

ACACIA SEEDLINGS, PART II.

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With Plates I to IV.

[Read before the Royal Society of N.S. Wales, August 2, 1916.]

SYNOPSIS:

SEQUENCE IN THE DEVELOPMENT OF LEAVES.

VITALITY OF SEED IN SEA-WATER.

DESCRIPTIONS OF SEEDLINGS.

Sequence in the Development of Leaves.

It was pointed out in a previous paper (Part I), on *Acacia* Seedlings, read before this Society in July 1915, that in by far the greater number of about sixty *Acacia* species, of which seedlings had been raised, the cotyledons were succeeded by one simply-pinnate leaf, which was followed by a varying number of bipinnate leaves, but that in the case of four species it was found that an opposite pair of simply-pinnate leaves appeared next after the cotyledons. The examination of fifteen species more has revealed two further species which have an opposite pair of simply-pinnate leaves.

Further species which have only one pinnate leaf are the following :—

<i>Acacia pumila</i> , Maiden and Baker.	<i>Acacia Flocktoniæ</i> , Maiden.
„ <i>trinervata</i> , Sieb.	„ <i>homalophylla</i> , A.Cunn., (with an exception).
„ <i>collettioides</i> , A. Cunn.	„ <i>excelsa</i> , Benth.
„ <i>oxycedrus</i> , Sieb.	„ <i>flavescens</i> , A. Cunn.
„ <i>aspera</i> , Lindl.	„ <i>doratoxylon</i> , A.Cunn.
„ <i>flexifolia</i> , A. Cunn.	„ <i>cincinnata</i> , F.v.M.
„ <i>Mabellæ</i> , Maiden.	

The two further species which produce an opposite pair of pinnate leaves are :—

Acacia galioides, Benth., and *A. Murrayana*, F.v.M.

A. galioides has a considerable range in tropical Australia, while *A. Murrayana* occurs in north-western New South Wales, in Queensland, and South Australia.

In the case of *A. homalophylla*, (Yarran), three seedlings produced one simply-pinnate leaf, but the fourth seedling had an opposite pair. Out of about 500 seedlings of about 70 *Acacia* species examined, this is the second instance where a species has been noticed to produce a single pinnate leaf and also an opposite pair next after the cotyledons. The previous case was that of *A. aneura*, (Mulga). All others have fallen wholly into one group or the other. These two species, therefore, may be regarded as being in a transition stage, more examples of which will probably be found among other species.¹

Vitality of Seed in Sea-water.

When discussing, in Part I, the possibility of seeds being transported long distances by oceanic currents, it was mentioned that seeds of *Acacia Farnesiana* from Central Queensland had germinated after having been immersed in sea-water for 148 and 190 days respectively. Since then, a seed of this same species from the same locality, which had been in a bottle of sea-water for 405 days, and was shaken from month to month, was taken out and placed in a cup which was then filled with boiling water and allowed to remain standing for a couple of hours, after which the seed was planted. At the end of five weeks the seed had not germinated, and was taken out of the soil and found to be still perfectly sound. It was again placed in boiling water as before, and then planted. As it showed no change at the end of a further nine weeks, it was again removed

¹ This Journal, Vol. XLIX, (1915), pp. 82 – 85.

from the soil, and after being placed in boiling water was again planted. After another five weeks, or nineteen weeks from the time the seed was taken from the sea-water, and had been three times placed in boiling water, the little seedling appeared.

The object of placing the seed in boiling water was to soften the coating, and hasten the germination by allowing the moisture to enter, which process is often performed in nature by bush fires. Had this particular seed not been so treated, it might not have germinated for years.

This experiment shows the wonderful vitality of the seed owing to it being encased in a very strong testa, and demonstrates the possibility of it retaining the power of germination for a sufficient length of time to be drifted in a piece of wood for thousands of miles.

It was mentioned in Part I,¹ that of four seeds planted after having been in sea-water for three months, two germinated.

One of the remaining seeds, after having been left in the soil twenty-three months, has recently germinated.

Descriptions of Seedlings.

CONTINUÆ.

ACACIA TRIPTERA, Benth., "Wait a While." Seeds from Howell, N. S. Wales (T. S. McCrae). (Plate I, Numbers 1 and 1a.)

Seeds shiny black, oblong, 3 to 3·5 mm. long, 2 mm. broad, 1·5 mm. thick.

Hypocotyl erect, terete, pale pink to greenish, 1·2 to 2·7 cm. long, ·7 to 1·5 mm. thick at base, ·5 to ·8 mm. at apex, glabrous.

¹ This Journal, Vol. XLIX, (1915), p. 94.

Cotyledons sessile, slightly sagittate, oblong, apex rounded, 5 to 6 mm. long, 2 mm. broad, at first erect, but becoming horizontal in a few days, remaining for a few weeks; outer or underside red to pink, sometimes yellowish-brown towards base, slightly wrinkled longitudinally, upperside green, glabrous.

