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CONSERVATOIRE  
BOTANIQUE

VILLE de GENÈVE

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DU CONSERVATOIRE BOTANIQUE DE GENÈVE  
VENDU EN 1922



# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

(Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney)

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(WITH 40 PLATES.)

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*“Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise.”*

MACAULAY'S "ESSAY ON MILITON."

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# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

(Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

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VOL. II. PART I.

Part XI of the Complete Work.

(WITH FOUR PLATES.)

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*“Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise.”*

MACAULAY'S "ESSAY ON MILTON."

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# DESCRIPTION.

## XLI.—*E. Bosistoana*, F.v.M.

*Australasian Journal of Pharmacy*, October, 1895.

Finally tall; branchlets slender, at first angular.

**Leaves.**—On rather short petioles, almost chartaceous, mostly narrow or elongate-lanceolar, somewhat falcate, very copiously dotted with translucent oil glandules, generally dull-green on both sides, their lateral venules distant, much divergent, the peripheric venule distinctly distant from the edge of the leaf, all faint.

**Leaves of Young Seedlings.**—Roundish or ovate, scattered, stalked; umbels few-flowered, either axillar-solitary or racemously arranged.

**Peduncles.**—Nearly as long as the umbels or oftener variously shorter, slightly or sometimes broadly compressed.

**Pedicels.**—Usually much shorter, rather thick and angular.

**Tube of the Calyx.**—Turbinate-semiovate, slightly angular.

**Lid.**—Fully as long as the tube, semiovate-hemispheric, often distinctly pointed.

**Stamens.**—All fertile, the inner filaments abruptly inflected before expansion; anthers very small, cordate or ovate-roundish, opening by longitudinal slits.

**Style.**—Short; stigma somewhat dilated.

**Fruit.**—Comparatively small, nearly semiovate, its rim narrow, its valves 5-6 or rarely 4, deltoid, totally enclosed, but sometimes reaching to the rim; sterile seeds very numerous, narrow or short; fertile seeds few, ovate, compressed, slightly pointed.

In swampy localities at Cabramatta, and in some other places of the County of Cumberland and also in the County of Camden (Rev. Dr. Woolls); near Mount Dromedary (Miss Bate); near Twofold Bay (L. Morton); near the Genoa (Barnard); on the summit of the Tantawanglo Mountains, and also near the Mitchell River (Howitt); between the Tambo and Nicholson Rivers (Schlipalius); near the Strezlecki Ranges (Olsen). The "Wul Wul" of the aborigines of the County of Dampier; the "Darjan" of the aborigines of Gippsland. Called locally by the colonists of New South Wales "*Ironbark Box-tree*," and in some places also "*Grey Box-tree*," which appellations indicate the nature of the wood and bark, though the latter may largely be shedding.

As richly oil-yielding and also as exuding much kino, this tree is especially appropriate to connect therewith the name of Joseph Bosisto, Esq., C.M.G., who investigated many of the products of the Eucalypts, and gave them industrial and commercial dimensions.

This species in its systematic affinities is variously connected with *E. odorata*, *E. siderophloia*, *E. hemiphloia*, and *E. drepanophylla*. A fuller account of this valuable tree will early be given.

### Notes supplementary to the Description.

Shortly after the publication of *E. Bosistoana*, I wrote to Baron von Mueller, pointing out that he had confused two trees in his description—namely, a "Grey Box" and an "Ironbark Box." He thanked me for the information, and stated he intended to publish further notes on the tree (as, indeed, he promised at the conclusion of the description), but his intention was frustrated by pressure of work and subsequent death. I will endeavour to make *E. Bosistoana* quite clear—that

is to say, the tree almost exclusively referred to in the description—and will touch upon the confusion which has arisen when referring to the Ironbark Boxes in this and a later Part.

It is a species which has successively been confused by Mueller (and by Woolls and others following Mueller), with *E. bicolor*, *E. melliodora*, and *E. odorata*.

---

## SYNONYM.

*E. bicolor*, Woolls (*Contrib. Flora of Australia*, 232), non A. Cunn. ;  
see also p. 7 of the present Part.

IN the Woollsian herbarium, which is my property, there is a specimen in Dr. Woolls' handwriting bearing the following label:—

“Yellow or Bastard Box, half-barked when young, nearly smooth when full-grown. Hard wood. Height, 120 feet. Cabramatta. *E. bicolor*.”

On another occasion, Dr. Woolls labelled a similar specimen from Cabramatta “*E. largiflorens*.”

There is no question as to the identity of this tree, even if his specimens did not make it quite clear. It is *E. Bosistoana*, F.v.M., is typical for the species, as determined by Mueller himself (Mueller first labelled this specimen *E. odorata*, Behr., and then *E. Bosistoana*), and the assumption that Woolls' determination of the tree as *E. bicolor* was correct has given rise to some curious mistakes. See my paper, *Proc. Linn. Soc.*, N.S.W., xxvii, 519 (1902), for a full account of the matter.

---

## RANGE.

So far as we know at present, it is confined to eastern New South Wales, from the Illawarra and the southern tableland in the north as far as north Gippsland (Bairnsdale district), Victoria, in the south.

### VICTORIA.

It grows only in Gippsland, especially on limestone formations, commencing to the westward of Bairnsdale, and extending beyond Lake Tyers. Unfortunately, it grew principally upon lands which were required for settlement, and, consequently, immense quantities of this tree have been ringbarked. It is still found growing on some private lands, on some unalienated Crown lands, in the neighbourhood of Lake King, and in Cunninghame State Forest.—(A. W. Howitt, in an unpublished official report, 1895.)

## NEW SOUTH WALES.

EDEN (A. W. Howitt).

Following is a copy of a label by Oldfield (dated 1866), in Herb. Barbey-Boissier: "Box-tree.—Tree 160 feet; bark dark grey, spongy on trunk; limbs very white, soft to the touch, like velvet. Stony Ranges, called Mountain Hut Range, near Eden, Twofold Bay." Later, the label bears the name *E. leucoxylo*n in Oldfield's handwriting. The specimens are *E. Bosistoana*, F.v.M.

There are similar specimens in Herb. Cant., labelled "No. LX *Eucalyptus leucoxylo*n, F.M., 'Box-tree,' New South Wales, Hb. Oldfield," and, doubtless, in other herbaria.

This is the key, in my opinion, to the use of the name "Box" having been attached to *E. leucoxylo*n. The name box is never used in Australia for true *E. leucoxylo*n, so far as my experience goes. If it is so used, it must be very rarely.

Bega district; also, "Red, Grey, White Box," Cobargo (J. S. Allan); Mt. Dromedary (Miss Bate); "Grey Box," Noorooma (A. Langley); abounds in Wagonga district (F. R. Benson); "Grey Box" (J. V. de Coque) and "Red Box" (J. S. Allan), both in the Moruya district; Lower Araluen (J.H.M.); Milton; also "Yellow Box," West Dapto (R. H. Cambage); "Box," or "White Box," of Razorback, 4 miles from Wingello (J.H.M. and J. L. Boorman); Marulan (A. Murphy). (*E. Bosistoana*, from Marulan, was provisionally determined by F.v.M. as *E. bicolor* many years ago.) Bullio to Wombeyan (R. H. Cambage and J.H.M.).

Cabramatta district, County of Cumberland, occurring between Bankstown and the Cabramatta railway station, and also thence to Bringelly and Cabramatta (now Rossmore).

Woolfs' Cabramatta specimens, already referred to, have large, plump flower-buds; there are no fruits.

"There used to be some large trees of it near Bringelly, growing in a swampy place. Wood reddish-yellow and very tough when dry." (W. Woolfs.)

Then on specimens collected by J. L. Boorman at Bankstown, on 8th February, 1900, he and I made the following notes:—

"No. 13, 'Yellow Box.' Very tall trees, ribbony base. Clean grey tips from 12 to 14 feet from ground. Leaves elliptic ovate, acuminate, of a glaucous colour. Timber yellow. Usually known as Bastard Box."

Subsequently, on 20th July, 1901, I went to Cabramatta with Mr. Boorman and interviewed Mr. Hoy, a local resident, in regard to the range of this tree in the district, and compared the local Grey Box (*E. hemiphloia*) with it. See Affinities, p. 4.

## AFFINITIES.

### 1. With *E. odorata*, Behr.

The *odorata* of Howitt's paper, "The Eucalypts of Gippsland." *Trans. Roy. Soc. Viet.*, 1890, is *E. Bosistoana*.

The Bairnsdale Grey Box is one of our most durable, and from the large size attained, one of the most valuable of our timber trees. Until I examined its characters critically, and until its botanical peculiarities were investigated, at my instance, in collections which I forwarded to Baron von Mueller, it was considered locally as "Yellow Box" (*E. melliodora*), to which it has a slight superficial resemblance. —(Report of A. W. Howitt, 1895.)

It differs from *E. odorata* in the greater paleness of its timber, its more erect habit, and in other characters.

*E. Bosistoana* belongs to a group of species including *E. odorata*, *melliodora*, *leucoxyloa*, and others, which have almost similar rims to the nearly ripe fruit.

### 2. With *E. hemiphloia*, F.v.M.

*E. Bosistoana* is often known as "Yellow Box," it is also like *E. hemiphloia*, sometimes known as "Grey Box." Both are upright growing trees, with broad suckers. It is called "Yellow Box" at Cabramatta (Dr. Wood's original locality for the species), and I was at considerable pains, with Mr. Hoy, a local resident, and Mr. Boorman, to ascertain the local differences between it and *E. hemiphloia*.

*E. hemiphloia* is known locally as "Grey Box." *E. Bosistoana* ("Yellow Box") has straighter timber than the Grey. It grows on swampy, low ground, but then keeps shrubby; on high ground it makes good timber.

The Grey Box timber turns black or grey; the Yellow Box keeps yellow for a long time, and this colour shows in old timber when freshly adzed. This is the origin of the name. Grey Box keeps on dry, hilly ground.

The fruits of *E. hemiphloia* are more cylindrical.

### 3. With *E. melliodora*, A. Cunn.

It is worthy of note that the immature fruits of this species have a marked outer rim such as is a prominent character in *E. melliodora*.

An axe-cut readily shows the difference between the two species, *E. Bosistoana* having a white sapwood, and *E. melliodora* a yellow one. The foliage of the latter is more glaucous, more pendulous, and altogether less rigid, than that of the former. The fruit is also smaller and more cylindrical.

### 4. With *E. leucoxyloa*, F.v.M.

The specimen collected by Oldfield, many years ago, was labelled *E. leucoxyloa*. The juvenile foliage of both species is broad; the fruits of *E. Bosistoana* are, however, much smaller than those of *E. leucoxyloa* and the inflorescence very much less sparse. The juvenile foliage of the latter and of the tree generally is more glaucous. The shapes of the juvenile leaves are different,

5. With *E. Boormani*, Deane and Maiden.

The species has undoubted affinity with *E. Bosistoana*. (See *Proc. Linn. Soc., N.S.W.*, xxv, 112.) They can, however, be readily distinguished by the rough branches of *E. Boormani*, while those of *E. Bosistoana* are smooth, like the Boxes (*E. hemiphloia*, &c.). At the same time it must be noted that the rough bark on the butt of *E. Bosistoana* often displays considerable similarity to that of *E. Boormani*. The timber of *E. Bosistoana* is of a paler colour, and is less tough and hard.

6. With *E. leptophleba*, F.v.M. (*drepanophylla*, Benth.).

I mention this because Mueller does. It may be, as hinted by Deane and Maiden, in giving the description of *E. Boormani*, that that species is identical with *E. leptophleba*, but the latter is an imperfectly known species, and does not come as far south as *E. Bosistoana* so far as is known at present.

7. With *E. siderophloia*, Benth.

This is mentioned also because of Mueller's reference. The two species, *E. Bosistoana* and *E. siderophloia* have, however, no close affinity. The former is a Box with pale-coloured timber, and the latter an Ironbark with dark-red timber; the buds of *E. siderophloia* are "egg-in-egg-eup" when young, and the operculum more pointed than those of *E. Bosistoana*, while the fruits of *E. siderophloia* have exerted valves.

## DESCRIPTION.

XLII.—*E. bicolor*, A. Cunn.

*E. bicolor*, A. Cunn., was first alluded to in a published work in the following passage:—

“*E. bicolor*, A. Cunn., MS., a species closely allied to *E. hæmastoma*, Sm., but the marginal nerve is not so close to the edge of the leaf (this is the ‘Bastard Box’ of the carpenters).”—(Hooker in Mitchell’s “*Journ. Trop. Australia*,” 390, 1848.)

I have examined the following specimens:—

1. “*Eucalyptus bicolor*” in A. Cunningham’s handwriting, and bearing the label “New Holland, A. Cunningham, Hooker, 1835.” This specimen was given by Sir William Hooker to Bentham.
2. *E. bicolor*, 1846. Sub-tropical New Holland, Lieut.-Col. Sir T. L. Mitchell. The above are from Herb. Kew. A second specimen from Herb. Melb. of No. 2, labelled “No. 446 of Nov. 1846.”

There are two specimens on one sheet in Herb. Cant. ex herb. Lindl., both from sub-tropical New Holland, Lieut.-Col. Sir T. L. Mitchell, and both labelled “*E. bicolor*, A. Cunn.,” by Cunningham himself. One label carries the additional information “No. 439, Nov. 20, 1846, ‘Bastard Box of carpenters,’” and the other “No. 614, Nov. 30, 1846, camp 86.”

Then comes Mueller’s very full description of *E. bicolor*, A. Cunn., in *Journ. Linn. Soc.* iii. 99 (1859), Mueller being then ignorant that *E. bicolor*, A. Cunn., was a synonym of *E. largiflorens*, F.v.M., described in 1855.

Bentham accepted *E. bicolor*, A. Cunn., as having priority, in B.Fl. iii. 214, without comment, reducing *E. largiflorens*, F.v.M., to a synonym.

Mueller’s own quotation of the synonymy is interesting—(“*Eucalyptographia*,” under *E. largiflorens*, F.v.M.):—

“*E. largiflorens*, F.v.M. (1854); *Fragmenta*, ii. 58. *E. pendula*, A. Cunn., in Steudel (1810); *E. bicolor*, A. Cunn., in Mitchell (1848).”

He proceeds to say:—

Preference is here given, in accordance with De Candolle’s code, to the name under which this species was first defined, and chosen as expressive of the exuberance of its flowers. Of neither of the names bestowed by Allan Cunningham on this species, timely description was given; the pendulous branches suggesting the one name, and perhaps the sometimes but often pale colour of the filaments,\* giving rise to the other unless it was derived from the coloration of the bark.

\* See p. 312, Allan Cunningham’s MS. Journal, under date 30th June, 1817. “We made the angle of a large deep lagoon, of considerable depth, thinly dotted with trees, that had marks of inundation, about 4 feet above the present level of water and a few inches above the general flatness of the plains. I here gathered specimens of a species of *Eucalyptus* having a submucronated hemispherical operculum, and flowers in terminal panicles of two colours (red and white), a tree of about 30 feet.”

And again, p. 318, 8th July, 1817. “Buried a bottle beneath a species of *Eucalyptus (bicolor)* near our tent.” Allan Cunningham, therefore, in his own manuscript named *E. bicolor* as far back as 1817, and explained the origin of the name. He was then with Oxley on the lower Lachlan.

I would point out that early descriptions of *Eucalyptus* and other plants were often vague, and I have had, in some cases, to appeal to herbarium specimens and other less certain, collateral evidence, to decide what is intended as a species. I frequently hear that zoologists are in a similar situation. I think it would place a dangerous power in the hands of any man to enable him to pass over these imperfect early descriptions, especially when they are supported, as in the present case, by authentically named herbarium specimens deposited under proper safeguards, in important herbaria.

Many of Sieber's names have been accepted from herbarium labels only. Schauer adopted Cunningham's names and described the plants, rectifying Cunningham's omission to describe them. In 1859, Mueller's act in fully describing *E. bicolor*, A. Cunn., shows that he had no wish to suppress Cunningham's name.

I therefore, after the most careful consideration, have decided to follow Bentham in adopting the name *E. bicolor*, A. Cunn. (B.Fl. iii, 214).

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## SYNONYMS.

(a) Prefatory Note on *E. bicolor*, Woolls (also R. T. Baker), not A. Cunn.

1. *E. pendula*, Page (?).
2. *E. pendula*, A. Cunn.
3. *E. largiflorens*, F.v.M.
4. *E. hæmastoma*, Miq.

Note on (a) *E. parviflora*, F.v.M. ; (b), *E. bicolor*, Duff (*partim*).

(a) Prefatory Note on *E. bicolor*, Woolls (also R. T. Baker), not A. Cunn.

In many instances it is impossible to classify Eucalypts on the shape of fruits, anthers, buds, and leaves, and in this connection is mentioned the case of *E. bicolor*\* and *E. pendula*† of A. Cunningham. It has been customary in recent times to synonymise these species under the name of *E. largiflorens*, F.v.M. Now Cunningham, who was a field botanist, and who was familiar with these trees, named the bastard box of Cabramatta *E. bicolor*\*, a tree with a *dark box bark* on the stem, and with clear *white* limbs, and having a light brown-coloured timber, whilst the "Coolabah" of the interior he named *E. pendula*,† from its drooping habit. This tree has a red-coloured timber, and a box-bark extending to the ultimate branches. The oils of the two trees are also quite distinct . . . . . If placed under *E. largiflorens*,‡ then there would be the anomaly of having under one species a tree with two kinds of bark, two kinds of timber, two kinds of oil, and a variation in leaves.—(R. T. Baker, *Proc. A.A.A.S.* Melbourne, 1900, p. 230.)

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\* *E. Bosistoma*, F.v.M.

† *E. bicolor*, A. Cunn.

‡ *E. bicolor*, A. Cunn., is a synonym of *E. largiflorens*, F.v.M.

Again the same writer states :—

I am much indebted in this instance to the writings of the late Dr. Woolls for finding the particular tree of *E. bicolor*.\* In his "Contributions to the Flora of Australia" (p. 232), he gives the locality Cabramatta, where will be found trees that exactly coincide with Cunningham's description of *E. bicolor*, and in no way agree with *E. largiflorens*, F.v.M. (*E. pendula*, A. Cunn.†), of the interior. I and others have now seen both trees in the field, and agree that the two are quite distinct, and Cunningham was quite justified in making two species, viz., *E. pendula*, "Red Box," and *E. bicolor*, "Bastard Box."

This latter species occurs all along the banks of the South Creek.—(R. T. Baker, in *Proc. Linn. Soc., N.S.W.*, xxv, 666; see also J. H. Maiden, *ib.*, xxvii, 519.)

### 1. *E. pendula*, Page.

This name was first published (name only) in Page's "Prodrumus; as a general nomenclature of all the plants . . . cultivated in Southampton Botanic Gardens, by William Bridgewater Page, London, 1818." Svo. pp. 136.

In Steudel's "Nomenclator Botanicus" (ed. ii. Vol. i. p. 600) appears the simple entry "pendula, Page, Nov. Holl." I have been unable to ascertain that Page's name is other than a *nomen nudum*.

### 2. *E. pendula*, A. Cunn.

In B.Fl. (iii. 215) this is quoted as "A. Cunn. in *Stend. Nom. Bot.* Ed. 2." It is assumed to be a synonym of *E. pendula*, Page.

The origin of A. Cunningham's name *pendula* doubtless arose from the following :—

The "Weeping Eucalyptus" of Major Mitchell's Expedition, 1836, No. 83 of 20th April. Specimen in Herb. Cant. ex herb. Lindl. This is no doubt the plant referred to in the "Three Expeditions," ii, 45, in these words, "In the woods I observed a Eucalyptus of a graceful drooping character, apparently related to *E. pilularis* and *E. amygdalina*."

Mitchell was then on the Lachlan.

The specimen No. 83 has been examined by me and is identical with *E. bicolor*, A. Cunn., or *E. largiflorens*, F.v.M.

The interior species, *E. pendula*, has a Box bark right out to the branchlets (W. Bäuerlen and R. H. Cambage), a red timber, the leaves being longer than those of *E. bicolor* and glaucous, whilst the fruits are only half the size of the eastern species. The oils are also quite different (R. T. Baker, *Proc. Linn. Soc., N.S.W.*, xxv, 666). The name *E. pendula*, A. Cunn., cannot stand, and the tree referred to is *E. bicolor*, A. Cunn. The *E. bicolor* referred to in this passage is, as has been shown, *E. Bosistoana*, F.v.M.

### 3. *E. largiflorens*, F.v.M.

Arboreous: leaves alternate, glaucous, opaque, oblong-lanceolate, acute, slightly oblique, thinly veined, hardly dotted; umbels pedunculate, paniced, few-flowered; flowers small, on short pedicels; lid double, thin, nearly even, hemispherical, blunt or minutely apiculate; tube of the calyx obovate-bell-shaped, hardly angular, twice as long as the lower lid; fruits small, half ovate, short stalked, slightly contracted at the top; valves of the capsule inclosed.

In bushy barren localities on the Murray, Avoca, Wimmera, and on St. Vincent's Gulf. A small tree, with persistent grey-blackish bark.—(Trans. Vict. Inst. i. 34, 1855.)

A type specimen in Herb. Melb. bears the following label :—

"Eucalyptus largiflorens, Ferd. Mill. herb. Stuartii 153. Nov. Holl. Austral. 1847. Murray. (E. hemastoma, Sm., Miquel." in Miquel's handwriting, and also bearing the species number 16, in his Ned. Kruidk. Arch. iv.). "*E. bicolor*, A.C." (in Bentham's handwriting).

\* *E. Bosistoana*, F.v.M.

4. *E. hæmastoma*, Miq.

16. *Eucalyptus hæmastoma*, Smith, Act. Soc. Linn. Lond. iii. 285; DC. Prodr. l.c. 219, n. 23.—*E. largiflorens*, Ferd. Müll. Herb.

Locis humidis ad fl. Murray, fl. æstate (F.M.). Van Diemensland (Stuart).

Umbellæ sub-5-floræ, nunc superne paniculato-confertæ. Operculum duplex; exterius depressum obsolete apiculatum, interius membranaceum convexum muticum; calycis tubus (p. 131) obovaticus apice ampliatus hoc paulum, illo duplo amplior, ambobus multo longior (ex Müll. adnot.). *Nederl. Kruidk. Arch.* iv. 130 (1856).

This is *E. bicolor*, A. Cunn., "as to the Murray specimens" (B.Fl. iii. 215). The Tasmanian (Van Dieman's Land) specimens were probably *E. amygdalina*.

(a) Note on *E. parviflora*, F.v.M.

This is a name only given as a synonym of *E. bicolor*, A. Cunn. (in *Journ. Linn. Soc.* iii. 90) and it is referred to here in order that it may be cleared up. It is the same as *E. bicolor*, A. Cunn., var. *parviflora*, F.v.M. (B.Fl. iii. 215) and is *E. populifolia*, Hook., as noted by Mueller himself in Herb. Melb. It is, doubtless, the same as "var. *parviflora*, Benth." (should be F.v.M., "Eucalyptographia" under *E. largiflorens*).

