

ACACIAS OF SOUTH-EAST QUEENSLAND.

By JOHN SHIRLEY, D.Sc., and C. A. LAMBERT.

(Plates II-VI.)

(Read before the Royal Society of Queensland, 27th June, 1921.)

1.—INTRODUCTION.

To the Australian, the native wattles, forming his national emblem, possess a sentimental interest. To the general botanist they are none the less interesting, presenting striking peculiarities in their adaptation to climate. Many species use their flattened leafstalks or phyllodes to play the part of leaves after the seedling stage is passed, and these phyllodes bear stomata in almost equal number on both surfaces. The colour attraction for insects is found in the filaments of the stamens and not in the petals. The stamens may have eight spherical chambers for the protection of pollen, instead of the four usually present in flowering plants; and there are no arrangements for protecting the pollen from rain or dew. Another peculiarity is the propagation of many species by means of root-cuttings.

2.—REVIEW.

The following are the common wattles in S.E. Queensland :—

No.	Series.	Scientific Name.	Local Name.
	Uninerves—	<i>Acacia</i> —	
1	Brevifoliæ	<i>plagiophylla</i> F.v.M.	Transverse-veined wattle
2	Racemosæ	<i>penninervis</i> Sieb.	Feather-veined wattle
3	Racemosæ	<i>falcata</i> Willd.	Burra
4	Racemosæ	<i>suaveolens</i> Willd.	Sweet-scented wattle
5	Racemosæ	<i>fimbriata</i> A. Cunn.	Creekside wattle
	Plurinerves—		
6	Triangulares	<i>amblygona</i> A. Cunn.	Obtuse-angled wattle
7	Nervosæ	<i>implexa</i> Benth.	Curly-fruited wattle
8	Nervosæ	<i>complanata</i> A. Cunn.	Winged wattle
	Julifloræ—		
9	Tetrameræ	<i>longifolia</i> Willd.	Toowoomba wattle
10	Falcatæ	<i>maideni</i> F.v.M.	Maiden's wattle
11	Falcatæ	<i>glaucescens</i> Willd.	Rosewood wattle
12	Falcatæ	<i>cunninghamii</i> Hook.	Black wattle
13	Falcatæ	<i>aulacocarpa</i> A. Cunn.	Hickory wattle
14	Dimidiatæ	<i>cincinnata</i> F.v.M.	Island wattle
15	Bipinnatæ	<i>decurrens</i> Willd.	Green wattle

Less common, or more local, are *A. pugioniformis* Wendl., *A. hispidula* Willd., *A. amœna* Wendl., *A. adunca* A. Cunn., *A. podalyriæfolia* A. Cunn., *A. elongata* Sieb., &c., &c. The anatomical details, given in this paper, are restricted to Nos. 2, 5, 6, 7, 10, 12, 13, and 14.

3.—GENERAL NOTES.

I.—*Acacia amblygona* A. Cunn. is found in undulating country, and on the foothills of ranges, both in coastal and inland districts. Near Brisbane its height is seldom more than 3 or 4 feet. Its branches are terete and pubescent, and the phyllodes are 3-4 lines by $1\frac{1}{2}$ to 3 lines and almost triangular. The pods are linear, somewhat curved, and $1\frac{1}{2}$ -2 lines broad. They are slightly contracted between the seeds. It is figured in Mueller's Australian Acacias, decade 7, plate 3. It has been reported from Eidsvold, Miles, and Chinchilla.

II.—*Acacia aulacocarpa* A. Cunn. is known in South-eastern Queensland as the hickory wattle, as its young stems were formerly used as handles for the whips of bullock-drivers. It is found along the eastern coast of Queensland from the Tweed River to Bowen and Lizard Island,¹ and inland through the Suttö Desert² to tropical West Australia.³ Its phyllodes are similar in general appearance to those of *A. cunninghamii* Hook., from which they can be distinguished, under the lens, by their freedom from anastomoses in the veins, and by their faintly glaucous surface. The pods are 2-3 $\frac{1}{2}$ inches long and $\frac{3}{4}$ inch broad, the outer surface marked by oblique furrows, from which the specific name is derived. *Acacia aulacocarpa* grows in communities, forming wattle scrubs, and reaches in S. E. Queensland a height of 20 to 30 feet. It is figured in Mueller's Aust. Ac., dec. 9, pl. 9; and in Maiden's Forest Flora, vol. 3, pl. 103.

III.—*Acacia cincinnata* F.v.M.⁴ In the Flora Australiensis this wattle was reported as from "Rockingham Bay and several other localities in tropical Queensland," a statement repeated in Bailey's Queensland Flora, vol. ii, p. 513. Unfortunately Bailey seldom added to the localities given in the Flora. Cambage (Proc. Roy. Soc. N.S.W., vol. 49, p. 396)

¹ Maiden, Tropical Acacias of Queensland, p. 45.

² Maiden, Flora of Northern Territory, p. 327.

³ Maiden, Notes on Tropical West Australian Acacias, p. 111.

⁴ White, Queensland Naturalist, April 1917, p. 65.

ACACIAS OF SOUTH-EAST QUEENSLAND.

PLATE II.

