is neglected, lead to a certain mathematical relation between the speed of the wings and the resistance which they experience. Mr. Hargrave finds by his experiment that the observed relation does not exactly coincide with the calculated relation, *especially when the wings are associated so as to set great quantities of air in motion.** In this case viscosity would have a great effect, and if the formulæ employed by Mr. Hargrave had been calculated without taking this viscosity into account, the discrepancy between theory and experiment might be accounted for, amongst others, in this way.

Mr. Hargrave replied that the viscosity of the air had not been taken into account in his calculations.

The thanks of the Society were accorded to Mr. Hargrave for his paper.

List of Drawings.

Figure 1. Plan of large machine. Scale 3″ to the foot.
„ 2. Side elevation of large machine. Scale 3″ to foot.
„ 3. End elevation of large machine. Scale 3″ to foot.
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SOME NEW SOUTH WALES TAN-SUBSTANCES.

Part I.

By J. H. Maiden, F.R.G.S.

[*Read before the Royal Society of N.S.W., 1 June, 1887.*]

This paper is the first of a series which I hope to be able to complete, on the Tans or astringents of New South Wales. There is no doubt that there are many barks, (especially of species of Acacia), which contain the tanning principle in quantity sufficient for them to be rendered useful to man, and which are either not in use at all, or are not generally known. It will also be useful

* Note.—The difference between observation and a rough formula is only noted in the experiment of a plane of 1 sq. ft. area moving at a maximum speed of 10·16 miles per hour.

to determine the amount of tanning principle in those barks which do not contain it in sufficient abundance for the purposes of the tanner; we shall thus know which to avoid. As regards the kinos, although they are usually rich in tannic acid, they will probably come into extensive use in the future in medicine, and as ingredients in pigments and coloured varnishes &c., rather than as tans, for they usually make but indifferent leather.

Dates.—Notwithstanding the well-known facts, (1) that in most cases, barks, especially those from species of Acacia, improve in tanning power if they are properly stored for a period, and (2) that after a further more or less variable period they diminish in tanning power,—it has not been the practice, as far as I am aware, to give dates with analyses, in order to make them comparable with others. I propose in every instance not only to give the dates of collection of the substances analysed, but also of the analyses themselves. This, in my humble opinion, is a matter of the highest importance. (Experiments giving the percentages of tannin in the same bark at regular intervals, will of course take years to complete).

In the case of kinos, it is very desirable to know approximately the dates at which they were exuded. The present samples were all fairly new, with the exception of that of *E. siderophloia*, when collected; I can state nothing more definite in these instances. Kinos while attached to the trees are liable to alteration, firstly, from rain, which washes out more or less of their soluble constituents, and secondly, from the air, as under its action they tend to become insoluble; for instance, some kinos which are freely soluble in water become more or less insoluble in that liquid, and even insoluble in alcohol.

Species Names.—Fully sensible that if there be the slightest doubt as to the identity of any species an analysis may be even worse than useless, as it may be misleading, every care has been taken to ensure perfect accuracy in the names of species. Flowering or fruiting specimens (or both) have been taken in each case. Specimens from the exceedingly difficult genus Eucalyptus have in all cases been referred to Baron Mueller for determination or confirmation, and I take this opportunity of expressing my indebtedness to him.

Allowance for Moisture.—The percentages of tannic acid and extract have in all cases been determined upon substances thoroughly dried at 100° C. The amount of moisture in freshly stripped bark (as compared with bark dried at 100° C.) may, for practical purposes, be assessed at from a quarter to one-third of its weight.

Selection of Samples.—Of the kinos I have had from 3 to 4 lbs of each to select from. From each parcel I have endeavoured to

make a thoroughly *average* sample by hand-picking. Of the barks I have had from 7 to 14 lbs of each. From each parcel I have taken a strip which appeared to me to be an average specimen. Abnormal specimens, or obviously superior or inferior ones, whether of barks or kinos, have therefore been rejected. The barks have (prior to grinding) been cut truly horizontal into thin sections with a small guillotine, in order that the samples tested may contain the proper proportions of outer and inner bark.

The quantity operated upon for quantitative purposes has been 5 grammes in each case.

Qualitative Tests.—Notes.

1. All tests were performed in the cold unless stated to the contrary.
2. Ammoniacal Picric Acid gives no precipitate with any of the extracts, but deepens the tint of the liquid in all cases.
3. The tests show the great similarity between the extracts of the barks of *Acacia decurrens* and *A. penninervis*, and the kinos of *Eucalyptus amygdalina* var. and *E. Sieberiana* var.
4. It is often necessary to filter, and even wash, before the colours of precipitates can be observed.

ACACIA SENTIS, (F. v. M.) N.O. Leguminosæ, B. Fl. ii., 360.

Found—In all the colonies except Tasmania, (usually in arid country) Locality of the particular specimen now under examination:—Ivanhoe, viâ Hay, N.S.W.