Stem terete in the lower portion, but becoming angular in the upper part were affected by decurrent leafstalks, green, glabrous. First internode .5 to 1 mm.; second about 1 mm.; third 1.5 to 4 mm.; fourth 2 to 5.5 mm.; fifth 2 to 5 mm.

Leaves—No. 1. Abruptly pinnate, petiole 4 to 5 mm. long, glabrous; leaflets two pairs, the basal pair oblong acuminate, 5 mm. long, 1.5 mm. broad, not always opposite, the terminal pair obovate, 5 mm. long, 2 to 2.5 mm. broad, upperside green, underside pink; rachis 4 mm. long, green, glabrous, excurrent; stipules .5 mm.

No. 2. Abruptly bipinnate, petiole slender, 7 mm. to 1.1 cm. long, glabrous, excurrent; leaflets two to three pairs, oblong-acuminate to obovate, mucronate, not always opposite, of irregular size, the largest being 3.5 mm. long, and 1 mm. broad, midrib fairly distinct especially on underside; the pinna usually lyrate; rachis 5 to 7 mm. long, glabrous, excurrent.

Nos. 3, 4, and 5. Abruptly bipinnate, petiole 1.3 to 2 cm. long, Nos. 4 and 5 being sometimes slightly flattened vertically to about .5 mm. broad, and with a few parallel nerves, glabrous, excurrent; leaflets two to three pairs similar in shape, size, and arrangement to those of No. 2, with, in some cases, a few indistinct hairs on margins, midrib and secondary vein sometimes showing under pocket lens, the pinnæ not always equally pinnate; rachis 4 to 6 mm. long, glabrous, excurrent; stipules weak, or little more than scales, up to about 1 mm. long. In one case No. 5 appeared as a phyllode without any leaflets.

No. 6 and upwards. Phyllodes, the first few being linear and almost straight, the later ones becoming falcate and remarkably decurrent on the stem, all being striate with several nerves, and tapering into a pungent point. In a seedling 8 to 10 cm. high, the phyllodes reach about 1·8 cm. long, by 1 to 1·5 mm. broad.

UNINERVES—*Brevifoliæ*.

ACACIA HISPIDULA, Willd. Seeds from Cheltenham, near Sydney. Growing on Hawkesbury Sandstone formation. (Plate I, Numbers 2 to 3a.)

Seeds dull black, oval-oblong, 7 mm. long, 4 mm. broad, 3 mm. thick.

Hypocotyl erect, terete, sometimes brownish just above soil, pale green in upper portion, up to 3 cm. long, 1·7 to 2·3 mm. thick at base, ·8 to 1 mm. at apex, swelling suddenly into the root, which in the case of No. 2, Plate I, reached a length of 10 cm. in a few days, glabrous.

Cotyledons sessile, sagittate, ovate, soon becoming revolute, and cylindrical, 8 mm. long, 4 to 4·5 mm. broad, outer or underside at first pale yellow, becoming pale green, with a ridge about 1 mm. wide along central portion; upper-side at first pale green, becoming dark green, glabrous.

Stem terete, hispid; becoming scabrous in upper portion. First internode ·5 to 1 mm.; second 5 mm. to 2·5 cm.; third 5 mm. to 1·2 cm.; fourth 2 to 5 mm.; fifth 2 to 9 mm.; sixth 2 to 7 mm., varying in different individuals.

Leaves—No. 1. Abruptly pinnate, petiole 6 mm. to 1·4 cm. long, green, pilose; leaflets four to five pairs, oblong, acuminate, often mucronate, midrib and secondary vein usually distinct, 6 mm. to 1·1 cm. long, 2·5 to 4 mm. broad, upper-side green, underside paler, glabrous; rachis 1·7 to 2·6 cm. long, green, sometimes glabrous or with a very few scattered hairs, excurrent.

No. 2. Abruptly bipinnate, petiole dilated, with a strong nerve along lower margin, 1·3 to 1·5 cm. long, 1 to 1·5 mm. broad, green, hoary, excurrent; leaflets three to four pairs, obovate-oblong, mucronate, 5 to 8 mm. long, 3 to 4 mm. broad, the basal leaflets often smaller, midrib and secondary vein distinct, upper side green, becoming brownish-red in winter months, underside paler; rachis 7 mm. to 1·3 cm. long, green, pilose, excurrent; stipules reduced to scales.

Nos. 3, 4, 5 and 6. Abruptly bipinnate, petiole dilated vertically, about the same as in No. 2, and with a similar strong lower marginal nerve extending to the base of the pinnæ, 8 mm. to 1·4 cm. long, hoary to hispid; leaflets three to four pairs, similar to those of No. 2; rachis pilose to hispid, excurrent; stipules reduced to scales about 1 mm. long.

No. 7 or 8 and upwards. Usually phyllodes.

The petiole of the first bipinnate leaf of this species shows a distinct transition stage towards the development into the subsequent phyllodes.

UNINERVES—*Angustifoliæ*.

ACACIA STRICTA, Willd. Seeds from Homebush, near Sydney.

Growing on Wianamatta Shale formation. (Plate I, Numbers 4 to 7.)