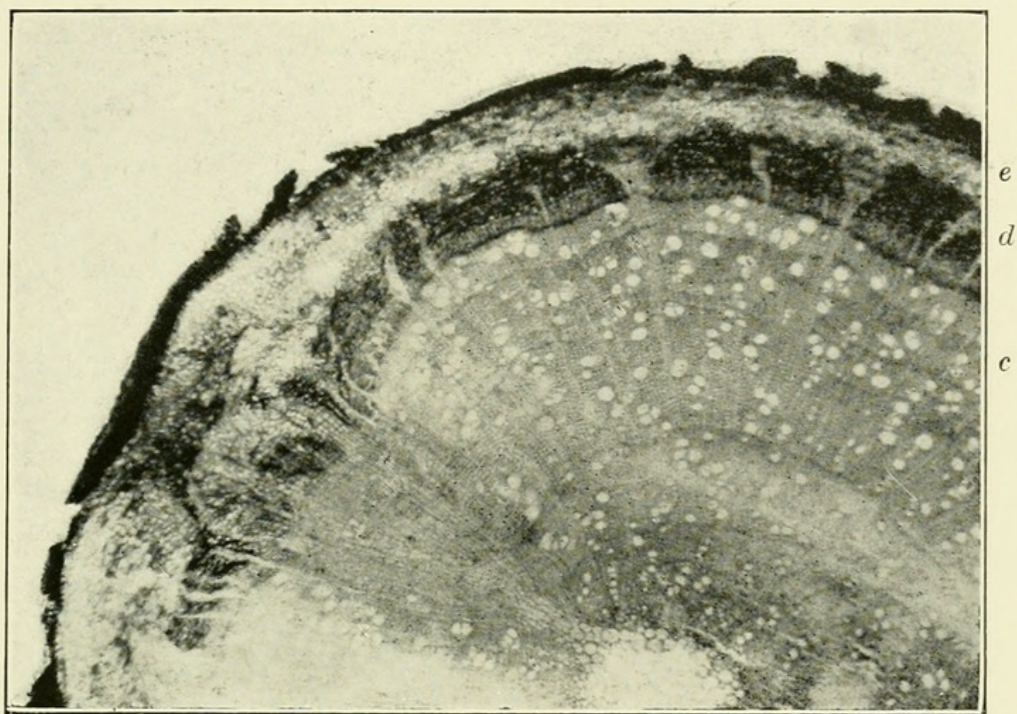


Fig. 1.—*A. amblygona*, T.S., x 25.

a. Pith. b. Leaf trace. c. Secondary wood.
d. Bast. e. Phelloderm.

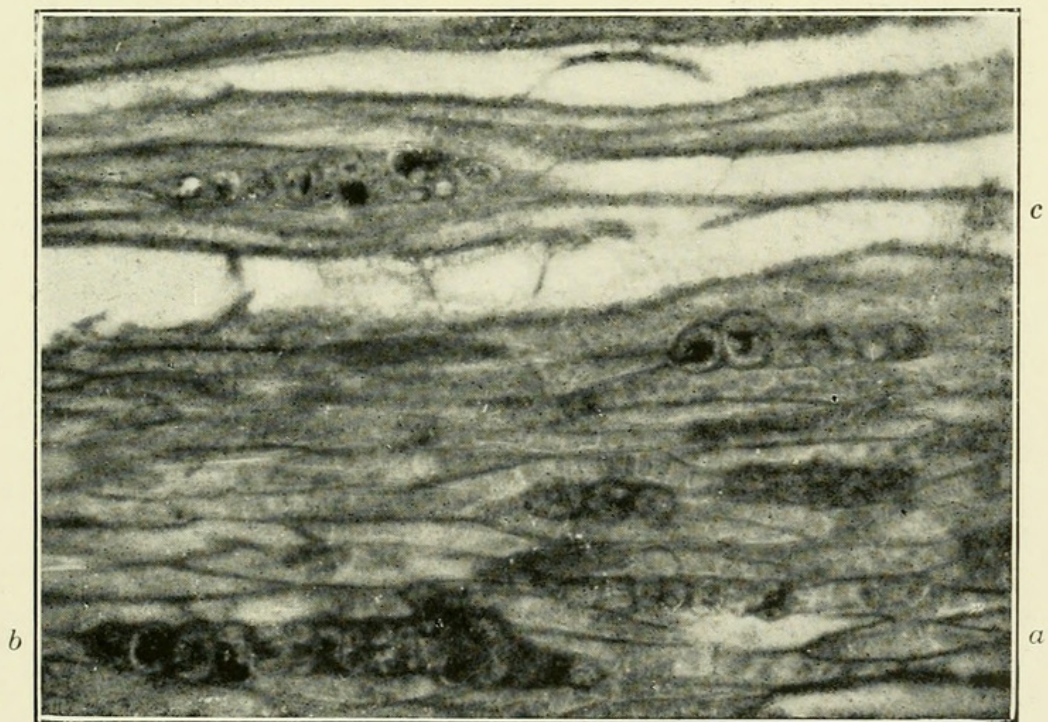


Fig. 2.—*A. amblygona*, L.T.S., x 200.

a. Wood fibres. b. Medullary ray. c. Tracheides.

ACACIAS OF SOUTH-EAST QUEENSLAND.

PLATE III.