Remarks—The bark of the trunk. Diameter of Stem 3 feet from ground, 6 to 8 inches. Height of tree, 8 to 10 feet (low-spreading). Date of Collection, 2nd Oct. 1886. *Date of Analysis, 17th and 19th May, 1887.

Bark fissured, but not deeply so. Of a dirty grey colour. Epidermis scaly, and, when removed, showing a dark brown colour underneath. Bast not readily separable; of a light-brown colour. Average thickness of bark $\frac{3}{8}''$. Yields 18·02 per cent. of extract to water at 100° C. Catechu-tannic acid 6·32 per cent.

Qualitative Tests.—(Dilute Extract)

1. Reaction faintly acid.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, yellowish ppt. *On boiling*, slight salmon ppt.
3. Bromine water—Slight canary yellow ppt.
4. Dilute ferric chloride—Light indigo purple colour. Ppt on standing. Add Ammonia—Dark brownish purple colour to ppt.
5. Baric hydrate—Dirty brown ppt.
6. Ammonium sulphide—Dirty yellowish colour.

* Experiments were commenced on the first date and finished on the second.

7. Potassium bichromate—Ppt similar to, but slightly darker than that of *A. melanoxylon.*
8. Tartar emetic—No change. Add Ammonium chloride—Whitish-brown ppt.
9. Copper sulphate.—Slight dirty green ppt. (a little darker than that of *A. melanoxylon*). Add Ammonia—Vandyke brown ppt.
10. One drop of strong sulphuric acid to one drop extract (on a white glazed tile). Like the colour yielded by *A. aneura*, only a little more intense.
11. Lead nitrate—Slight orange-brown ppt.
12. Manganese sulphate—Turbidity.
13. Chrome alum—Slight turbidity.
14. Mercuric chloride—Light stone-coloured ppt.
15. Hydro-disodic phosphate—Slight purplish ppt.
16. Potassium ferrocyanide—Light orange-brown ppt.

ACACIA PENNINERVIS, (Sieber), N. O. Leguminosæ, B. Fl. ii., 362, "Hickory," "Blackwood."

Found—In all the Colonies except South and Western Australia. Locality of the particular specimen now under examination :—Monga, near Braidwood, N.S.W.

Remarks—A. Bark of the trunk ; B. bark of the branches. Diameter of stem 3 feet from ground, 10 inches. Height 20 to 30 feet. Date of Collection, 19th Oct., 1886. Date of Analysis, 16th and 23rd May, 1887.

A. *Bark of trunk.*—Smoothish bark, of a dirty brown colour. The epidermis peels off in scales, showing a bright reddish-brown colour. Bast very fibrous. Average thickness of bark as stripped $\frac{3}{8}''$. Yields 45·5 per cent. of extract to water at 100° C. (a remarkably high percentage) ; or 55·5 per cent. of residue. Of this residue a portion equal to 2·4 per cent. of the total quantity of bark acted upon, is soluble in alcohol at 60° F. Catechu-tannic acid 16·96 per cent.

B. *Bark of branches.*—Smoother than that of the trunk, yet not perfectly smooth. Outwardly of a dirty grey colour, with patches of white, or very light grey. Inner bark of a very bright colour, being, even when thoroughly dry, of a warm red brown. (I would especially draw attention to this as a pigment-yielding species). Bast available for coarse tying material. Average thickness of bark $\frac{1}{16}''$. Yields 22·88 per cent. of extract to water at 100° C. Catechu-tannic acid 16·24 per cent.

Qualitative Tests.—(Dilute extract of trunk-bark).

1. Reaction slightly acid
2. Equal volume of sulphuric acid (1 in 5) *In the cold*, yellowish ppt. *On boiling*, dark salmon ppt in small quantity.

3. Bromine water—Dirty yellow ppt.
4. Dilute ferric chloride—Reaction same as *A. decurrens.* Add Ammonia—Same as *A. decurrens.*
5. Baric hydrate—Dark brown ppt, same as *A. decurrens.*
6. Ammonium sulphide—Light olive-brown colour. (Decidedly different in tint to that of *A. decurrens).*
7. Potassium bichromate—Same as *A. decurrens.*
8. Tartar emetic—No change. Add Ammonium Chloride—Pink gelatinous ppt.
9. Copper sulphate—Same as *A. decurrens.* Add Ammonia—Same as *A. decurrens.*
10. One drop of strong sulphuric acid to one drop of extract (on a white glazed tile).—Magenta colour, by no means so vivid as that of *A. decurrens.*
11. Lead nitrate—Same as *A. decurrens.*
12. Manganese sulphate—No change.
13. Chrome alum—Same as *A. decurrens.*
14. Mercuric chloride—Ditto.
15. Hydro-disodic phosphate—Ditto.
16. Potassium ferrocyanide—Ditto.

Acacia melanoxylon, (R. Br.), N. O. Leguminosæ, B. Fl. ii., 388. "Blackwood," "Lightwood."

Found—In all the Colonies except Queensland and Western Australia. Locality of the particular specimen now under examination:—Monga, near Braidwood, N.S.W.

