora intermedia* but perhaps a shade lighter	No change; slight Sienna brown ppt on standing	No change; turbidity on standing
26. ACACIA glaucescens, Willd. (Bark.)	Brownish light-drab ppt	No change; slight brownish ppt on standing	No change
27. ACACIA dealbata, Link. (Bark.)	Same as *A. vestita*	Same as *A. vestita*	Same as *A. vestita*
28. ACACIA decurrens, Willd. See p. 33 for reactions not noted here.		No change; purplish ppt on standing	
29. FUSANUS acuminatus, R. Br. (Bark.)	Warm Sienna brown ppt	No change; slight reddish-brown ppt on standing	No change; turbidity on standing

QUALITATIVE TESTS, (Dilute Extract)—*continued.*

14 Mercuric Chloride.	15 Ammoniun Molybdate in Nitric Acid.	16 Potassium ferrocyanide	17 Zinc Acetate.
Abundant yellow ochre ppt	Darkens liquid	Slight whitish-brown ppt which increases on standing	Dense café au lait ppt
ditto	ditto	No change; slight purplish-brown ppt on standing	Dense purplish-grey gelatinous ppt
Abundant dark salmon ppt	ditto	ditto	ditto
No change	ditto	No change; liquid becomes turbid on standing	Olive-brown ppt
ditto	ditto	No change, orange ppt on standing	Slight yellowish-white ppt
ditto	ditto	Marked turbidity; slight purplish-white ppt on standing	Light brown ppt
Cloudiness	ditto	No change	Turbidity; yellowish flocculent ppt on standing
No change	ditto	No change other than the formation of two layers, a light and a darker one; on standing there forms a slight orange-brown ppt, uniformly distributed	Dark reddish-brown ppt, forming an upper layer in the test-tube
Turbidity	ditto	Slight turbidity; pure purplish-brown ppt on standing	Abundant light purple ppt
Slight turbidity	ditto	No change, cloudiness on standing	Same as *A. rigens*, but without the tendency to separate into layers
Turbidity	ditto	Slight turbidity; light purplish-brown ppt on standing	Ppt little lighter than that yielded by *A. vestita*
ditto	ditto	No change; dirty drab ppt on standing	Whitish-brown ppt
No change	ditto	No change; faint cloudiness on standing	Ppt a shade lighter than *A. pendula*
Turbidity	ditto	Same as *A. vestita*	Same as *A. vestita*
ditto	ditto	No change; faint cloudiness on standing	Ppt a little darker in colour than that of *E. macrorrhyncha* Turbidity; orange-red granular ppt on standing

Discussion.

In reply to Mr. W. A. Dixon, Mr. Maiden stated that the samples treated by him were dried at a temperature of 100° C., and that some had taken several days to dry and were weighed from a desiccator. The percentages of tannin obtained by him instead of being higher than the calculations of anybody else were actually lower in some cases. Baron Von Mueller for instance gave in one case 54 per cent., for *Acacia decurrens*, while he (Mr. Maiden) had not been able to get within 22 per cent. of that. Unless the barks are dried at a constant temperature it was impossible to get satisfactory results, they would give one result in June and a different one in August.

In answer to questions of Mr. J. T. Wilshire, Mr. Maiden said that Limestone was the only formation which was known for certain to yield barks weak in tannin. (2) That the *Acacia vestita* which is so rich in tannin is comparatively rare in well settled districts. It is so handsome a tree that it is generally cut down very ruthlessly, but exists in some quantity in parts of Gippsland. (3.) That there was no chance of the dyes obtainable from the Eucalypts and Acacias ever rivalling in quality or price the aniline dyes.

The President in presenting the thanks of the Society to Mr. Maiden for his paper, intimated that very little importance could be placed on the geological formations in regard to the properties of the trees growing upon them, except in certain localities. So much depended on the climate and the elevation. Certain trees found growing for instance at Sydney in the sand, and at an elevation of 3,000 feet perhaps the same trees would be found growing in a clay soil. A southern aspect seems however, the most essential for their thorough growth, and some derive more moisture from gullies sloping in a southerly direction. In Sydney alone, many varieties of the Wattle would grow admirably and pay well to do so, and it is important that by researches such as these we should know what varieties can be most profitably grown.