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

Hypocotyl erect, terete, creamy, becoming pale green to pale pink, 1·4 to 2·6 cm. long, 1 to 1·5 mm. thick at base, ·5 to 1 mm. at apex, glabrous.

Cotyledons sessile, slightly sagittate, oblong, apex rounded, 5 to 6 mm. long, 2 mm. broad, remaining on the plants, in many cases, until the phyllodes appear, outer or underside pinkish-green, becoming green, upper side green, glabrous.

Stem terete, green, sometimes becoming reddish on sunny side, glabrous. First internode .5 to 1 mm.; second 1.5 to 7 mm.; third 1 mm. to 2.7 cm.; fourth 3 mm. to 2.5 cm.; fifth 2 mm. to 1.8 cm.; sixth 6 mm. to 2 cm.; seventh 1.2 cm. to 2.1 cm.

Leaves—No. 1. Abruptly pinnate, petiole slender, from 6 mm. to 1.1 cm. long, pale green, glabrous; leaflets three pairs, oblong, acuminate, 5 to 6 mm. long, 1.5 to 2 mm. broad, the basal pair often narrower, midrib and sometimes two short veins, one on either side, showing under pocket lens, making the leaflet trinerved at the base, upper side green, underside paler; rachis 6 to 7 mm. long, glabrous, excurrent; stipules minute.

No. 2. Abruptly bipinnate, 1.1 to 2 cm. long, green, glabrous, excurrent; leaflets three to four pairs, oblong, acuminate, the terminal pair being sometimes obovate; rachis 7 mm. to 1.1 cm. long, glabrous, excurrent; stipules reduced to scales and soon falling.

No. 3. Abruptly bipinnate, petiole slender, 2 to 2.7 cm. long, glabrous, excurrent; leaflets four to five pairs, often mucronate; rachis glabrous, excurrent; stipules 1 mm. long, soon falling.

Nos. 4 and 5. Abruptly bipinnate, petiole from 1.7 to 2.5 cm. long, No. 5 being sometimes dilated and with a strong nerve along the lower margin from the stem to the base of the pinnæ; leaflets five to six pairs.

Nos. 6 and 7. Usually abruptly bipinnate, petiole vertically flattened, 2.2 to 3.3 cm. long, 2 to 3 mm. broad, No. 6 having a strong nerve along the lower margin, with the dilated lamina on the upper edge, while No. 7 may have the prominent vein slightly removed from the lower margin, and a fine vein towards the upper edge confluent with the prominent nerve at both ends. No. 7 is sometimes a phyllode.

Nos. 8, 9 and 10. Phyllodes, having a prominent nerve below the central portion of the lamina, and a fine nerve extending along the upper part. These veins are confluent at the base, but not at the apex, the upper or fine vein not extending quite to the apex of the phyllode. When the trees reach maturity this fine vein is not seen though it is very distinct in seedlings, and Bentham describes the phyllode of this species as "1-nerved."¹ This feature is suggestive of the possibility that the ancestor of this species was bi-nerved, from which a 1-nerved form has been developed. See also description of *Acacia binervata*, (*infra*).

UNINERVES—Racemosæ.

ACACIA FALCATA, Willd. Seeds from Homebush. Growing on Wianamatta Shale formation. (Plate II, Numbers 1 to 2a.)

Seeds black, oval, 4 to 4.5 mm. long, 2.5 to 3 mm. broad, 1.2 mm. thick.

Hypocotyl erect, terete, reddish-brown, 1 to 3.2 cm. long, 1 to 1.4 mm. thick at base, .4 to .8 mm. at apex, glabrous.

Cotyledons sessile, slightly sagittate, oblong, apex rounded, 6 mm. long, 3 mm. broad, soon becoming revolute and cylindrical, falling off in a few weeks; outer or underside brownish, becoming green, upperside green, glabrous.

Stem terete, greenish-brown, glabrous. First internode .5 mm.; second 2 to 5 mm.; third 3 to 8 mm.; fourth 4 mm. to 1.5 cm.; fifth 5 mm. to 2.7 cm.

Leaves—No. 1. Abruptly pinnate, petiole 4 to 5 mm. long, reddish-green, glabrous; leaflets three to four pairs, oblong-lanceolate, acuminate, 6 to 9 mm. long, 2 to 2.5 mm. broad, midrib distinct, upperside green, glabrous, underside pale green; rachis 5 mm. to 1 cm. long, green, glabrous, excurrent.

¹ B. Fl., Vol. II, p. 359.

No. 2. Abruptly bipinnate, petiole 1·2 to 2 cm. long, terete, or sometimes slightly channelled above, glabrous, excurrent; leaflets four to five pairs, midrib distinct, secondary vein showing under pocket lens.

No. 3. Abruptly bipinnate, petiole 2 to 3 cm. long, usually vertically flattened, up to 1 mm. wide, with a strong nerve along the lower margin, and a finer one bordering the upper margin; leaflets four to six pairs, the terminal pair generally obovate, and the number of leaflets on the pinnæ often unequal; rachis 1·4 to 2·5 cm., glabrous, excurrent.