Remarks—The bark of the trunk. Diameter of stem 3 feet from the ground, 1 foot. Height 40 to 50 feet. Date of Collection, 29th Sept., 1886. Date of Analysis, 12th and 23rd May, 1887.

This tree does not attain its full luxuriance in New South Wales. The bark now under examination is, judging from its appearance, apparently from an old tree. It is of a dirty brown colour, with whitish patches, giving the whole a silvery appearance. Has irregular vertical fissures, and this circumstance, with the small horizontal cracks, causes the outer bark to be readily detached in small flakes. The inner bark or bast is very strong, and would form an excellent coarse tying material for local use. Where it joins the outer bark it is of a reddish-brown colour, but yellowish near the wood. In passing, I may mention that many of the inner barks of our Acacias show a rich red colouring when newly stripped. It usually requires a little exposure to bring out the colour in its full intensity, but prolonged exposure to the air destroys it. Other barks are of a white colour when newly stripped, but turn yellowish or drab on exposure to the atmosphere —doubtless from oxidation.

It yields 20·63 per cent. of extract to water at 100° C. Catechu tannic acid 11·12 per cent.

Qualitative Tests—(Dilute Extract)

1. Reaction faintly acid.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, cloudiness. *On boiling*, yellowish-brown ppt.
3. Bromine water—Bright yellow ppt.
4. Dilute ferric chloride—Dark indigo purple colour. Ppt on standing. Add Ammonia—Ppt becomes dark purplish-brown.
5. Baric hydrate—Dirty brown ppt.
6. Ammonium sulphide—Orange colour.
7. Potassium bichromate—Orange brown ppt.
8. Tartar Emetic—No change. Add Ammonic Chloride—Whitish-brown ppt.
9. Copper Sulphate—Slight dirty green ppt. Add Ammonia—Copious Vandyke-brown ppt.
10. One drop of strong Sulphuric acid to one drop extract (on a white glazed tile)—Light brown colour.
11. Lead nitrate—Slight orange-brown ppt.
12. Manganese sulphate—Whitish-brown ppt.
13. Chrome alum—Turbidity.
14. Mercuric Chloride—Whitish ppt.
15. Hydro disodic phosphate—Turbidity.
16. Potassium ferrocyanide—Light purplish-brown ppt.

ACACIA ANEURA, (F.v.M.), N. O. Leguminosæ, B. Fl. ii., 402. (The normal species). The common "Mulga" forming the chief portion of the scrub of that name. Occasionally called "Myall."

Found—In all the Colonies except Tasmania, but only in the dry interior. Locality of the particular specimen now under examination :—Ivanhoe, viâ Hay, N.S.W.

Remarks—The bark of the trunk. Diameter of stem 3 feet from the ground, 6 to 8 inches. Height of tree, 25 or 30 feet. Date of Collection, 26th Sept. 1886. Date of Analysis, 17th and 21st May, 1887.

This bark is very deeply furrowed, flaky, and pulverulent, and apparently from a very old tree. Outer bark grey; the inner bark of a pale drab. Average thickness $\frac{3}{8}''$. Yields 10 per cent. of a slightly mucilaginous extract to water at 100° C. (This round number is the exact mean of several careful determinations). Catechu-tannic acid 4·78 per cent.

Qualitative Tests.—(Dilute extract—normal species only used, as the variety gives similar reactions).

1. Reaction faintly acid.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, no change *On boiling*, slight bleaching, and faint turbidity.

3. Bromine water—Slight yellow turbidity.
4. Dilute ferric chloride—Hardly any change with the exception of a faint greenish tint. No further change on standing. Add Ammonia—Yellowish ppt, turning to a warm brown on standing.
5. Baric hydrate—Brown ppt.
6. Ammonium sulphide—Slight yellow ppt.
7. Potassium bichromate—No change.
8. Tartar emetic—No change. Add Ammonium Chloride—Slight milkiness.
9. Copper sulphate—Slight greenish ppt. Add Ammonia—Ppt dissolved in the Ammonio-cupric sulphate.
10. One drop of strong sulphuric acid to one drop of extract (on a white glazed tile)—Slight reddish colour.
11. Lead nitrate—Light brown ppt.
12. Manganese sulphate—Slight brownish ppt.
13. Chrome alum—Slight ppt.
14. Mercuric chloride—Slight drab ppt.
15. Hydro disodic phosphate—No change.
16. Potassium ferrocyanide—Darkens colour.

Acacia aneura, var: (F.v.M.) N.O. Leguminosæ, (the narrow-leaved variety). B. Fl. ii., 402. "Narrow-leaved Mulga."

Found—It has about the range of the normal species. Locality of the particular specimen now under examination:—Ivanhoe, viâ Hay, N.S.W.

Remarks—The bark of the trunk. Diameter of stem 3 feet from the ground, 6 to 8 inches. Height of tree, 25 or 30 feet. Date of Collection, 30th Sept., 1886. Date of Analysis, 17th and 23rd May, 1887.