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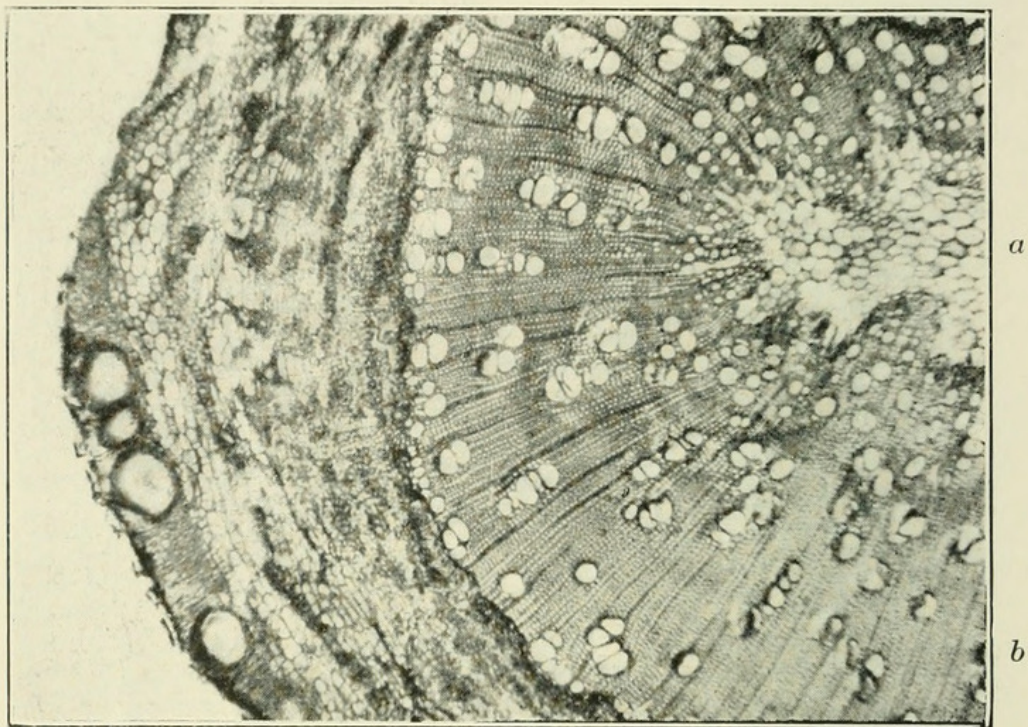


Fig. 1.—*A. cunninghamii*, T.S., x 40.

a. Pith. b. Secondary wood. c. Bast.
d. Phelloderm. e. Cork.

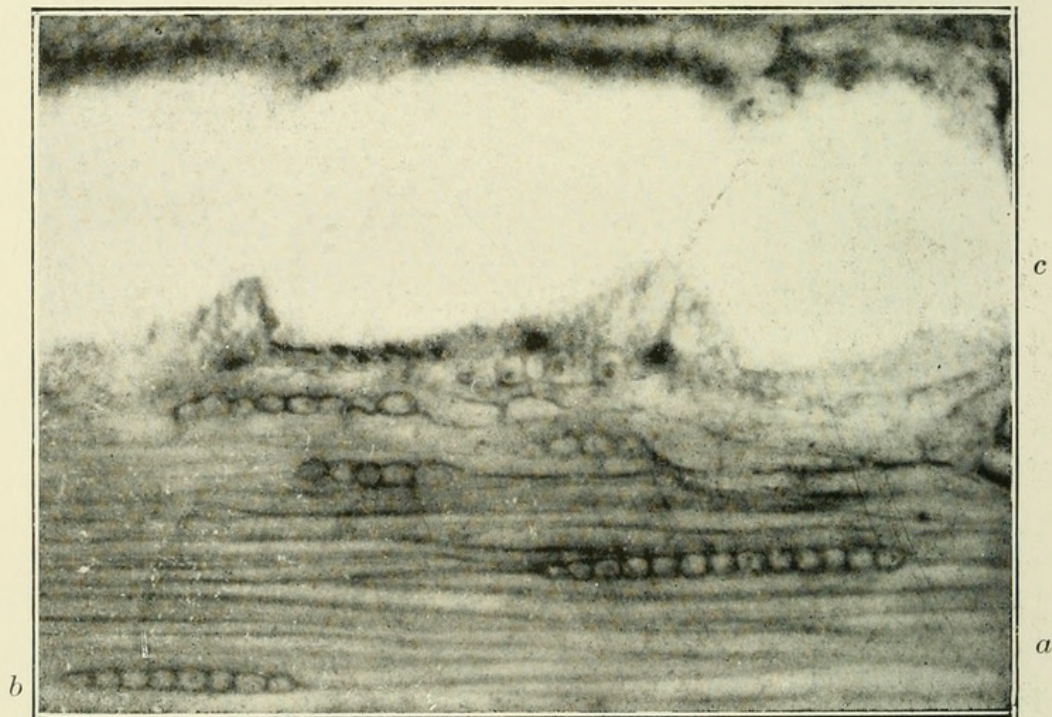


Fig. 2.—*A. cunninghamii*, L.T.S., x 200.

a. Wood fibres. b. Medullary ray. c. Dotted vessel.

gives Kuranda to Almaden in the Cairns hinterland as additional habitats. Recently⁵ it has been found on Bribie Island at the northern end of Moreton Bay, growing in swampy ground, and forming tall trees 40 to 50 feet high. Fortunately it was found in fruit, and the curious spirally curled pods were confirmative of its determination. The bark is dark, and at first sight suggests an ironbark eucalypt. This species is figured in Mueller's Aust. Ac., dec. 9, pl. 6. Along the tropical coast it is called the island wattle.