No. 4. Abruptly bipinnate, petiole 2·1 to 4 cm. long, vertically flattened, up to 2·5 mm. wide, sometimes with a strong nerve along the lower margin extending to the base of the pinnæ, and confluent with a finer nerve along the upper margin, or sometimes with the strong nerve extending along just below the centre line of the lamina, the upper margin of the lamina being bordered with a fine nerve, leaflets seven to eight pairs; rachis 2·3 to 3·2 cm. long.

Nos. 5, 6 and 7. Lanceolate-falcate phyllodes with one prominent nerve extending along above the centre of the lamina, thus leaving the greater portion of the leaf-blade on the lower side, which is unusual in the early phyllodes of species of uninerved Acacias.

UNINERVES—Racemosæ.

ACACIA PENNINERVIS, Sieb. Seeds from Glen Innes, N.S.W.
(J. H. Maiden). (Plate II, Numbers 3 to 4a.)

Seeds black, oblong-oval to ovate, 7 mm. long, 3·5 to 4 mm. broad, 2 mm. thick.

Hypocotyl erect, terete, light-red to brownish-red, becoming darker, up to 1·8 cm. long, 2 to 3 mm. thick at base, 1 to 1·5 mm. at apex, glabrous.

Cotyledons sessile, sagittate, oblong, apex rounded, 9 mm. long, about 3·7 mm. broad, at first erect, becoming horizontal in two or three days, revolute and cylindrical in a week, falling in about two weeks, outer or underside brownish-red, slightly convex, with sometimes one or two whitish glands; upperside brownish-red but paler than underside, glabrous.

Stem terete, brownish-green to reddish-green, glabrous. First internode 5 mm.; second 3 mm. to 1·7 cm.; third 4 to 8 mm.; fourth 7 mm. to 1·3 cm.; fifth 6 mm. to 2·7 cm.; sixth 1·1 to 3·6 cm.; seventh 1·6 to 2 cm.

Leaves—No. 1. Abruptly pinnate, sometimes showing as soon as the cotyledons have left the soil, petiole 4 to 7 mm. long, reddish-brown, glabrous; leaflets four to five pairs, oblong, acuminate, often mucronate, 8 mm. to 1 cm. long, 2·5 to 3 mm. broad, midrib and secondary vein distinct, upperside green, glabrous, underside pale green; rachis 1·3 to 1·7 cm. long, green, glabrous, excurrent.

No. 2. Abruptly bipinnate, petiole 7 mm. to 1·3 cm. long, sometimes with very small gland about 3 to 5 mm. from base, glabrous, excurrent; leaflets four to five pairs, pinnæ sometimes having an unequal number of leaflets.

No. 3. Abruptly bipinnate, petiole 1·5 to 2 cm. long, sometimes with very small gland on upper edge about 3 to 6 mm. from base, excurrent; leaflets five to seven pairs; stipules about 1 mm. long, pubescent.

No. 4. Abruptly bipinnate, petiole 2 to 2·4 cm. long, sometimes slightly channelled above, with a small gland about 5 mm. from base; leaflets six to eight pairs; stipules as in No. 3.

No. 5. Abruptly bipinnate, petiole 2·3 to 3·1 cm. long, with strong nerve along lower margin, channelled above, sometimes vertically flattened, and having a gland about 4

to 5 mm. from base; leaflets eight to ten pairs; rachis 2·5 to 3·6 cm. long, excurrent; stipules as in Nos. 3 and 4.

No. 6. Sometimes a phyllode, or abruptly bipinnate, with petiole similar to No. 5; leaflets nine to ten pairs; rachis 3·3 to 4 cm. long.

No. 7. Either a phyllode, or abruptly bipinnate, petiole vertically flattened to 7 mm. broad, the upper margin convex, with a strong nerve or "midrib" extending along the lower portion of the lamina, and usually a short, fine, rather insignificant vein terminating in the upper marginal gland about 5 to 7 mm. from base, the margins nerve-like, the whole blade having a system of lateral anastomosing veins; leaflets ten to eleven pairs; rachis about 4·5 cm. long.

Nos. 8 and upwards. Phyllodes.

UNINERVES—Racemosæ.

ACACIA MABELLÆ, Maiden,¹ "Black Wattle." Seeds from Milton, N.S.W. Growing on a moderately siliceous soil. (Plate II, Numbers 5 to 7).

Seeds black, oval, 4 to 5 mm. long, 3 mm. broad, 2 mm. thick.

Hypocotyl erect, terete, brownish-red, 1·8 to 3 cm. long, 1·5 to 2·4 mm. thick at base, ·5 to 1 mm. thick at apex, glabrous, often suddenly constricted just above soil.

Cotyledons sessile, sagittate, oblong, apex rounded, 5 to 6·5 mm. long, 2·5 to 3 mm. broad, at first erect, but becoming revolute and cylindrical in a few days, soon falling, outer or underside brownish-red, often with ridge along centre, upperside brownish-green, glabrous.