A moderately fissured bark of a dark grey colour, sometimes nearly black. Removal of epidermis shows a light-brown colour. Bast not readily separable; light coloured, being yellowish or drab when dry. A thin, poor bark, not exceeding $\frac{3}{16}''$ in average thickness. Yields 20·72 per cent. of extract to water at 100° C. Catechu-tannic acid 8·62 per cent.

Acacia decurrens, (Willd.) N.O. Leguminosæ. B. Fl. ii., 414. The "Green Wattle," of the older New South Wales Colonists. Called also "Silver Wattle," but usually "Black Wattle."

Found—In all the Colonies except Western Australia. Locality of the particular specimen now under examination:—Cambewarra, New South Wales.

Remarks—The bark of the trunk. Diameter of stem 3 feet from the ground, 6 to 8 inches. Height 20 to 30 feet. Date of Collection, 10th August, 1886. Date of Analysis, 12th and 23rd May, 1887.

A more than ordinarily smooth, homogeneous bark. Small fissures and irregularities rarely occur in it except around buds. Of an umbery colour, with greyish patches. Is very tough, the bast yielding a fair fibre. Average thickness of outer and inner bark together, $\frac{1}{8}$—$\frac{3}{16}$″. It is excessively hard when dry. Yields 42·16 per cent. of extract to water at 100° C., and therefore 57·84 per cent. of woody fibre &c. Of this residue, a portion equal to 6·96 per cent. of the total quantity of bark acted upon, is soluble in alcohol at 60° F. Catechu-tannic acid 32·08 per cent.

Qualitative Tests—(Dilute extract).

1. Reaction slightly acid.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, cloudiness. *On boiling*, reddish-brown ppt.
3. Bromine water—Dirty yellow ppt.
4. Dilute ferric chloride—Dark purple colour. Brown ppt on standing. Add Ammonia—Deepens the tint.
5. Baric hydrate—Dark brown ppt.
6. Ammonium sulphide—Darkens the colour slightly.
7. Potassium bichromate—Coffee-coloured ppt.
8. Tartar emetic—No change. Add Ammonium Chloride—Pink gelatinous ppt.
9. Copper sulphate—Pinkish ppt, turning reddish-brown on exposure. Add Ammonia—Ppt more copious, and colour intensified (copper brown).
10. One drop of strong sulphuric acid to one drop extract (on a white glazed tile)—Bright magenta colour.
11. Lead nitrate—Slight reddish purple ppt.
12. Manganese sulphate—No change.
13. Chrome alum—Slight purple-brown ppt.
14. Mercuric chloride—Light purplish-brown ppt.
15. Hydro disodic phosphate—Slight purplish ppt.
16. Potassium ferrocyanide—Purplish-brown ppt.

Eucryphia Moorei, (F.v.M.) N.O. Saxifrageæ, B. Fl. ii., 447. Often called "Acacia," by country people, as when not in flower the tree resembles some of the larger species of Acacia. Other vernacular names are "Plum Tree," and "White Sally."

Found—In Victoria and New South Wales (Southern districts). Locality of the particular specimen now under examination:—Monga, near Braidwood, N.S.W.

Remarks—The bark of the trunk. Diameter of stem 3 feet from the ground, 3 to 4 feet. Height 40 to 60 feet. Date of Collection, 3rd October, 1886. Date of Analysis, 12th and 23rd May, 1887.

This tree flourishes in moist valleys, and the bark is consequently often moss-grown. It is not fissured, but is more or less finely

tuberculated. Colour of outer bark that of the bark of the cork-tree. Brittle, and inside of a reddish-brown colour. Average thickness about $\frac{3}{16}''$. Inner bark very smooth, of about half the thickness of the outer-bark, very tough, and evidently available for coarse fibre. My attention was directed to this bark through learning that in the neighbourhood of Braidwood it is used by the settlers for tanning, "with excellent results." It yields 21·4 per cent. of extract to water at 100° C. Per centage of tannic acid 7·74.

Qualitative Tests—(Dilute extract).

1. Reaction faintly acid.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, yellowish turbidity. *On boiling*, no change.
3. Bromine water—Ochrey yellow ppt.
4. Dilute ferric chloride—Blackish-green colouration. Add Ammonia—Reddish-purple ppt.
5. Baric hydrate—Copious reddish-brown ppt.
6. Ammonium sulphide—Orange turbidity.
7. Potassium bichromate—Coffee-coloured ppt.
8. Tartar emetic—No change. Add Ammonic chloride—Brownish-white ppt.
9. Copper sulphate—Hardly to be distinguished from *A. aneura* Add Ammonia—Light brownish-green ppt.
10. One drop of strong sulphuric acid to one drop extract (on a white glazed tile)—Yellowish-brown colour.
11. Lead nitrate—Pale dirty brown ppt.
12. Manganese sulphate—Slight brownish ppt.
13. Chrome alum—Ditto.
14. Mercuric chloride—Slight whitish-brown or stone coloured ppt
15. Hydro disodic phosphate—Turbidity.
16. Potassium ferrocyanide—Orange-brown ppt.