IV.—*Acacia cunninghamii* Hook. was formerly known round Moreton Bay as the black wattle. It grows in the same situations as *A. aulacocarpa*, which it often closely resembles in height and phyllodes. When in fruit it can easily be distinguished by its much narrower pods; when without fruit it can be separated from its ally by the frequent anastomoses of the veins of the phyllodes, and by the triangular outline shown in a cross-section of the young twigs.

V.—*Acacia fimbriata* A. Cunn. is known as the creek-side and flax-leaved wattle, and loves the sides of streams and the borders of marshes, being found in coastal country from Brisbane to Broadsound. It was formerly known and distributed in Queensland as *Acacia linifolia* Willd., from which Mr. J. H. Maiden has shown that it must be specifically separated. The main differences are in the phyllodes, which in *A. fimbriata* are larger, broader, and fringed along the margins with minute cilia. Mr. Maiden⁶ has suggested the vernacular name of fringed wattle, leaving that of flax-leaved wattle to the true *A. linifolia*. This species is figured in Forest Flora, vol. v, pl. 157. It is a tall shrub or small tree, seldom reaching 20 feet in height.

VI.—*Acacia implexa* Benth. is found in Queensland from the Brisbane to the Burnett River along the coast, and inland to the valley of the Dawson, the great southern tributary of the Fitzroy. In S.E. Queensland it is typically a mountain species, and is specially characteristic of such basaltic masses as Tambourine, Beech Mountain, and Springbrook. It forms trees reaching 30 or 40 feet or more. The linear pods, not more than 3 lines broad when ripe, form a twisted and curled-up mass, hence the specific name. It is figured in Mueller's Aust. Ac., dec. 8, pl. 2; and in Maiden's Forest Flora, vol. v, pl.

⁵ Proc. Roy. Soc. Qd., vol. 27, p. 97.

⁶ Forest Flora, vol. v, p. 31.

153. It is known as the mountain wattle and curly-fruited wattle among bushmen and selectors. The flowers are usually of a very pale yellow colour.

VII.—*Acacia maideni* F.v.M. is a common wattle in sandy country near Brisbane. A fine specimen in the Botanic Gardens, Brisbane, is probably a survival from the old river scrub in that locality. When young its phyllodes are often mistaken for those of *Acacia longifolia* Willd. The flowers are in nearly sessile spikes, solitary or two or three together, and are pale yellow or almost white. The pods are narrow and twisted, and may be mistaken for those of *A. implexa*. The flowers closely resemble those of *Acacia longifolia*, from which Maiden's wattle may be separated by not possessing the white bract at the base of each flower, as in *longifolia*. At times the similarity between the phyllodes of *A. implexa* and *A. maideni* is extremely close. No common name is used for this tree in Southern Queensland. It is seldom found more than 20 feet in height; it is figured in Maiden's Forest Flora, vol. vi, pl. 220.

VIII.—*Acacia penninervis* Sieb., the feather-veined wattle, is extremely common in the low-lying coastal country of S.E. Queensland. It is easily recognisable by its pinnately veined phyllodes, the edges thickened, and usually showing a marginal gland below the middle. Each globular capitulum contains about 20 flowers, the calyx truncate, the petals smooth. It extends from Point Danger to Roma and Mitchell, beyond which to the north and west it seems to be replaced by its ally *A. bancrofti* Maiden. It is figured in Maiden's Forest Flora, vol. iii, pl. 91, 92.

4.—HISTOLOGY OF STEMS.

I.—*Acacia amblygona* A. Cunn., transverse section of twig in its third year. (Plate II.) The pith shows large polygonal cells, in transverse section, six- or seven-sided, 20-26 μ in diameter, some having lost their protoplasmic contents, others filled with starch grains, showing radiate arrangement. The medullary rays, coloured by methylene blue, show very plainly, and the cells are large for the *Acacia* family, measuring 14-20 μ . Through the wood of the first and second years they are in single rank, in the third year's wood they may be in double or treble rows. The vessels of the xylem are smaller