Stem terete in lower portion, but becoming angular where leaf-stalks are decurrent on the stem, brownish-green, glabrous, or at first with a few scattered hairs which soon

¹ This Journal, Vol. XLIX, (1915), p. 471.

disappear. First internode .5 mm.; second 2 mm. to 1 cm.; third 2 mm. to 1.8 cm.; fourth 3 mm. to 5 cm.; fifth 3 mm. to 3.2 cm.; sixth 2 mm. to 3.1 cm.; seventh 3 mm. to 5 cm.; eighth 3 mm. to 5 cm.; varying very much in different individuals.

Leaves—No. 1. Abruptly pinnate, petiole 2 to 8 mm. long, reddish-green, becoming brownish-red, glabrous; leaflets four to five pairs, in twenty cases the leaflets were four, and in three cases there were five, oblong, acuminate, often mucronate, 6 mm. to 1.1 cm. long, 2.5 to 3.7 mm. broad, upperside green, underside often red, sometimes becoming pale green, midrib very distinct on underside, often remaining of a red colour, secondary vein showing under pocket lens; rachis 5 mm. to 1.6 cm. long, green, glabrous, excurrent.

No. 2. Abruptly bipinnate, petiole 6 mm. to 1.4 cm. long, green to brownish-red, with a few scattered hairs, and often with a very small gland about 4 mm. from base, excurrent; leaflets four to six pairs, the basal pair sometimes very small; rachis glabrous.

No. 3. Abruptly bipinnate, petiole usually slightly dilated, 1 to 3.3 cm. long, green to brownish-green, with a few scattered hairs, and a small gland about 5 mm. from base, also a strong nerve along lower margin, excurrent; leaflets four to seven pairs; stipules little more than scales.

No. 4. Abruptly bipinnate, petiole slightly dilated, 1.7 to 4.8 cm. long, with prominent nerve either along lower margin, or below centre line of lamina, and gland on upper margin; leaflets up to eleven pairs; rachis 2.2 to 4.2 cm. long; stipules as in No. 3.

Nos. 5 and 6. Abruptly bipinnate, petiole 2.5 to 5.8 cm. long, vertically flattened, with prominent nerve extending along just below centre line of lamina, and gland on upper margin about 5 mm. from base; rachis from 3 to 4 cm. long.

No. 7. Abruptly bipinnate, petiole up to 5 cm. long, vertically flattened, 2·5 mm. broad, with prominent central vein, nerve-like margins, and gland on upper margin; leaflets up to fourteen pairs; rachis up to 4 cm. long, excurrent.

No. 8. Often a phyllode up to 14 cm. long, 4 mm. broad, with prominent central nerve, and gland on upper margin about 5 mm. from base, and usually with an insignificant vein from the gland to the central nerve near the base, as in the case of *A. penninervis*, as though the upper nerve-like margin is partly deflected from the gland towards the base.

In one case all leaves up to No. 15 were abruptly bipinnate, the petiole of No. 15 being 9·5 cm. long, rachis 2·7 cm.

UNINERVES—Racemosæ.

ACACIA PRAVISSIMA, F.v.M. Seeds from Cotter River, Federal Capital Territory, Canberra. (Plate III, Numbers 1 to 2a.)

Seeds black, oblong-oval, 3 to 4 mm. long, 2 to 2·5 mm. broad, 1 mm. thick.

Hypocotyl erect, terete, sometimes pink just below surface of soil, upper portion pinkish-green, about 1·7 cm. long, 1·5 mm. thick at base, 1 mm. at apex, glabrous.

Cotyledons sessile, sagittate, oblong, apex rounded, about 5 mm. long, 2 to 3 mm. broad, at first erect but becoming horizontal in about a week, and later revolute, outer or underside pale green, with sometimes a raised central nerve or ridge, upperside green, glabrous.

Stem terete, pinkish-green in lower portion, pale green above, hirsute. First internode 5 mm.; second 2 to 3 mm.; third about 5 mm.; fourth about 6 mm.; fifth 6 to 7 mm.; sixth 5 to 6 mm.; seventh 6 to 7 mm.

Leaves—No. 1. Abruptly pinnate, petiole about 3 mm. long, glabrous; leaflets three pairs, about 5 mm. long, 2 mm.

broad, oblong, acuminate, the terminal pair often obovate, light green on both sides, midrib and secondary vein showing clearly under pocket lens, especially on underside; rachis about 5 mm. long, glabrous, excurrent.

No. 2. Abruptly bipinnate, petiole 3 to 4 mm. long, pilose, excurrent; leaflets four pairs; rachis, glabrous, excurrent.

Nos. 3 and 4. Abruptly bipinnate, petiole about 4 to 6 mm. long, pilose to hispid, excurrent; leaflets four to five pairs, mucronate; rachis pilose, excurrent; stipules reduced to scales.

Nos. 5 and 6. Abruptly bipinnate, petiole about 5 to 8 mm. long, slightly dilated, with nerve along lower margin, pilose to hispid, varying in degree on different plants; leaflets five to six pairs; rachis with a few scattered hairs.