EUCALYPTUS STELLULATA, (Sieber), N.O. Myrtaceæ, B. Fl., iii., 200. Usually called "Black Gum," or "Black Sally."

Found—In Victoria and New South Wales. Locality of the particular specimen now under examination:—Blue Bell, near Braidwood, New South Wales.

Remarks—The bark of the trunk. Diameter of stem 3 feet from the ground, 2 feet. Height 30 to 40 feet. Date of Collection, 17th Oct., 1886. Date of Analysis, 16th and 21st May, 1887.

An "Ironbark," of a blackish or dark-grey colour. Exceedingly hard, moderately fissured, and portions of it almost smooth. Average thickness $\frac{1}{2}''$. No kino visible to the naked eye. Inner bark of a light brown colour when dry. (Note.—From decortication, this tree often appears of a greenish or leaden colour, and smooth). Yields 27·64 per cent. of extract to water at 100° C. Kino-tannic acid 12·86 per cent.

Qualitative Tests—(Dilute extract).

1. Faintly acid reaction.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, faint salmon ppt. *On boiling*, ppt. darkens, and becomes flocculent.
3. Bromine water—Faint yellow ppt.
4. Dilute ferric chloride—Indigo liquid, with faint purplish tinge. Add Ammonia—Dirty brown purplish ppt.
5. Baric hydrate—Dark olive-brown ppt.
6. Ammonium sulphide—Slight dirty yellow ppt.
7. Potassium bichromate—Orange-brown ppt.
8. Tartar emetic—Slight brownish turbidity. Add Ammonium chloride—Increased ppt, like that of *E. leucoxylon* only a little lighter.
9. Copper sulphate—Dirty greenish-brown ppt, very like that of *A. sentis* and *A. melanoxylon*. Add Ammonia—Light Vandyke-brown ppt.
10. One drop of Sulphuric acid to one drop extract (on a white glazed tile)—Light brown colour.
11. Lead nitrate—Pale dirty brown ppt with a grey tint.
12. Manganese sulphate—Light drab ppt. The most copious ppt obtained with this reagent amongst all the substances referred to in this paper.
13. Chrome alum—Slight brownish ppt.
14. Mercuric chloride—Stone ppt.
15. Hydro disodic phosphate—Bark brown ppt.
16. Potassium ferrocyanide—Same as *A. melanoxylon*.

EUCALYPTUS AMYGDALINA, var., (Labill.) N.O. Myrtaceæ, B. Fl. iii., 202. "Ribbon Gum," from the circumstance that the bark can be peeled off in thin sheets, or ribbons. The botanical synonyms and vernacular names of the normal species are very numerous.

Found—In South Eastern New South Wales (range not co-extensive with that of the normal species). Locality of the particular specimen now under examination:—Nelligen, Clyde River, N.S.W

Remarks—Part of tree, kino. Diameter of stem 3 feet from ground, 2 feet, 6 inches. Height 80 to 100 feet. Date of Collection, 21st and 22nd Sept., 1886. Date of Analysis, 20th April and 17th May, 1887.

A clear port-wine coloured kino, which is very friable, forming a sparkling powder. Dissolves readily in cold water, forming a clear liquid, and with but little residue. Water at 100° C. dissolves 99·22 per cent. extract, leaving 0·78 per cent. of a brownish resin. Of this residue a portion equal to 0·46 per cent. of the total quantity of kino acted upon, is soluble in alcohol at 60° F. 97·32 per cent. of the kino is soluble in alcohol at 60° F. The kino yields 57·76 per cent. of kino-tannic acid.

Qualitative Tests—(Dilute extract).

1. Distinctly acid reaction.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, dense salmon ppt. *On boiling*, clear ruby liquid.
3. Bromine Water—Light brown ppt, with streaks or coagulated masses of a bright yellow colour which rise to the top of the liquid like a scum.
4. Dilute ferric chloride—Deep purple colour. Neither this nor the other kinos form ppts on standing. Add Ammonia—Claret colour with brownish tinge.
5. Baric hydrate—Mauve ppt.
6. Ammonium sulphide—Brownish colour.
7. Potassium bichromate—Very abundant dirty greenish-brown ppt.
8. Tartar Emetic—Pink gelatinous ppt. Add Ammonium Chloride—The ppt condensed.
9. Copper sulphate—Slight turbidity. Add Ammonia—Dense dirty olive-green ppt.
10. One drop of strong sulphuric acid to one drop extract (on a white glazed tile). Orange-brown colour, with slight tinge of magenta.
11. Lead nitrate—Reddish-brown ppt.
12. Manganese sulphate—No change.
13. Chrome alum—Turbidity.
14. Mercuric chloride—Gelatinous salmon ppt.
15. Hydro disodic phosphate—Slight pink gelatinous ppt.
16. Potassium ferrocyanide—Reddish-brown ppt.