(b) Note on *E. bicolor*, Duff (*partim*).

*E. bicolor*, Duff, in "Catal. of N.S.W. Forestry Exhibits," Melbourne, Adelaide, and other Exhibitions, is called "Slaty Gum," and its timber is described as "hard, tough, strong, durable, and said by experts to be one of the best hardwoods; used for fencing, wheelwrights' work, bridges, railway sleepers, and house building; plentiful. Hab. open forests south-western river districts, Blue Mountains, and the Darling River."

It is evident that the above partly refers to *E. bicolor*, A. Cunn., and to *E. polyanthemus*, Schauer, and it is only referred to on the present occasion as the source whence *E. bicolor*, "Slaty Gum," has crept into numerous official reports.

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## RANGE.

It seems to be confined to South Australia, Victoria, New South Wales, and Queensland.

From St. Vincent's Gulf and the Murray River and its lower tributaries, through eastern Australia, and particularly its eastern tracts to Carpentaria, at least as far as the Flinders and Gilbert Rivers, but reaching also, in some places, the coast tracts.—(Mueller, in *Eucalyptographia*.)

This reference to "coast tracts" applies, as regards eastern Australia, to Queensland solely. *E. bicolor* is a dry country species, and in central and northern Queensland many western New South Wales species approach the coast. It prefers rich flats which are liable to occasional submergence.

I have examined the following specimens (chiefly in the National Herbarium, Sydney):—

SOUTH AUSTRALIA.

Mannum (W. Gill).

VICTORIA.

A specimen in herb. Melb. bears the following label:—"16. *Euc. largiflorens*, ferd. Mill. herb. *Stuartii*, 153. Nov. Holl. Austral, 1847, Murray." "*E. hæmastoma*, Sm. Miquel" (in Miquel's handwriting). "*E. bicolor*, A. C" (in Bentham's handwriting). I have a specimen from Kew, "Murray River (Mueller)," that seems in no way different.

Eight to 10 miles north-west of Nhill, on somewhat moist flats (St. Eloy D'Alton); north-west of Lake Albacutya (C. French); Wimmera, with normal flowers (J. Reader and others); Wimmera, 1891 (J. P. Eckert), with red flowers—one of the many instances in this species of two-coloured flowers (*bicolor*); Swan Hill (Dr. Griffiths). "A Box which grows with *E. rostrata* on the river flats, Swan Hill to Mildura. Habit, spreading, bark greyish, close and even, resembling a typical Grey Box" (W. S. Brownsecombe); Murray River (J. P. Eckert); Benjerup, Murray River (C. Walter); Murray River, near Kerang. "A Box-tree . . . a low straggling tree, something like *E. melliodora* in habit. The leaves, however, have generally a bluish tint, and the wood is heavier, darker, and not "ringy" like the Yellow Box. 2 feet 6 inches in diameter, perfectly sound, fine, hard, red timber, with very little sap-wood" (J. Blackburne).

NEW SOUTH WALES.

"Grey Box, the common Box of Riverina" (T. G. Sloane, Mulwala). The fruits urceolate when unripe; Nyanda, Booligal (J. O'Brien, through F. B. Guthrie), used for feeding sheep through the 1902 drought; "Black or Flooded Box," Deniliquin (Forester Wilshire); Jerilderie, Dwarf Box (25–30 feet), with a blackish persistent bark on the stem. Wood dark-red inside, but lighter in the sapwood (W. H. Suttor). Mr. W. H. Suttor's specimens were labelled "Goborro" by Dr. Woolls, and are *bicolor*; Ivanhoe, *viâ* Hay (H. Deane), red timber.

"Box." "The country around Hay is all Box or Gum, with a very small proportion of Needlewood, and no Mallee" (Acting Forester D. A. Wilson); "Black Box," "Swamp Box," Hillston. "A sure indication of swampy country or country flooded at times, and is dense and low-growing" (W. S. Campbell); "River Box," Lake Cudgellico (G. S. Home, J. L. Boorman); "Drooping Box," Condobolin Flats, some leaves a little shiny (J.H.M.); Condobolin–Euabalong Road (J.H.M.); Euabalong (J. L. Boorman); "Swamp White Box" or "Coolabah" of Lachlan (F. R. Kidston).

"Sample taken from a tree about 15 feet high and 1 foot in diameter. I selected a young tree, as almost all the large ones are hollow. It grew on flooded land on the first creek 3 miles south of Condobolin. I should call it dwarf or stunted Box with drooping branches like a 'Willow tree'" (W. H. Suttor).

"Grey Box" or "Apple Box" or "Red Box" of Lacluan River, 30 miles below Condobolin. "Rough grey bark on limbs." "White Box," Mt. Hope Road to Euabalong; "White Box," "Grey Box," "Apple Box," "Red Box." Persistent bark on the branchlets, wood redder than *E. hemiphloia*, and not so hard, bark not so useful either. Condobolin." "White or Grey Box" with limbs partly white (R. H. Cambage).

Paldrumatta Bore, *viâ* Wilcannia, "Box," "Curra Curra" of the aborigines. "The only Eucalypt growing in the creek here" (P. Corbett). Mt. Oxley, Bourke (E. Betehe).

(a) Victorian Expedition, 1860, towards Barrier Range.

(b) Clay flats, near River Darling, 31st October, 1860.

(c) Victorian Expedition, 1st November, 1860, Bambouroo, Dry Lake, near Menindie.

(d) High sandy banks of River Darling.

(These four specimens were collected by the Burke and Wills' Expedition, and are in the Nat. Herb. Melbourne).

Cobham Lake (W. Bäuerlen), No. 263, 20-30', 12". Bark persistent. Dull leaves. Venation strongly marked. A very broad-leaved form.

"River Box," Bourke. "Plentiful on all the low lands of this and adjacent districts. Trees small, much resembling mallee in appearance. Long pendulous branches, bark rough, dark to the extreme tips of the branches. Timber reddish-brown, of superior quality. A handsome tree" (J. L. Boorman). Leaves narrow.

"River Box," Cobar Road, near Bourke. "Found in plenty; much larger specimens than those growing in the Lignum Swamps on the Darling, near Bourke" (J. L. Boorman). The leaves of this specimen are mostly coarser than those of the preceding specimen. Bourke to Barrington (W. S. Campbell); River Darling at Bourke (J.H.M.).

"No. 13, broad-leaf kind of *E. bicolor*, North Bourke" (A. Murphy). Further information supplied by Mr. Murphy, is: "The timber of this variety is red, the same as the narrow-leaved *bicolor*; there is no difference as far as timber is concerned; the only difference is in the leaves—those of the broad-leaved variety are of a lighter green than the narrow-leaved variety. I found red and white flowers on the same tree, and also on the narrow-leaved one." The leaves of this form are somewhat shiny, as well as broad; and I think we have evidence of hybridism with *E. populifolia*. I will deal with this specimen when dealing with the question of hybridism generally.

"Box." Banks of river, Tinapagee, Wanaaring, Paroo River (E. Betehe, R. J. Dalton); Cuttaburra River, Yantabulla (A. Murphy); "River Box," Belalie Bore (H. V. Jackson); Wilcannia (H. V. Jackson); Murtee Holding (Stock Inspector Tully); "Black, narrow-leaved or Bogan River Box," Coolabah

(J. W. Peacock); Cobar (J. L. Boorman); "River Box," "Coolibah Box," Nyngan (District Forester C. Marriott). Sent as distinct specimens at the same time, but identical.

Scone (J.H.M.).

QUEENSLAND.

Bailey gives the localities, "Maranoa, Port Denison, Flinders and Gilbert Rivers."

## AFFINITIES.

### 1. With *E. odorata*, Behr.

Mueller (in "Eucalyptographia") says *E. odorata* perhaps nearest approaches to *E. largiflorens* (*bicolor*).

This species runs into *odorata*, and in extreme forms I doubt if it is possible to separate them. Usually the leaves of *E. bicolor* are dull-coloured, but this is not an infallible guide. The fruits are usually smaller, sometimes much smaller, and more cylindrical than those of *E. odorata*. The fruits of *E. bicolor* are sub-cylindrical or ovoid, while those of *odorata* are more hemispherical. *E. bicolor* has usually short filaments and blunt opercula. *E. bicolor* is usually found on flats liable to floods; *E. odorata* prefers drier situations.

### 2. With *E. hemiphloia*, F.v.M.

The likeness of *E. bicolor* to *E. hemiphloia*, F.v.M., var. *microcarpa*, Maiden, when herbarium specimens are alone available, is often very striking and sometimes deceived Mueller. The timbers at once separate them, that of *E. hemiphloia* being pale and that of *E. bicolor* being red. The variety *microcarpa* has clean limbs, while *E. bicolor* has rougher; the former has erect branches, while those of the latter are drooping or scrambling. The leaves of var. *microcarpa* are green, while those of *E. bicolor* are more glaucous, and with the intra-marginal vein further from the edge. The fruits of var. *microcarpa* are often slightly angled at the calyx, and less sessile.

### 3. With *E. microtheca*, F.v.M.

The habit, foliage, bark, and timber of the two species are often very similar. The fruits are very different; the valves of those of *E. microtheca* being exserted. Both timbers are red, but where they grow together the timber of *E. microtheca* is reputed less durable, softer and more faulty than that of *E. bicolor*. The bark of *E. bicolor* usually covers the branches more than in the case of *E. microtheca*.

4. With *E. melliodora*, A. Cunn.

The colour and shape of leaves closely resemble those of *E. melliodora* at a distance, but the sucker-leaves distinguish them, being long narrow-lanceolar in *E. bicolor* and oblong-ovate in *E. melliodora*. The pendulous habit and even the buds help to show the similarity. The sapwood of *E. melliodora* is yellow, and the timber pale.

5. With *E. crebra*, F.v.M.

The similarity of this species to *E. bicolor* is sometimes marked, particularly in Queensland specimens.

With typical *crebra* the confusion could never arise in the field as it is an Ironbark, but as the tropics are approached Ironbarks lose some of their characteristics and more closely approximate to the Red Boxes such as *E. bicolor*.

## DESCRIPTION.

XLIII. *E. hemiphloia*, F.v.M.

FRAGM. ii. 62 is quoted by Mueller himself (*Census*) as the description of his species, and following is a translation of the quotation itself. (It is a paragraph under the heading of *E. persicifolia* on the previous page.)

*E. hemiphloia* and *E. leptophleba*\* remain over of the nearly allied species which I have examined. I have received a similar species, if not a variety more or less allied to *E. leucorylon*, from various localities in New England, N.S.W. They are distinguished, it would appear, by really chartaceous leaves, the intra-marginal veins of which are very close to the edge, or at least not frequently far removed from it, by the pedicels thickened into the very slightly angular calyx-tube, by the conical operculum, shorter and paler, less coriaceous and hardly acuminate, not equal to the width of the calyx-tube, by the smaller anthers rather sub-globose or quadrate-ovate, by the slightly dilated stigma and the 4- to 6-celled capsules.

This shares the name "Ironbark tree" with that Eucalypt distributed by Sieber under the number 468 (this is *E. paniculata*, Sm.—J.H.M.) with which it exactly agrees. Both should perhaps be combined, and probably represent the true *E. resinifera*.

This is a very cryptic description of a species and one would not have been surprised if one had heard nothing further of it. As a matter of fact, Mueller omitted both *hemiphloia* and *leptophleba* from the "Index generum et specierum in volumine secundo descriptorum" (p. 184) of the same volume (*Fragm.* ii).

So far as I know, one does not hear of *E. hemiphloia* again until Bentham described the species in B.Fl. iii, 216 (1866), which, as far as I can see, was really a *nomen nudum* in 1861-2 (date of publication of *Fragm.* ii). Mueller subsequently figured and described *E. hemiphloia* in the "Eucalyptographia."

The passage I have translated is a conundrum, and not on a par with Mueller's usually good work. [*En parenthèse*, the "similar species" (query to "*E. hemiphloia* and *E. leptophleba* ?"), and which, according to Mueller's reference in the *Census* is *E. hemiphloia*, is apparently a New England ironbark, and one of its characters is "the conical operculum . . . not equal to the width of the calyx-tube." The specimen before Mueller appears not to be in existence, but the few words apply with special appropriateness to my *E. Caleyi*.] Bentham's description is, however, perfectly clear, except as regards the mix-up with the South Australian specimens (see p. 15).

## Notes Supplementary to the Description.

Besides the normal form, there are two well-marked forms, viz., var. *albens* and var. *microcarpa*. They have, *inter alia*, the following characters in common:—

1. Broadness of juvenile foliage.

\* Previously described by Mueller in *Proc. Linn. Soc.* iii., 86 (1859), from the Gilbert River, Queensland. In the same paper pp. 99, 100, he had established a section of Eucalyptus which he called "Hemiphloia," but there is no mention of an *E. hemiphloia*.

2. Urceolate shape of fruit, and well-defined rim in immature fruits (see figures 11 and 22, Plate 50).
3. Angularity of the fruit, usually a sign of immaturity (see figures 17 and 21b, Plate 50, and 2, Plate 51).
4. Variation in the size of the fruits, even on the same tree.
5. Paniculate inflorescence (see figures 9 and 20a, Plate 50).
6. Bracts, or double opercula.
7. Valves of fruit much sunk.

## RANGE.

MUELLER did not originally publish a locality for his type.

Bentham (B.Fl. iii, 217), doubtless guided by Mueller, gives the following localities :—

Parramatta, New South Wales, “Box-tree” (Woolfs); Moreton Bay, Queensland, “Box-tree” (F. Mueller).

Specimens from these localities precisely tally with the form figured by Mueller as *hemiphloia* in his “Eucalyptographia,” and I think we can accept his figure as representing the type without any doubt.

Bentham adds the South Australian localities (all of which I have visited for the purpose of Eucalyptus investigation), Memory Cove and Kangaroo Island (R. Brown); Port Lincoln (Wilhelmi). There is no form of *hemiphloia* there; at all events, diligent search on my part failed to find any, but that plant which I have named *E. odorata*, var. *purpurascens* (see p. 29), and which was referred to as *E. hemiphloia* by Mueller, is abundant, and this is doubtless the “*hemiphloia*” referred to by Bentham.

I do not know of any South Australian locality for the typical form of *E. hemiphloia*. Victorian specimens, in their variety *microcarpa*, closely approach the normal form; indeed, some specimens from Sheepwash, Bendigo, can scarcely be separated from the Parramatta, or normal form, specimens. The typical form appears to be, however, mostly confined to eastern New South Wales and Queensland, but further collecting is necessary yet.

### NEW SOUTH WALES.

Rhodes, Sydney (H. Deane); the southern suburbs of Sydney generally; Bankstown (R. H. Cambage); Bankstown and Cabramatta (J. L. Boorman); Parramatta (Dr. Woolfs), a type locality; Campbelltown (J. V. Alkin); Narellan (J. Mitchell); Pitt Town Settlement (J. V. de Coque); Windsor (J. S. Allan); Blacktown (R. T. Baker).

All the above are practically from the Parramatta district, and may be looked upon as typical. The fruits from Windsor vary in size, some of them being as small as those of var. *microcarpa*.

*Northern Localities*.—Glendon, Singleton (Leichhardt); Paterson River (J. L. Boorman); Booral to Gloucester, 60 feet 10 inches, on low clayey soil (A. Rudder).

Often called "Forest Box," to distinguish it from the "Brush Box" (*Tristania conferta*). Raymond Terrace, *viá* Stroud and Gloucester, to Taree. I did not again notice it on the coast road. The straightness of the stems of this tree is worthy of note.—(J.H.M.)

"Gum-top Box," "Mountain Box," "Green Top," Bulliac Ranges or Tops, Barrington River, Gloucester (W. H. Etheridge).

*Eucalyptus virgata*, Sieber, Hunter River, New South Wales, Wilkes, U.S. Expl. Exped., 1838-42 (Botany, Asa Gray, i, 553), No. 25,503 U.S. Nat. Herb. is *E. hemiphloia*, F.v.M.; Port Macquarie (Forest Ranger Wilson); Casino (District Forester Pope); Unungar Station, Upper Richmond (W. Forsyth); Drake (E. C. Andrews); Acacia Creek, Macpherson Range, "White, Grey, or Gum-top Box" (W. Dunn). Some specimens show transit to var. *microcarpa*.

#### QUEENSLAND.

Toowong, Brisbane, and Dinmore (F. M. Bailey); "Gum-top Box," Maryborough (W. H. Williams); "Gum-top Box," north of Rockhampton (A. Murphy); also west of Rockhampton, *e.g.* Duaringa and Wallaroo (J.H.M.); Herbert Creek (Bowman).

The first two are co-type localities: the specimens from all the localities are similar to typical *hemiphloia*, which is remarkably uniform in coastal Queensland.

## AFFINITIES.

1. With *E. Bosistoana*. See p. 4.
2. With *E. odorata*.

*E. hemiphloia* recedes from *E. odorata* in the external paleness of the persistent portion of its bark, in the more extensive secession of the bark from the branches, in the broader leaves of thicker consistence with less spreading and less copious veins and less distinguishable oil-dots, in not usually solitary axillary umbels, often more acute lid and more deeply inserted valves of the fruit. The reliability of these distinctions should be further traced in South Australia, wherever the two species grow promiscuously.—("Eucalyptographia" under *E. hemiphloia*).

The rim round the orifice of the fruit cannot be used as a specific difference between these two species; it is abundant enough in *E. hemiphloia* from the County of Cumberland, N.S.W., hundreds of miles from the nearest locality ever attributed

to *odorata*. This rim is especially evident in young fruits of both species; indeed it is found in a number of other species also.

*E. hemiphloia*, as compared with *E. odorata*, has broad, usually larger and coarser, dull foliage, also pale filaments, but they appear to go darker with age. There appear to be no pink filaments in any form of *E. hemiphloia*. Venation more spreading from the base; marked rim in immature fruit; fruits sub-cylindrical, and greater angularity of the fruit in *E. hemiphloia*.

The inflorescence in *E. odorata* is either not paniculate or that character is rare.

I doubt, however, whether it be possible, without botanically perfect material to in all cases separate *E. hemiphloia* from *E. odorata*. *E. hemiphloia*, F.v.M., var. *microcarpa*, and *E. odorata*, var. *Woolfsiana*, are the two varieties of the respective species which approach each other closest.

### Var. *microcarpa*, Maiden.

The first use of this name was as follows:—

The confusion between these two species (*E. Behriana*, F.v.M. and *E. hemiphloia*, F.v.M.) has been already referred to. It occurs with the small-fruited variety of *hemiphloia*, which in many herbaria goes under the name of *parviflora*. This in itself would be an appropriate name, but one at least of the specimens tentatively so named by Bentham (B.Fl. iii, 217) is an Ironbark. I therefore propose for the small-fruited variety of *hemiphloia*, so extensively distributed over the greater part of the range of the species, the name of *E. hemiphloia*, F.v.M., var. *microcarpa*. It is synonymous with *E. Woolfsiana* R. T. Baker, *Proc. Linn. Soc., N.S.W.*, xxv, 684; R. H. Cambage, *ib.*, 714.—(*Proc. Royal Soc., S.A.*, 1901 (1902), p. 11).

Then in *Proc. Linn. Soc., N.S.W.*, 1902, 523, in referring to its affinity with *E. bicolor*, A. Cunn. In my "Forest Flora of New South Wales," i, 131, there is a reference only. A fourth reference is:—

*E. Woolfsiana* has the numerous fine oil-dots of *E. odorata*, a character it shares with *E. hemiphloia*, var. *microcarpa*, Maiden. The inclusion of *E. Woolfsiana* in this variety (*Trans. Roy. Soc. S.A.*, 1902, p. 11) is perhaps erroneous. Certainly it is very close to *hemiphloia*, var. *microcarpa*, and some botanists may consider it to be nearer to that species than to *E. odorata*, New South Wales (*Proc. Roy. Soc., S.A.*, 1903, 245).

Through some inadvertence the variety does not seem to have been formally defined. I therefore proceed to define it.

## DESCRIPTION.

A medium-sized or large tree, rather erect in habit, known usually as "Grey Box" or "Box."

*Bark*.—Sub-fibrous, rather compact, and greyish or whitish on the trunk; the limbs smooth.

*Timber*.—Pale coloured or light brown; rather interlocked.

*Juvenile leaves.*—Glaucous, equally pale green on both sides, broadly ovate, tapering to a blunt point, commonly 3 inches long by  $1\frac{3}{4}$  inches broad, with a slightly twisted petiole of  $\frac{1}{2}$  to  $\frac{3}{4}$  inch. Oil-dots obvious, venation faint though distinct, spreading, with the intramarginal vein a considerable distance from the edge.

*Mature leaves.*—Coriaceous, equally green on both sides, of egg-shell lustre, sometimes dull, lanceolate, slightly oblique, commonly 4 inches long by 1 inch broad, venation not very distinct, spreading, the intramarginal vein not very close to the edge.

*Buds.*—The operculum and calyx alike conoid and of approximately equal dimensions.

*Flowers.*—Profusely borne in panicles, three to seven or more, borne on a common peduncle. Anthers with filaments at base and with pores near the top. A small gland near the top. These anthers may be termed "semi-terminal." In an anther of this class back and front are much alike. The anthers of all forms of *hemiphloia* appear to be identical. Stigma a little dilated.

*Fruit.*—Sub-cylindrical and the valves well sunk; the shape of that of the normal species, but in other respects not different.

Type, Gulgong, N.S.W., in National Herbarium, Sydney.

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## SYNONYM.

*E. Woolliana*, R. T. Baker, *partim*.

"The Woolliana No. 2" of J. H. Maiden. *Proc. Linn. Soc., N.S.W.*, xxix, 764.

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## RANGE.

As a very general rule this form occurs in "dry country" localities, but it also occurs in the coast-belt, *e.g.*, on mountains in the Gloucester district, New South Wales, also in the Macpherson Range, and coastal Queensland.

It seems to be most abundantly diffused in New South Wales, but it is common in Victoria, and will probably be found in Queensland.

### VICTORIA.

The "Grey Box" is met with in two varieties (*a*) in the northern and north-eastern districts. It is a principal constituent of the State forests and timber reserves in the neighbourhood of Bendigo, Maryborough, Wedderburn, and Heathcote, and is a useful and durable timber, but it has a fault in being, when of any size, almost invariably pipy and hollow.—(A. W. Howitt's official unpublished Report, 1895.)

The form (*a*) is var. *microcarpa*, and the second variety is var. *albens*.

I have seen specimens from the following localities:—Campbellfield and Warrandyte, Upper Yarra (C. Walter). "Grey Box," Tatura, Goulburn Valley (J. M. Griffiths); "Grey Box," Goulburn Valley (Sylvester Browne); head of Loddon and Avoca (W. K. Bissill), Melbourne Herbarium. Mueller labelled this specimen "*E. hemiphloia*, a form verging to *E. Behriana*," and a similar specimen, "*E. Behriana*, transit to *E. hemiphloia*," Heathcote (W. S. Brownscombe, 17a); Bendigo (W. W. Froggatt); Maryborough; Rushworth; our common box tree found nearly all over Victoria (J. Blackburne); Benalla and Kerang (A. W. Howitt).