Nos. 7 and 8. Abruptly bipinnate, petiole about 6 mm. to 1 cm. long, vertically flattened up to 2.5 mm. broad, with strong nerve along or near lower margin, and sometimes with a very small gland showing below middle of upper margin, while in other cases the gland is absent, pilose to hispid, excurrent; leaflets five to seven pairs; rachis glabrous or with a few scattered hairs.

Nos. 9 to 11. These, on some plants, may be phyllodes, or they may be abruptly bipinnate, and similar to Nos. 7 and 8 on others, with considerable development of lamina above the prominent nerve, and showing the secondary and lateral veins which appear in the phyllodes, margins pilose, excurrent.

Nos. 12 and upwards. Usually phyllodes, showing an abnormal development of lamina above the prominent nerve, which latter corresponds with the lower marginal nerve of the bipinnate leaves. The excurrent point of the petioles has developed into the mucronate point of the phyllodes, whose lower margins are sometimes pilose. The gland may be present on the upper margin of some of the phyllodes,

but absent from others, while on the phyllodes of the mature tree from which these seedlings were raised the gland is always conspicuous.

UNINERVES—*Racemosæ*.

ACACIA MYRTIFOLIA, Willd. Seeds from Cheltenham, New South Wales, growing on Hawkesbury Sandstone formation, and from Aldgate, South Australia. (Plate III, Numbers 3 to 5a.)

Seeds shiny brown, oblong, about 3 to 3·5 mm. long, 2 mm. broad, 1·5 mm. thick.

Hypocotyl erect, terete, brownish-red, 1 to 2·2 cm. long, 1·3 to 1·8 mm. thick at base, ·6 to 1 mm. at apex, glabrous.

Cotyledons sessile, sagittate, oblong, 4 to 5 mm. long, 2 mm. broad, remaining erect until they fall, in about ten days, outer or underside brownish-red, slightly convex, upperside brownish-red but paler than underside, glabrous.

Stem terete in lower portion, angular above where affected by decurrent leaf-stalks, reddish-brown, glabrous. First internode ·5 mm.; second 2 mm. to 1·7 cm.; third 2 mm. to 1·4 cm.; fourth 3 mm. to 1·1 cm.; fifth 5 mm. to 2·2 cm.; sixth 4 mm. to 1·4 cm.; seventh 4 mm. to 2·6 cm.

Leaves—Nos. 1 and 2. Abruptly pinnate, forming an opposite pair, petiole slender, from about 3 mm. to 1 cm. long, brownish-red, glabrous; leaflets usually two pairs, rarely three, out of forty pairs of leaves counted, thirty-eight had two pairs of leaflets on each pinna, while of the other two pairs of leaves each had two pairs of leaflets on one pinna and three on the other, (Plate III, No. 5) oblong, acuminate, up to 6 mm. long, and 2·5 mm. broad, midrib and secondary vein showing under pocket lens, upperside green to pale green, sometimes tinged with red, underside reddish-green, to red; rachis 2 to 5 mm. long, glabrous, excurrent.

No. 3. Abruptly bipinnate, petiole slender, from about 6 mm. to 2·5 cm. long, green to reddish-brown, glabrous, excurrent; leaflets three to four pairs, the terminal pair usually obovate; rachis glabrous, excurrent.

Nos. 4 and 5. Abruptly bipinnate, petiole from 6 mm. to 2·6 cm. long, channelled above, small gland about the middle, glabrous, or with a few scattered hairs along edges; leaflets three to four pairs; rachis 6 mm. to 2·7 cm. long.

No. 6. Abruptly bipinnate, sometimes with two pairs of pinnæ, petiole slightly flattened vertically with strong vein along lower margin, and small gland about or below the middle on upper margin, 1·2 to 3·2 cm. long; leaflets four to five pairs; rachis 8 mm. to 2·7 cm. long.

Nos. 7 and 8. These may be phyllodes, but on some plants are abruptly bipinnate, petiole up to 2·8 cm. long, vertically flattened, with strong midrib; leaflets up to six pairs.

Some seedlings of this species flowered freely, and also set fruit, at two years and two months old.

PLURINERVES—Dimidiatæ.

ACACIA BINERVATA, DC., "Two-Veined Hickory." Seeds from Tomerong (J. C. Grant). Growing on a moderately siliceous soil. (Plate III, Numbers 6 to 8.)

Seeds black, obovate to oblong, 4 to 5 mm. long, 2·5 to 3 mm. broad, 1·5 mm. thick.

Hypocotyl erect, terete, pink to reddish-brown, 1 to 2·3 cm. long, 1·2 to 1·7 mm. thick at base, ·5 to ·8 mm. at apex, glabrous.

Cotyledons sessile, sagittate, oblong, apex rounded, 6 mm. long, 3 mm. broad, soon becoming revolute, and later cylindrical, falling in about two weeks, outer or underside, straw-coloured to pink, sometimes becoming brown, often with a central ridge, upperside green, glabrous.

Stem terete in lower portion, angular above, where affected by decurrent leaf-stalks, glabrous. First internode 5 mm.; second 6 mm. to 2.7 cm.; third 2 to 9 mm.; fourth 3 mm. to 1.6 cm.; fifth 4 mm. to 1.2 cm.; sixth 4 to 7 mm.; seventh 5 mm. to 1.4 cm.