EUCALYPTUS SIEBERIANA,(F.v.M.), N.O. Myrtaceæ,(*E. virgata*, Sieb., is the species name in B. Fl. iii., 202, vide also Dec. 2, F.v.M., "Eucalyptographia.") "Cabbage Gum," is the name by which this tree is known in the Braidwood district of N.S.W., owing to the perishable nature of the wood. The wood of Victorian trees appears to be more durable. Called also "Mountain Ash," "Gum Top," &c.

Found—In all the Colonies except Queensland and Western Australia. Locality of the particular specimen now under examination:—Monga, near Braidwood, N.S.W.

Remarks—The bark of the trunk. Diameter of stem 3 feet from the ground, 1 foot to 2 feet. Height, 60 to 80 feet. Date of Collection, 1st and 2nd Oct., 1886. Date of Analysis, 20th April, 17th and 21st May, 1887.

This kino as taken from the trees has very much the appearance of that of *E. amygdalina*, except that it is perhaps a shade duller in colour. But the difference between them is perceptible directly each is tapped with the pestle, the large pieces of the kino now under examination readily becoming dulled by a coating of their own

powder. This kino is rather tenacious, adhering readily to pestle and mortar, and yielding a dull, orange-coloured powder. It dissolves readily, and almost entirely, in cold water. Mr. Bauerlen who collected this kino, informs me that it is the most readily soluble one he has met with, the least shower of rain softening it on the trees. However true this may be of the fresh substance, six-months old *E. amygdalina* kino is unmistakeably more soluble than *E. Sieberiana* kino of similar age. Extract—Water at 100° C. dissolves 95·04 per cent. leaving 4·96 per cent. of a liver-coloured resin greatly resembling broken stick lac in appearance. Of this resinous residue a portion equal to 0·94 per cent. of the total quantity of kino acted upon, is soluble in alcohol at 60° F. 91·8 per cent. of the kino is soluble in alcohol at 60° F. The kino yields 36·96 per cent. of kino-tannic acid.

Qualitative Tests—(Dilute extract).

1. Reaction distinctly acid.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, dense salmon ppt. *On boiling*, clear dark ruby liquid.
3. Bromine water—Like *E. amygdalina*. Ppt perhaps a little more dense.
4. Dilute ferric chloride—Like *E. amygdalina*. Add Ammonia —Ditto.
5. Baric hydrate—Like *E. amygdalina*.
6. Ammonium sulphide.—Ditto
7. Potassium bichromate—Ditto
8. Tartar emetic—Ditto.—Add Ammonium chloride—Ditto
9. Copper sulphate—Ditto. Add Ammonia—Copious brownish-black ppt.
10. One drop of strong sulphuric acid to one drop extract (on a white glazed tile). Same as *E. amygdalina* only less intense.
11. Like *E. amygdalina*.
12. Manganese sulphate—No change.
13. Chrome alum—No change.
14. Mercuric chloride—Like *E. amygdalina*.
15. Hydrodisodic phosphate—Copious pink gelatinous ppt, in this respect different to *E. amygdalina*.
16. Potassium ferrocyanide—Like *E. amygdalina*.

EUCALYPTUS LEUCOXYLON, F. v. M., (*E. sideroxylon*, A. Cunn.) N.O. Myrtaceæ, B. Fl. iii., 209. "Red-flowering Ironbark."

Found—In all the Colonies except Tasmania and Western Australia. Locality of the particular specimen now under examination:—Near Richmond, N.S.W.

Remarks—The bark of the trunk. Diameter of stem 3 feet from the ground, up to 12 inches. Height of tree, 40 to 50 feet. Date of Collection, July, 1886. Date of Analysis, 17th and 23rd May, 1887.

I am indebted to Rev. Dr. Woolls for this bark. It is deeply fissured; the kino is in more or less distinct small cavities in the bark, giving it a pitted or beaded appearance. The bark dull-looking and pulverulent, the kino in dull, never large, masses. This bark readily yields its kino to water, forming a liquid of a very intense reddish-brown colour. It yields 67 per cent of extract to water at at 100° C., or 33 per cent. of residue. Of this residue a portion equal to 0·26 per cent. of the total quantity of bark acted upon, is soluble in alcohol at 60° F. The bark is soluble in alcohol at 60° F. to the extent of 18·84 per cent., forming a rich garnet liquid. Kino-tannic acid, 41·9 per cent.

Qualitative Tests.—(Dilute Extract).

