

ACACIA SEEDLINGS, PART XI.

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[With Plates IV. - VIII.]

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SYNOPSIS:

NOCTURNAL MOVEMENT OF EARLY LEAVES.

CLOSING UP OF COTYLEDONS AT NIGHT.

DESCRIPTION OF SEEDLINGS.

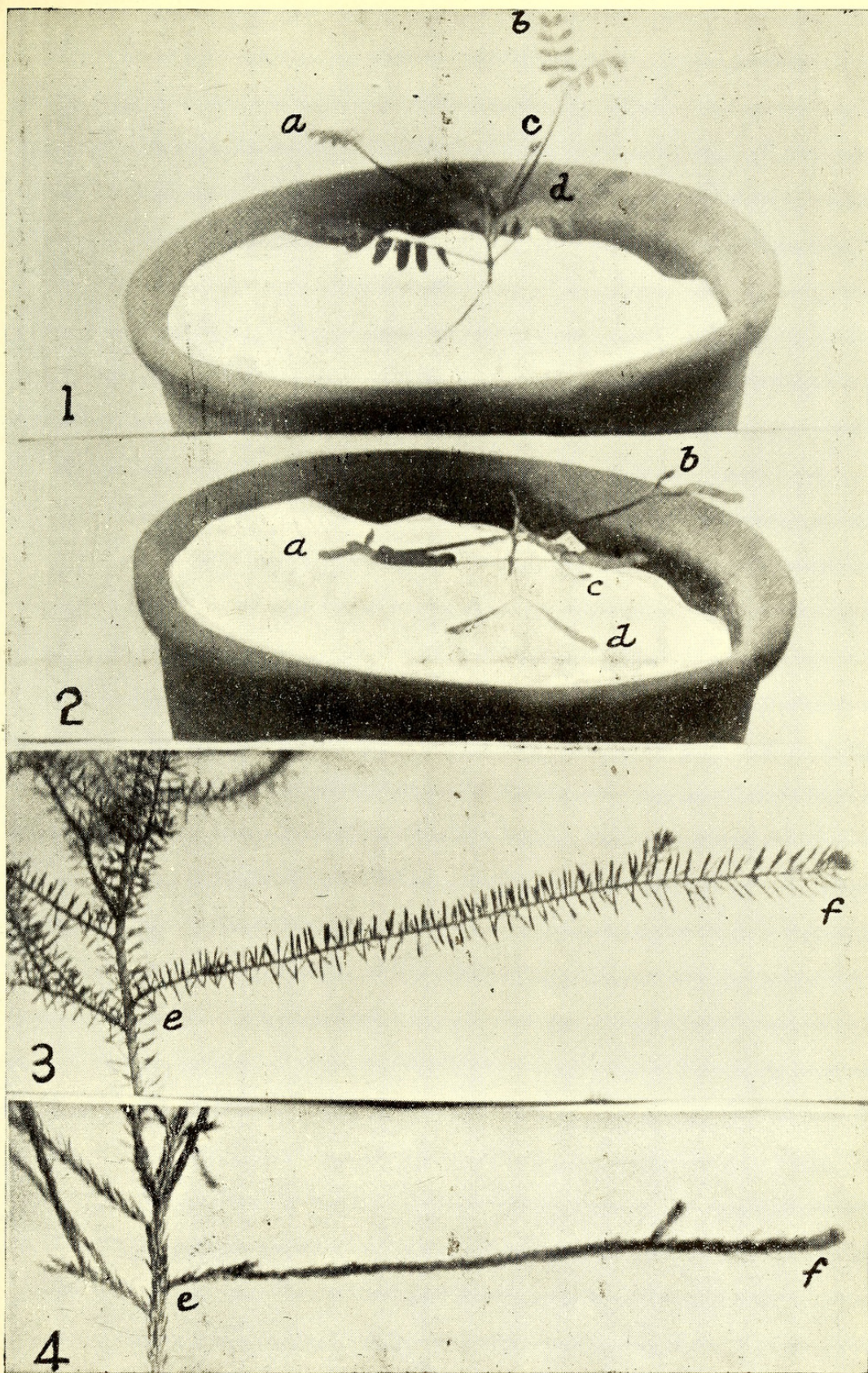
Nocturnal Movement of Early Leaves.

The closing up at night and re-opening in the morning of leaflets on plants of the Family Leguminosæ, which includes the genus *Acacia*, is a matter of world-wide knowledge, but in previous papers of this series it has been pointed out that the phyllodes or modified leaf axes of certain *Acacias* also respond to changes from light to darkness, and, as evening approaches, close up towards the stem.* (Plate IV., Figs. 3 and 4.)

A popular expression used to describe the practice of a leaf in nightly closing up its leaflets is that the leaf goes to sleep. From observations made during last summer it has now been found that the early leaves of many species of *Acacia*, probably all, not only go to sleep, but it may also be said that they first go to bed and then to sleep.

The observations disclose that as the afternoon advances, the first to perhaps the tenth leaves of many *Acacia* seedlings gradually develop a downward movement radiating from the point of contact with the stem. This motion continues until the terminal portion of the leaf

* This Journ. Vol. LV. 106 (1921), and Vol. LVI. 131 (1922).



Acacia sclerosperma (1 - 2) by day and night, seven-inch pot ;
Acacia Conferta (3 - 4) by day and night. (e to f eight inches).

is resting on the ground, while the leaflets are still spread open, and all of this takes place before sundown. After this, the leaflets gradually close up in pairs, and the leaves lie there till morning, when the leaflets again unfold and the leaves slowly resume their daily position, usually reaching their maximum height somewhere between 8.30 and 10 a.m., according to the sunlight available. (Plate IV., Figs. 1 and 2.)