## NEW SOUTH WALES.

Deniliquin (District Forester O. Wilshire); "Black Apple," "Red Apple," (*sic*) Narrandera (late Forester Condell); Wagga Wagga (J.H.M.); "Grey or White Box," Wyalong (District Forester Arthur Osborne); Young (J.H.M.); Tumut, near the normal form (Forester Meeham); "Narrow Leaf White Box," clean limbs; Cudal (R. H. Cambage); "Box," clean limbs, coarse foliage, Mt. McDonald (R. H. Cambage); "Black Box," Wongajong, Forbes; also Parkes (P. Holdsworth); "White Box," Forbes to Engowra (R. H. Cambage); "Narrow-leaved Box," grows on swampy ground; Krowther (H. Deane); near Murga (H. Deane); "White Box," clean limbs, Mt. Hope Road, Euabalong (R. H. Cambage); Condobolin-Euabalong Road (J.H.M.); Condobolin (W. Baeuerlen.) *E. Woolfsiana*, R. T. Baker, *partim*. The *E. Woolfsiana*, No. 2 of my paper in *Proc. Linn. Soc., N.S.W.*, p. 764, (1904); Nyngan (Forester Martin); "Coolibah," Murrumbidgee (A. Murphy); Tomingley to Narromine, coarse foliage, also with narrower leaves (J.H.M.); "Box" Minore (J. L. Boorman); Mudgee (H. Deane); "Box or White Box," Gulgong (J.H.M. and J. L. Boorman). This specimen I take as the type.

"Mountain Box." Rough bark on trunk and limbs. Bulliac tops, Gloucester (W. H. Etheridge).

## AFFINITIES.

1. With *E. Behriana*, F.v.M.

As showing how difficult it sometimes is to deal with closely related forms, I have two specimens, apparently identical, sent by W. K. Bissill, of near Bendigo, Victoria, to the Melbourne Herbarium at different times. Mueller labelled one "*E. hemiphloia*, a form verging to *Behriana*," and the other "*E. Behriana*, transit to *E. hemiphloia*." I have also specimens, apparently identical, from the Mallee country of Victoria, labelled variously by Mueller *E. hemiphloia*, *E. Behriana*, and *E. largiflorens (bicolor)*. All these are Mueller's own species, and I can give no better illustration of the way in which it is sometimes difficult to discriminate between species from herbarium material alone. (See Part X p. 337, vol. 1 of this work.)

2. With *E. bicolor*. See p. 12.3. With *E. populifolia*, Hook.

*E. populifolia* has usually egg-shaped or "poplar" leaves, which, as a rule, are different enough from those of var. *microcarpa* as it is commonly observed in western New South Wales, but lanceolate leaves are marked in specimens of *E. populifolia*, from various localities. It is, in fact, strange as it may at first appear, not always easy to separate var. *microcarpa* from *E. populifolia*, not only

as regards narrow-leaved forms, but as regards those that are broad-leaved. The leaves of *E. populifolia* have usually a wavy margin, and are usually, perhaps always, shiny, unless they have been collected wet. The venation of *E. populifolia* is usually more prominent. The timber and bark of the two trees are often a good deal alike. The fruit of *E. populifolia* is quite small, and is not constricted at the orifice as in *E. hemiphloia* and its forms.

**Var. *albens*, F.v.M.**

## SYNONYMS.

1. *E. albens*, Miq.

2. *E. pallens*, Miq., non DC.

This is Mueller's statement :—

The name of *E. albens* only arose from a misprint of *E. pallens*, and was first promulgated without any diagnosis, and the specific designation is apt to mislead, as the whitish hue, significant of *E. albens*, and for which it is called "White Box tree," occurs only in a particular variety, chiefly of the western interior (probably South Australia is referred to.—J.H.M.) where even this characteristic is often not more remarkable than in several other congeners.—(Mueller in "Eucalyptographia," under *E. hemiphloia*.)

Following is Miquel's statement :—

35. *Eucalyptus albens*, D.C. Prodr. Lc. 219, n. 30. *E. dealbata*, A. Cunning. mss. Schauer in Walp. Rep. ii. p. 924 (?).

Booker (Broken, J.H.M.) river (F. Müll.). "Box tree colonorum. A pago Clairvillage ad m. Remarkable, arbor 50–60 pedalis comâ squarrosâ, sylvas constituens (F. Müll.)."—(Miquel, in *Ned. Kruidk. Arch.* iv, 138 (1856).

Following is one of the specimens seen by Miquel :—

"35. *Euc. dealbata*, A.C. Mt. Remarkable F. M. in Herb. Sonder." This was changed to *E. albens*, DC., by Miquel. This specimen is in the Melbourne Herbarium, and is *E. hemiphloia*, var. *albens*.

Specimens labelled "*E. pallens*, DC. Broken River," in Mueller's handwriting in Herb. Kew, are *E. hemiphloia*, var. *albens*. These specimens are evidently the co-types of those referred to by Miquel above.

Let us now turn to *E. pallens*, DC. *Prod.* iii, 219.

Miquel calls his plant *E. albens*, quoting the above reference, and also De Candolle's sequence number (30) of the species. So that there is no doubt as to the plant referred to. But there is no *E. albens*, in the *Prodromus*, the plant being *E. pallens*, DC., and the type Sieber's *Pls. Evs.* No. 606. I have seen specimens of Sieber's plant (I indeed have small pieces), and an excellent photograph of the *Prodromus* type is, through the kindness of M. Casimir De Candolle, before me as I write.

I have figured it at Plate 7, Part II of this work, and have also described it at page 57 of the same Part. I have there referred it to *E. obtiqua*, L'Hérit., which is probably as nearly as ever we shall get (from the material available). In my view, it is not a form of *E. hemiphloia*, F.v.M.

Miquel has made the further mistake of synonymising his plant with *E. dealbata*, A. Cunn.

The position therefore is this: Mueller's specimens from Booker (Broken) River and from Clairville (Clare) to m. (Mount) Remarkable (South Australia) were sent to Miquel, who named them *E. albens*, thinking he was referring them to *E. pallens*, DC., which was a mistake. Referring them to *E. dealbata*, A. Cunn., is another mistake. This was in 1856.

In 1866, adopting Mueller's views at that time, Bentham (B.Fl, iii, 219) accepted the name *E. albens*, Miq.

In 1880 Mueller, in "Eucalyptographia," Fifth Decade, specifically suppresses *E. albens*, placing it under *E. hemiphloia*, which opinion he maintained in his "First Census" (1882) and his "Second Census" (1889). He maintained that view to the close of his life, and, having given special attention to the matter, both in the herbarium and in the field, I think it is impossible to justify their separation as distinct species.

#### Is *E. hemiphloia* F.v.M., conspecific with *E. albens*, Miq.?

I have just stated that I do not think they can be separated. At the same time, I readily admit that they are often different in appearance, chiefly because of the greater glaucousness of var. *albens*, but this character and also that of habit of tree, shape and size of fruit, are not constant, breaking down when carefully looked into. The composition of the oils of the two forms is the same (Baker and Smith), but these authors state that "in the field the two trees are never confounded," which begs the question.

As regards the two forms, Mueller, who established them, says:

*E. albens* can be distinguished from the typical *E. hemiphloia* only in perhaps more extensively persistent bark, in paler dull foliage and chalky white bloom on the panicles, and in calyces somewhat larger and tapering more gradually into a thicker stalklet.—("Eucalyptographia," under *E. hemiphloia*).

Attention may be invited the following specimens which in my view break down the line of demarcation between *E. hemiphloia* and *E. albens*. See also some notes under "Range."

(a) "Large-leaved Box"; bushmen call the tree, which is not plentiful, "Black Box," because of its dark bark. Bendigo, also Rushworth, Victoria (J. Blackburne.) These specimens closely resemble the normal *hemiphloia*; the fruits are those of the type, as fig. 2d, plate 50, shows. At the same time the angularity of the buds is reminiscent of var. *albens*, but the fruits are smaller, and have no glaucousness, like var. *albens*.

(b) Young, N.S.W. (W. W. Froggatt). Specimens glaucous, and if the fruits were of larger size they would be named var. *albens* without question, but, although the fruits are not quite ripe, it does not appear that they will be larger than *E. hemiphloia typica*.

(c) "White Box," Grenfell, N.S.W. (Forest Ranger Postlethwaite, District Forester Arthur Osborne, R. H. Cambage). These specimens show only a trace of glauconsness; the fruits are those of normal *hemiphloia*. Typical variety *albens* is common at Grenfell. "Grey Fox," Balranald (G. S. M. Grant), and "White Box," Tomingley Creek, Dubbo district, N.S.W. (R. H. Cambage), have fruits more spherical than those of *hemiphloia typica*, and appear to be intermediate between that and var. *albens*.

(d) "Black Box" (bark seems normal colour, but the comparison is with var. *albens*, J.H.M.) On low flats, not seen on hills. Merrindee, between Mudgee and Wellington, N.S.W. (A. Murphy). These specimens very much resemble the Murrurundi specimens below. The Merrindee specimens have slightly glaucous juvenile foliage; I have no juvenile foliage of the Murrurundi specimens.

The Merrindee specimens would be labelled *hemiphloia typica* if found on the coast. Some of the fruits are small, as those of specimens included under var. *microcarpa*; so indeed are some of the coast (typical locality) specimens.

(e) A White Box from Gulgong (J. L. Boorman), "plentiful all over the lowlands of this district," adds another to forms of *E. hemiphloia*. Compared with typical var. *albens* its fruits are smaller, its pedicels are absent, and it is markedly constricted at the orifice, giving the fruits a distinctly ovoid appearance. Specimens from other districts connect absolutely with the type.—(*Proc. Linn. Soc. N.S.W.*, 1904, pp. 760-1).

(f) Coarse buds and leaves, but no sign of glauconsness. Hunter's Vale, near the source of the Hunter; also Murrurundi, N.S.W. (J. L. Boorman and J.H.M.). These specimens appear to show transit to var. *albens*.

(g) "Box," Narrabri (J.H.M.). The remarks I have made under Bendigo and Grenfell largely apply here. I refer these specimens to *E. hemiphloia*, near the type, but state that they display some local variation owing to a drier climate.

All these transit specimens are from interior localities in contradistinction to the coastal localities of *E. hemiphloia*, and the variation displayed appears to be simply referable to the influence of environment. *E. hemiphloia* comprises innumerable individuals extending over enormous areas in South Australia, Victoria, New South Wales, and Queensland, and that there are various forms is not surprising.

## RANGE.

THIS variety is found in South Australia, Victoria, and New South Wales. It avoids the coast (except in South Australia), and is what is generally termed a "dry country" form. At the same time on the Snowy River, and in some other

places, it is found in country with good rainfall. It does not appear to have been hitherto recorded for Queensland, which seems strange. It is worth looking for in the Stanthorpe district, and on the Macintyre River, for example.

*E. albens*, Miquel (given as a synonym of *E. hemiphloia* by Mueller), which occurs near Mount Remarkable, and in some other localities not far from the apex of Spencer's Gulf (these are South Australian localities—J.H.M.); also in the vicinity of the Avoca, Loddon, Campaspe, Broken, Ovens, and Snowy Rivers (F.v.M.); along the whole valley of the Tambo (Howitt) (these are Victorian localities—J.H.M.); on the Upper Murrumbidgee in Silurian Shales and Sandstone, also more or less on all geologic formations on the western slope of the Main Dividing Range of New South Wales down to the Tertiary plains (C. S. Wilkinson), verging northward to New England (C. Stuart).—(Mueller in "Eucalyptographia," under *E. hemiphloia*).

#### SOUTH AUSTRALIA.

Wirrabara Forest (spontaneous trees) (W. Gill and J.H.M.); Laura (W. Gill).

The fruits of my South Australian specimens are only of the size of those of normal *hemiphloia*, but they are glaucous like var. *albens* usually is. Both of the above are in the Mount Remarkable district (a type locality).

*E. hemiphloia*.—This species is extensively represented in Gippsland as a mountain form. It occurs, for instance, in the valley of the Tambo River, north of Fainting Range, where it forms the principal part of the forest, from about 750 feet at Numlamungie to 2,500 feet at Tongee Gap. It is found at Turnback, at the Snowy River, at Deddick, and, more rarely, at Tubbutt. . . . (Extract given at p. 25). This form of *E. hemiphloia* appears to me to be that variety called *E. albens*.—"The Eucalypts of Gippsland" (A. W. Howitt), in *Trans. Roy. Soc. Vict.*, Vol. ii (1890-1), p. 96.)

"Den" or "Dern" of aborigines (Howitt).

Again,—

This form is distinguished botanically as *albens* from the "mealy" aspect of its foliage. Grows almost exclusively in the Tambo Valley between the Fainting Range and Bindi, and in the valley of the Snowy River about Turnback, Deddick, Gutta-Murra, &c. I have also observed it in places in the North-eastern District.—(A. W. Howitt, in an unpublished official Report, 1895.)

The Broken River (a type locality) joins the Goulburn River, and runs into the Murray.

The following Victorian specimens in the National Herbarium, Sydney, are all very glaucous, coarse-leaved, and large-fruited.

Tongio, Gippsland, and Gap Creek, Tongio; also Rutherglen (A. W. Howitt); Ovens River (H. B. Williamson); Euroa district (C. Walter); Heathcote (W. S. Brownscombe).

Trees about 60 feet high; stem-diameter near ground, 3 feet. Grows plentifully on road between Heathcote and Rushworth (J. Blackburne.)

Mr. R. H. Cambage has drawn especial attention to the practical importance of the western boundary line in New South Wales of this particular form. It seems to present a very useful climatic boundary to agriculturists, pastoralists, and others, in that it demarcates the western plains from the table-lands.

## NEW SOUTH WALES.

Tumut (A. W. Howitt, W. W. Froggatt, J.H.M.); Albury (A. W. Howitt); (I have seen specimens from Tocumwal, labelled "White, Silver or Blue Box") Wagga Wagga (J.H.M.); Young (J.H.M.); Grenfell, 2 feet diameter, 60 feet high (F. R. Postlethwaite); Cowra (J.H.M.); Mount McDonald, 20 miles east of Cowra (R. H. Cambage, J.H.M.); Bowan Park, near Cudal, 70-80 feet high; girth for sound trees 3-4 feet; hollow, 6-8 feet (W. F. Blakeley); Molong (W. S. Campbell); Eugowra (P. J. Holdsworth); Parkes (P. J. Holdsworth, J.H.M.); Wellington (W. Woolls); Euchareena (J. L. Boorman).

Dubbo "Grey Box, No. 1." This in no way differs in bark or wood from Dubbo *hemiphloia* (J. V. de Coque); Minore (J. L. Boorman); Tomingley to Peak Hill (J.H.M.).

Hurley's Paddock, Campbelltown (J. V. Alkin); Bullio to Wombeyan (R. H. Cambage and J.H.M.).

Barrigan Ranges, Bylong; Taloo by (R. T. Baker); Capertee (J. L. Boorman); Mudgee to Wellington, *e.g.*, Merrindee, &c. (A. Murphy).

Merriwa (J. L. Boorman and J.H.M.); Scone (J.H.M.); Nundle and Hanging Rock (J. L. Boorman and J.H.M.); Warialda (E. J. Hadley, J. L. Boorman); Inverell (H. Deane, Gordon Stewart); Inverell to Howell (E. C. Andrews).

Narrabri (J.H.M.); Baradine (W. MacDonald); Coonabarabran-Baradine road (W. Forsyth).

I have also seen it from the following localities, but have no specimens:—Yass, Mudgee, Orange.

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## AFFINITIES.

1. With *E. tereticornis*, Sm. var. *dealbata* (*E. dealbata*, A. Cunn.).

Both are glaucous, and the venation and shape of the leaves are often much the same. The venation of *E. hemiphloia*, var. *albens* is usually more spreading, and the leaves more lanceolate; the trees are usually more erect; the fruits are totally different; the buds are angular. The timber of var. *dealbata* is red; that of var. *albens* is pale brown; that of the latter is woolly fibrous, that of the former is smooth or ribbony.

2. With *E. leucoxydon*, F.v.M.

The juvenile leaves of *E. leucoxydon* are stem-clasping; those of var. *albens* have always a stalk; the venation of the former is more prominent and spreading. They are both glaucous, and their timbers are a good deal alike, but the bark of

*E. leucoxyton* is not fibrous ("box"-like) but smooth or ribbonry. The fruits of *E. leucoxyton* have usually a deciduous rim encircling the orifice, are more hemispherical, often warty, and often attain a very much larger size.

### 3. *E. siderophloia*, Benth.

The foliage of this species is not, as a rule, glaucous, but where it occurs in the western districts it is often so, and forms the variety *glauca*. The juvenile leaves of *E. siderophloia* are very coarse, the mature leaves are much the same as those of *E. hemiphloia*, var. *albens*; the buds of *E. siderophloia* are "egg-in-egg-eup," and with a longer operculum; the fruits of *E. siderophloia* are smaller and of a different shape, and with exserted valves. As to the trees themselves, *E. siderophloia* is an Ironbark with red timber, while *E. hemiphloia*, var. *albens* is a Box with pale brown timber.

### 4. *E. polyanthemos*, Schauer.

Howitt has already drawn attention to the similarity, "when the leaves (of *E. polyanthemos*) are not markedly elongated."

Its characteristics accord entirely with the diagnosis given in the "Eucalyptographia," with the exception that the umbels are formed by buds of comparatively large size. The fruit is proportionately large. The bark also extends frequently far up the branches, so that when the leaves are not markedly elongated, this tree resembles, as I have already said, at first sight, the mountain form of *E. polyanthema*. Yet, so far as I have observed, the two species are sharply marked off from each other.—(Howitt, the abstracted paragraph referred to at p. 23).

The timber of *E. polyanthemos* is red, the fruits are smaller and of a different shape. I think the chief resemblance of the two trees lies in their glaucousness.

## DESCRIPTION.

XLIV. *E. odorata*, Behr and Schlechtendal.

ORIGINALLY described by Behr and Schlechtendal in *Linnea* xx, 547 and 567 (1847). See also Mueller in *Fragm.* ii, 66 (1860).

Then Mueller has a plate in "Plants Indigenous to the Colony of Victoria. (Lithograms, 1864-5.) Supplementary plate xvii," labelled *E. odorata*. The anthers are, however, not those of *E. odorata*, but of *E. melliodora*. No juvenile foliage is shown, nor is the origin of the specimen indicated. The twig might do alike for *E. odorata* or for *E. melliodora*, as the differences between the two species are not brought out.

Then Bentham (B.Fl. iii, 215) described the species in English, and Mueller subsequently described and figured it (rather diagrammatically) in the "Eucalyptographia."

The original description, by Behr and Schlechtendal, is in Latin, of which the following is a translation. The portion [ ] is in German.

*Branches* elongated, glabrous in all parts, the young ones angular (angles two, starting from the base of the petiole and becoming much more prominent upwards), the old ones terete, with a greenish-brown bark.

The *umbels* shortly pedunculate, and springing from the axils of the leaves which have been shed or more rarely persist from the past year; the *peduncle* from  $\frac{1}{4}$  to  $\frac{1}{2}$  inch long, bearing six to fifteen flowers on short pedicels; the *pedicels* about a line long, thick and angular, passing by degrees into the *tube of the calyx*, about 2 lines long, the top cylindrical, the *whole fruit* obconical in shape, the *operculum* scarcely  $1\frac{1}{2}$  lines long, bluntly conical. The *stamens* arranged in several rows, at first with the filament bent, finally  $1\frac{1}{2}$  lines long. The *style* terminated by a flattened stigma, sometimes below the edge of the calyx, sometimes more or less emerging from it. *Leaves* oblong (with the petiole  $3-4\frac{1}{2}$  inches long) slightly oblique, scarcely ever curved, narrowing at the base into the petiole, with the top blunt and then sometimes mucronate or acute or continued into a short point, uniformly glaucous, with numerous oil-dots, the margin of a paler colour and slightly thickened, with a netted venation prominent on both sides (in dried specimens), the primary veins forming an intramarginal vein, the space between margin and vein venulose. More often the leaves are irregularly lobed (*sic*), with one or other of the lobules very blunt at the side or meeting towards the top. ("Saepius folia irregulariter lobata apparent, lobulo uno alterove obtusissimo in latere vel apicem versus occurrente," in the original. I have not noticed lobing in this species.—J.H.M.)

[Moderate-sized tree fairly common on dry spots and light soil. It exudes a gum which might be used like gum-kino. Its leaves are filled with abundant volatile oil and smell strongly when it is inclined to rain. The stem is rough as it does not shed the bark. (Peppermint of the Colonists.)]

1. *Typica*.

Following is a type specimen:—

*Eucalyptus odorata*, Behr and Schlecht. (sine nom. ex herb., Behr), Light's Pass, Sandberg, Nov. Holl. Austr., Dr. Ferd. Müller." (Copy of label in herb. Melb. in Mueller's handwriting.)

An identical specimen is labelled "*Euc. odorata*, var. *erythrostoma*, Light's Pass."

It may be described in the following words:—

A shrub or medium-sized tree; rarely a very large tree. Sometimes Mallee-like, but not a true Mallee.

**Bark.**—It is often of that peculiar character known as “Peppermint.” It is very commonly intermediate in character between that of an Ironbark and a Box, hence the name “Ironbark Box,” which is sometimes applied to it in New South Wales, and which is descriptive. The height to which the scaly or sub-fibrous bark occurs up the trunk varies.

**Timber.**—This varies somewhat; but it is brown in colour, hard, and inlocked.

**Juvenile leaves.**—Rather narrow, from linear to broadly lanceolate; dull, often glaucous or bluish green.

**Mature leaves.**—Lanceolate, nearly symmetrical, up to 4 inches long and about half an inch in greatest width, equally green on both sides, sometimes dull, often glaucous or bluish green.

The midrib sometimes sunk, giving the upper face a somewhat channelled appearance. Venation not always prominent, spreading; the intramarginal vein sometimes a considerable distance from the edge.

**Buds.**—The calyces and buds angular, the calyces tapering gradually to the common peduncle; the operculum ovoid and the shape of the whole bud clavate.

**Flowers.**—Usually 5 to 7 in the head. The filaments often drying reddish; the anthers opening by nearly terminal pores, sometimes their widest opening being towards the base of the anther; a small gland at the top of the anther; the stigma enlarged.

**Fruits.**—Small, subcylindrical, or hemispherical, spreading at the mouth. More or less angular, sometimes nearly sessile as regards the pedicels.

### Notes supplementary to the Description.

First, as regards Spencer’s Gulf, S.A. Specimens from Mt. Remarkable, near Melrose, have larger cylindrical fruits. Those from Flinders Range, near Quorn, have leaves sometimes shiny, fruits shiny, buds and young fruits glaucous.

The type of *E. cajuputea* has the leaves rather shiny. Sometimes the venation is well marked, indeed so marked as to approach that of var. *calcicultrix*. The width of the leaves varies.