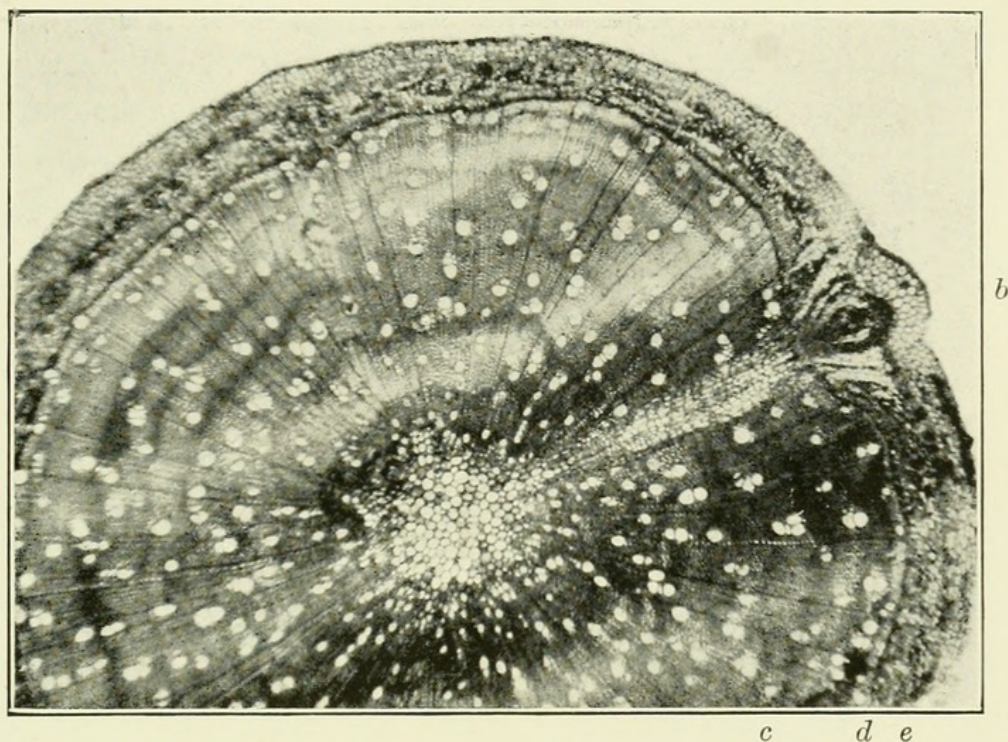


Fig. 1.—*A. linifolia*, T.S., x 25.

Pith in centre. *b.* Leaf trace. *c.* Secondary wood.
d. Bast. *e.* Phelloderm.

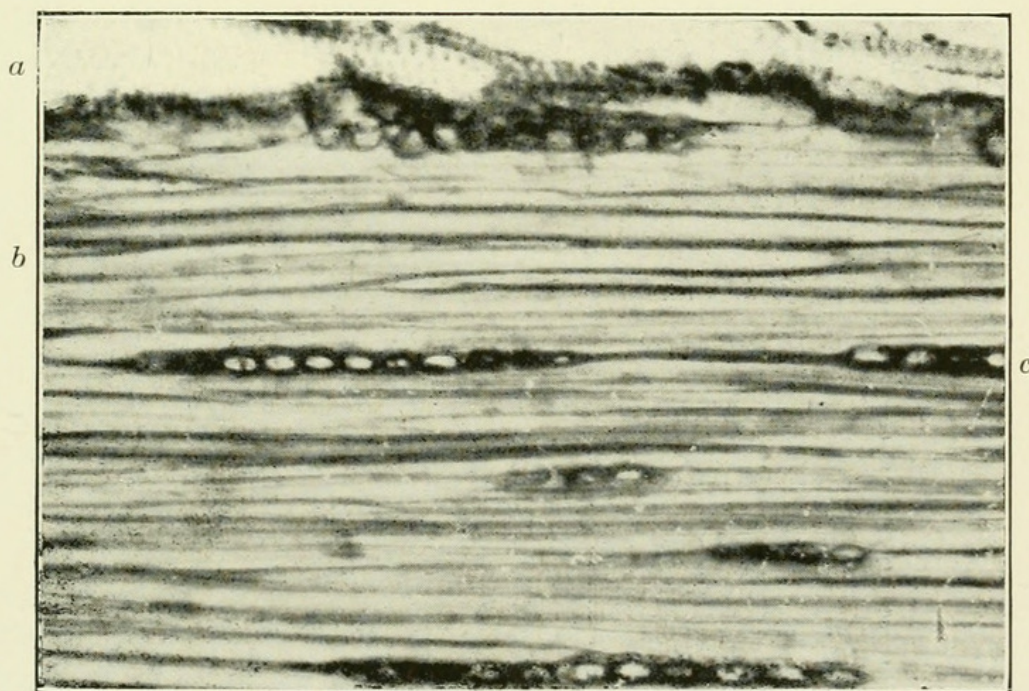


Fig. 2.—*A. linifolia*, L.T.S., x 200.

a. Tracheides. *b.* Wood fibres. *c.* Medullary ray.

than usual, ranging from 30-57 μ in diameter; in all other wattle stems sectioned, the vessels reach usually twice these dimensions. The sieve tubes show the same peculiarity, being decidedly narrow in transverse section. The stem is strengthened by old strands of hard bast, pushed out towards the circumference, to form sclerenchymatous strengthening bands, like the steel laths of reinforced concrete. The phellogen takes the methylene blue stain very deeply, as does the live cork; between the two is seen the almost unstained phellogen, some of the cells undergoing mitotic division.

In the tangential longitudinal section the same structures are seen, small reticulated vessels and tracheides prevailing throughout a great portion of the xylem, with larger dotted vessels in the sapwood.