This movement is more accentuated, and its amplitude or extent greater in the summer, especially on sunny days, than in the winter. The motive for this sinking down of the early leaves, and also of the closing up of the leaflets, is probably similar in both cases, and may be a natural provision for sheltering and protecting the delicate leaflets, as well as the tender and somewhat fragile young leaves. Obviously it is the lowest leaf which has the greatest proportion of its under surface resting on the ground when the leaves are depressed, the amount which comes in contact with the soil diminishing with each leaf in an ascending scale, until, in some plants the terminal point only, of perhaps a number seven leaf, will touch the earth, while number eight may just fail to reach it.

The feature is not confined to the genus *Acacia*, for leaves of *Mimosa pudica*, a Sensitive plant, were observed to act in a similar manner, and furthermore, it is well known that mature leaves and branchlets of this and other species of *Mimosa*, when touched at any time in the day, will at once collapse and sink down.

So great may be the amplitude of the movement of the leaf that in the case of one species of *Acacia* from Western Australia it was found to be 8.5 cm. for a number five leaf of the same length.

Measure of Force.—In view of the evidence of force or strength exerted by the young leaves in their efforts to accommodate themselves to the changing conditions of light and darkness, it was decided to secure some measure of such strength. Small loops of copper wire of known weight were placed on the end of the petiole at the base of the apical pair of pinnæ, and the height measured to which the terminal point of the leaf was carried. With a weight of 0.2276 grams, or 3.5124 grains placed at 6 cm. from the base of an *Acacia* leaf 8 cm. long, the terminal point of the leaf in one case was carried upwards 6.5 cm., or just over two and a half inches.

In the following table giving records of some of the leaf movements, the plants shown as species Nos. 2 and 5 were raised from seeds collected in the Gascoyne River district, Western Australia, by Mr. E. C. Andrews, and have not yet been identified. They belong to the section *Uninerves*, and somewhat resemble seedlings of *Acacia salicina*, while they show affinities with *A. sclerosperma*.

Name of species.	No. of leaf.	Length of leaf.	Length of petiole.	Greatest width of petiole.	Extent of terminal movement without weight.	Extent of terminal movement with weight.	Weight in grams. (1 gr. = 15.43234 grains).
<i>Acacia</i>							
<i>trineura</i>	6	6.7cm.	5cm.	7mm.	—	4.5cm.	0.1594
do	7	6cm.	4.3cm.	5.5mm.	—	4.5cm.	0.0762
do	7	6.5cm.	5.5cm.	9mm.	—	6.5cm.	0.1076
do	5	4cm.	2.4cm.	1mm.	4.5cm.	2.7cm.	0.1200
Sp. No. 2	5	8cm.	5.5cm.	3mm.	—	5cm.	0.1650
do	6	7.5cm.	6cm.	3.5mm.	—	6cm.	0.1808
do	7	8cm.	6cm.	4mm.	8cm.	6.5cm.	0.2276
Sp. No. 5	4	9cm.	6cm.	3mm.	—	1.5cm.	0.1808
do	5	8.5cm.	6cm.	2.5mm.	8.5cm.	5cm.	0.1650
do	6	8.5cm.	6cm.	3mm.	6cm.	4cm.	0.1594
do	5	8cm.	6cm.	2mm.	—	3cm.	0.1200
do	9	11cm.	9cm.	3.2mm.	—	4cm.	0.1200
<i>concinna</i>	?	12cm.	—	1.5mm.	—	5.5cm.	0.2276
do	?	12cm.	—	1.5mm.	—	3cm.	0.3320
<i>Mimosa</i>							
<i>pudica</i>	?	4.5cm.	3.7cm.	1.2mm.	5.2cm.	4.2cm.	0.3320



Acacia pumila (1 - 3) ; *Acacia bidentata* (4 - 6) ; *Acacia obliqua* (7 - 9) ;
Acacia rhodoxylon (10 - 12).
Two-thirds Natural Size,

Closing Up of Cotyledons at Night.

In addition to the closing up of leaflets and phyllodes at night, it has recently been noticed that the same habit extends to the cotyledons of a few species, but so far it has been observed only in the case of species which have large fleshy petiolate cotyledons.

Acacia Farnesiana.—The terminal points of cotyledons were 2.60 cm. apart in the forenoon, and 2.10cm. at night.

A. Bidwilli.—The terminal points of four pairs of cotyledons gave the following measurements, forenoon and night respectively :—(a) 2.2cm., 1.2cm.; (b) 2.8cm., 2.5cm.; (c) 2.5cm., 1.8cm.; (d) 3cm., 2cm., the latter showing the combined movement of the two cotyledons to be 1cm.

Description of Seedlings.

PUNGENTES—(Plurinerves).

ACACIA PUMILA, Maiden and Baker.* Seeds from Wentworth Falls, New South Wales (A. A. Hamilton), (Plate V., Numbers 1 to 3).

Seeds brownish-grey, oblong, about 4 mm. long, 2 mm. broad, 1.5 mm. thick.

Hypocotyl terete, reddish-green to brown and brownish-red, swelling into root, 1 to 2.3 cm. long, 2 to 2.3 mm. thick at base, 0.8 to 1.5 mm. at apex.

Cotyledons sessile, auricled, oblong, apex rounded, 5 mm. long, 2.2 to 2.5 mm. broad, upperside dark green, underside reddish-brown, sometimes with one or two raised lines, becoming horizontal in a few days.