Leaves—No. 1. Abruptly pinnate, petiole 3 to 5 mm. long, green, becoming brown, glabrous, or with a few scattered hairs; leaflets four to five pairs, oblong-lanceolate, acuminate, often mucronate, 7 to 8 mm. long, the terminal pair shorter and sometimes obovate, upperside green, underside reddish, becoming green, margins red, midrib distinct, secondary vein showing under pocket lens; rachis 8 mm. to 1.4 cm. long, green, glabrous, excurrent, stipules reduced to scales.

No. 2. Abruptly bipinnate, petiole 6 mm. to 1.2 cm. long, green, becoming reddish, pilose, excurrent; leaflets four to five pairs. (Leaf No. 2 is missing from Number 7, Plate III).

Nos. 3 and 4. Abruptly bipinnate, petiole 7 mm. to 2 cm. long, channelled above, and sometimes dilated, with strong nerve along lower margin, faintly pilose; leaflets six to eight pairs; rachis of No. 4 1.7 to 2.4 cm. long, excurrent.

Nos. 5 and 6. Abruptly bipinnate, petiole 1.3 to 4 cm. long, vertically flattened, the upper margin being convex, the lamina of No. 6 may be 2 cm. broad, with a strong nerve a little above the lower margin and running from the plant-stem to the base of the pinnae, above this nerve are two others extending from the base almost to the margin, the remainder of the lamina being pinnately veined; leaflets up to nine pairs.

Nos. 7 and 8. These may be abruptly bipinnate, with vertically flattened petioles from 2 to 3.3 cm. long, 2 cm. broad, and having up to eleven pairs of leaflets; or they may be phyllodes, usually triplinerved, the third or upper one scarcely reaching the margin, while the second may

sometimes be confluent with the first or lower vein at both ends, but this latter feature is noticed less in the later phyllodes. The first phyllode in Number 7, Plate III, has a fourth vein above the others, extending from the base to nearly the middle of the upper margin. The small insignificant vein extending from the gland towards the base may be seen in phyllodes of this species as in those of *A. penninervis* and *A. Mabellæ*.¹

Bentham describes the phyllodes of *A. binervata* as having two or three longitudinal nerves. The mature phyllodes are usually 2-nerved, and this fact, as in the somewhat similar case of *A. stricta*, (*supra*), is suggestive of the possibility that, as the species developed, it reduced the number of veins in the phyllodes.

PLURINERVES—Julifloræ—Falcatæ.

ACACIA MAIDENI, F.v.M., "Sally." Seeds from Milton.

Growing on a moderately siliceous soil. (Plate IV, Numbers 1 to 3.)

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

Hypocotyl erect, terete, pale green, up to 2.5 cm. long, 2 mm. thick at base, .5 to 1 mm. thick at apex, glabrous.

Cotyledons sessile, slightly auricled, oval-oblong, about 6 mm. long, 3 mm. broad, outer or underside at first yellowish-green, becoming pale green, with one or two raised lines along centre, upperside at first yellowish-green, becoming dark green within a week, glabrous.

On one plant the cotyledons were fused along one side, and appeared as one, almost encircling the stem, the line of fusion being undiscernible.

¹ See "The Forest Flora of N.S.W.," by J. H. Maiden, Part xxv, pl. 95.

Stem terete, green, at first faintly pilose, becoming glabrous. First internode .5 to 1.5 mm.; second 1 mm. to 1 cm.; third 3 mm. to 1 cm.; fourth 3 to 6 mm.; fifth 2 to 4 mm.; sixth 3 to 5 mm.; seventh 3 mm. to 1 cm.; eighth 5 mm. to 1.6 cm.

Leaves—No. 1. Abruptly pinnate, petiole 3 to 7 mm. long, green, glabrous; leaflets three pairs, oblong-lanceolate, basal or largest pair up to 9 mm. long, 3 mm. broad, upper-side green, underside paler, with midrib distinct, sometimes raised, secondary vein showing under pocket lens; rachis 6 mm. to 1 cm. long, green, glabrous, excurrent.

Nos. 2 and 3. Abruptly bipinnate, petiole 7 mm. to 1.3 cm. long. No. 3 sometimes channelled above and with strong nerve along lower margin, excurrent; leaflets three to four pairs; stipules little more than scales.

Nos. 4 and 5. Abruptly bipinnate, petiole 1 to 1.5 cm. long, vertically flattened, with prominent nerve just above lower margin; leaflets four to five pairs; rachis 7 mm. to 1.5 cm., glabrous, excurrent; stipules about 1 mm. long.

Nos. 6 and 7. Abruptly bipinnate, petiole 1.7 to 4 cm. long, vertically flattened, similar to Nos. 4 and 5, but with one or two fine veins parallel to the prominent nerve; leaflets four to six pairs; rachis 1 to 2.2 cm.; stipules about 1 mm. long, pointed.