1. Reaction distinctly acid.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, light brown ppt. *On boiling*, ppt. darkens and rises to the top as a scum.
3. Bromine water—Reddish-brown ppt.
4. Dilute ferric chloride— Brownish-purple colour. Add Ammonia—Slight ppt.
5. Baric hydrate—Reddish-brown ppt.
6. Ammonium sulphide—Reddish-brown colour.
7. Potassium bichromate—Dark brown ppt.
8. Tartar emetic—No change. Add Ammonium chloride—Orange-brown ppt.
9. Copper sulphate—Slight pale-brownish ppt. Add Ammonia —Vandyke-brown ppt.
10. One drop of strong sulphuric acid to one drop extract (on a white glazed tile). Warm brown colour.
11. Lead nitrate—Brown ppt.
12. Manganese sulphate—No change.
13. Chrome alum—No change.
14. Mercuric chloride—Light brown gelatinous ppt.
15. Hydro disodic phosphate—Abundant purple ppt.
16. Potassium ferro-cyanide—Darkens the colour.

EUCALYPTUS SIDEROPHLOIA, Benth., *(E. resinifera*, A. Cunn.) N.O. Myrtaceæ, B. Fl. iii., 220. "Broad-leaved" or "Red Ironbark."

Found—In New South Wales and Queensland. Locality of the particular specimen now under examination:—Richmond, N.S.W.

Remarks—A. bark of trunk, with adherent kino. *B.* bark of trunk; no kino visible to the naked eye. *C.* kino. Diameter of stem 3 feet the ground, up to 12 inches. Height of tree, 40 to 50 feet, (a small tree of its kind). Date of Collection, July 1886. Date of Analysis, 17th and 23rd May, 1887.

I am indebted to Rev. Dr. Woolls for this kino yielding bark. It is more or less foliaceous. The kino is not uniformly distributed throughout the bark-mass as in *E. leucoxylon*, but in masses of a pure reddish-brown, and almost transparent. As I received the kino *in situ*, it occurred to me that it would be practically useful and convenient to present the results of examination in three different ways, viz. :—A. Bark of trunk, with adherent kino ; an average sample *i.e.*, exhibiting the kino and bark in about the proportions in which they usually exist in nature. B. Bark of the trunk ; no kino visible to the naked eye. C. Kino ; all woody matter has been carefully removed. This is therefore about the state in which "best selected kino" will be sent to market in the future.

A.	Extract, soluble in water at 100° C.,	68·1	per cent.
	Kino-tannic acid	26·48	,,
B.	Extract, soluble in water at 100° C.,	26·56	,,
	Kino-tannic acid	10·4	,,
C.	Extract, soluble in water at 100° C.,	97·56	,,
	Soluble in alcohol at 60° F. ...	13·98	,,
	Kino-tannic acid	35·1	,,

Qualitative Tests.—(Dilute extract of kino).

1. Reaction distinctly acid.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, no change. *On boiling*, clear pale ruby liquid.
3. Bromine water—No change.
4. Dilute ferric chloride—Dark brownish purple liquid. Add Ammonia—No change, except perhaps more intense colour.
5. Baric hydrate—Light purplish-brown gelatinous ppt.
6. Ammonium sulphide—Orange-brown colour.
7. Potassium bichromate—Very dense ppt. of a coffee colour.
8. Tartar emetic—No change. Add Ammonium chloride—Café-au-lait ppt.
9. Copper sulphate—No change. Add Ammonia—Intense Vandyke-brown ppt.
10. One drop of strong sulphuric acid to one drop extract (on a white glazed tile). Warm brown colour.
11. Lead nitrate—No change.
12. Manganese sulphate—No change.
13. Chrome alum—No change.
14. Mercuric chloride—Faint whitish ppt.
15. Hydro disodic phosphate—No change.
16. Potassium ferrocyanide—Darkens colour.

EUCALYPTUS CORYMBOSA, (Smith), N.O. Myrtaceæ, B. Fl. iii., 256. "Bloodwood."

Found—In New South Wales to Northern Australia. Locality of the particular specimen now under examination:—Cambewarra, N.S.W.

Remarks—The kino. Diameter of the stem 3 feet from the ground, 3 to 4 feet. Height, 80 to 100 feet. Date of Collection, 28th August, 1886. Date of Analysis, 20th April and 17th May, 1887.

This kino is obtainable in irregular pieces as large as a fist. Before they have been bruised, they have the appearance of a very pulverulent, purplish-red haematite (such, for instance, as is common in the Elba mines). To say that it resembles a low-grade Dragon's blood also gives a very good idea of its appearance. It readily makes an impalpable powder of a Venetian-red colour, soiling everything with which it comes into contact. Water at 100° C. dissolves 72·28 per cent., leaving 27·72 per cent. of residue, strikingly resembling powdered Brazil-wood in appearance. The solution in hot water readily becomes turbid if it be either slightly lowered in temperature or partly evaporated. The particles suspended in the water are in such a fine state of division that they readily pass through a filter-paper. The solution in boiling-water is of a deep garnet colour. The ligneous, insoluble (in water) residue, yields 2·16 per cent. (calculated on the total weight of kino operated upon) of a rich red colouring matter to alcohol at 60° F. Cold water (60° F.) dissolves 35·38 per cent. of the kino. Alcohol at 60° F. dissolves 71·14 per cent. of the kino.