Then, as regards the Adelaide district, we have cylindrical fruits; and broader leaves from the Mt. Lofty Range; fruits shiny, and sucker leaves mucronate, at Kapunda. At National Park, near Adelaide (W. Gill), we have specimens with juvenile leaves nearly orbicular!

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## SYNONYMS.

This is a very abundant species, and very variable. It has rather a complicated synonymy.

### Typica.

1. *E. cajuputea*, F.v.M.
2. *E. odorata*, Behr., var. *erythrostroma*, F.v.M.

1. 7. *Euc. cajuputea*, *Ferd.* Müll., Herb. ramulis tenuibus superne acutangulis, foliis *linearibus* apice acuminate vulgo sphacelatis, basi in petiolum brevum tortum attenuatis ut plurimum falcatis, coriaceis, costa tenui subtusparumper prominente, venis ascendentibus obtectis, una utrinque e basi subdistincta, umbellis axillaribus et lateralibus, 3-7-vulgo 5 floris, floribus breviter pedicellatis, operculo conico non mucronato calycis tubum obconicum fere aequante.

Flinders Range (F. Müller).

Petioli circiter 3 lin., folia  $2\frac{1}{2}$ - $4\frac{1}{2}$  poll. longa, 2-4 vulgo 3 lin. lata. Pedunculi 2-3 lin. longi; pedicelli  $1-1\frac{1}{2}$  lin. longa, ancipites vel tetraquetri. Calycis tubus  $1\frac{1}{2}$ -2 lin. quandoque subanceps. (Miq. in *Ned. Kruidk. Arch.*, iv, 126, 1856.)

I have a specimen of the type. "Mt. Remarkable, F. Mueller, 1851." With narrow lanceolate leaves, venation hardly observable. Labelled *odorata*, both by Mueller and Bentham.

2. *E. odorata*, Behr., var. *erythrostoma*, F.v.M. (*ante* p. 26).

A type specimen is identical with one labelled :—

"*Euc. odorata*, var. *erythrostoma*. Madam Pepperweath, Light's Pass" Copy of a label in Miquel's handwriting in Herb. Melb.

It is one of the specimens labelled "Madam Pepperweath," by Miquel, a mistaken reading by him for "in modum Peppermenth, or *like peppermint*," as pointed out under *E. incrassata*, in B.Fl. iii, 231.

## Varieties.

### i. Var. *calcicultris*, Miq.

Size, bark, and timber like that of the type.

**Juvenile leaves.**—Sometimes glaucous, veins very prominent, often triplinerved, with the lateral veins nearly as prominent. Broadish ovate, say  $1\frac{1}{2}$  inches long by 1 inch wide, but variation in width remarkable.

**Mature leaves.**—Sap-green in colour, thinnish, and with rather prominent oil-dots. Well-marked (*E. loxophleba*-like) venation; intramarginal vein at a considerable distance from the edge. Colour bright, often sap-green. An average size is 3 inches long and  $\frac{3}{4}$  inch broad, with a petiole of half an inch.

**Buds.**—Scarcely angular, but showing angularity somewhat, each on a tapering stalk, and the cluster on a common pedicel of half an inch.

**Flowers.**—Usually four to six in the head; anthers same as the type.

**Fruits.**—Pedicellate, almost ovate; sometimes markedly pear-shaped. Valves usually six, and deeply sunk. Rim of fruit often accentuated like that of *E. leucorylon* and *E. melliosora*. A quarter of an inch long.

### Notes Supplementary to the Description.

Specimens from Spencer's Gulf have broader leaves, and specially shiny foliage; venation well marked. The width of leaves varies. When growing close to the sea they are sometimes very coarse.

Koch's No. 588, Flinders Range specimen, has leaves less shiny.

Juvenile leaves (on same tree) from narrow to *very* broad, and green. The buds are sometimes with a hemispherical operculum. Filaments paler. Larger fruits, often with marked rim. Mount Brown Forest Reserve, Flinders Range, has fruits large, more pear-shaped, and the orifice smaller.

## SYNONYMS.

1. *E. calcicultrix*, F.v.M.
2. *E. porosa*, F.v.M.
3. *E. leucoxydon*, F.v.M., var. *pluriflora*, F.v.M.

1. Var. *calcicultrix*? (*E. calcicultrix*, F. Müll., Herb. et adnot.); foliis tenuioribus elliptico-vel oblongo-lanceolatis extenuato-apiculatis, adspectu subtrinerviis, 2-3 $\frac{1}{4}$  poll. longis. Locis calcareis ad Adelaide Nov. Holl. Austr. (F.M.). (Miq. in *Ned. Kruidk. Arch.*, iv, 129, 1856.)

Following are specimens of the type:—

*Euc. calcicultrix*, F.M. (*odorata*), Nr. Adelaide (Herb. Melb.).

13. *Eucalypt. odorata*, Behr, var. *calcicultrix*, Adelaide. Fl. hieme., F. Müller. (Copy of a label by Miquel in Herb. W. Sonder in Herb. Melb.)

## 2. *E. porosa*, Miq.

19. *Eucalyptus porosa*, Ferd. Müll., ramulis tenuibus teretibus superne saltem leviter angulatis, foliis longiuscule petiolatis e basi acuta subæquali lanceolatis vulgo falcatis attenuato-acuminatis coriaceis glanduloso-perforatis nitidulis venis patule adscendentibus prominentibus tenere reticulatis ante marginem unitis, pedunculis axillaribus et lateralibus petiolo duplo brevioribus 4-6 floris, floribus subsessilibus, calycis tubo viridi obconico-obovato operculum conico-semiglobosum lutescens æquante vel subsuperante.

In monte Kaiserstuhl Novæ Holl. austr., ab æstate ad autumnum florens, Flinders Range, F.M.

*Euc. stricta*, Sieb. affinis. Petioli  $\frac{1}{2}$ -fere 1 poll. longi. Folia 3-4 poll. longa. Pedunculi 2 lin., alabastra operculata circiter æquantes. Foliorum venis valde distinctis ab *E. sandalifolia*, cui cæteròquin haud assimilis, differt. (Miq. in *Ned. Kruidk. Arch.*, iv, 132.)

“19. *Eucalyptus porosa*, F. Müller. Flinders Range, Dr. F. Müller.” Copy of label in Herb. W. Sonder, in Herb., Melb.

## 3. *E. leucoxydon*, F.v.M., var. *pluriflora*, F.M.

Umbellis plerumque five-floris, pedicellis abbreviatis. *E. odorata*?, Behr Herb., non in Linnaea. Ad. Gawler-town. (Miq. in *Ned. Kruidk. Arch.*, iv.)

Following is a specimen in Herb., Melb.:—

“*E. leucoxydon*, var. *pluriflora*, Ferd. Müll., in Herb. Behr., Gawler Town, Nov., 1848.”

## ii. Var. *purpurascens*, Maiden, *Proc. Roy. Soc. S.A.*, xxxii, 283 (1908).

A tall shrub or small tree.

**Bark and Timber.**—The same as in the normal form.

**Juvenile leaves.**—Petiolate, from nearly obovate to broadly lanceolate, say 2 $\frac{1}{2}$  inches long to half that width. Dull on both sides. Venation spreading; intramarginal vein a considerable distance from the edge. The intermediate leaves are coriaceous, coarse, and large; veins strongly marked both on upper and lower surfaces.

**Mature leaves.**—As leaves reach their maturity they become narrower, 3 to 4 inches long, with a width of half an inch, though broader leaves are not rare on flowering branches. Coriaceous, dull on both sides, or shining on both sides. Venation as in juvenile leaves, but far less conspicuous than in the intermediate stage.

**Buds.**—Angular, sessile, on a common peduncle of  $\frac{1}{4}$  to  $\frac{1}{2}$  inch; a pale-coloured pointed operculum with a subcylindrical calyx of twice the length.

**Flowers.**—Colour of flowers white or cream coloured to pale purplish or pink and crimson. Anthers same as type.

**Fruits.**—Subcylindrical, more or less angular, and compressed; sessile on a common angular pedicel. The shape and size of the individual fruits a good deal similar to those of the type.

## SYNONYMS.

1. *E. perforata*, F.v.M.
2. *E. odorata*, Behr, forma *angustifolia*, F.v.M.
3. *E. odorata*, Behr, var. *erythrandra*, F.v.M.
4. *E. purpurascens* (R.Br.), F.v.M.
5. *E. Behriana*, F.v.M., var. *purpurascens*, F.v.M.
6. *E. hemiphloia*, F.v.M., var. *purpurascens*, Maiden.
7. *E. Lansdowneana*, Mueller and J. E. Brown.

1. *E. perforata*, F.v.M.

13. *Eucalyptus odorata*, Behr. in Linnæa, xx, p. 657, n. 178. *E. perforata*, Ferd. Müll., Herb. olim., Dombey Bay, forma *angustifol.* frutex 5-8 pedalis as aquas stagnantes ad fl. Murray passim crebro; in terra calcarea undulata prope Adelaide (F.M.); ad Light's Pass et Sandberg (Behr).

Cortex ramorum juniorum interdum nigrescit; pedicelli pedunculique plus minus angulati rugulosi, filamenta denique 2 longa. F. Müll. (Miq. in *Ned. Kruidk. Arch.*, iv, 129.)

Following are specimens of *E. odorata* collected by Wilhelmi at Dombey Bay:—

“No. 13. *Eucal. odorata*, Behr, Dombey Bay,” in Herb. Sond.

2. “*Euc. odorata* forma *angustifolia*, Dombey Bay, December, 1851.” The leaves seem to be of normal width.

These specimens are identical with a very small-fruited form of *E. odorata*, at 10-11 miles (Port Lincoln to Lake Wangary), and also vicinity of Tumbly (Dombey) Bay, Spencer's Gulf.

It is a small-fruited, narrow-leaved, mallee-like form, with pale brown timber and a ribbony, rough butt. Only green fruits and very young buds were collected, but the smallness of the fruits is an additional instance of the variability of the species.

In the original description of *E. perforata* we have “Cortex ramorum juniorum interdum nigrescit.” Compare the “Black Mallee” of Adelaide and other localities.

3. *E. odorata*, Behr, var. *erythrandra*, F.v.M.

Var. *erythrandra*, Ferd. Müll., filamentis rubris, foliis latioribus, habiter robustiore.

Port Lincoln, Novæ Holl. austr. frutex 5-6 pedalis (F. Müller). (Miq. *Ned. Kruidk.*, &c.).

Following is a type specimen:—

“*E. odorata*, var. *erythrandra*, Ferd. M. (*E. perforata*, mihi aut.), Port Lincoln, Ferd. Müll.”

“13. *E. odorata*, Behr, var. *erythran tra*, F.v.M. Murray, Dr. Behr.”

These two labels in Herb. W. Sonder in Herb., Melb., are on specimens identical in appearance.

4. *E. purpurascens* (R.Br.) F.v.M.

Collected by Robert Brown at Port Lincoln in 1802, and distributed by the British Museum under No. 4735. It is in many herbaria under Brown's name.

Afterwards, Mueller adopted the name. I have seen the type labelled by him "*E. purpurascens*, Ferd.M. Scrub of Port Lincoln, 1855. 4-6". Carl Wilhelmi." Mueller distributed a number of specimens under that name.

5. *E. Behriana*, F.v.M., var. *purpurascens*, F.v.M.

"Flowers larger. Peduncles and calyx angular, the latter fully two lines long. Operculum obtusely conical, but shorter than the calyx-lobe. Stamens purplish. Lake Wangaroo (Wangary.—J.H.M.). *Wilhelmi*." (B.Fl. iii, 214).

6. *E. hemiphloia*, F.v.M. var. *purpurascens*, Maiden, *Proc. Roy. Soc. S.A.*, xxvi, 12 (1902).

Mueller's *E. purpurascens* is identical with Bentham's specimens of *E. hemiphloia*, F.v.M., referred to in B.Fl. iii, 217, as "Memory Cove and Kangaroo Island, R. Brown; Port Lincoln, *Wilhelmi*."

The same specimen was labelled by Mueller "*E. hemiphloia* var.; pedicels none; lid short and blunt."

*Loc. cit.* I suggested that the form be named *E. hemiphloia*, F.v.M., var. *purpurascens*.

7. *E. Lansdowneana*, Mueller and J. E. Brown, in Brown's "Forest Flora of South Australia," Part 9, t. 31 (1890).

The forms under the above names have puzzled a good many people, because there is absolute transition between white and pink (sometimes deep pink) coloured flowers. The variety is, in my opinion, not a strong one.

All the synonyms, except *E. Lansdowneana*, are based on material collected in the Port Lincoln district.

Following are field notes, of some value for that reason.

"Red Mallee" seems to be commonest in the Port Lincoln district; it is pink flowering, and very pretty. It is usually a straggling small tree of 10 feet and more, with a stem of 3 or 4 inches. It is certainly not a variety of *E. hemiphloia* as has been supposed, from herbarium material.

"Pink Mallee," for so it is also called, is at Kirton Point much like *E. incrassata*, var. *dumosa*; it has a small operculum, but this is never grooved, and it is more pointed and less rounded than that of var. *dumosa*. Pink Mallee is usually more compact in habit than the latter.

The pale Pink Mallee occasionally attains the height of a tree, *e.g.*, at Kirton Point, where it is a foot in diameter, and at other places, as much and more. So that in size it does not really differ from the normal form. I cannot see any difference between the Pink Mallee and the tree known as Peppermint (*odorata*).

It is common for a few miles along the western road from Port Lincoln.

The Peppermint, the Pink Mallee and the "white" Pink Mallee (that is to say, Mallee that cannot be distinguished from pink except by its white filaments) are all in flower in the same stage at the same time (January, 1907).

At  $2\frac{1}{2}$  miles on the old road I cut some timber of pink flowering Mallee. It is brown inside. I also cut a piece of white flowering Mallee. I could detect no difference in the two timbers, nor in either of them from that of normal *odorata*.

Then we have *E. Lansdowneana*, F.v.M. and J. E. Brown, figured and described as the "Red-flowering Mallee." It was collected by Mr. Thomas Lansdowne Browne on his Pandura Run in the Gawler Ranges.

In the district where found the species is locally referred to as the "Red-flowering Mallee," but Mr. Browne explains that it is not a Mallee proper, as it rises with one stem only, like any ordinary tree. . . . It varies in height from 10-16 feet, and is rarely more than 2 inches in diameter. Imperfect specimens of this species were collected in 1847 near Encounter Bay by C. Stuart; others in 1851 near Port Lincoln by C. Wilhelm.

Luehmann says "*E. Lansdowneana*. I have seen neither a specimen nor description, and Tate, who has seen the plant says it is not a tenable species." (*Proc. A.A.A.S., Sydney, 1898, p. 535.*)

There is a fragment of the type in the herbarium of the University of Adelaide, which I have seen.

The plant, like the rest of the "Pink or Red Mallee" of Port Lincoln, is referable to *E. odorata*, of which it is a variety, though not a strong one. The type specimen of *E. Lansdowneana* from the Gawler Range is of a deeper purple than I have seen it anywhere else.

### iii. Var. *Woolsiana*, var. nov.

A medium sized tree.

**Bark.**—Whitish-grey like that of *E. hemiphloia*, and persistent as in that species, on the trunk and main branches.

**Timber.**—Brown coloured and interlocked.

**Juvenile leaves.**—Linear-lanceolate, say 4 inches long and  $\frac{1}{4}$  inch broad, dull on both sides, venation distinct though not conspicuous, except as regards the midrib. Intramarginal vein a little distant from the edge, venation spreading.

**Mature leaves.**—Narrow lanceolate, say 4 inches long and up to  $\frac{1}{2}$  inch broad, shining or dull-shining (egg-shell lustre) on both sides; venation as in juvenile leaves.

**Buds.**—Not angular, with conical operculum, the calyx tapering into the pedicel.

**Flowers.**—Anthers identical with those of the type; the stigma slightly dilated.

**Fruits.**—Small, conoid to subcylindrical,  $\frac{1}{2}$  inch long, tapering to a pedicel rather exceeding that length to a common peduncle of  $\frac{3}{8}$  inch; rim distinct, sometimes white, valves usually 4, well sunk.

## SYNONYM.

*E. Woollsiana*, R. T. Baker in *Proc. Linn. Soc. N.S.W.*, xxv, 684 (1900), *partim*; the "Woollsiana No. 1" of J. H. Maiden, *ib.*, xxix, p. 764.

The name variety *Woollsiana* has been adopted with the desire to commemorate the name of a man who well deserves this tribute, but I do not shut my eyes to the fact that it is possible that its incautious use may lead to confusion, since the variety *Woollsiana* is not wholly synonymous with *E. Woollsiana*, R. T. Baker. See also *E. hemiphloia*, var. *microcarpa*, p. 17.

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## RANGE.

(Of species.)

This is an interesting species, described from South Australian specimens collected in 1847, and until a few years ago believed to be endemic to that State.\* Since then it has been traced into Victoria and extensively in New South Wales. It is believed to occur in Queensland, and may yet be found in Western Australia.

In the "Eucalyptographia," Mueller recorded it only for South Australia, and doubtfully for Victoria; in the "Second Census" he recorded it for South Australia, Victoria, and New South Wales.

### The Type Form.

SOUTH AUSTRALIA.

"No. 178. *Eucalyptus odorata*, Sud Australie, Dr. Behr, 1848." (Herb. Barbey-Boissier.) A type specimen.

"One of the common scrub (Adelaide) forms apparently referable to *E. odorata*. This type is of a dull and bluish type of green, and fairly erect in its general growth" (W. Gill).

This is the common Adelaide scrub form of *E. odorata*, sometimes known as "Black Mallee." "Of a dull and bluish type of green, and fairly erect in its general growth" (W. Gill). Leaves narrow, fruits in heads.

"Peppermint," Adelaide (R. H. Cambage); Mt. Lofty Range (M. Koch); National Park, near Adelaide (W. Gill); Frances, 20 miles south of Wolseley (W. Gill).

Light's Pass, S.A., venation, colour, and texture of leaves precisely similar to that of Tomingley, N.S.W.

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\* "*E. odorata*, from imperfect specimens forwarded to me, appears to exist on the Lachlan (N.S.W.)." "A Contribution to the Flora of Australia." W. Woolls, p. 244 (1867). The clue was not, however, followed up at the time.

A specimen in "Plantæ Müllerianæ, Nov. Holland, meridional," bearing the words "Eucalyptus? Arbor, Port Lincoln," in Miquel's handwriting is *Euc. odorata*. (From Herb. Vindob.)

The two following specimens precisely match Adelaide specimens :—

"Plantæ Müllerianæ, B. and Schl. (Behr and Schlechtendal), Nov. Holland, meridional, Dombey Bay." (Examined by Miquel.)

"Eucalyptus odorata, B. and Schl., Dombey Bay," in Herb. Barbey-Boissier, ex herb., Miquel.

They have abundant small fruits, and precisely resemble Adelaide Mallee, and also specimens formerly labelled *E. calcicultrix*.

*E. odorata*, var. *cajuputea* (*E. cajuputea*, F.v.M.), Flinders Range (specimen in Herb. Melb.).

Mr. Walter Gill, the Conservator of Forests of South Australia, writes to me about *E. odorata* :—

"It is growing on the Mount Brown Forest Reserve in the Flinders Range, about 9 or 10 miles south of the town of Quorn. The Reserve is situated about 20 miles a little north-east of Port Augusta. The Flinders Range runs from Quorn south as far as west of Laura. There is a lot of *E. odorata* growing round Melrose, the town under Mt. Remarkable, and some of it is very large timber (for *odorata*). It may be said that the species is general in the southern portion of the State."

"Peppermint." Type of Mallee growing in the Flinders Range country, about 10 miles south of Quorn, and just a little north of Mt. Brown.

St. Vincent's Gulf and upper part of St. Vincent's Gulf (W. Gill).

"Peppermint," Kapunda. "A Box tree, very hard wood" (R. H. Cambage). Kapunda (W. Gill).

Bundaleer Forest (J.H.M.); Scrub between Murray Bridge and Monarto (J. M. Black); Wirrabara Forest Reserve, Mt. Remarkable and Spencer's Gulf generally (W. Gill); Hog Bay, Kangaroo Island (J.H.M.); Kangaroo Island (J. G. O. Tepper), with rather broad leaves. These two specimens without flowers and may be var. *purpurascens*.

#### VICTORIA.

Many of these specimens well show the dilated stigma which Behr gives as a character of the species.

Serviceton, South Australian-Victoria border (R. H. Cambage); Rushworth and Wedderburn (J. Blackburne); Avoca (W. Percy Wilkinson); the Wimmera district, near Nhill (St. Eloy D'Alton and Walter); the channelling of the leaves is well marked in this specimen. North-west Victoria (C. Walter). Stigma not much dilated, "*Odorata* var. *floribunda*," Bentham, Yarra (Mueller). Dimboola (St. Eloy D'Alton). Typical var. *calcicultrix* does not seem to have been collected out of South Australia, but this specimen is very close to it.

## NEW SOUTH WALES.

As regards specimens of "Box Mallee" or "Mallee Box" from Wyalong, received from Arthur Osborne, District Forester, Mr. Osborne makes a distinction between the "Mallee Box" and the "Grey Box" (*E. hemiphloia*, var. *microcarpa*) at the same place.

"Mallee Box" has a broader or more dilated stigma. (A character of *E. odorata*. See original description.)

"Grey Box," Moama, with dilated stigma; Parkes district (P. J. Holdsworth); Colar (J. L. Boorman); "Mallee Box," Moondana, Nymagee district (E. F. Rogers); "Narrow-leaved Box," Moree (W. S. Campbell).

**i. Variety calcicultrix, F.v.M.**

Confined to South Australia, where it is known as "Peppermint" and "Box Gum."

Houghton (George McEwen); "Common on the foot-hills near Adelaide. It is Peppermint Gum, and the stunted form ('Black Mallee') appears due to poor stony soil" (J. M. Black); Gawler (F.v.M. His *E. leucoxyton*, var. *pluriflora*); Cape Jervis, also Port Lincoln to Coffin's Bay (J.H.M.); York Peninsula (J. G. O. Tepper).

This is another type differing from the Adelaide specimens (3,324/99) in having the colour of the leaves bright sap-green instead of a bluey-green, and having the inflorescence of a far more paniculate and terminal character than the other. Soil dirty cream colour overlaying soft slaty rock of a dull yellow inclining to green, and sometimes also overlaying marl or limestone (W. Gill). Flinders Range to Quorn (Max Koch).

Emu Flat, 90-mile Desert (W. Gill). Marked rim to green fruit. This specimen well exhibits the bright yellow green or sap-green foliage so commonly seen in this species in the interior.

Murray Bridge (R. H. Cambage and J.H.M.).

**ii. Var. purpurascens, Maiden.**

Confined to South Australia so far as known.

Pandura Run, Gawler Ranges. Habitat of the type of *E. Lansdowneana*, Mueller and J. E. Brown (Thomas Lansdowne Browne). "Appears to be confined, so far as the Gawler Ranges are concerned, to the southern watersheds of the water-courses."