Stem terete, green, hirsute to pubescent. First internode 0.5 mm.; second to fifth 0.5 to 1 mm.; sixth to eighth 1 to 2 mm.; ninth to tenth 2 to 7 mm.

* Proc. Linn. Soc. N.S.Wales, Vol. XX., 385 (1895).

Leaves—No. 1. Abruptly pinnate, petiole about 4 mm., glabrous to pilose; leaflets two pairs, oblong, shortly mucronate, apical pair often obovate, 5 to 8 mm. long, 2.5 to 3.5 mm. broad, upperside green, underside pale green; rachis 3 to 5 mm., with terminal seta; stipules small, acuminate.

No. 2. Abruptly bipinnate, petiole 4 to 6 mm., upperside sometimes channelled, with terminal seta; leaflets two pairs, the basal pair oblong-acuminate, the apical pair obovate, mucronate, 2 to 4 mm. long, 1.5 to 3 mm. broad; rachis 4 to 6 mm., with terminal seta.

Nos. 3 to 5. Abruptly bipinnate, petiole 6 mm. to 1.2 cm., glabrous to pilose; leaflets two pairs; rachis 4 to 8 mm.; stipules acuminate, 1 mm.

Nos. 6 to 9. Abruptly bipinnate, petiole 9 mm. to 2.2 cm., dilated up to 1 mm. broad, glabrous to pilose; leaflets two to three pairs, the apical pair obovate; rachis 7 mm. to 1 cm.

Nos. 10 to 12. These may be phyllodes, or abruptly bipinnate, petiole 1.2 to 2.3 cm., dilated up to from 1 to 2.5 mm. broad, with two or three strong nerves, pilose; leaflets two to three pairs, margins sometimes ciliate; rachis 5 to 9 mm.; stipules 1.5 mm.

Nos. 13 to 18. Linear or lanceolate rigid pungent pointed, slightly falcate phyllodes, 1.3 to 2.5 cm. long, 2 to 3 mm. broad, with three strong longitudinal nerves, the central one often the most prominent, sometimes with a much finer one between the central and lower veins, margins ciliate to hirsute.

UNINERVES—(Triangulares).

ACACIA BIDENTATA Benth. Seeds from Wongan Hills, Western Australia (W. M. Carne). (Plate V, Numbers 4 to 6.)

Seeds brownish-black to black, oblong-oval to obovate, 2.5 to 3 mm. long, 1.5 to 2 mm. broad, about 1 mm. thick.

Hypocotyl terete, reddish-brown above soil, 1 to 1.6 cm. long, 1.5 mm. thick at base, about 0.7 mm. thick at apex.

Cotyledons sessile, oblong, apex rounded, 3 mm. long, 1 mm. broad, upper side and under side yellowish-brown, with several raised longitudinal lines, remaining erect and falling in a few days.

Stem at first slightly angular, becoming terete, greyish-green, hirsute to pubescent. First internode 0.5 mm.; second to third 0.5 to 1 mm.; fourth to sixth 1 to 3 mm.; seventh to ninth 2 to 9 mm.

Leaves—No. 1. Abruptly pinnate, forming an opposite pair (in one instance only a single leaf appeared), petiole 2 to 3 mm., glabrous; leaflets two pairs, oblong-acuminate, 3 to 4 mm. long, 1 to 2 mm. broad, upper side green, under side paler; rachis 1 to 2 mm., with terminal seta; stipules small.

No. 2. Abruptly bipinnate, petiole 3 to 5 mm., glabrous to pilose, with terminal seta; leaflets two to three pairs, oblong, shortly acuminate, apical pair usually obovate, 2 to 3 mm. long, 1 to 2 mm. broad, upper side green; rachis 3 to 4 mm., with terminal seta.

Nos. 3 and 4. Abruptly bipinnate, petiole 6 mm. to 1.5 cm. with a strong nerve along the lower margin in the case of No. 4; leaflets three to four pairs; rachis 4 to 8 mm.

Nos. 5 and 6. No. 6 may be a phyllode, or both may be abruptly bipinnate, petiole 1.3 to 2 cm., 2 to 5 mm. broad, with a main nerve along or close to the lower margin, and a second finer one extending for some distance above, the dilatation being almost wholly above the strong vein, glabrous to pilose; leaflets three to four pairs, up to 5 and

6 mm. long, 2.5 mm. broad, the terminal pair obovate; rachis 7 mm. to 1.3 cm.; stipules 1 mm., acuminate.

Nos. 7 to 10. No. 7 may be bipinnate, or all may be irregularly obovate to cuneate phyllodes, 1.5 to 2 cm. long, 6 mm. to 1 cm. broad, venation very similar to that of the petiole of No. 6, the upper portion usually protruding beyond the point of the main nerve, the margin sinuate with the appearance of having been eaten into by some insect.

UNINERVES—(*Brevifoliae*).

ACACIA OBLIQUA A. Cunn. Seeds from Cassilis, New South Wales (W. H. Cullen). (Plate V, Numbers 7 to 9.)

Seeds black, irregularly oval to oblong-oval, 3 to 4 mm. long, about 2 mm. broad, 1 to 1.5 mm. thick.

Hypocotyl terete, greenish-brown above soil, 1.3 to 2 cm. long, about 2 mm. thick at base, 1 mm. at apex.

Cotyledons sessile, oval-oblong to oblong, very slightly auricled, 5 to 6 mm. long, 3 mm. broad, upperside green, underside pale green, with raised line along centre.