Bloodwood kino can be delivered in Sydney for about 3d. per lb. and there is no doubt that it is a cheap and efficient substitute for the lower grades of Dragon's blood. Both the aqueous and alcoholic solutions form excellent wood-stains. (Samples of wood stained by them were exhibited). Experts will probably pronounce the colour to be too "fiery," but it can be brought to the required tint by admixture with Burnt Sienna or Vandyke Brown. As a matter of fact, most wood-stains are compound substances, and the most I claim for this kino at present is that it will form a useful *base* for stains and varnishes. Whether it will, (and in what measure), supersede the beautiful aniline dyes which now form part of the "material" of the painter and polisher, remains to be seen. Some enterprising firm should put it to serious test without unnecessary delay.

This kino yields 28·44 per cent. of kino tannic acid. This percentage of tannin is of course low (for a kino); nevertheless the abundance of the raw material, and the readiness with which its excellent colouring matter is available, will render this one of the most useful of our kinos.

Qualitative Tests.—(Very dilute extract, prepared by treating the kino with cold water, and filtering.

1. Reaction distinctly acid.
2. Equal volume of sulphuric acid (1 in 5). *In the cold*, no change. *On boiling*, no change.
3. Bromine water—Orange-yellow ppt.
4. Dilute ferric chloride—Brownish purple ppt. Add Ammonia —Deepens the colour.
5. Baric hydrate—Brown ppt.
6. Ammonium sulphide—Slight yellowish turbidity.
7. Potassium bichromate—Coffee-coloured ppt.
8. Tartar emetic—Slight turbidity. Add Ammonium chloride —Whitish ppt.
9. Copper sulphate—Greenish ppt. Add Ammonia—Light Vandyke-brown ppt.
10. One drop strong sulphuric acid to one drop extract (on a white glazed tile). Slight reddish colour.
11. Lead nitrate—Reddish-brown ppt.
12. Manganese sulphate—No change.
13. Chrome alum—Reddish ppt.
14. Mercuric chloride—Salmon ppt.
15. Hydro disodic phosphate—No change.
16. Potassium ferrocyanide—Darkens colour.

Discussion.

Rev. S. Wilkinson, in proposing a vote of thanks to Mr. Maiden for his paper, said he considered it to be exceedingly valuable, both for commercial and practical uses in the Colony, and the investigations were likely to have results of very great importance. Some tanners felt themselves very dependent upon the bark they had been importing from other colonies. Leathers were imported largely from Europe, and this also was done to the disadvantage of the whole colony. The kino extracts were also of great value for polishers &c. At present our dyers import nearly everything they use, while probably the Colony contains all that is necessary for their trade.

Mr. J. T. Wilshire seconded the motion and said he had been identified with the tanning business through his parent, who was the first to establish the industry here. He was glad to be able to testify to the excellence of the paper read by Mr. Maiden, and asked that gentlemen, through the chair, if the percentage of tannin contained in the Acacia, would bear comparison with that of the Oak.

Mr. Maiden in reply, stated that there were some 336 species of Acacia in Australia. He spoke from memory when he said

that oak bark contained between 10 and 12 per cent. of tannin. The percentage of tannin in species of Acacia is on the average, far higher.

Hon. L. F. de Salis, remarked that in 1885, £17,500 worth of bark was brought into this country. Mr. Maiden had spoken of the value of the Eucalypts for tanning purposes; this was a valuable discovery. A practical tanner of England had mentioned to him the delight with which he was receiving the Acacia bark, which he considered of more value than the Oak. This gentleman, however, knew nothing about the Eucalypts possesing such excellent tanning properties. The colony imported something like £600,000 of foreign leather. As we have the hides and the means of tanning them, it is a great pity that this should take place. He hoped Mr. Maiden would persist in his efforts, as the results of the analyses would be of great value to the country.

The President in presenting the thanks of the Society to Mr. Maiden, said that all the members would feel gratified that this was only the first of a series of papers on the same subject. Mr. Maiden had chosen an almost untrodden path, and there being so many species of Acacia in the colony, shows the importance of the work. It would have special value as a work of reference in the Society's Proceedings, and the specimens will be labelled and placed in the Technological Museum.

Mr. Maiden acknowledged the compliment, and said that as the word discovery had been used, he might state that the value of Eucalyptus bark for tanning purposes was no discovery. In 1823 an extract of wattle bark was sent to England and realised a very high price. By sending it in the form of an extract a considerable saving was effected in freight charges. An objection to wattle bark is that it makes a reddish leather, and we cannot at present make the finer kinds of leather with it. The bark would be more valuable if it could be decolorised without destroying its tannic acid. The Government had planted a great many wattle trees, especially on the railway lines, but there were difficulties in the way of the cultivation of them, as in some places they would not flourish, because water could not be regularly applied to them, and where they grew luxuriantly they were said to interfere with the telegraph wires, and were cut down in consequence.

Maiden, J. H. 1887. "Some New South Wales tan-substances, Part 1." *Journal and proceedings of the Royal Society of New South Wales* 21, 27–43. https://doi.org/10.5962/p.359022.

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