II.—*Acacia fimbriata* A. Cunn. and *A. linifolia* Willd. (Plate IV.) No support is given to a separation of these two wattles by a study of their internal structure. The supply and arrangement of the vessels of the xylem agree in both forms; the medullary rays are similarly strongly marked, the pith is larger in area, relative to the wood, than in many allied species, and in tangential section the medullary rays show both in xylem and phloem a single row of elongated oval cells. In the deeper layers of the cortex, strands of sclerenchyma are noted, the cavities of the cells almost obliterated by the addition of layers to the cell-walls. Occasionally these strands invade the outer layers of the alburnum. The larger vessels and tracheides are pitted ones; reticulated vessels are far less numerous than in *A. amblygona*.

In the medullary rays, when passing through the phloem, the cells are shortest in the direction of the ray, the transverse diameter being much enlarged.

III.—*Acacia aulacocarpa* A. Cunn., *A. cincinnata* F.v.M., and *A. cunninghamii* Hook. (Plate III.) These all belong to Julifloræ, and the first and third species have many features in common. In the transverse section of a young twig, the triangular outline at once distinguishes *A. cunninghamii*, but this means of identification is lost in older branches. Vessels of the xylem of *A. cunninghamii* range from 70 μ to 140 μ and are the broadest of any acacia examined; in *A. aulacocarpa* they vary from 30 μ to 105 μ ; and in *A. cincinnata* have about the same limits. In the first year's stem of *cunninghamii*,

triangular in outline, the epidermis is well shown, the outer walls so strengthened with cutin as to form half the radial diameter of each cell. A circle of sclerenchyma lies between the phelloderm and the phloem, lying in a series of curves round the vascular bundles, with larger thick-walled cells where two curves meet, some of which have the diameter of vessels. In older sections of 4-5 years, the vessels have their greatest diameter parallel to the circumference, and the lines of wood-cells are much distorted around vessels and near the outer portions of the xylem. The pith-cells are full of starch grains, and a few contain tabulate crystals. In tangential longitudinal section both *aulacocarpa* and *cunninghamii* show the cells of the medullary rays in uniseriate arrangement; in the former the ray sections are $210\text{--}225\ \mu$ by $9\text{--}12\ \mu$; in the latter $110\text{--}210\ \mu$ by $10\ \mu$. *A. cincinnata* shows alternating layers of hard and soft bast in the phloem, but otherwise its histology is that already described for *aulacocarpa*.

In *cunninghamii* the pith cells are large, filled with starch, often elongated in a radial direction and bounded by a wavy outline of protoxylem. The primary medullary rays are strongly marked, and are formed of cells of considerable radial diameter.

Neither endodermis nor pericycle is clearly shown in any member of this group.

IV.—*Acacia penninervis* Sieb., in transverse section, is remarkable for the numerous broken concentric rings of sclerenchyma or hard bast in the phloem, and for the thickness of the bast layer. The vessels vary in diameter from $43\ \mu$ to $105\ \mu$. The wood-cells produced in autumn have their walls much thickened, and each annual zone is thus made to add to the strength and elasticity of the stem. Dotted tracheides are more than usually numerous.

Passing through the phloem, the cells of the medullary rays remain uniseriate, but acquire a greater transverse diameter, and are plainly seen in the more internal masses of sclerenchyma. In tangential section they measure $103\text{--}220\ \mu$ by $6\text{--}17\ \mu$. In the phelloderm, at intervals, the large cells are seen to be placed with the long axis directed radially; in other parts of the inner cortex the longitudinal axis of each cell of this inner layer is vertical. These cells retain their protoplasm, and have a rather narrowly elliptical nucleus. (Plate VI.)

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PLATE V.

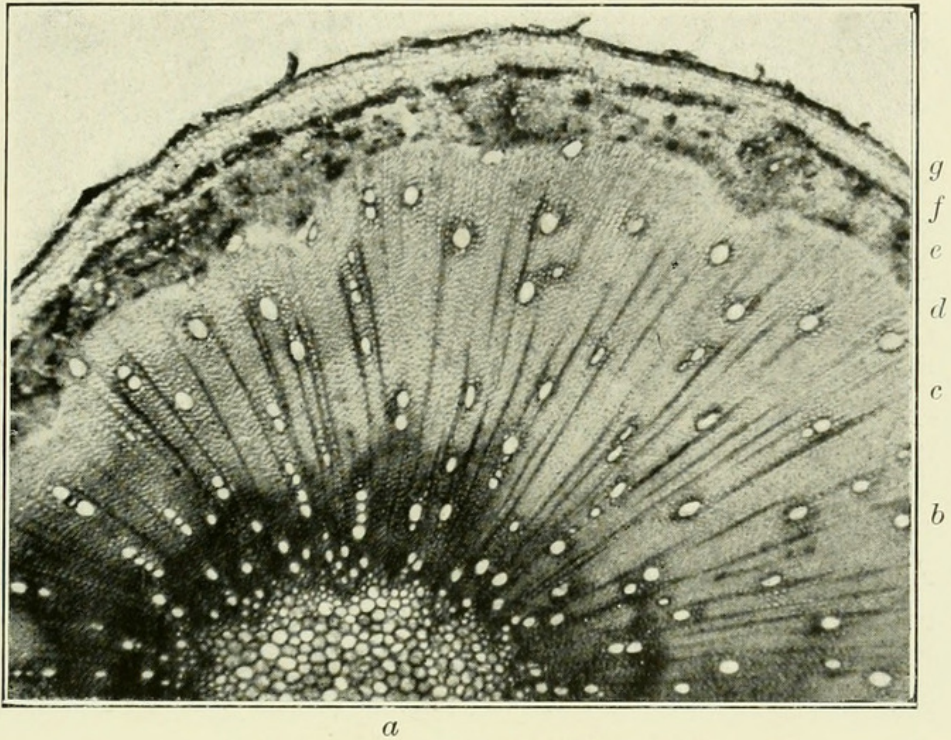


Fig. 1.—*A. maideni*, T.S., x 35.