Stem at first angular, becoming terete, green, pilose to hirsute. First internode 0.5 mm.; second 1 to 3 mm.; third and fourth 2 to 6 mm.; fifth to seventh 3 to 6 mm.; eighth to twelfth 2 to 7 mm.

Leaves—No. 1. Abruptly pinnate, petiole 3 to 4 mm., green, glabrous; leaflets two pairs, the basal pair oblong-acuminate or sometimes obovate, the apical pair obovate, 4 to 5 mm. long, 2 to 3 mm. broad, midrib distinct on underside, upperside green, underside paler; rachis 2 to 3 mm., with terminal seta; stipules minute.

No. 2. Abruptly bipinnate, petiole 5 to 6 mm., green, glabrous, with terminal seta; leaflets two to three pairs, obovate, the basal pair sometimes oblong-acuminate, 3 to 4 mm. long, 1.5 to 3 mm. broad, upperside green; rachis 4 to 5 mm., with terminal seta.



Acacia gladiiformis (1 - 3); *Acacia retinodes* (4 - 6).

Slightly Under One-half Natural Size.

Nos. 3 to 6. Abruptly bipinnate, petiole 3 to 6 mm.; leaflets two to four pairs; rachis 4 to 8 mm.; stipules flat acuminate scales, 1 mm. long.

Nos. 7 to 10. Abruptly bipinnate, petiole 5 to 8 mm., No. 10 sometimes dilated to 1 mm. broad, with a strong nerve along the lower margin, pilose to hirsute; leaflets four to five pairs, chiefly obovate, the basal pair often very small, margins sometimes ciliate; rachis 2 to 7 mm.

Nos. 11 to 14. These may be phyllodes, or abruptly bipinnate, petiole 7 to 8 mm. long, dilated up to 2 mm. broad, with a prominent vein along or near the lower margin, the lamina on the upper side in some cases extending beyond the terminal seta, sometimes as much as 2 mm., but in any such case one pinna may be missing, although the terminal seta is present; leaflets four to five pairs; rachis 6 to 8 mm.

Nos. 15 to 20. Obliquely obovate phyllodes, 5 mm. to about 1 cm. long, about 3 mm. broad, with a fairly conspicuous midrib below the centre, and a shorter secondary very indefinite nerve above diverging from the base, the midrib terminating in a small recurved point beyond which the upper portion of the lamina often extends.

UNINERVES—(Racemosæ).

ACACIA RETINODES Schlecht. Seeds from Mount Lofty, Adelaide (E. H. Ising). (Plate VI, Numbers 4 to 6.)

Seeds black, oblong, 4 to 5 mm. long, 1.7 to 2.5 mm. broad, 1 to 1.5 mm. thick.

Hypocotyl terete, pale green above soil, 8 mm. to 1.6 cm. long, about 1.5 mm. thick at base, 1 mm. at apex.

Cotyledons sessile, oblong, apex rounded, 5 mm. long, 2.5 mm. broad, upperside green, underside pale green, with one or two raised lines.

Stem at first angular, becoming terete, green, glabrous. First internode 0.5 mm.; second to third 1 to 2 mm.; fourth to sixth 3 to 5 mm.; seventh to ninth 2 mm. to 2.8 cm.

Leaves—No. 1. Abruptly pinnate, petiole 2 to 3 mm., green, glabrous; leaflets three to four pairs, oblong-acuminate, 4 to 5 mm. long, 1 to 2 mm. broad, upper side green, underside paler; rachis 3 to 5 mm., with terminal seta.

No. 2. Abruptly bipinnate, petiole 5 to 7 mm., with terminal seta; leaflets three to four pairs, oblong-acuminate, the apical pair sometimes obovate, 3 to 5 mm. long, 1 to 2 mm. broad; rachis 5 to 7 mm., with terminal seta.

Nos. 3 to 5. Abruptly bipinnate, petiole 6 mm. to 2 cm.; leaflets three to six pairs; rachis 8 mm. to 1.6 cm.

Nos. 6 to 8. No. 8 may be a phyllode, or all may be abruptly bipinnate, sometimes with two pairs of pinnae, petiole 1.7 to 3 cm., with a strong nerve along the lower margin, sometimes dilated to 2.5 mm. broad and with a small gland in the case of No. 8; leaflets six to nine pairs, up to 9 mm. long; rachis 1.9 to 3.1 cm.; stipules flat, acuminate, up to 1.5 mm.

Nos. 9 to 12. Linear-lanceolate, prominently 1-nerved phyllodes, much narrowed towards the base, decurrent on the stem, with purple tips, becoming green.

UNINERVES—(Racemosæ).

ACACIA GLADIIFORMIS A. Cunn. "Sword Wattle". Seeds from Cassilis, New South Wales (W. H. Cullen). (Plate VI, Numbers 1 to 3.)

Seeds jet-black, oblong to oblong-obovate, about 5 mm. long, 3 to 3.5 mm. broad, 1.5 mm. thick.

Hypocotyl terete, brownish-red above soil, 2 to 3 cm. long, about 2 mm. thick at base, 1 mm. at apex.

Cotyledons sessile, auricled, oblong, apex rounded, 6 to 7 mm. long, 3 mm. broad, upperside reddish-green, underside red, with three raised longitudinal lines, soon becoming revolute and cylindrical.

Stem at first angular, becoming terete, green to brownish-green, glabrous. First internode 0.5 mm.; second 0.5 to 1 mm.; third 1 to 2 mm.; fourth 2 to 5 mm.; fifth and sixth 2 mm. to 1 cm.; seventh to ninth 4 mm. to 1.6 cm.