Nos. 8 and 9. Abruptly bipinnate, petiole 4 to 5.3 cm. long, vertically flattened, 3 mm. broad, with a prominent, almost central nerve from the plant-stem to the base of the pinnæ, giving the leaf, at a little distance away, the appearance of a uninerve, but with several fine parallel veins visible on closer inspection.

Nos. 10, 11 and 12. Often abruptly bipinnate, petiole up to 10 cm. long, 3.5 mm. broad, with prominent central nerve and several fine veins on each side.

In the winter months the exposed sides of the flattened petioles and young phyllodes often become purple. Tips of young phyllodes are often brownish-purple.

BIPINNATÆ—Botryocephalæ.

ACACIA PUBESCENS, R. Br. Seeds from Lidcombe, near Sydney. Growing on Wianamatta Shale formation, often among small ironstone pebbles. (Plate IV, Numbers 4 to 6.)

Seeds black, oval, 3 to 4 mm. long, 2 to 3 mm. broad, 1·5 mm. thick.

Hypocotyl erect, terete, pale pink to pale brown, up to 2·2 cm. long, 1 mm. thick at base, ·5 to ·9 mm. at apex, glabrous.

Cotyledons sessile, very slightly auricled, oblong, apex rounded, 5 to 6 mm. long, 2 to 2·5 mm. broad, becoming horizontal, revolute and cylindrical, falling in a few weeks, outer or underside brown, with central ridge, upperside reddish to green, glabrous.

Stem terete, hirsute. First internode ·5 mm.; second 1 to 5 mm.; third 3 mm. to 1·4 cm.; fourth about 5 mm.; fifth 3 mm. to 1 cm.

Leaves—No. 1. Abruptly pinnate, petiole 3 to 7 mm. long, reddish-green, glabrous or faintly pilose; leaflets three to four pairs, obovate-lanceolate 4 to 9 mm. long, 1·5 to 2·5 mm. broad, midrib showing under pocket lens, upperside green, glabrous, underside reddish, becoming reddish-green; rachis 3 mm. to 1·1 cm. long, glabrous or with a few scattered hairs, excurrent; stipules small.

Nos. 2 and 3. Abruptly bipinnate, petiole pilose to hispid, 6 mm. to 1·2 cm. long, reddish to reddish-brown, excurrent; leaflets four to seven pairs, the terminal pair opposite, the remainder often alternate, upperside green, underside pale green; rachis 4 mm. to 1·2 cm. long, pilose; stipules small.

Nos. 4, 5 and 6. Abruptly bipinnate, petiole hispid; pinnæ one to several pairs; rachis pilose to hirsute.

EXPLANATION OF PLATES.

PLATE I.

Acacia triptera, Benth.

1. Cotyledons, pinnate leaf, bipinnate leaves, and phyllodes.
Howell. (T. S. McCrae.)

- 1a. Pod and seeds.

Acacia hispidula, Willd.

2. Cotyledons. Cheltenham.
3. Pinnate leaf, bipinnate leaves and phyllodes.
- 3a. Pod and seeds.

Acacia stricta, Willd.

4. Cotyledons, pinnate leaf and young bipinnate leaves. Homebush.
5. Pinnate leaf, bipinnate leaves and phyllodes.
6. Two-nerved phyllodes.
7. Pod and seeds.

PLATE II.

Acacia falcata, Willd.

1. Cotyledons, with pinnate leaf showing. Homebush.
2. Pinnate leaf, bipinnate leaves and phyllodes.
- 2a. Pod and seeds.

Acacia penninervis, Sieb.

3. Cotyledons, with pinnate leaf showing. Glen Innes. (J. H. Maiden.)
4. Pinnate leaf, bipinnate leaves and phyllodes.
- 4a. Seeds.

Acacia Mabellæ, Maiden.

5. Cotyledons, with pinnate leaf showing. Milton.
6. Pinnate leaf, bipinnate leaves and phyllodes.
7. Pod and seeds.

PLATE III.

Acacia pravissima, F.v.M.

1. Cotyledons. Cotter River, Canberra.
2. Pinnate leaf, bipinnate leaves and phyllodes.
- 2a. Pod.

Acacia myrtifolia, Willd.

3. Cotyledons and opposite pair of pinnate leaves. Aldgate, South Australia.
4. Cotyledons and opposite pair of pinnate leaves. Cheltenham, New South Wales.
5. Opposite pair of pinnate leaves, bipinnate leaves and phyllodes. Cheltenham.
- 5a. Pod and seeds.

Acacia binervata, DC.

6. Cotyledons. Tomerong. (J. C. Grant).
7. Pinnate leaf, bipinnate leaves (one pinna dropped from the last bipinnate leaf), and phyllodes.
8. Pod and seeds.

PLATE IV.

Acacia Maidenii, F.v.M.

1. Cotyledons. Milton.
2. Pinnate leaf, bipinnate leaves and phyllodes.
3. Spirally twisted pod and seeds.

Acacia pubescens, R. Br.

4. Cotyledons and young pinnate leaf. Lidcombe.
 5. Pinnate and bipinnate leaves.
 6. Pod.
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