The describers add "Imperfect specimens of this species were collected already in 1847 near Encounter Bay by Ch. Stuart, others in 1851 near Port Lincoln by C. Willhelmi."

Abundant in the Port Lincoln district, as I have already shown.

### iii. Var. *Woollsiana*, Maiden.

Confined to New South Wales so far as known, but it probably occurs in South Australia, near the New South Wales border.

“Mallee Box” has a thin, tall trunk with a Box bark, ribbony at the branches, which issue at a good height from the ground. It grows amongst other Mallees in dry, stony situations. Mount Boppy, near Cobar (J. L. Boorman). Has very small fruits.

Girilambone to Condobolin (W. Baeuerlen). Suckers of moderate width, broader than those of Narrabri.

Condobolin. “White or Grey Box” with limbs partly white. Gilgandra (both R. H. Cambage).

“Narrow-leaved Box.” On the plains near Baradine. “Large scrub or small tree,” 18 miles from Dubbo (both W. Forsyth); Castlereagh River (Rev. Dr. Woolls), labelled *E. largiflorens* (*bicolor*), by Mueller; “Box,” Narrabri, where it is common (J.H.M.). Narrow lanceolate suckers.

Narrabri West. A Box, growing on flats, black soil plains, by side of river; medium-sized trees; very shiny foliage (J. L. Boorman); Pilliga (J. L. Boorman) is *E. odorata* with the small fruits of var. *Woollsiana*; Denman (W. Heron).

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## AFFINITIES.

1. With *E. hemiphloia*, F.v.M. See p. 16.
2. With *E. melliodora*, A. Cunn.

The affinity of this species to *E. melliodora* has already been pointed out in the “Eucalyptographia.” The figure (Suppl. pl. xvii) Mueller’s “Plants of the Colony of Victoria,” labelled *E. odorata*, Behr and Schlecht., is, in my opinion *E. melliodora*, A. Cunn., for reasons stated at page 26. *E. melliodora* is sharply separated by its more drooping habit, pale coloured wood, and the bright yellow colour of the inner bark.

3. With *E. bicolor*, A. Cunn. See p. 12.

Sometimes the narrow-leaved form of this species, *e.g.*, some of the “River Box” about Bourke, simulates *E. odorata*, var. *Woollsiana*, a good deal. The resemblance even extends to the small fruits. *E. bicolor*, however, has rough bark to the tips of the branches, and the timber is red.

4. With *E. leucoxyton*, F.v.M.

*E. odorata* may be readily confused with *E. leucoxyton* as regards the small fruited forms of the latter. For example, Mueller’s variety *pluriflora* of the latter

is *odorata*. The timber of *E. leucoxyton* is pale, and its bark less rough. The venation of the leaves of *E. odorata* is more marked than that of *E. leucoxyton*. The stem-clasping glaucous foliage of *E. leucoxyton* is quite different.

5. With *E. fœcunda*, Schauer.

The affinity of these two species as regards foliage, buds, fruits, and perhaps timber, is undoubted. *E. loxophleba*, Benth., var. *fruticosa*, Benth., B.Fl. iii, 252, is, in my opinion, referable to *E. odorata* (*E. loxophleba* is now acknowledged to be a form of *E. fœcunda*). *E. odorata* has not yet been traced to Western Australia, and the relations of the two species require to be more closely studied.

6. With *E. Behriana*, F.v.M.

Mueller (*Eucalyptographia*) remarks that while *E. odorata* could not be easily mistaken for *E. Behriana*, the former is discriminable by the mainly axillary inflorescence and persistent bark. *E. odorata* is usually a fairly large tree, while *E. Behriana* is a Mallee; the former is rough-barked, while the latter is smooth.

Sometimes *E. odorata* is coarse (especially near the sea-coast) and broad-leaved; this form is a good deal like *E. Behriana*, but the timber is brown, not red as in *E. Behriana*.

## DESCRIPTION.

XLIV (a). *An Ironbark Box.*

WE are now in a position to understand an interesting tree whose closest affinity is, I think, with *E. odorata*. At one time I thought it to be a new species, and it is one of the forms included by Mueller in his original description of *E. Bosistoana*.

I think it will be best to describe it in detail, as if it were a new species, since this is the clearest way of showing what the plant really is.

A tree of medium size.

**Bark.**—Scaly-fibrous, rough and thick, persisting only on the lower portion of the trunk.

**Timber.**—Pale-coloured (brownish), interlocked.

**Seedlings.**—Linear lanceolate to lanceolate, pale on the under side.

**Juvenile leaves.**—Green, not blue, dull, same on both sides, lanceolate, say,  $2\frac{1}{2}$  inches long by  $\frac{3}{8}$  inch broad. Venation not well defined. Intramarginal vein not far from the edge, and the veins spreading.

**Mature leaves.**—Narrow lanceolate, only slightly falcate, 3 to 4 inches long, with a width of about half an inch. Somewhat coriaceous, bright green when fresh, equally green on both sides, more or less shining. Venation not very prominent, intramarginal vein a little removed from the edge, venation almost spreading, sometimes nearly penninerved.

**Buds.**—Somewhat angular, clavate, operculum pointed, and with the calyx tapering gradually into a pedicel nearly equal in length to that of the bud. The common peduncle about  $\frac{1}{2}$  an inch.

**Flowers.**—Three to eight in the umbel; seven is a common number. Anthers with very nearly terminal pores, between an odorata anther and those which have strictly terminal pores, as in some Ironbarks.

**Fruits.**—About  $\frac{3}{16}$  inch in diameter and length, the pedicels of equal length and well defined, the common peduncle of twice the length. Truncate ovate, when young slightly urceolate and with a marked rim after the fashion of *E. odorata*, var. *calicultrix*; when fully ripe the rim is absent or scarcely evident. Valves usually five, and well sunk below the orifice.

## RANGE.

FROM Inglewood, Victoria, "in a rough rangy situation." (J. Blackburne.)

I have had much correspondence with Mr. Blackburne in regard to this tree, which is the only one he knows.

I received a similar specimen (but not in fruit), from the late Charles Walter. It was collected in the Wimmera district near Nhill, by D'Alton and himself.

For further remarks on the Range of allied forms, see below, p. 39.

## AFFINITIES.

### 1. With *E. Bosistoana* F.v.M.

Very like *E. Bosistoana* in general appearance, and in many details, but the juvenile leaves sharply differentiate the two species, those of *E. Bosistoana* being "roundish or ovate." *E. Bosistoana* is also a coastal species of large size; this Ironbark Box is a smaller tree from dry country.

### 2. With *E. bicolor*, A. Cunn.

The foliage of the Ironbark Box is bright green, and the venation closer to the edge; that of *E. bicolor* dull whitish-green. The bark of the former persists *only at bottom of trunk*, that of *E. bicolor* is *all over stem and branches*. The timber of the former is paler and less interlocked. The filaments of the former plant are longer and the operculum is more conical. The fruits of the former are larger and more rimmed, are sparingly distributed; those of *E. bicolor* profusely distributed (in clusters).

*Ironbark Box*.—What is the tree? I have already stated my view that its closest affinity is with *E. odorata*. The set of drawings (fig. 5, plate 52) illustrating this form show the affinity without doubt.

I believe it to show hybridism and to belong to the group of Ironbark Boxes. That being so, I propose to defer further consideration of it until I deal with the Ironbark Boxes, and my object in describing the present tree at length is to interest collectors all over Australia in the subject, in order that they may look out for supposed Eucalyptus hybrids, and particularly those supposed to be hybrids between the Ironbarks and the Boxes.

I refer to a paper of mine\* on the hybridisation in the genus, and at p. 494 are some notes on the Ironbark Boxes.

In New South Wales we have some Ironbark Boxes which are more or less similar to the Inglewood one, but not absolutely identical with it, which is not to be surprised at if they be hybrids, which I think they are, the more closely I study them.

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\* "Further notes on hybridisation in the genus Eucalyptus," *Proc. Linn. Soc. N.S.W.*, xxx, 492 (1905). See also a reference at p. 330, Part X of the present work.

## XLV. *E. fruticetorum*, F.v.M.

THE original description (in Latin) of this species is quoted by Miquel, and will be found in Part III, p. 80, of this work.

Later, in *Fragm.*, ii, 57, Mueller re-described the species with some synonymy (erroneous as regards *E. santalifolia*), and I offer a translation of it here.

*Eucalyptus fruticetorum* (F.M. in Miq. *Stirp. New Holl.*, 35; *E. santalifolia*, F.v.M., l.c., 37, and in *Transact. Vict. Instit.*, i, 35. Sect. Hemiphoiæ.)

Shrubby, growing to a tree; *leaves* alternate, moderately petiolate, narrow- or falcate- or oblong-lanceolate, papery or leathery, first finely then prominently spreading, penniveined, shining, the same colour on both sides, the peripheral veins close to the margin; *umbels* axillary and lateral, solitary or subpaniculate; *peduncle* almost terete or compressed, about as long as the flowers; the *calyx tube* truncate- or obovate-ovate, little or not angular, without or with short pedicels, depressed or pyramidally hemispherical, not striate, and scarcely exceeding three times the length of the operculum; *anthers* subovate; *style* short; *fruit* truncate- or cylindrical-ovate, with three to four cells, rim thin, valves short, entirely enclosed; *seeds* without wings.

In sandy-clayey or stony plains in the desert from the R. Murray to the R. Murchison,\* forming a considerable portion of the scrub.

A shrub varying in height, growing to the size of a small tree. The bark of the branches and of the younger stems smooth, but that of the old trunk rugose, semifibrous, ashy-grey, adhering for a long time. Young branches slender, more often smooth than angular. Leaves 2-4" long, 4-8" broad, rarely larger, tapering into a point, often uncinatè, more or less pellucidly dotted, but thickly coriaceous and imperforate with age. Peduncles  $\frac{1}{2}$  inch long or shorter, rarely longer. Pedicels often 1" long, sometimes invisible. Calyx tube 2-3" long. Operculum about 1" high,  $1\frac{1}{2}$ -2" broad, coriaceous. Filaments somewhat thick, of a whitish colour, drying yellowish, the outer ones reaching a length of 2-3". Anthers of a pale colour,  $\frac{3}{4}$ -1" long, varying from ovate to globose, quadrate and cuneate, more or less bent, dehiscent for the whole length on both sides. Style somewhat thick, filiform, scarcely exceeding 1". Fruit 2 $\frac{1}{2}$ -4" long, the orifice slightly contracted. Sterile seeds almost rhomboid, clavate or deltoid,  $\frac{1}{3}$ - $\frac{2}{3}$ " long, brownish or deep yellow; the fertile ones dorsally convex, dirty brown, at length turning black, about  $\frac{3}{4}$ " long.—(*Fragm.*, ii, 57.)

Mueller then proceeds to indicate its affinity to *E. amygdalina*, Schauer, (*E. fœcunda*, Schauer), and *E. gracilis*, F.v.M.

He then states that it is allied to the species known to the W.A. aborigines as "Yandee." I print what he said, as it will be useful for reference, but the tentative inclusion of the Yandee of Western Australia (*E. fœcunda*) has caused some confusion.

The species seems to have affinity between *E. amygdalina* and *E. gracilis*. The aborigines make spears from the younger stems. *E. amygdalina*, Schauer, in Lehn. *Pl. Preiss.*, i, 130, appears applicable to this species; Labillardière's species does not appear among the numerous Eucalypts of W.A. preserved in our collection.

It is allied to the species known by the aborigines of W.A. as "Yandee," unless a variety, forming a taller tree, is evolved during a long period of time. This specially differs from it in that the marginal vein of the leaf is situated further from the edge, and the lateral veins are less spreading. The bark, moreover, according to the careful enquiries of Oldfield, is blackish, and tardily falls off in bundles (*sic*). This tree has a straight trunk, and belongs better to the Pachyphloia section than to the Hemiphoiæ. In what way this tree, which is known to West Australians as "York Gum," is distinguished from *E. fruticetorum* is not clear from the specimens sent by Oldfield.

\* This W.A. locality was founded on a misapprehension, and refers to the species *fœcunda* confused with it.

*E. largiflorens*, F.M., in *Transact. Vict. Instit.*, i, 34 (*E. hirmastoma*, Miq., *Stirp. New Holl.*, 34, not Sm.) is peculiar to the Australian desert, and not a native of Tasmania; in what way *E. Behriana* has affinity to *E. fruticetorum* is a matter for further observation and statement of the differences.-- (*Fragm.*, ii, 57.)

References to *E. fruticetorum*, F.v.M., will also be found in Part III, p. 84, of the present work (two of Mr. Wilkinson's specimens being figured as G. H. of Plate 11); Part IV, p. 99, and at p. 119.

On the occasion of a recent (July, 1908) visit to the Melbourne Herbarium I came upon an excellent specimen, bearing a label, entirely in Mueller's handwriting, as follows:—" *Eucalyptus fruticetorum*, F.v.M. Lower Avoca (Wedderburn) Scrub. W. Percy Wilkinson, 1892."

I had never seen it before, although I had worked on Wilkinson's specimens labelled by the late Mr. J. G. Luehmann, and transmitted by that gentleman to Sydney, and it had probably been mislaid (with many other specimens) in the confusion which took place after Mueller's death. I shall fully figure it in my "Forest Flora of New South Wales" in due course, and it is identical in every respect with type specimens of *E. polybractea*, R. T. Baker.

The type specimen seems to have been lost. I made a personal search in the Melbourne Herbarium for it with the kind help of Professor Ewart; and no trace of it can be found at Kew, so Colonel Prain is good enough to tell me. There is no good reason to doubt the correctness of Mueller's determination of this characteristic specimen of his own species.

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## SYNONYM.

*E. polybractea*, R. T. Baker, in *Proc. Linn. Soc. N.S.W.*, xxv, 692 (1900).

In the original description of *E. polybractea* the author describes the anthers as "parallel, opening by longitudinal slits." While the anthers are more or less variable in this and other species, they may be more fitly described as globular (or nearly so), and opening by pores. Sometimes the pores are elongated, but the term parallel anthered, while quite appropriate for some other species, is misleading in the present one.

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## RANGE.

It is confined to South Australia, Victoria, and New South Wales, so far as we know. It is a dry country species, and Wyalong is the only New South Wales record for it at present. No doubt further search will greatly extend the range.

## SOUTH AUSTRALIA.

Flinders Range, near Quorn (Max Koch).

Road from Gladstone to Beetaloo, Flinders Range. "The tree (scarcely more than a shrub) had the appearance of a "Whipstick Mallee" or "Peppermint" (J. M. Black).

## VICTORIA.

Lower Avoca Scrub, Wedderburn; also Mildura (W. Percy Wilkinson) (both labelled *E. fruticetorum* by Mueller).

Wedderburn (J. Blackburne). This specimen is from trees used for oil-distilling, and is certainly intermediate between *E. fruticetorum* and *E. odorata*; Inglewood (J. Blackburne). With broad juvenile leaves. Another form intermediate between *E. fruticetorum* and *E. odorata*.

"Mallee," Rushworth (A. W. Howitt, J. Blackburne); "Mallee," St. Arnaud (A. W. Howitt).

## NEW SOUTH WALES.

"Blue Mallee." Locality for type of *E. polybractea* (R. T. Baker), West Wyalong. "Willowy, light-coloured stems" (W. S. Campbell). "Mallee," Wyalong (Forester J. G. Postlewaite, March, 1900). Bluish, glaucous cast, narrow leaves, very similar to *E. fruticetorum*, but with hemispherical fruits.

Blue Mallee, Wyalong (R. H. Cambage), September, 1900. Type of *E. polybractea*, R.T.B., kindly supplied by Mr. Baker. See R. H. Cambage in *Proc. Linn. Soc. N.S.W.*, xxvii, 192 (1902).

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## AFFINITIES.

1. With *E. calycogona*, Turcz., var. *celastroides*, Maiden (*E. celastroides*, Turcz.).

The only differences I can see between *E. celastroides* and *E. fruticetorum* lie (a) in the shape of the fruits, which in the former appears to be always more or less urceolate; (b) we have the size of *E. calycogona*, var. *celastroides*, which attains the dignity of a tree, while *E. fruticetorum* appears to be always of shrubby size. At the same time we have many instances of species being of tree size in one district and shrubby in distant localities.

Coming to similarities, the oils are alike (the composition is, indeed, similar to that of other oils not closely related).

The anthers are identical, and in regard to other points the two plants are similar, as far as I can see. One is not surprised to find some differences (assuming they are the same) since *E. calycogona*, var. *celastroides*, is only recorded from West

Australia and *E. fruticetorum* from Victoria and New South Wales, and now traced, for the first time to the eastern side of Spencer's Gulf, South Australia.

I am not at present prepared to assert the identity of *E. calycogona*, var. *celestroides* and *E. fruticetorum*, but submit that my remarks at p 80, Part III of this work were quite justified, particularly when the material available at the time the passage was penned is considered.

Diels and Pritzel, speaking of *E. celestroides*, Turcz., say :—

A very distinct species with small flowers and very short operculum. To the description may be added : At length, a tree up to 20 metres (65 feet) high ; with a beautiful ashy-grey roughish bark, when young smooth with ashy whiteness or reddish and shining ; the young leaves dull and glaucous, conspicuously trinerved, broader than the shining mature leaf.—(Engler's *Jahrb.* 1904, p. 438.)

The following two specimens from the Elder Exploring Expedition are in the Adelaide Herbarium :—

(1) "Camp 63, W.A., 27/7/91, R. Helms."

This specimen was labelled by the late Professor Tate (who worked more or less in conjunction with Mueller in the elucidation of the plants of this Expedition, as "*E. fecunda* and *E. gracilis*," apparently uncertain as to what name to attach to it (Mr. Luehmann labelled it *gracilis*.)

This is interesting in view of the early confusion of *E. fruticetorum* (afterwards merged by him in *E. gracilis*) and *E. fecunda* by Mueller.

(2) "40 m. N.W. of Fraser Range, 5/11/91, R. Helms."

Called "Gungurru" by a native of Hampton Plains.

## 2. With *E. Thozetiana*, F.v.M.

The foliage of *E. fruticetorum* is more glaucous and broader than that of *E. Thozetiana*, being shiny ; the juvenile foliage of the latter is much narrower (as a rule) and if not so shiny as the mature foliage, certainly not glaucous, like that of *E. fruticetorum* usually is. The fruits of both species have a longitudinal rib ; those of *E. fruticetorum* are more slender, and have a tendency to be urceolate. The foliage of *E. Thozetiana* is rather pendulous, that of *E. fruticetorum* is inclined to be rigid ; *E. Thozetiana* attains a much larger size,—up to 60 feet in Western Queensland.

## 3. With *E. odorata*, Behr and Schlecht.

The "Whipstick Peppermint" (*E. odorata*) of the Mt. Lofty and Flinders Ranges is no larger than *E. fruticetorum* of Flinders Range, and the anthers appear similar, but the lid is as long as the calyx tube and the greyish calyx and whitish-green leaves give it a different aspect (J. M. Black).

*E. fruticetorum* has an enlarged stigma ; so has *E. odorata*. I do not know that this is a constant character in both species, but it is certainly very common in both, particularly as the stamens fall away.

One specimen of indubitable *odorata* was labelled by Mueller "Eucalyptus fruticetorum, F.v.M. var. Stigm. stylo latius."

We have evidence that Mueller placed *E. fruticetorum* with *gracilis*, but I believe that he finally looked upon *E. fruticetorum* (*polybractea*) as *odorata*. Certainly the two species are very close to each other morphologically, especially to the typical form, less to var. *calcicultrix*. In *Proc. Roy. Soc. S.A.*, xxvii (1903), I held that view, and I hesitate still about the feasibility of keeping them apart, and I speak from long experience with the widely distributed and protean *odorata*.

I believe that many botanists will still hold the opinion that *E. fruticetorum* is a variety of *odorata*, usually shrubby, more or less glaucous, and yielding a larger percentage of oil than typical *odorata*. The composition of the two oils is identical; it varies in quantity only. *E. odorata* was originally named in allusion to its richness in oil.

XLVI. *E. acacioides*, A. Cunn.

THIS has been distributed amongst several first-class herbaria labelled in Cunningham's handwriting. While most commonly a small Mallee, it sometimes attains the height of 30 or 40 feet. It is identical with Mr. Baker's *E. viridis*.

Following is a copy of Allan Cunningham's Journal (Oxley's Expedition), on the Lachlan River, under date 23rd May, 1817:—"Eucalyptus acacioides. A shrub about 12 feet high, allied to *E. saligna*."

I have received a specimen in flower from Herb., Kew, labelled "*Euc. acacioides*, A. Cunn., Mss. New Holland, A. Cunningham, Hooker, 1835. Herb., Kew, Lachlan River."

There is a fruiting specimen in Herb. Cant. In the absence of fruit its superficial resemblance to *E. virgata*, var. *stricta* (*E. stricta*, Sieb.), is remarkable, which led Cunningham to confuse his own plant with another. There is a specimen of *E. stricta*, Sieb., in Herb. Vindob., bearing the following label in Allan Cunningham's handwriting:—"Eucalyptus acacioides, C., Mar., 1817, Blue Mountains, N.S.W., 1817 (?), one of Sieber's species" (which, indeed, it really is).

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## SYNONYMS.

1. *E. viridis*, R. T. Baker.
2. *E. odorata*, Behr, var. *linearis*, Maiden.
1. *E. viridis*, R. T. Baker, *Proc. Linn. Soc. N.S.W.*, xxv, 316 (1900), where a description of the plant is given.

"Green Mallee, Red Mallee, Brown Mallee."

Type localities: "On the hills near Girilambone, N.S.W., thence across country to Cobar; also 7 miles out from Coolabah, on the Wilga Downs Road." (W. Baeuerlen).

Allan Cunningham discovered this plant, and first gave it a name. It has been distributed, under this name, in herbaria for many years. Bearing in mind the haphazard circumstances under which Eucalyptus names were sometimes promulgated in the early days, the name is tenable, and, doubtless, would have been adopted by Mr. Baker, had he known of it. To Mr. Baker belongs the credit of the first description of this species, and, under the special circumstances, I am in doubt as to whether the name *viridis* should not be adopted.

2. *E. odorata*, Behr, var. *linearis*, Maiden, in *Proc. Roy. Soc. S.A.* xxvii, p. 241 (1903).

"I have made an attempt to subdivide the various forms of *E. odorata*, but it is obvious that they run into one another; and, further, the same tree has different kinds of leaves (within limits) according to the season of the year and the part of the tree from which they have been taken. These remarks apply with more or less force to most species of the genus. One form, however, seems worthy of special mention.

"Linear-lanceolate leaves, coriaceous, shiny, veins not strongly marked. This is, perhaps, the form most dissimilar in appearance to the type, and might be called var. *linearis*, var. nov.

"It is the prevailing form in the 'Whipstick Mallee' of New South Wales and Victoria."

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## RANGE.

So far it has only been recorded from certain of the drier parts of Victoria and New South Wales. I confidently expect it to be found in Queensland.