Leaves—No. 1. Abruptly pinnate, petiole 3 to 4 mm., often with gland on upper margin, glabrous; leaflets three to four pairs, oblong-acuminate, 5 mm. to 1 cm. long, 2 to 3 mm. broad, upperside often at first reddish-green, becoming green, underside red; rachis 5 mm. to 1 cm., with terminal seta.

No. 2. Abruptly bipinnate, petiole 7 mm. to 1.1 cm., usually with gland, glabrous, with terminal seta; leaflets three to four pairs oblong-acuminate, the apical pair sometimes obovate, the basal pair often small, 2 to 9 mm. long, 1 to 4 mm. broad, upperside green, underside red to reddish-brown; rachis 6 mm. to 1.4 cm., glabrous, with terminal seta; stipules small, flat, acuminate.

Nos. 3 and 4. Abruptly bipinnate, petiole 1.5 to 4.4 cm., with gland; leaflets four to nine pairs, sometimes up to 1.2 cm. long and 5 mm. broad, the apical pair obovate; rachis 1.4 to 4 cm.

Nos. 5 and 6. Abruptly bipinnate, sometimes with two pairs of pinnae, gland on upper margin, with strong nerve along lower margin, No. 6 may be dilated to 2 and sometimes 5 mm. broad; leaflets seven to thirteen pairs; rachis 1.7 to 5 cm.

Nos. 7 and 8. These may be phyllodes, or abruptly bipinnate, petiole 6.5 to 12.2 cm. long, sometimes up to 9 mm. broad in No. 7, and 1.1 cm. broad in No. 8, with

the midrib along or very slightly below the centre, and a strong nerve along the margins, with a gland on the upper margin, or sometimes six glands on No. 8; leaflets seven to thirteen pairs; rachis 2.5 to 4 cm.; stipules 1 mm. long.

Nos. 9 to 12. Linear-lanceolate phyllodes, from about 9 to 14 cm. long, 5 mm. to 1.5 cm. broad, much narrowed towards the base, with a terminal small hooked point, the midrib often slightly above the centre of the lamina as in the case of *A. falcata* and which is not a common occurrence in early phyllodes,* the margins thickened, often with three to five glands; in one case No. 8 had six and a No. 10 had nine glands. Phyllodes above Nos. 10 or 12, and sometimes earlier ones, curve upwards.

UNINERVES—(Racemosæ).

ACACIA SUBULATA Bonpl. Seeds from Warialda, New South Wales (J. H. Maiden). (Plate VII, Numbers 1 to 3.)

Seeds dull black, oblong, the smaller ones oblong-oval, 4 to 6 mm. long, 3 mm. broad, 1 to 1.5 mm. thick.

Hypocotyl terete, brownish-green above the soil, 1.5 to 2.5 cm. long, about 1.5 mm. thick at base, 1 mm. at apex.

Cotyledons sessile, auricled, oblong, apex rounded, 6 mm. long, 3 mm. broad, upperside green, underside pale green, with a few raised lines, soon becoming horizontal and revolute.

Stem at first angular, becoming terete, glabrous. First internode 0.5 to 1 mm.; second 1 to 3 mm.; third 2 to 8 mm.; fourth to fifth 4 mm. to 1.9 cm.; sixth to ninth 8 mm. to 2 cm.

Leaves—No. 1. Abruptly pinnate, petiole 3 to 5 mm., glabrous; leaflets three to five pairs, oblong-acuminate,

* This Journ., Vol. L., 151 (1916).



Acacia subulata (1 - 3) ; *Acacia sparsiflora* - 6)

Three-fifths Natural Size.

apical pair often obovate, mucronate, 4 to 8 mm. long, 1 to 4 mm. broad, upperside green, underside pale green; rachis 6 mm. to 1.4 cm., with terminal seta.

No. 2. Abruptly bipinnate, petiole 1 to 1.7 cm., with terminal seta; leaflets three to four pairs, oblong-acuminate, apical pair obovate, mucronate, 2 to 7 mm. long, 1 to 4 mm. broad, upperside green; rachis 6 mm. to 1.2 cm., with terminal seta; stipules very small.

Nos. 3 and 4. Abruptly bipinnate, petiole 1.4 to 4 cm., sometimes with a gland on No. 4; leaflets four to seven pairs; rachis 1.2 to 2.4 cm.

No. 5. This may be a phyllode, or abruptly bipinnate, sometimes with two pairs of pinnae, petiole 3.5 to 7 cm., with a strong nerve along the lower margin, a gland on upper margin; leaflets seven to eight pairs; rachis 1.6 to 2.5 cm.

Nos. 6 to 10. Very narrow linear phyllodes, 12 to 17 cm. long, 1 to 1.5 mm. broad, with a central nerve.

JULIFLORÆ—(Falcatae).

ACACIA SPARSIFLORA Maiden.* Seeds from Eidsvold, Queensland (Dr. T. L. Bancroft, per J. H. Maiden). (Plate VII, Numbers 4 to 6.)

Seeds shiny black, oblong, about 5 mm. long, 2 mm. broad, about 1 mm. thick.

Hypocotyl terete, green to greenish-brown and brownish-red above soil, 2 to 3 cm. long, 0.8 to 1 mm. thick at base, 0.5 to 0.8 mm. at apex.

Cotyledons sessile, auricled, oblong, apex rounded, 6 to 8 mm. long, 2 to 2.5 mm. broad, upperside green, underside pale green.

Stem at first angular, becoming terete, pilose to hirsute.

* This Journ., Vol. LIII., 221 (1919).