- | | | |
|-------------|------------|--------------------|
| a. Pith. | b. Vessel. | c. Secondary wood. |
| d. Cambium. | e. Bast. | f. Phelloderm. |
| | g. Cork. | |

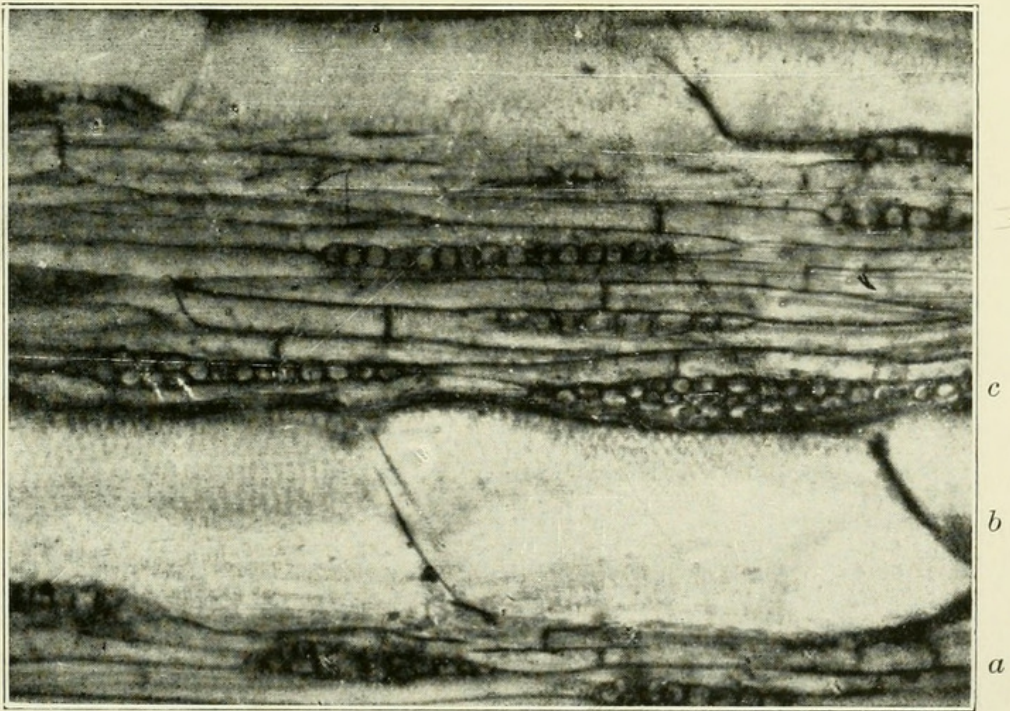


Fig. 2.—*A. maideni*, L.T.S., x 200.

- | | | |
|-----------------|----------------|-------------------|
| a. Wood fibres. | b. Tracheides. | c. Medullary ray. |
|-----------------|----------------|-------------------|