### VICTORIA.

"Whipstick Gum" covers a large tract of country north of Bendigo (W. W. Froggatt, July, 1892). "Mallee," Eaglehawk Flagstaff (A. W. Howitt), August, 1891; "Mallee," Rushworth (A. W. Howitt); Wedderburn and Ingleburn, "not used for oil" (J. Blackburne).

### NEW SOUTH WALES.

Wyalong (District Forester Osborne, R. H. Cambage); "Mallee," Condobolin (Forester Kidston); The Lachlan (Miss Clements); Bundaburra, between Fifield and Condobolin (P. J. Holdsworth); Coolabah (R. W. Peacock); Girilambone (E. Betcher, J. L. Boorman); "Green Mallee." Type of *E. vividis*, R. T. Baker. Girilambone (W. Baueren).

"Plentiful round the hills of Girilambone. Small thin stems, ribbony at base, white at tips" (J. L. Boorman); Nyngan (Forester G. Martin, also J. Wharton Cox and E. F. Rogers); Parish of Kickabel, County of Ewenmar (A. R. Samuels).

"Known as Whipstick Mallee from its erect, slender stems. Its fruits are generally small, but vary in size very much. The bark is brown at the base, and white above. This is the most easily distinguished of all the Mallees owing to its narrow green leaves. In some cases it grows as a single tree 50 feet high and a foot in diameter" (R. H. Cambage, *Proc. Linn. Soc. N.S.W.*, 1900, p. 602).

Cobar (W. Woolls, J. L. Boorman); Nymagee (J. Wharton Cox); Mt. Hope and Mt. Boppy (J. L. Boorman); East of Bidden Road, Gilgandra (R. H. Cambage); Dubbo-Gilgandra Road, 14 miles from Dubbo (W. Forsyth); Dubbo to Minore on a slight elevation, also Peak Hill (J. L. Boorman); 12 miles north of Dubbo (H. Deane); Warialda (J.H.M., J. L. Boorman, E. J. Hadley).

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## AFFINITIES.

### 1. With *E. odorata*, Behr.

Already alluded to in my synonym of *E. odorata*, var. *linearis*, above. *E. acacioides* is usually smaller than *E. odorata*; but the coastal specimens of *E. odorata*, e.g., the so-called "Black Mallee" of the Adelaide district, and also var. *purpurascens*, are quite as small. As a rule, *E. acacioides* is smaller in all its parts, the leaves being narrower, the fruits smaller and with less tendency to a rim, and the venation less prominent.

### 2. With *E. fruticetorum*, F.v.M.

In *E. acacioides* we have greener and usually less glaucous leaves than in *E. fruticetorum*, but in juvenile and mature leaves or fruits they seem to run into each other. Typical *acacioides* from Girilambone, has not only broadish leaves, but a glaucous cast on the young leaves. Indeed, both it and *fruticetorum* are closely related, and both have close affinity to *E. odorata*.

The leaves have often a dull and bluish type of green, and often have a channelled appearance as if a depression on the upper surface was caused by the midrib. Both are usually Mallees, but *E. acacioides* attains a larger size than I have ever seen in *E. fruticetorum*.

### 3. With *E. calycogona*, Turcz., var. *gracilis*, Maiden.

A very ready difference between them lies in the pointed opercula of *E. acacioides*. The leaves of var. *gracilis* are broader, usually more shiny, and with more visible oil-dots. The oil-dots are readily seen in the buds of var. *gracilis*. The leaves of var. *gracilis* are more glaucous, while the fruits are usually somewhat larger, more conoid or subcylindrical.

### XLVII. *E. Thozetiana*. F.v.M.

In Part III, p. 82 (see also figs. C-F, Plate 11) of this work I suggested that this might be looked upon as a variety of *E. gracilis*, F.v.M. (*E. calycogona*, Turcz.)

Since then, in *Proc. Linn. Soc. N.S.W.*, xxxi, 395, with plate xxiv (1906), Mr. R. T. Baker has adopted the view of Mueller that the plant might be a distinct species (*E. Thozetiana*, F.v.M.). His description of the tree should be referred to. Whether it is a species or a variety (of *E. calycogona*, Turcz., or perhaps of *E. ochrophloia*, F.v.M.) is not yet settled, in my mind, but it is found at such distant localities from either Sydney or Brisbane, that one is largely dependent on second-hand sources of information concerning it.

Mr. C. W. Chapman told me that his "Yapunya" (not *E. ochrophloia*, of which there is none on his station, Newinga, so far as he knows) is like a Mallee, but he does not believe it has the bulbous stock of a Mallee. The average size of the stems is a diameter of 7-8 inches, with a length of 25 feet (as poles drawn into the station), so that the length may be fairly put at 30 feet. The colour of the timber is brown or black-brown, not red.

*Vernacular Name*.—Mr. C. W. Chapman (to whom I was introduced by Mr. R. T. Baker) says that "Yapunya" is the spelling on his station (Newinga), but that it is called "Napunya" on the adjacent station.

I have noticed a similar use of the two names in regard to *E. ochrophloia*, and the well-known case of Yarran and Narran\* which I took considerable pains to attempt to clear up, may be referred to in this connection.

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## SYNONYMS.

1. *E. gracilis*, F.v.M., var. *Thozetiana*, F.v.M., in "Eucalyptographia."
2. *E. calycogona*, Turcz., var. *Thozetiana*, Maiden, p. 82, vol. I of this work.

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## RANGE.

See the localities given at p. 82, Part III of this work.

Mr. C. W. Chapman states that it is plentiful at Newinga Station, 65 miles west of Goondiwindi, on the St. George's road from Goondiwindi. He believes it also occurs at Tandavanna Station, 40 miles west of Goondiwindi. These are all Queensland localities, but at no very great distance from the New South Wales border.

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\* What is Narran? "Forest Flora of New South Wales," Part xxxv, p. 75.

## AFFINITIES.

1. With *E. fruticetorum*, F.v.M.

The anthers are very similar to those of *E. fruticetorum*, F.v.M., and *E. acacioides*, A. Cunn. See also p. 43 (under *E. fruticetorum*).

2. With *E. acacioides*, A. Cunn.

*E. Thozetiana* attains a larger size, the buds are more pointed, the fruits more urceolate, and the foliage more pendulous, and, apparently, more shiny. The juvenile foliage is very similar in both species; the timber of *E. Thozetiana* appears to contain less sap-wood; but in order that the differences between the two timbers may be accurately ascertained, specimens from approximately similar localities should be compared.

3 and 4. With *E. ochrophloia*, F.v.M. and *E. calycogona*, Turcz.

*E. Thozetiana* has a smooth or hard scaly bark, with a dark brown timber. (O'Shanesy, in the note quoted below,\* says the wood is "red, but very little known." Perhaps he is mistaken as to the colour.)

*E. ochrophloia* has a hard scaly bark, and dark brown timber with a little red in it (one specimen only examined by me).

*E. calycogona* has a smooth bark and dark brown timber.

As far as my knowledge goes at present there is not much difference between the timbers of the three species. The relations between the two first species is undoubtedly close, geographically as well; *E. calycogona* is not found within hundreds of miles of the other two, so far as we know at present.

5. With *E. calycogona*, Turcz., var. *celastroides*, Maiden.

*E. Thozetiana* also requires to be very carefully compared with *E. calycogona*, Turcz., var. *celastroides*, Maiden = *E. celastroides*, Turcz., which, as Diels and Pritzel have shown (see p. 43), attains the height of 65 feet. The two trees display a good deal of similarity (compare Plate 10 of this work and Mr. Baker's figure of *E. Thozetiana*). The leaves of *E. celastroides* are usually glaucous. It is, however, not to be surprised at that a New South Wales tree should present differences to a West Australian one. Distances may be very great in Australia, and, hence, some comparisons of plants have to remain in abeyance which in small countries could be readily settled.

\* *E. gracilis* (he is referring to *E. Thozetiana*, F.v.M., J.H.M.) is a middle-sized tree of graceful habit, with a clear trunk and short spreading head; bark smooth, white, and entirely deciduous; wood red, but very little known.

The trunk is beautifully fluted, which appears to be a constant character of the species. It was first discovered by the late Mr. Thozet in his fatal excursion to Expedition Range, and subsequently by the writer in the neighbourhood of Cometville, but its distribution in this district is very local.—("Contributions to the Flora of Queensland," p. 42.)

XLVIII. *E. ochrophloia*, F.v.M.

THIS tree has been dealt with at some length at pages 86 and 87 of Part III of this work. It requires further field observations by a competent botanist. Mr. A. Murphy, who made observations on it in the Paroo district, reports as follows:—

“Yappunyah.”—Very abundant; a river gum. Has a very erect trunk for 20–30 feet; it then branches off into a number of limbs. The trunks are up to 3 feet 6 inches in diameter. It has very drooping branches, almost like a willow, and this, conjoined with the straight trunk, gives the tree a peculiar appearance. It has clean limbs, but at the base of the trunk it is very rough, scaly, peeling off, and very black. It is the toughest timber of the district; you cannot break it. It is used for buggy shafts, &c.

It is evident that the timbers of this and *E. Thozetiana* have very similar qualities as regards the timber.

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## AFFINITIES.

1. With *E. calycogona*, Turcz.

At p. 86, Part III, vol. 1 of this work, I have suggested its affinity to this species. Examination of the anthers shows that those organs cannot be distinguished from each other.

2. With *E. Thozetiana*, F.v.M.

This has been referred to under *E. Thozetiana*, p. 48. The relations between these two species are not yet fully worked out.

## DESCRIPTION.

XLIX. *E. microtheca*, F.v.M.

DESCRIBED in *Journ. Linn. Soc.*, iii, 87 (1858), in Latin, which may be translated as follows :—

A tree with slender nearly terete branches. *Leaves* alternate, shortly petiolate, linear-lanceolate subfalcate, somewhat acute, dark and without visible oil-glands, very thinly veined, the marginal vein close to the edge. *Umbels* axillary, solitary or paniculate, few-flowered, the peduncles angular. *Fruits* small, semi-ovate, not ribbed, shortly pedicellate, 3- to 4-celled, the valves inserted below the margin and hardly exerted. *Fertile seeds* blackish, smooth, not winged. *Hab.*—Not rare in the fertile plains of Tropical Australia. Tree of middle size with a dirty brownish-white bark full of wrinkles and cracks, persistent on the trunk, deciduous on the upper branches, leaving them ashy-white. *Leaves* rather thin, 2-5" long, 4-8" broad. *Panicle* shorter than the leaves, the peduncles variable in length. *Fruits*, 1½ to 2" long; *seeds* nearly ⅓" long, peltate- or truncate-ovate.

It was afterwards described in English by Bentham in *B.Fl.* iii, 223 as *E. brachypoda*, Turcz., though with some confusion with *E. rudis*, Endl., as will be explained presently. Mueller subsequently figured and described the species in the "Eucalyptographia."

## Notes Supplementary to the Description.

Mueller (*Eucalyptographia*) figures *E. microtheca* with a non-dilated stigma, and draws attention to this as a character, but I have seen quite a number of flowers of this species with a more or less dilated stigma, so that this supposed character falls to the ground.

## SYNONYM.

*E. brevifolia*, F.v.M., *Journ. Linn. Soc.*, iii, 84 (1858).

Mueller in "Eucalyptographia" agrees with Bentham (*B.Fl.* iii, 223) that *E. brevifolia* is a synonym of *E. microtheca*. It is the older name and would have replaced *E. microtheca* had not there been an earlier *E. brevifolia*.

**E. brachypoda, Turcz., not a Synonym.**

Bentham (*B.Fl.* iii, 223) unites *E. microtheca* with *E. brachypoda*; but as already pointed out in *Fragm.*, xi, 14, Drummond's plant iv, 73, belongs to the southern regions of Western Australia, only his subsequent collections, particularly the sixth, bringing plants from the neighbourhood of the Murchison River. His plant in the Melbourne collection is also not in fruit; but the flowering specimen, to which Turczaninow's description is well applicable, agrees with *E. rudis*.—(*Eucalyptographia*, under *E. microtheca*.)

I have examined Drummond's iv, 73, and agree with Mueller in referring it to *E. rudis*, so that *E. brachypoda*, Turcz., is not a synonym of *E. microtheca*, F.v.M.

A specimen of Mueller's "*Eucalyptus microtheca*, ferd Mueller, Victoria River" (doubtless a co-type), named by Bentham *E. brachypoda*, Turcz., for the *Flora Australiensis*, was presented to me by Kew, and is the species under consideration, so that Bentham has placed two species under *E. brachypoda*.

## RANGE.

It is found in the drier parts of Australia, in all the mainland States except Victoria. It usually occurs on the banks of rivers, or in depressions liable to flooding.

### NEW SOUTH WALES.

This is the "Dwarf Box" of Forest Department (N.S.W.) Exhibition Catalogues of a few years back, where it is labelled "*E. brachypoda* ; timber not much used or valued. Open plains, Lachlan, Darling, and towards the Barrier Range."

The late K. H. Bennett, sent this species from Ivanhoe, *via* Hay, under the native name "Tangoon," with the note that "this is our largest tree, often attaining a height of 70 to 80 feet, with a diameter of 4 feet. It is the principal tree used by the blacks for the extraction of water from the roots." While indubitably *E. microtheca*, it resembles the broad-leaved forms of *E. bicolor*. The flowers are large, the leaves have a yellowish cast, and are  $\frac{3}{4}$  or 1 inch broad by  $2\frac{3}{4}$  inches long, having a different appearance from normal *microtheca*.

We have it from the banks of the Bogan and on flats near the Darling River, *e.g.*, Bourke, &c The leaves vary in width, *i.e.* (with same length), varying on the same tree from  $\frac{3}{8}$  inch to  $\frac{3}{4}$  inch broad.

Angledool, north of Walgett, near the Queensland border (Newcomen); Burren Junction (J. L. Boorman); Boggabilla (H. M. R. Rupp).

While usually a small gnarled tree on the flats near the Namoi, it sometimes occurs as a tree of considerable size.

Bark rough and persistent, scaly, a pretty tree, with rather dense and drooping foliage. Banks of Namoi at Narrabri. (H. Deane and others.)

"Coolabah or Swamp Box," Narrabri. Leaves 7 inches long, and up to 1 inch broad, and glaucous. (Forester McGee.)

This is the Coolabah whose suckers are, under the provisions of the Crown Lands Act of 1889, declared to be "scrub" in a *Gazette* notice of November, 1904 (District Surveyor Arch. Lockhard, Moree).

Howell, near Inverell (E. C. Andrews).

On the level river country a conspicuous tree is *Eucalyptus microtheca*, F.v.M. (Coolabah) which is easily identified by its rough grey bark all over the trunk, and its perfectly smooth white limbs. . . .

All these trees—*E. microtheca*, *E. largiflorens* (*bicolor*) and its variety, according to my observations, grow only on what is known as the river or black soil country, and never away on the hills. They are of crooked growth, and average about 30 to 40 feet high. Over the country which is now being described, *E. microtheca* was only found extending as far as 12 miles south of Bourke, ceasing with the black soil, though it goes northward through Queensland.—(R. H. Cambage, *Proc. Linn. Soc. N.S.W.*, 1900, p. 592.)

## QUEENSLAND.

Goondiwindi, near New South Wales border (Glasson); Roxborough (through F. M. Bailey); Thargomindah; "Coolabah," Mulligan River. The seed is a favourite article of food of the blacks (H. Clarke); Rockhampton (J.H.M.).

"Coolabah" or "Flooded Box" is found on all Gulf (of Carpentaria) waters, often in flooded ground, of a crooked growth, about 30 feet high (E. W. Palmer, *Proc. Roy. Soc. N.S.W.*, 1883, p. 106). Mr. Palmer's specimens came from the Flinders.

## SOUTH AUSTRALIA.

Lake Eyre (W. Baldwin Spencer).

## NORTH AUSTRALIA.

Port Darwin. Not in fruit (M. Holtze); Victoria River, type (Mueller).

## WEST AUSTRALIA.

Murchison River (Oldfield), in flower and fruit. Labelled by Mueller "*E. brachypoda*, Turcz. non Benth."

"Flooded Gum," Mt. Narryer, Murchison (Isaac Tyson, per R. Helms); Milly's Soak, near Cue (W. V. Fitzgerald; J.H.M.).

"Tree 4 to 10 metres high, with pendulous branches, smooth, white bark, subglaucous foliage. Creek near Roeburn in clayey soil, with Acacias. No. 2,758" (L. Diels).

Dr. J. B. Cleland (who collected it at Strelley River and other north-west localities, where it is known as "Black-heart Gum") tells me that the trunk of this species in Western Australia is often as white as if whitewashed, and the whiteness rubs off readily if touched.

## AFFINITIES.

1. With *E. melanophloia*, F.v.M.

Mr. R. T. Baker (*Proc. Linn. Soc. N.S.W.*, xxvii, 226, (1902), points out that *E. microtheca* leaves are very similar to those of the lanceolate ones of *E. melanophloia*, and states that the barks are also identical: "in herbarium material, however, the leaves of the latter species can easily be separated from the former, as they always dry a light slate colour, in contradistinction to the brownish colour of those of the Ironbark." Ordinarily the two species are sharply separated as regards the leaves, those of *E. melanophloia* being broad, almost cordate, and stem-clasping, while the juvenile foliage of the two species is very different, that of *E. microtheca* being lanceolate or narrow lanceolate. The fruits of *E. microtheca* have exerted

valves; the bark is dark and hard (or perfectly smooth in tropical or nearly tropical localities), but very different to that of *E. melanophloia*, which is an Ironbark. The strong similarities indeed only refer to the lanceolate-leaved forms. As regards the lanceolate leaves of *E. melanophloia*, it is very rarely the case that they are ever as narrow as those of *E. microtheca*, and the venation is more spreading. My experience is that the colour on drying of the leaves of the two species is much the same—glaucous on both sides. The matter will be again referred to when *E. melanophloia* is figured.

2. With *E. Raveretiana*, F.v.M.

The fruits and flowers are smaller, and the timber is brown, not red. Mueller (and also O'Shanesy) points out the *E. Raveretiana* timber was formerly distributed in International Exhibitions as *E. microtheca*. *E. Raveretiana* is a much larger tree and the bark less scaly; it is also very local, being confined to the Rockhampton district so far as is known at present.

3. With *E. rudis*, Endl.

There has been some confusion between these two species in the past, and the synonymy has, I hope, been now cleared up. See p. 51. The fruits of *E. rudis* are much larger than those of *E. microtheca*, the buds are also larger, and the leaves usually broader and thinner, and do not dry white.

4. With *E. rostrata*, Schlecht.

Especially in Western Australia there is a closer resemblance between *E. microtheca* and *E. rostrata*. The fruits of the latter are usually larger and the opercula more rostrate (a character to be applied with caution in Western Australian specimens), the venation less fine, the intramarginal vein further from the edge, and the surface non-glaucous. As a rule, also, *E. rostrata* lacks the black hard bark that is common on the butt of *E. microtheca*, but West Australian trees of the latter appear to have less of it than eastern ones. The anthers of the two species are very different.

5. With *E. bicolor*, A. Cunn. See p. 12.

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### Explanation of Plates (49-52).

#### PLATE 49.

##### *E. Bosistoana*, F.v.M.

1. Juvenile foliage. Metung, Gippsland, Victoria. (A. W. Howitt.)
- 2*a*. Juvenile foliage (J. L. Boorman, Jan., 1904); 2*b*. unripe fruit, showing rim (J.H.M., Mar., 1900); both Wingello, near Goulburn, N.S.W.
3. Ripe fruits, showing exerted valves; usually 6-celled, but sometimes 7. "Red Box," Bega district, N.S.W., Nov., 1894.

4*a*. Intermediate leaf (R. H. Cambage, Aug., 1901); 4*b* and 4*e*, intermediate and mature leaf (J. L. Boorman, Feb., 1900); 4*d* and 4*e*, buds and anther (Rev. Dr. Woolls, Nov., 1886); 4*f*, fruits and transverse section of a fruit, 5 or 6 celled. All from Cabramatta, or Cabramatta to Bankstown, near Sydney.

*E. bicolor*, A. Cunn.

- 5*a*. Juvenile leaf; 5*b*, another juvenile leaf, still in the opposite stage, but much larger, and the intra-marginal vein well defined; 5*c*, buds; 5*d*, immature fruits, showing rim and taking on an urceolate shape. All from Lake Cudgellico, N.S.W. (J. L. Boorman.)
- 6*a* and 6*b*. Leaves; 6*c*, buds; 6*d*, fruit of type of *E. largiflorens*, F.v.M., Murray River (Mueller), named "*E. bicolor*, A.C." by Bentham for the Flora Australiensis.
7. Twig with buds, "*Eucalyptus bicolor*, A. Cunningham, New Holland, Hooker (Sir W. J.) 1835." Part of Allan Cunningham's type.
8. Twig, with flowers, part of "No. 446 of 1846, sub-tropical New Holland, Lieut. Col. Sir T. L. Mitchell." Marked *E. bicolor* by Bentham. Both 7 and 8 were presented by Kew, and had been examined for the Flora Australiensis.
- 9*a*. Leaf; 9*b*, buds; 9*c*, narrow leaf and fruits; 9*d*, still narrower leaf and fruits; 9*e*, anther. All "River Box." Bourke (on the Colbar Road). (J. L. Boorman.) Note the variation in size of fruits, and the remarkably linear leaves. Might reasonably be confused with *E. odorata*, var. *Wooltsiana*. See p. 36.
- 10*a*. Buds; 10*b*, leaf and fruits; 10*c*, anther. Note the small blunt buds, the coarse leaf, and the open or wide mouths of the fruits. No. 62, "Bastard Box," Cobham Lake, N.S.W. (W. Baeuerlen.)
- 11*a*. Buds with very pointed opercula; 11*b*, fruits. North-west of Lake Albacutya, Victoria. (C. French.)
12. Small spheroid fruits, with the orifice nearly closed. Near Condobolin, N.S.W. (Hon. W. H. Suttor.)
13. Elongate fruits, Coolabah, N.S.W. (R. W. Peacock.)

PLATE 50.

*E. hemiphloia*, F.v.M. (typical form).

1. Juvenile leaf (not in opposite stage). Drake, N.S.W. (E. C. Andrews.)
- 2*a*. Juvenile leaf (not in opposite stage); 2*b*, mature leaf; 2*c*, buds; 2*d*, fruits; 2*e*, anther. From Bankstown, N.S.W. practically a type locality. (J. L. Boorman.)
3. Fruits, a common eastern New South Wales form, a little smaller than the type. Acacia Creek, Macpherson Range. (W. Dunn.)
4. Immature fruit showing a marked tendency to be urceolate and to have a rim. Windsor, N.S.W. (J. S. Allan.) Compare 11.
5. Mature fruit, yet with a tendency to be urceolate. Unungar Station, Upper Richmond River, N.S.W. (W. Forsyth.) Compare 22.
6. Immature buds, showing double operculum and paniculate inflorescence. (See also 9 and 20*a*.) "Gum-topped Box." North of Rockhampton, Queensland. (A. Murphy.) See also 16.

Var. *microcarpa*, Maiden.