First internode 0.5 mm.; second 1 to 2 mm.; third and fourth 2 to 7 mm.; fifth to seventh 3 to 9 mm.; eighth to tenth 4 to 9 mm.

Leaves—No. 1. Abruptly pinnate, petiole 3 to 5 mm., glabrous or with a few scattered hairs; leaflets two pairs, 5 to 8 mm. long, 2 to 4 mm. broad, oblong-acuminate to obovate, sometimes mucronate, upper side green, underside pale green to sometimes reddish-green; rachis 2 to 4 mm., with terminal seta.

No. 2. Abruptly bipinnate, petiole 6 mm. to 1 cm., with a few scattered hairs, terminal seta present; leaflets two to three pairs, oblong-acuminate to obovate, 2 to 4 mm. long, 1 to 2 mm. broad; rachis 3 to 4 mm., with terminal seta; stipules small.

Nos. 3 and 4. Abruptly bipinnate, petiole 1 to 1.9 cm., pilose to hirsute, dilated to 0.5 mm. broad; leaflets three to four pairs; rachis 3 mm. to 1 cm.; stipules up to 1.5 mm., flat, acuminate.

Nos. 5 and 6. Abruptly bipinnate, petiole 1.5 to 3.2 cm. long, up to 7 mm. broad, with a fairly prominent nerve along or near the lower margin and several finer ones above, pilose, margins ciliate; leaflets three to five pairs; rachis 7 mm. to 1.1 cm.

Nos. 7 to 10. Nos. 8 to 10 may be phyllodes, or all abruptly bipinnate, petiole 1.6 to 4 cm. long, up to 7 mm. broad, with a fairly prominent midrib near the centre of the lamina and numerous finer veins on both sides of it, pilose, margins ciliate; leaflets four to five pairs; rachis 6 mm. to 1 cm.

Nos. 11 to 15. These may be phyllodes, or abruptly bipinnate, petiole up to 4.3 cm. long, and up to 9 mm. broad, pilose; leaflets five pairs.

Nos. 16 to 20. Lanceolate phyllodes, narrowed at both ends, often flexuose, 3 to 5 cm. long, up to 1 cm. broad, usually with a fairly prominent nerve along the centre, a second vein above, a little less prominent, and a third still less prominent below the central nerve, the rest of the lamina closely striated with very fine parallel veins, pilose, the margins slightly ciliate.

JULIFLORÆ—(Falcatæ).

ACACIA RHODOXYLON Maiden.* Seeds from Eidsvold, Queensland (Dr. T. L. Bancroft, per J. H. Maiden). (Plate V, Numbers 10 to 12.)

Seeds shiny black, oblong-oval to oval, about 3 to 4 mm. long, 2.5 mm. broad, 1 to 1.5 mm. thick.

Hypocotyl creamy to pale brown, 1.5 to 2.5 cm. long, about 1.5 mm. thick at base, 0.8 to 1 mm. at apex, spreading into flange at root.

Cotyledons sessile, auricled, oval-oblong, about 5 mm. long, 3 to 3.5 mm. broad, upperside green, underside pale green.

Stem at first angular, becoming terete, glabrous. First internode 0.5 mm.; second 0.5 to 1 mm.; third and fourth 1 to 2 mm.; fifth and sixth 2 to 3 mm.; seventh and eighth 3 to 5 mm.

Leaves—No. 1. Abruptly pinnate, petiole 2 to 3 mm.; leaflets two, rarely three pairs, 3 to 6 mm. long, 1 to 2.5 mm. broad, oblong-acuminate, the apical pair sometimes obovate, upperside green, underside paler; rachis 2 mm., with terminal seta.

No. 2. Abruptly bipinnate (in one instance this leaf was simply pinnate), petiole 2 to 5 mm., with terminal seta; leaflets two pairs, 2 to 5 mm. long, 1 to 2 mm. broad, oblong-acuminate, upperside green; rachis 2 to 4 mm., with terminal seta.

* This Journ., Vol. LIII., 223 (1919).

Nos. 3 and 4. Abruptly bipinnate, petiole 4 mm. in No. 3, to 1.7 cm. in No. 4, dilated to 1 mm. broad in the case of the latter, with a prominent vein along the lower margin and a few much finer ones above, glabrous; leaflets two to three pairs; rachis 2 to 5 mm.

Nos. 5 to 8. These may be oblong-lanceolate, slightly falcate phyllodes, narrowed at both ends, from about 2 to 5 cm. long, up to 7 mm. broad, finely striate with numerous parallel veins, with the central nerve the most prominent, and sometimes one above and another below a little less conspicuous than the central vein.

BIPINNATÆ—(Botryocephalæ).

ACACIA DEALBATA Link, "Silver Wattle". Seeds from Cooma, New South Wales (J. H. Maiden). (Plate VIII, Numbers 1 to 3.)