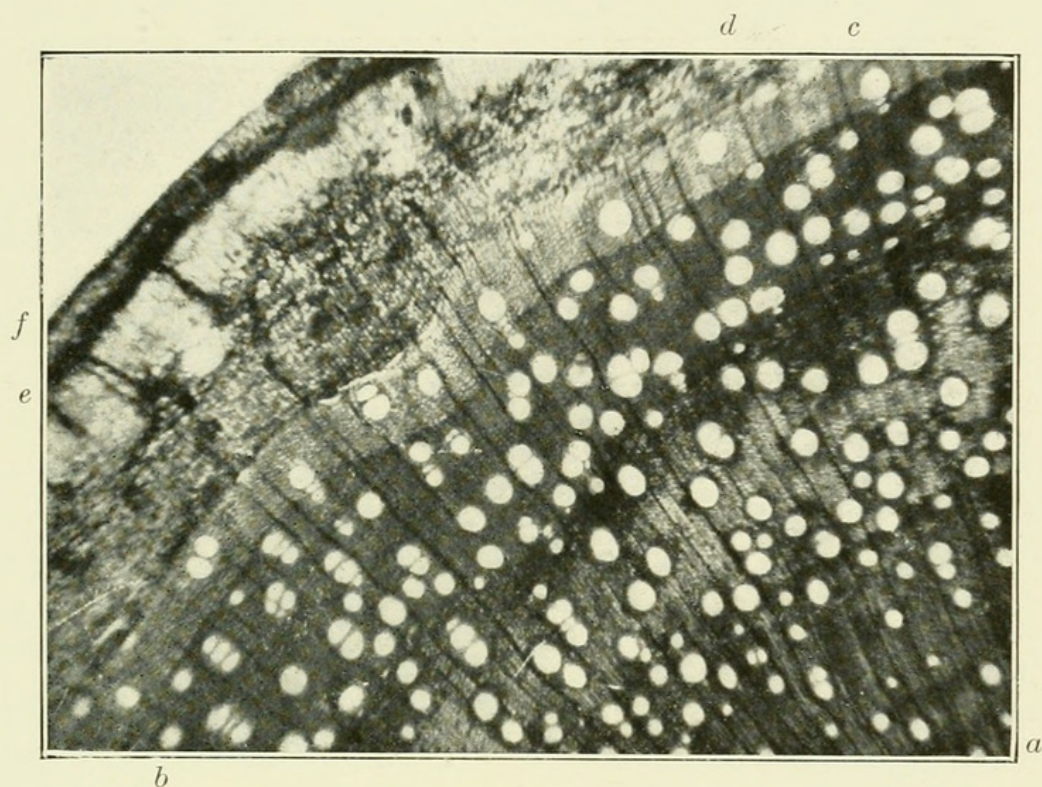


Fig. 1.—*A. penninervis*, T.S., x 25.

a. Pith.
d. Bast.

b. Secondary wood.
e. Sclerenchyma.

c. Cambium.
f. Cork.

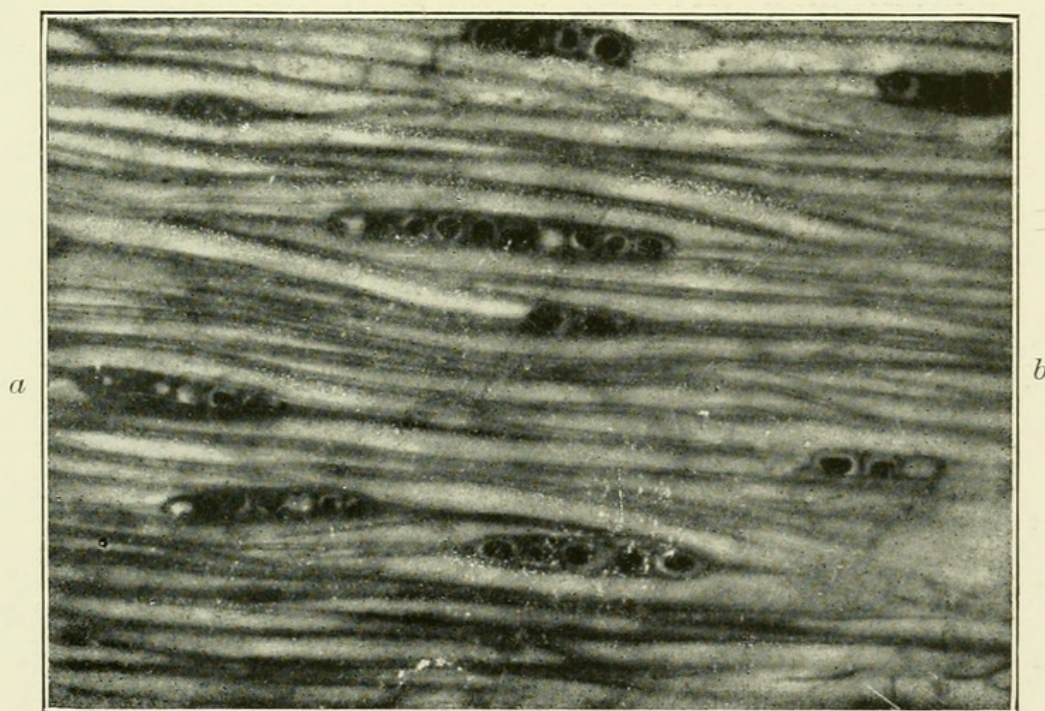


Fig. 2.—*A. penninervis*, L.T.S., x 200.

a. Medullary ray.

b. Wood fibres.

V.—*Acacia maideni* F.v.M. differs radically in its histology from all other species examined. The vessels of the xylem are few and small, and in young stems all are elongated in a radial direction. The medullary rays are narrow and drawn out radially, and the cells of the wood parenchyma are less thick-walled than usual. Much of the water and dissolved minerals of the ascending sap must pass by osmosis through the wood-cells of the alburnum.

Passing through the phloem the medullary rays take a very wavy course. In tangential section they measure 110-285 μ by 8 to 12 μ . The pith is of the usual structure and contains a few idioblasts. Strands of sclerenchyma are found in the cortex, but this tissue is not as strongly developed as in any of other acacias examined. Surrounding the vessels of the xylem the wood-cells are larger and their rows more irregularly constituted (tangential section) than elsewhere. In the cells of the cortex numerous tabulate crystals were noted. (Plate V.)

VI.—*Acacia implexa* Benth. The young stem of *implexa* 1-2 years old shows the layer of epidermal cells with their external thickening of cutin. The pith and xylem are of the ordinary type, but the phloem is mainly of soft bast, and the sclerenchyma is only moderately developed. In all other respects it agrees with the characteristics already laid down.



Shirley, John and Lambert, C A. 1922. "Acacias of South-East Queensland." *The Proceedings of the Royal Society of Queensland* 33, 39–45.

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