- 7*a*. Juvenile leaf (still in opposite stage); 7*b*, mature leaf; 7*c*, anther; 7*d*, fruits and section of one, showing the sunk valves. Gulgong, N.S.W. (J.H.M. and J. L. Boorman.)
8. Buds. Near Murga, N.S.W. (H. Deane.)
9. Paniculate inflorescence. Compare 6 and 20*a*. Bendigo, Victoria. (W. W. Froggatt.)
- 10*a* and 10*b*. Buds. Note the variation in size. "White Box" or "Grey Box," Wyalong, N.S.W., (Arthur Osborne.)

11. Fruits. Note their angularity and urceolate shape. Compare 4 and 5. Goulburn River, Victoria.
12. Fruits. Note variation in size on same twig. "Grey Box," Wyalong. (Arthur Osborne.)
- 13a, 13b. Fruits. Variation in size from same tree. Mt. McDonald, N.S.W. (R. H. Cambage.)
- 14a, 14b. Fruits, showing slight rim, also elongation of fruit-stalk. Condobolin-Euabalong Road, N.S.W. (J.H.M.)
- 15a. Mature leaf, rather broad; 15b, fruits, rather hemispherical. Tomingley to Narromine, N.S.W. (J.H.M.)
- 16a. Juvenile leaf; 16b, buds; 16c, fruits. Herbert Creek, Queensland. (E. M. Bowman.) This specimen is nearest to *typica*, but it will be seen how gentle is the transition between it and var. *microcarpa*.
17. Urceolate fruit, displaying slight angularity. Compare 4 and 11. Narrandera, N.S.W. (Forester Condell.)

Var. *albens*, F.v.M.

- 18a. Buds; 18b, fruits. From practically a type locality. Wirrabara Forest, South Australia, spontaneous trees. (J.H.M.)
- 19a. Juvenile leaf (opposite stage); 19b, buds; 19c, anthers; 19d, fruits (there are larger ones from this locality). Tongio, Gippsland, Victoria. (A. W. Howitt.)
- 20a. Panicle of buds; see Nos. 6 and 9; 20b and 20c, different sizes of fruit. All from the same tree, Wagga Wagga, N.S.W. (J.H.M.)
- 21a. Fruits; 21b, fruit, showing angle. Compare 4 and 17. Cowra, N.S.W. (J.H.M. and J. L. Boorman.)
22. Fruits, decidedly urceolate. Compare 5 and 11. Mt. Macquarie, near Blayney, N.S.W. (J. L. Boorman.)

PLATE 51.

*E. hemiphloia*, F.v.M., var. *albens*, F.v.M. (continued).

- 1a. Buds; 1b, rather cylindrical fruits. Young, N.S.W. (J.H.M.)
2. Fruit, showing marked angle. Scone, N.S.W. (J.H.M.) Compare 3 and 11, plate 50.
3. Fruits less cylindrical, no pedicels. Gulgong, N.S.W. (J.H.M.)
4. Fruits. Inverell to Howell, N.S.W. (J.H.M.)
5. Fruits. Merrindee, between Mudgee and Wellington, N.S.W. (A. Murphy, No. 5.)
6. Fruit, no pedicel. Bullio to Wombeyan Caves, N.S.W. (R. H. Cambage and J.H.M.)
- 7a. Juvenile leaf; 7b, fruits. Mudgee to Wellington, N.S.W. (A. Murphy, No. 4.) I look upon this as a transit specimen between the normal form and var. *albens*. See p. 22.
8. Fruits, nearly spheroid. Tomingley Creek, near Dubbo, N.S.W. (R. H. Cambage.) Approaching var. *albens*. See p. 22.

*E. odorata*, Behr and Schlecht. Typical form.

- 9a. Leaf; 9b, buds and flowers; 9c, anther of the type "Dr. Behr, Sud Australie, 1848."
- 10a and 10b. Juvenile leaves, both in the opposite stage. Note the remarkable variation in width; 10c, mature leaf. Wirrabara, near Mt. Remarkable, South Australia. (W. Gill.)
- 11a. Buds; 11b, fruits; 11c, longitudinal section of a fruit to show the sunk valves. Upper part of St. Vincent's Gulf, S.A. (W. Gill.)
12. Fruits, showing angularity of fruit and slight rim. Near Melrose, by Mt. Remarkable, Flinders Range, S.A. (W. Gill.)

- 13a. Leaf, the venation very indistinct; 13b, buds and flowers and anther. Box-tree flats near Mt. Remarkable ("Dr. Ferd. Müller, pharm. cand. 1854"). This is a specimen of the type of *E. cajuputea*, F.v.M., and is conspecific with *E. odorata*.
- 14a. Buds; 14b, fruits. "Peppermint." Mount Lofty Range, South Australia. (Max Koch.)
- 15a. Mature leaf (showing channelling, see p. 27); 15b, small fruits, many in the head. Adelaide. (W. Gill.)
- 16a and 16b. Juvenile leaves in the opposite stage; 16c and 16d, leaves in different stages of maturity; 16e, fruits. Leaves like these show the impossibility of separating *E. odorata* from its broad-suckered variety *calcicultrix*. National Park, near Adelaide. (W. Gill.)
17. Very small fruits. Port Lincoln to Coffin's Bay, South Australia. (J.H.M.)
- 18a. Young fruit, urceolate and with rim; 18b, mature fruit. Scrub between Murray Bridge and Monarto, S.A. (J. M. Black.)
- 19a. Juvenile leaf; 19b, fruits, with wider mouth. Kapunda, S.A. (R. H. Cambage.)

Var. *calcicultrix*, F.v.M.

- 20a. Juvenile leaf (note its broadness); 20b, mature leaf (note the intramarginal vein away from the edge); 20c, fruits (note the rim). Adelaide. (F. Mueller.) Type of *E. calcicultrix*, F.v.M.
- 21a. Leaf; 21b, buds; 21c, anther. Gawler, S.A. (F. Mueller.) Type of *E. leucoxydon*, var. *pluriflora*. See p. 29.
- 22a, 22b, 22c. Specimens of juvenile leaves, still in the opposite stage, and showing the great variation in the width and shape. Cape Jervis, S.A. (J.H.M.)
23. Buds. Opereulum quite hemispherical. Quorn, S.A. (W. Gill.)
- 24a. Leaf (note its narrowness); 24b, buds; 24c, fruits (note their smallness). South Australia (W. Gill.)
- 25a. Leaf; 25b, buds and flowers. Flinders Range, S.A. (F. Mueller.) Type of *E. porosa*, F.v.M.
26. Fruits; pear-shaped and with small orifice. Mt. Brown Forest Reserve, Flinders Range, S.A. (W. Gill.)

Var. *Woolisiana*, Maiden.

- 27a. Juvenile leaf (in opposite stage); 27b, mature leaf; 27c, fruits (small, and with distinct rim). Narrabri, N.S.W. (J.H.M.). Type of variety.
- 28a. Buds and flowers; 28b, anther; 28c, fruits with wide mouths. Narrabri West, N.S.W. (J. L. Boorman.)
29. Fruits, pear-shaped. Gilgandra, N.S.W. (R. H. Cambage.)
30. Fruits, slightly pear-shaped, marked white rim. Mt. Boppy, N.S.W. (J. L. Boorman.)

PLATE 52.

*E. odorata*, Behr, var. *calcicultrix*, F.v.M. (concluded).

- 1a. Juvenile leaf in opposite stage; 1b, fruits, pear-shaped. Murray Bridge, S.A. (R. H. Cambage and J.H.M.)
- 2a and 2b. Fruits. These fruits are small, nearly spherical in shape, and show a rim when immature. The rim is absent when mature. Emu Flat, Ninety-mile Desert, S.A. (W. Gill.)

Var. *purpurascens*, Maiden.

- 3a. Juvenile leaf (in opposite stage); 3b, leaf in intermediate stage; 3c, mature leaf; 3d and 3e, buds of different sizes and varying angularity; 3f, anther; 3g, fruits, showing marked angularity. Port Lincoln district, S.A. (J.H.M.) Type of variety.

4. Young fruits, showing a decided urceolate tendency. Compare numbers 4 and 5, plate 50, and 18*a*, plate 51. Memory Cove, S.A. (Robert Brown, *Iter Australiense*, 1802-5.) British Museum, No. 4,735.

Variety of *E. odorata* (? member of the Ironbark Box group. See pages 38 and 39).

- 5*a*. Seedling leaf; 5*b* and 5*c*, juvenile leaves (still in opposite stage) of different widths; 5*d*, mature leaf 5*e*, buds; 5*f*, flowers; 5*g*, anther; 5*h*, young fruit, urceolate in shape, and with a distinct rim 5*i*, mature fruit, with rim scarcely evident. Inglewood, Victoria. (J. Blackburne, No. 14.)

*E. fruticetorum*, F.v.M.

- 6*a*. Leaf and buds; 6*b*, flowers; 6*c*, anther; 6*d*, fruits. Lower Avoca Scrub, Wedderburn, Victoria. (W. Percy Wilkinson.) The whole label, with the addition of the words "*Euc. fruticetorum*, F.v.M.", is in Mueller's handwriting. Apparently anterior to this is a note in Luehmann's handwriting: "Stamens all fertile. Anthers very small, globular, appearing often deformed, opening by minute lateral pores. Possibly a new species, but nearly allied to *E. odorata*." (Herb. Melb.)

- 7*a*. Juvenile leaves, almost in the opposite stage (note the variation in width); 7*b*, intermediate leaf. Wyalong, N.S.W. (J. L. Boorman.)

- 8*a*. Mature leaf; 8*b*, fruits. "Blue Mallee," Wyalong, N.S.W. (W. Baeuerlen.) Type of *E. polybractea*, R. T. Baker.

*E. acacioides*, A. Cunn.

- 9*a*. Twig, bearing buds and fruits; 9*b*, twig bearing flowers; 9*c*, anther. All from the type. "N.S.W., A. Cunningham, 1817," bearing the name "*Eucalyptus acacioides*" in Allan Cunningham's handwriting.

- 10*a*. Mature leaf; 10*b*, buds; 10*c*, fruits. Girilambone, N.S.W. (W. Baeuerlen.) Type of *E. viridis*, R. T. Baker.

11. Juvenile leaf. Warialda, N.S.W. (J. L. Boorman.)

- 12*a* and 12*b*. Fruits, showing variation in size. Minore, near Dubbo, N.S.W. (J. L. Boorman.)

*E. Thozetiana*, F.v.M.

(See also Plate 11, Part III.)

13. Juvenile Leaf. Newinga Station, Queensland. (C. W. Chapman.)

14. Anther from a flower from scrub near River Mackenzie, Queensland. (E. M. Bowman.)

*E. ochrophloia*, F.v.M.

- 15*a*. Juvenile leaf (in opposite stage); 15*b*, mature leaf; 15*c*, buds; 15*d*, anther; 15*e*, young fruits, showing rim; 15*f*, mature fruits (a slight black rim remains). Cuttaburra River, Yantabulla, N.S.W. (A. Murphy.)

*E. microtheca*, F.v.M.

16. Juvenile leaf. "Coolabah," Bourke, N.S.W. (J. L. Boorman.)

17. Juvenile leaf. Burren Junction, N.S.W. (J. L. Boorman.)

- 18*a*. Mature leaf; 18*b* and 18*c*, fruits, very different in size. "Coolabah," Bogan River, near Coolabah, N.S.W. (J.H.M. and J. L. Boorman.)

- 19*a*. Buds; 19*b*, anther. Bourke, N.S.W. (O. C. McDougall.)

20. Buds. Between Lachlan and Darling Rivers, N.S.W. (K. H. Bennett.)

- 21*a*. Buds (rather blunt opercula); 21*b*, fruits (in this specimen the valves are less exerted and are oftener four in number than three). Murchison River, W.A. (A. Oldfield.)

22. Fruits. North-West Australia. (L. Diels, No. 2,758.)

The following species of Eucalyptus are illustrated in my "Forest Flora of New South Wales"\* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

- acmenioides*, Schauer (xxxii).  
*amygdalina*, Labill. (xvi).  
*Andrewsi*, Maiden (xxi).  
*Baileyana*, F.v.M. (xxxv).  
*capitellata*, Sm. (xxviii).  
*Consideniana*, Maiden (xxxvi).  
*coriacea*, A. Cunn. (xv).  
*corymbosa*, Sm. (xii).  
*dives*, Schauer (xix).  
*goniocalyx*, F.v.M. (v).  
*hæmastoma*, Sm. (xxxvii).  
*hemiphloia*, F.v.M. (vi).  
*longifolia*, Link and Otto (ii).  
*Luehmanniana*, F.v.M. (xxvi).  
*macrorrhyncha*, F.v.M. (xxvii).  
*maculata*, Hook. (vii).  
*melliodora*, A. Cunn. (ix).  
*microcorys*, F.v.M. (xxxviii).  
*numerosa*, Maiden (xvii).  
*obliqua*, L'Hérit. (xxii).  
*paniculata*, Sm. (viii).  
*pilularis*, Sm. (xxxix).  
*piperita*, Sm. (xxxiii).  
*Planchoniana*, F.v.M. (xxiv).  
*punctata*, DC. (x).  
*regnans*, F.v.M. (xviii).  
*resinifera*, Sm. (iii).  
*saligna*, Sm. (iv).  
*siderophloia*, Benth. (xxxix).  
*sideroxylon*, A. Cunn. (xiii).  
*Sieberiana*, F.v.M. (xxxiv).  
*stellulata*, Sieb. (xiv).  
*tereticornis*, Sm. (xi).  
*virgata*, Sieb. (xxv).  
*vitrea*, R. T. Baker (xxiii).

---

\* Government Printer, Sydney. 4to. Price 1s. per part (10s. per 12 parts); each part containing 4 plates and other illustrations.





*E. BOSISTOANA*, F.v.M. (1-4).

*E. BICOLOR*, A. CUNN. (5-13).





E. HEMIPHLOIA, F.v.M. (1-6).

(Var. *microcarpa*, MAIDEN, 7-17.)

(Var. *albans*, F.v.M., 18-22.)





*E. HEMIPHLOIA*, F.v.M.

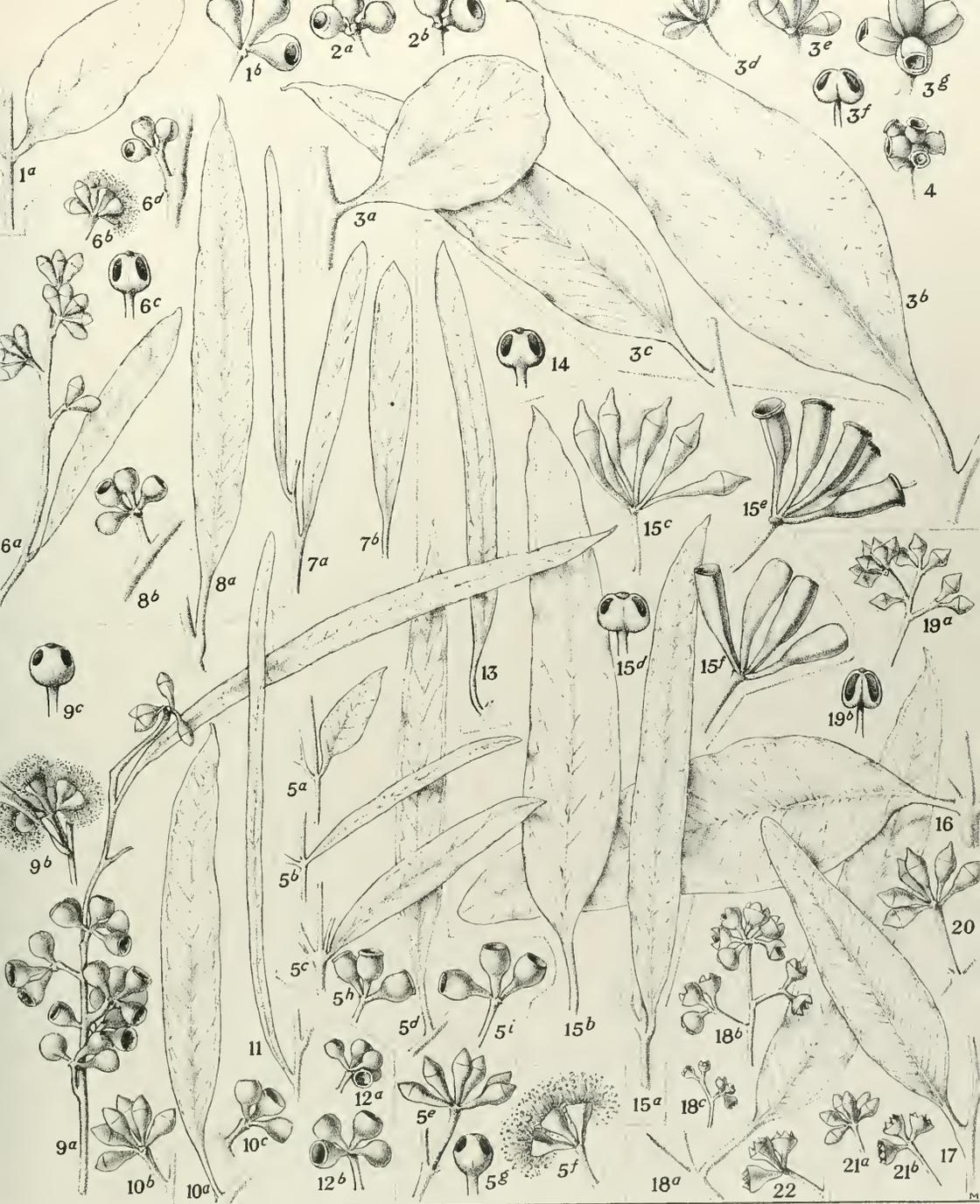
(Var. *albens*, F.v.M., 1-8.)

*E. ODORATA*, BEHR & SCHLECHT.

(Typical form, 9-19.) (Var. *calicultrix*, F.v.M., 20-26.)

(Var. *Woollisiana*, MAIDEN, 27-30.)





E. ODORATA, BEHR & SCHLECHT.

(Var. *calicultrix*, F.v.M., 1-2.)      (Var. *purpurascens*, MAIDEN, 3-4.)      (Var. ? *Ironbark Box*, 5.)

E. FRUTICETORUM, F.v.M. (6-8).      E. ACACIOIDES, A. CUNN. (9-12).

E. THOZETIANA, F.v.M. (13-14).      E. OCHROPHLOIA, F.v.M. (15).

E. MICROTHECA, F.v.M. (16-22).



# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

(Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

---

VOL. II. PART 2.

Part XII of the Complete Work.

(WITH FOUR PLATES.)

---

*“Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise.”*

MACAULAY'S "ESSAY ON MILTON."

---

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## DESCRIPTION.

*L. E. Raveretiana*, F.V.M.

*Fragmenta phytographiae Australiae*, x, 99 (1877). Figured and described in English in the "Eucalyptographia."

### Notes supplementary to the Description.

The figure in the "Eucalyptographia" is not a very good one. While the tree has many leaves of the shape depicted, yet there are also numerous long lanceolar leaves, as figured at fig. 3a, Pl. 53 of the present work, while the juvenile leaves, figured at 1a and 1b of the same Plate, have not previously been figured or described.

They vary from obovate to broadly lanceolate and elliptical in shape. Texture rather thin but tough, underside pale, intramarginal vein rather distant from the edge.

The tree is very large and sturdy, and the timber is very hard. It has flaky or hard scaly bark on the trunk and main branches. The flakes or furrows are not deep. The smaller branches are dirty blue grey in colour.

It is a "Box" tree.

---

## RANGE.

NEAR Rockhampton, Queensland (Thozet and O'Shanesy); Dawson and Nercool Creek (Bowman); near Port Denison (Fitzalan) [*Eucalyptographia*]. I have no additional localities other than those quoted. The type came from valleys within the tropic of Capricorn in Eastern Australia, but no definite locality. It doubtless came from the neighbourhood of Rockhampton.

Moore's Creek, north of Rockhampton, is the nearest locality to Rockhampton where this species occurs.

"Occasional trees along creeks and borders of scrubs in Mackay and Bowen districts."

## AFFINITIES.

1. With *E. microtheca*, F.v.M.

Mueller (*Eucalyptographia*) says these two species are closest related. The inflorescence and fruits of *E. Ravenetiana* are, however, smaller, being almost minute, the foliage is different, while the barks of the two trees are very different, and while the timber of *E. microtheca* is red, that of *E. Ravenetiana* is of a brown colour. The latter species is a much larger tree.

2 and 3. With *E. brachyandra*, F.v.M., and *E. Howittiana*, F.v.M.

Mueller (*Eucalyptographia*) points out the resemblance of it to the former species as regards size of fruits. Being a minute-flowered species, *E. Howittiana*, F.v.M., naturally also occurs to one in this connection.

From the point of view of anther-form, the closest affinity of this species is with the two Ironbarks *E. crebra* and *E. Staigeriana*, and an Ironbark Box, *E. leptophleba*.

## DESCRIPTION.

LI. *E. crebra*, F.v.M.

*Journ. Linn. Soc.*, iii, 87 (1859).

AGAIN described in B.Fl. iii, 221, and also in *Eucalyptographia*. Some of the trees referred to in the supplementary paragraphs (B.Fl. iii, 222) belong to *E. melanophloia*, F.v.M.

## Notes supplementary to the Description.

It would have been better had the figure in the *Eucalyptographia* been placed upside down, as the foliage is pendulous. It is, indeed, the most graceful of the Ironbarks. It has often quite thin leaves, but this is not an unfailing character. The foliage often dries whitish, particularly when from drier localities.

The fruits are quite small, perhaps not quite so small, on the average, as those depicted in the *Eucalyptographia*. Sometimes they are so large as to cause possible confusion with *E. paniculata*.

Sometimes the fruit has a rounded rim and has valves which are exsert.

## SYNONYMS.

1. *E. racemosa*, Cav. (probably).
2. *E. haemastoma*, DC., non Sm.
3. *E. gracilis*, Sieb., non F.v.M.
4. *E. angustifolia*, Woolls.
5. *E. terminalis*, Britten, non F.v.M.

1. *Eucalyptus racemosus*.

377. *Eucalyptus* foliis lanceolatis, acumine acutissimo valde producto; florum umbellis in racemum dispositis.

Caulis arboreus 20 et amplius pedes altus antequam ramis ornetur longis alternis iterum ramosis; folia obscure punctata, acumine acutissimo valde producto; nervus unicus longitudinalis, ex quo plures alternatim adsurgunt, parum ab ipso divergentes; umbellae 7-9 florae, pedunculo communi brevi, alternae in racemum foliosum dispositae.

*Obs.*—D. L'Heritier habeo 1. et 2. fasciculum Serti Anglici ubi est character genericus *Eucalypti*; tabulam non vidi. (Cav.  *Ic.* iv, 24.)

“Far too imperfectly described to render identification possible.” (B.Fl. iii, 200.) I concur, unless a specimen is available. The following, however, has been named *racemosa* by a good botanist.