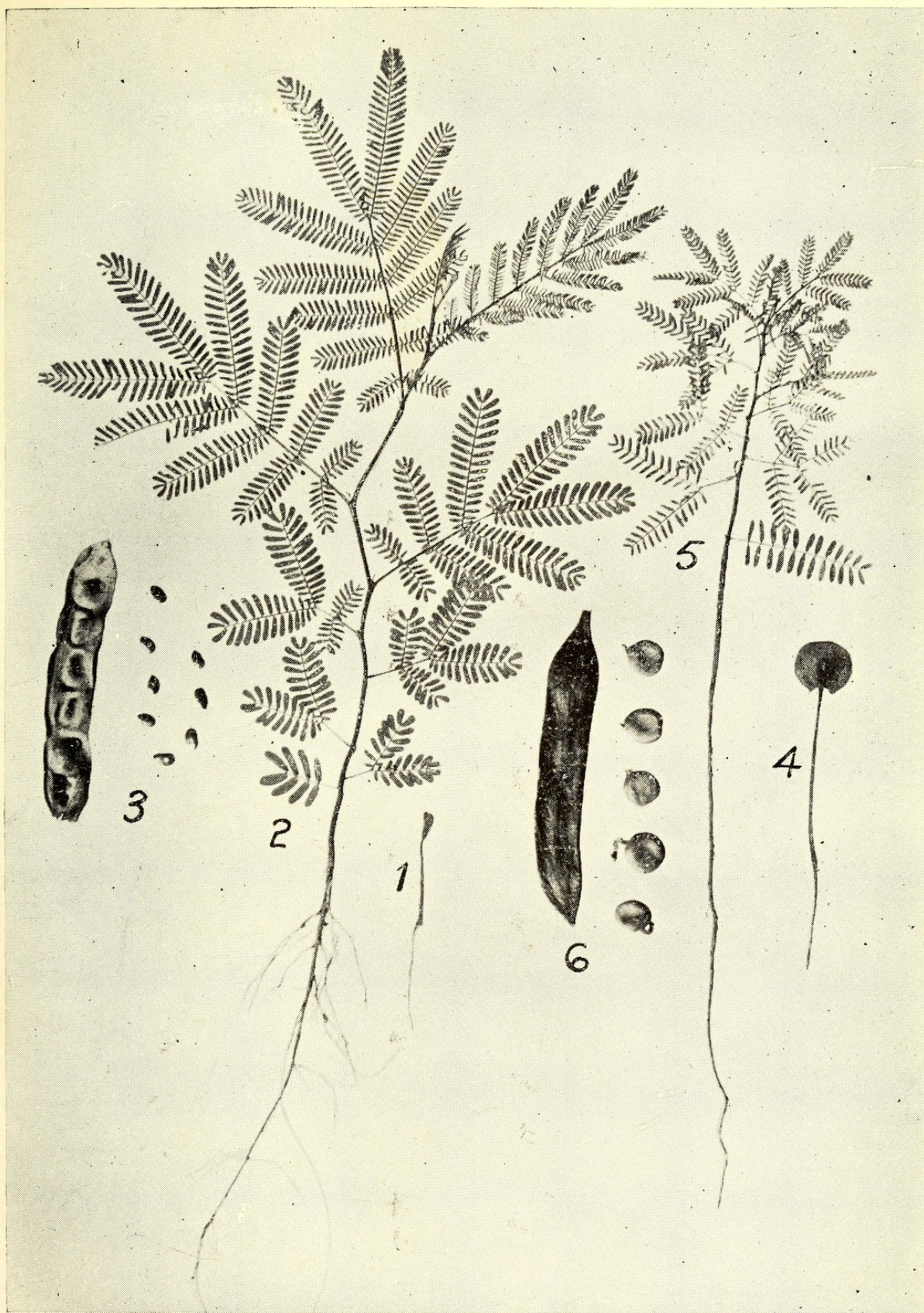
Seeds shiny black, oblong to obovate, 4 to 5 mm. long, 2.5 to 3 mm. broad, about 1.5 mm. thick.

Hypocotyl terete, pink to brownish-red above soil, 1.5 to 2.5 cm. long, about 2 mm. thick at base, 1 mm. at apex.

Cotyledons sessile, auricled, oblong, apex rounded, 5 to 6 mm. long, 2 to 3 mm. broad, upperside green, underside reddish-brown, with one or two raised lines, soon becoming revolute and cylindrical.

Stem at first slightly angular, soon becoming terete, greenish-brown to reddish-brown, slightly hoary. First internode 0.5 to 1 mm.; second 2 to 4 mm.; third 4 to 7 mm.; fourth to sixth 5 mm. to 1.5 cm.; seventh to ninth 1.2 to 2.5 cm.

Leaves—No. 1. Abruptly pinnate, petiole 2 to 5 mm., green to greenish-brown and brownish-red, rarely with a small gland; leaflets four to five pairs, oblong-acuminate to obovate, 4 to 7 mm. long, 1 to 2 mm. broad, upperside green, underside pale green to red; rachis 5 mm. to 1 cm., with terminal seta.



Acacia dealbata (1 - 3) ; *Acacia Bidwilli* 4 - 6).
About Half Natural Size.

No. 2. Abruptly bipinnate, petiole 4 to 8 mm., sometimes with gland, glabrous, with terminal seta; leaflets five to ten pairs, oblong-acuminate to obovate, 3 to 5 mm. long, 1 to 2 mm. broad, upperside green; rachis 5 mm. to 1.6 cm., with terminal seta.

Nos. 3 and 4. Abruptly bipinnate, often with two pairs of pinnae, common petiole 7 mm. to 1.9 cm., often with gland, pilose; leaflets seven to fourteen pairs; rachis up to 1.8 cm.

Nos. 5 and 6. Abruptly bipinnate, with from two to four pairs of pinnae, common petiole 1.2 to 3.1 cm., with a few scattered hairs, a gland below the base of each pair of pinnae; leaflets twelve to eighteen pairs, up to 6 mm. long, 1 to 1.5 mm. broad, oblong, shortly acuminate; rachis up to 3.6 cm.

Nos. 7 and 8. Abruptly bipinnate, with from three to seven pairs of pinnae, common petiole 3 to 6 cm.; leaflets twelve to twenty-seven pairs; rachis up to 3.8 cm.

Nos. 9 to 12. Abruptly bipinnate, with from four to ten pairs of pinnae, common petiole 3.5 to 6.4 cm., a gland below the base of each pair of pinnae but more distant from the basal pair, greenish-brown, hoary, with a minute pubescence; leaflets nineteen to thirty-two pairs; rachis up to 4.5 cm.

A later leaf may have twenty-seven pairs of pinnae and forty-three pairs of leaflets, the leaflets being of an ashy grey colour, about 4 mm. long, 0.7 mm. broad.

GUMMIFERAE.

ACACIA BIDWILLI Benth. Seeds from Eidsvold, Queensland (Dr. T. L. Bancroft, per J. H. Maiden), Almaden and Georgetown, North Queensland. (Plate VIII, Numbers 4 to 6.)

Seeds light brown, oval to almost orbicular, flat, 7 mm.

to 1.1 cm. long, 6 mm. to 1 cm. broad, about 2 mm. thick, areole distinct, 4.5 to 6 mm. long.

Hypocotyl terete, creamy to very pale green, 2.5 to 4 cm. long, about 2 mm. thick at base, 1.3 to 1.8 at apex.

Cotyledons petiolate, petiole 1.5 to 2 mm., deeply auricled, fleshy, irregularly orbicular to almost square, 9 mm. to 1.4 cm. long, 8 mm. to 1.4 cm. broad, green on both sides.

The cotyledons of this species may partly close up at night, reducing the distance apart of their terminals as much as 1 cm. in some cases.

Stem terete, green to greenish-brown, glabrous. First internode 0.5 to 4 mm.; second 1 mm. to 1.4 cm.; third to fifth 3 to 6 mm.; sixth to eighth 4 to 6 mm.

Leaves—No. 1. Abruptly bipinnate, petiole 3 to 4 mm., glabrous; leaflets eight to twelve pairs, oblong-acuminate, 2 to 5 mm. long, 1 to 1.5 mm. broad, upperside green, underside pale green; rachis 1 to 2.6 cm., with terminal seta; stipules 1 mm.

No. 2. Abruptly bipinnate, petiole 5 to 8 mm., with terminal seta; leaflets eight to twelve pairs, 2 to 4 mm. long, 1 mm. broad; rachis 1 to 2 cm., with terminal seta.

Nos. 3 to 5. Abruptly bipinnate, usually with two pairs of pinnæ, common petiole 3 mm. to 1.2 cm., glabrous; leaflets nine to eleven pairs; rachis 8 mm. to 2 cm., stipules spinescent, 3 mm.

Nos. 6 to 9. Abruptly bipinnate, No. 8 often having three pairs of pinnæ and No. 9 four pairs, common petiole 6 mm. to 2 cm.; leaflets ten to thirteen pairs; rachis 9 mm. to 1.7 cm.; stipules spinescent, 4 mm.

The plants raised were not very robust, and most of them died during the winter months.

EXPLANATION OF PLATES.

PLATE IV.

1. *Acacia sclerosperma* ?, at midday, with leaves erect.
2. The same plant at nightfall, with leaves resting.
3. *Acacia conferta* at midday, with phyllodes spread.
4. The same twig at nightfall, with phyllodes closed up.

PLATE V.

Acacia pumila Maiden and Baker.

1. Cotyledons. Wentworth Falls, New South Wales (A. A. Hamilton).
2. Pinnate leaf, bipinnate leaves and phyllodes.
3. Pod and seeds.

Acacia bidentata Benth.

4. Cotyledons and opposite pair of pinnate leaves.
Western Australia (W. M. Carne).
5. Opposite pair of pinnate leaves, bipinnate leaves and phyllodes.
6. Seeds.

Acacia obliqua A. Cunn.

7. Cotyledons, Cassilis, New South Wales (W. H. Cullen).
8. Pod and seeds.
9. Pinnate leaf, bipinnate leaves and phyllodes.

Acacia rhodoxylon Maiden.

10. Cotyledons, Eidsvold, Queensland (Dr. T. L. Bancroft per J. H. Maiden).
11. Pinnate leaf, bipinnate leaves and phyllodes.
12. Pod and seeds.

PLATE VI.

Acacia gladiiformis A. Cunn.

1. Cotyledons, Cassilis, New South Wales (W. H. Cullen).
2. Pinnate leaf, bipinnate leaves and phyllodes.
3. Pod and seeds.

Acacia retinodes Schlecht.

4. Cotyledons and pinnate leaf. Adelaide (E. H. Ising).
5. Pinnate leaf, bipinnate leaves and phyllodes.
6. Pod and seeds.

PLATE VII.

Acacia subulata Bonpl.

1. Cotyledons. Warialda, New South Wales (J. H. Maiden).
2. Pinnate leaf, bipinnate leaves and phyllodes.
3. Pod and seeds.

Acacia sparsiflora Maiden.

4. Cotyledons and pinnate leaf. Eidsvold, Queensland, (Dr. T. L. Bancroft, per J. H. Maiden).
5. Pinnate leaf, bipinnate leaves and phyllodes.
6. Seeds.

PLATE VIII.

Acacia dealbata Link.

1. Cotyledons. Cooma, New South Wales (J. H. Maiden).
2. Pinnate leaf and bipinnate leaves.
3. Pod and seeds.

Acacia Bidwilli Benth.

4. Cotyledons, Eidsvold, Queensland (Dr. T. L. Bancroft, per J. H. Maiden).
5. Pinnate leaf and bipinnate leaves.
6. Pod and seeds.



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