A specimen in Herb. Vindob. is labelled “*Eucalyptus haematostoma*, Smith; *E. racemosa*, Cav., with a note ‘No. 476, Sieber.’” It is *E. crebra*, F.v.M.

2. *E. hæmastoma*, DC. non Smith.

Operculo hemisphærico mucronulato cupula brevior. pedunculis axillaribus subterminalibusque subangulatis petiolo longioribus, aliis umbellam unicam aliis umbellas plures racemosè digestas gerentibus, floribus 5-10 pedicellatis, foliis lineari-lanceolatis acuminatis. In Novâ-Hollandiâ. *E. racemosa* Cav. *Icon.* 4, p. 24, n. 377. White, *Itin.* 226, cum icon, ex Smith et Willd., Sieb. *Plant. Ess.* n. 476. Folia basi subæqualia 3 poll. longa, 6 lin. lata (v. s.). (DC., *Prod.* iii, 219).

3. *E. gracilis*, Sieb., ex Benth., B.Fl. iii, 222.

To this form (specimens of *E. crebra* from New England) appear to belong also Sieber's specimens of *E. gracilis*, *Pl. Ess.* No. 476, referred by De Candolle to *E. hæmastoma*, but very different from Smith's plant of that name. They are in young bud and in fruit.

I have examined the specimen in Herb. Kew on which Bentham based the above remarks. It is in young bud, as stated, and has but one fruit, not quite ripe. I have since been able to examine better specimens of Sieber's No. 476 (notably those in the Vienna Herbarium), and believe that Bentham's view is a correct one, and that it is correctly referred to *E. crebra*, F.v.M.

At the same time I desire to emphasise the fact that herbarium specimens in mature leaf and half-ripe bud of *E. crebra*, are very difficult to discriminate between those of *E. hæmastoma* var. *micrantha*.

Indeed, I do not attach much importance to Sieber's No. 476. They are incomplete; perhaps they are mixed.

4. *E. angustifolia*, Woolls.

*Description.*—*E. angustifolia* is regarded as a variety of *E. paniculata*, but the workmen, judging only from the wood, call it a distinct species, by the name of the Narrow-leaved Ironbark. (*Lect. Veg. Kingd.*, 123.)

This is *E. crebra*, F.v.M., according to Mueller (*Eucalyptographia*). It is found in the Grose Vale and Lower Kurrajong, and I collected it there as directed by Dr. Woolls himself.

5. *E. terminalis*, Britten non F.v.M., in *Ill.*, *Bot. Captain Cook's Voyage* (Banks and Solander). Determinations by James Britten, ii, 39, with Plate 117.

## RANGE.

THE type was apparently from no specific locality, but from the area between the Newcastle Range to Moreton Bay, both in Queensland, say from the Etheridge River, in 18' N. lat. and 143° east longitude, to the Brisbane.

It is confined to New South Wales and Queensland, so far as we know at present.

### QUEENSLAND.

A specimen received from Kew, and examined by Bentham for the *Flora Australiensis*, bears the following label in Mueller's handwriting, "*Eucalyptus crebra*, Ferd. Mueller. Ironbark tree. Burdekin River. Dr. M." This is probably as near a type specimen as we shall get.

Following are additional Queensland localities mostly represented in the National Herbarium, Sydney :—

Brisbane River (Leichhardt), tips of valves exserted; Enoggera, Brisbane, and Taylor's Range (F. M. Bailey); "A Grey Ironbark," Maryborough (W. H. Williams); Brian Pastures, Gayndah, "Narrow-leaved Ironbark" (S. A. Lindeman).

The foliage inclined to be glaucous, and some of it broader than usual. The fruits with a rounded rim. Rockhampton (R. Simmons). Fruit with a distinct rim, and valves slightly exsert. Rockhampton (Thozet).

I have seen similar specimens from Rockhampton (No. 1431, Amalia Dietrich), of the Museum Goddefroy, of Hamburg. There are similar specimens, Rockhampton (F. J. Byerley), who called it "Black Box."

North Rockhampton (A. Murphy), with almost linear juvenile leaves. I cannot see any difference whatever between these specimens and those occurring near to Sydney.

Duaringa, 70 miles west of Rockhampton (J.H.M.).

"Ironbark." A tree up to 100 feet, and 2 feet in diameter; some of the fruits rather large, with a distinct angle when unripe. Valves slightly exsert. Stannary Hills (Dr. T. L. Bancroft); Cape River (S. Johnson).

Northern Queensland (?), Lizard Island or Thirsty Sound, Banks and Solander, 1770. Received from the British Museum, under the name "E. terminalis, F.M." (See p. 64.)

#### NEW SOUTH WALES.

*South.*—"Mokaarago," of the aborigines of the County of Camden. "Narrow-leaved smooth or red Ironbark, 24-48 inches in diameter, 50-90 feet high. From Camden. "The most picturesque of the different species of Eucalyptus called Ironbark" (Sir William Macarthur, in Catalogues of N.S.W. Timbers for the Paris Exhibition, 1855, and London, 1862); "Narrow-leaf Ironbark," Camden (A. Rudder); Brownlow Hill, Camden (F. W. A. Downes); near Menangle (H. Deane); Thirlmere and West Bargo (J.H.M.); Smithfield (Wools in *B.Fl.*, iii, 222); Bankstown and Cabramatta (J. L. Boorman).

*West.*—Blacktown (R. T. Baker); Baulkham Hills (W. Woolls); Windsor (J. S. Allan); Grose Vale and Lower Kurrajong (J.H.M.), urceolate and distinct rim to young fruit; Mulgoa (R. H. Cambage and J.H.M.), the leaves varying in texture; Capertee (J.H.M. and J. L. Boorman); Goulburn River, Murrumbidgee (R. T. Baker); Murrumbidgee (A. Murphy); Dubbo (H. Deane, J. V. de Coque, J.H.M., and others); Minore (J. L. Boorman); Midway, near Dubbo (J. L. Boorman); Coonamble (Forest Ranger E. Taylor); Pilliga, with almost linear juvenile leaves (J. L. Boorman).

“Narrow-leaf Red Ironbark” (in contradistinction to the Broad-leaved or Silver Ironbark, *E. melanophloia*). Aboriginal name, “Boobyinba.” “One of our best timbers, useful for many purposes, durable and strong. Habitat, open forests. Plentiful in places where soil is sandy. Flowers January–May.” (Forest Ranger McGee, Narrabri).

The largest forest of *crebra* in New South Wales (back country) is between Narrabri and Coonabarabran. There are fully two million acres of it. The forest commences at Gunnedah and goes to 25 miles from Coonamble.

*North.*—Paterson River (J. L. Boorman); “Black Ironbark,” Clarence Town (A. Rudder); Booral (A. Rudder), who says of it, “it is a much smaller tree than either *paniculata* or *siderophloia*, and, as far as I have seen, is of spreading and somewhat drooping habit. Leaves very narrow; fruit and flowers very small. Timber in colour, when fresh, either red or dark brown. Suitable for railway sleepers and girders, &c., and for use in bridges and culverts generally, where long lengths are not required. It does not, as a rule, approach so near the coast as the above two species. I have seen a little of it near Clarence Town, and it is fairly plentiful on the tributaries of the Upper Hunter.” Coolooloolook (A. Rudder).

Branxton (J. L. Boorman); Wybong Creek (A. Rudder); Denman (W. Heron); Merriwa, with broadish leaves like the Rockhampton specimens (J.H.M. and J. L. Boorman); Gungal (J. L. Boorman); Murrurundi (J.H.M. and J. L. Boorman); Page River and Gundy (J.H.M.). Tips of valves exerted; Scone (J.H.M. and J. L. Boorman).

Bentham’s No. 3 (in part).—“Specimens from New England, C. Stuart, described as having the bark white, separating in thin strips, the colour of the specimens not at all glaucous, and the inflorescence rather less compound, but the shape of the leaves, their venation, and the flowers and fruits precisely those of *E. crebra*.” . . . . (B.Fl. iii, 222.) I have examined this specimen, which is in bud and flower, and concur in Bentham’s view that it is *E. crebra*, F.v.M.

At the same time C. Stuart’s bark notes are those of *E. haemastoma*, var. *micrantha* (his specimens have got mixed in some way), and herbarium specimens of the variety and of *crebra* are often much alike, unless a complete suite be available.

“Red Ironbark,” Glen Innes (Forest Guard N. Stewart); western slopes of Dividing Range, County Clive, Tenterfield (A. S. O. Reid); hills about Warialda (J.H.M., J. L. Boorman, Forest Guard Edward Julius); Acacia Creek, Macpherson Range (W. Dunn).

---

## AFFINITIES.

THIS is one of the Ironbarks with porantherous anthers (the others are *E. melanophloia* and *E. siderophloia*), which sharply separate them from those with truncate anthers, which include *E. paniculata* and *E. sideroxylon*.

1. With *E. melanophloia*, F.v.M.

The narrow-leaved form of this species often displays considerable resemblance to *E. crebra*. See B.Fl. iii, 222, where a number of specimens of *E. melanophloia* are referred to *E. crebra* by Bentham, and discussed by me at p. 71 of the present Part. Mueller refers to the subject in *Eucalyptographia*, under *E. crebra*.

2. With *E. leptophleba*, F.v.M. (*E. drepanophylla*, Benth.).

In the *Eucalyptographia*, under *E. crebra*, Mueller expresses some doubt as to the specific value of the former species, and to its difference from *E. crebra*. He refers to the matter again in the same work under *E. siderophloia*. See p. 334, Part X, of the present work.

Reference to my notes on *E. leptophleba* at p. 332, and the figures on Plate 48, show it to be markedly different from *E. crebra*. Seeing my note (p. 333) to the effect that the juvenile leaves of *E. leptophleba* were unknown, Dr. T. L. Baneroff, of Stannary Hills, North Queensland, where the species is abundant, obligingly sent me juvenile leaves. They are huge, and as different from those of *E. crebra* as it is possible for them to be.

They are elliptical or nearly oblong in shape, very coriaceous, equally green on both sides, and  $4\frac{1}{2}$  inches in breadth by 7 inches in length are common dimensions! The veins are prominent, roughly parallel, and often nearly at right angles to the midrib. The intramarginal vein is at a considerable distance from the edge.

Mr. F. M. Bailey, in the *Queensland Agric. Journ.*, xxiii, p. 259 (1909), has redescribed these specimens, which in my view are *E. leptophleba* (*E. drepanophylla*) as a new species, under the name of *E. Stoneana*.

3. With *E. hæmastoma*, Sm., var. *micrantha*, Benth.

*E. crebra* is a small-flowered, often small-leaved species, and therefore it becomes necessary sometimes to compare it with other small-flowered species. It is sometimes very difficult, with the incomplete specimens often found in herbaria, to distinguish between the two plants. In the field their appearance is, of course, quite different, *E. hæmastoma* being a White Gum and *E. crebra* an Ironbark.

4. With *E. microtheca*, F.v.M.

In flower this species (*crebra*), especially in the thicker-leaved specimens, is sometimes difficult to distinguish from *E. brachypoda* (*E. microtheca* is meant in this instance; see page 51, Part XI, of this work); the leaves are generally, but not always, thinner, with more oblique veins, and the flowers not so glaucous, with the calyx less open; the fruit is, however, very differently shaped. (*B.Fl.* iii, 222.)

The above remarks were doubtless written partly in contemplation of those specimens of *E. crebra* found in dry localities (see p. 68), and partly of those lanceolar-leaved forms of *E. melanophloia* formerly considered (on herbarium specimens only) to belong to *E. crebra*. See also my remarks at p. 53, Part XI, of this work.

The two trees could not be confused in the bush, *E. crebra* being an Ironbark with more or less of a boxy bark as the tropics are approached, while *E. microtheca* is a Black Box, with flaky black bark on the butt, or it is a White Gum in Western Australia, where, however, there is no *E. crebra*, so far as we know.

5. With *E. bicolor*, A. Cunn., (*E. largiflorens*, F.v.M).

No. 4731, Robert Brown's Collections (1802-5), distributed by order of J. J. Bennett, is labelled *E. bicolor*, A. Cunn., in many collections.

Mueller refers to the similarity of the two species, and says:—

*E. bicolor* (*largiflorens*) recedes by its paler, less furrowed bark; the leaves more conspicuously and darker dotted; the lateral veins less copious; the circumferential vein much more removed from the edge; the anther-cells opening through a pore-like aperture; and the lid perhaps generally shorter and blunter.

*E. crebra* is an Ironbark, although the furrows get shallower as the tropics are reached. *E. bicolor* has black scaly bark; the wood of the two species is a good deal alike. The juvenile leaves of the two species are very narrow, and both trees have a drooping habit. The leaves of *E. bicolor* are glaucous, and those of *E. crebra*, as has been more than once pointed out, get glaucous also in dry localities. The foliage and branchlets of *E. crebra* are usually thinner and the fruits smaller. The filaments of *E. bicolor* are shorter.

6. With *E. acmenioides*, Schauer.

4. Gum-tree from the Brisbane, *Leichhardt*, with small globular fruits, much contracted at the orifice, but no flowers; the leaves those of the common Moreton Bay *E. crebra*. (*B.Fl.* iii, 222, under *E. crebra*.)

The leaves are nearly black, particularly on the upper surface, an appearance which is often occasioned through specimens having been wet and having become heated in that state, before drying. The under-surface is pale. I have been unable to find any Queensland specimens (Brisbane River or otherwise) precisely similar to *Leichhardt's*, but am of opinion that they are a narrow-leaved form of *E. acmenioides*, probably taken from the top of the tree, where the smallest leaves are usually found.

The affinity between *E. acmenioides* and *E. crebra* is not close, and I quote the present example of supposed affinity for what it is worth, as I think we should endeavour to elucidate all specimens referred to in *Bentham's* classic.

## DESCRIPTION.

LII. *E. Staigeriana*, F.v.M.

Ex Bailey in *Syn. Queensland Flora*, 176 (1883).

THE original description is as follows:—

Lemon-scented Ironbark tree of medium size; foliage glaucous. Leaves obovate to almost lanceolate, 2 to 5 inches long,  $\frac{1}{2}$  to nearly 2 inches broad, petiole about 1 inch; oil-dots numerous; veins not prominent, the intramarginal one near the edge. Peduncles lateral, about 1 inch long, each bearing from 3 to 6 small flowers, often forming terminal panicles. Operculum conical. Calyx-tube about 1 line diameter. Stamens 1 to 2 lines long, inflected in the bud; anthers globular. Fruit about 2 lines diameter. Seeds disk-like. (*Palmer River*.)

The foliage of this tree, which was first discovered by P. F. Sellheim, yields a large quantity of oil, equal in fragrance to that of lemons, and for which it forms an excellent substitute. The percentage of oil from dry leaves obtained by Mr. Staiger is  $2\frac{3}{4}$ ; the specific gravity 0.901.

## Notes supplementary to the Description.

The species was named in honour of Karl Theodore Staiger, Government Analytical Chemist of Queensland for some years, and who made many experiments in regard to the chemistry of native plants.

The present work only touches incidentally upon matters of economic botany, but since this is not a New South Wales species, and I, therefore, cannot deal with it in my "Forest Flora of New South Wales," I give brief particulars concerning its essential oil. Mr. Staiger first examined it, reporting that:—"The leaves possess an odour very like the Scented Verbena (*Lippia citriodora*); and yield an oil similar to the verbenia oil (from *Andropogon citratus*) of commerce. He found the dried leaves to yield  $2\frac{3}{4}$  to 3 per cent. (other figures give 1,290 oz. to 1 ton of dry leaves) of volatile oil of specific gravity .901."

Then Messrs. Schimmel & Co., of Leipzig, reported:—

Its leaves yield upon distillation 2.75–3.36 per cent. of an oil smelling pleasantly like lemon and verbenia. It has the sp. gr. 0.880–0.901 and boils from 170–230°. The lemon-like odour is due to citral; which, besides terpenes, forms the principal constituents of the oil.\* The same firm subsequently stated:—

Percentage of yield of oil from raw material, 3.7; specific gravity at 15° C. .880; contains Citral; boils between 223° and 233°.†

Finally, Messrs. Baker and Smith published a paper, entitled "The Lemon-scented Ironbark (*Eucalyptus Staigeriana*, F.v.M.) and its essential oil."‡ They find the oil to contain:—

Limonene	...	...	...	...	...	60.00
Geraniol	...	...	...	...	...	12.72
Geranyl Acetate	...	...	...	...	...	8.32
Citral	...	...	...	...	...	16.00
Undetermined	...	...	...	...	...	2.96
						100.00

\* Bericht von Schimmel & Co., April, 1888, p. 20.

† *Ib.*, October, 1893, p. 21.

‡ *Pharm. Journ.*, 19th May, 1906, p. 571.

## SYNONYM.

*E. crebra*, F.v.M., var. *citrata*, F.v.M.

Fruit-bearing twigs of an Ironbark tree, with lemon-scented foliage, were obtained by Mr. Bailey on the Palmer River; these seem referable to *E. crebra* also, although the leaves are shorter and blunter, and the peripheric vein is slightly removed from the edge; the fragrance of this supposed variety, which might be called *citrata*, is so exquisite that the leaves can be used as a culinary condiment. ("Eucalyptographia," under *E. crebra*.) The idea of flavouring food with a citronella-like oil is amusing.

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## RANGE.

Its range appears to be very limited, being confined to a not very extensive area in Northern Queensland, chiefly on the Palmer River (south-west of Cooktown). Hence its seed is sought after as a commercially valuable oil-bearing Eucalyptus tree for tropical countries.

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## AFFINITIES.

### 1. With *E. crebra*, F.v.M.

The affinity is very close. The shape of the juvenile foliage and the odour of the leaves separate them. There is no citral in *E. crebra*. The flowers and fruits of *E. Staigeriana* are, generally speaking, coarser than those of *E. crebra*. The wood, bark, and habit of the two trees are very similar. The fruit is sometimes conoid and with a rounded rim, like that of *E. crebra*.

### 2. With *E. melanophloia*, F.v.M.

The affinity is even closer to the lanceolate-leaved form of this species than with *E. crebra*. There is no citral in the leaves of *E. melanophloia*.

## DESCRIPTION.

LIII. *E. melanophloia*, F.v.M.

In *Journ. Linn. Soc.*, iii, 93 (1859), in Latin.

DESCRIBED in English by Bentham in *B.Fl.* iii, 220, with a doubt (p. 221), but subsequent investigations have confirmed its claim to specific rank.

It was not figured by Mueller in the "Eucalyptographia," but it was included by him in his "Second Census" (1889).

## Notes supplementary to the Description.

*Bark.*—The bark varies. Mueller, in the original description, says: "persistent bark thick, deeply furrowed, rough and blackish." He then speaks of Leichhardt (*Overland Expedition, &c.*) having found a second form, about the Gulf of Carpentaria, with dirty greyish, flaky bark.

*Leaves.*—The shapes of the leaves vary. The original description of them is "1½ to 3 inches long, 1-2 broad, obtuse or cuspidate-acuminate, occasionally cordate-lanceolate or entirely cordate."

Let us now study some specimens examined by Bentham for the *Flora Australiensis*.

1. Box-tree of the Mackenzie River, Leichhardt, also on the Suttor River, *Bowman*, described by both as having the bark persistent and fissured. The specimens are somewhat glaucous, the leaves rather thin and broad, and often obtuse. The flowers quite those of *E. crebra*, the fruit not seen. This is very probably an alternate-leaved state of *E. melanophloia*. (*B.Fl.* iii, 222, under *E. crebra*.)

The above two specimens are on one sheet in Herb. Kew. A note on the first is "Bark fissured," and on the second "Bark fissured, not shedding."

2. Gum-topped Box from Suttor River, *Bowman*, described as having the bark furrowed and persistent on the trunk, coming off in layers on the branches. Flowers of *E. crebra*. Fruits of the same shape, but rather larger, much smaller, however, than in *E. drepanophylla*. (*B.Fl.* iii, 222, under *E. crebra*.)

These three specimens are, in my opinion, identical. They were presented to me by the Director of Kew early in 1901 as the result of an application made by me during my visit to Kew in 1900.

They are the lanceolate-leaved form of *E. melanophloia*, F.v.M., that species having frequently lanceolate leaves and leaves of the ordinary shape on the same tree.

As regards the term "Box," as *E. melanophloia* approaches the warmer parts of Queensland its bark assumes less of the Ironbark character, and takes on that of a Box. (See my remarks on *E. crebra* at p. 68.)

These specimens are interesting, as the identical ones which caused Bentham (*B.Fl.* iii, 221 and 222) and Mueller (*Eucalyptographia*) to hesitate as to the relations between *E. crebra* and *E. melanophloia*.

In a paper\* Mr. R. T. Baker has emphasised this leaf-variation, and gives figures. I have figured small pieces of Bentham's specimens (these are heteroblastic, *i.e.*, with the juvenile and adult leaves different, as with most Eucalypts), at figs. 13-15 of Pl. 53, while what may be termed the normal form (homoblastic, with the juvenile and adult leaves similar) will be found figured on Pl. 54, figs. 1-4.

Mr. E. Maher, of Collaroy, gave me the name "Ginghi" as the native name for this tree on the Macquarie. I have received the name "Ghinghit" from the Dubbo district, but cannot understand the difference between the two words.

## RANGE.

In the original description the localities given for this species are:—

(a) Newcastle Range to Moreton Bay, accompanying *E. crebra*, and indicating sterile soil.

(b) Sub-tropical New Holland (*Mitchell*). "March 5, 1846. No. 485. Ironbark. Sub-tropical New Holland. Lieut.-Col. Sir T. L. Mitchell. *E. pulverulenta*, aff. H." (Hooker). Copy of a label in Herb. Cant. ex Herb. Lindl. This is *E. melanophloia*.

Mitchell, see his "Journal of an Expedition into the Interior of Tropical Australia," p. 80, and map, was, on that date, at the "Springs of Carawy," in lat. 30° S. and, say, 148° 30' east longitude, a little to the north of Walgett, New South Wales.

(c) Moreton Bay, *Moore*, No. 66 of the "Sydney" woods, Paris Exhibition (1855). The word "Sydney" may be misleading. The collection was got together in Sydney, but the original label is "The Silver-leaved Ironbark of the Northern Districts" (which in this particular instance referred to Moreton Bay, Queensland not having been proclaimed a separate colony).

It is very extensively distributed in the drier parts of New South Wales and Queensland. Following are some localities represented in the National Herbarium, Sydney:—

### NEW SOUTH WALES.

"Silver-leaved Ironbark," Dubbo (J. L. Boorman); Tomingley to Narromine, fruits very small (J.H.M.); Mulungrebar, Coolabah; also Willeroon, only a few in the district (R. W. Peacock); Ford's Bridge, 41 miles west of Bourke, on red sandy ridges (A. Murphy); Bourke district (O. C. Macdougall).

"Silver or Broad-leaved Ironbark," Narrabri (Henry Deane, J. L. Boorman, J.H.M.); Gundy, near Scone, the most easterly recorded locality (J.H.M.); Walroodah, Barraba (R. D. Hay); "Narrow-leaved form," Howell, near Inverell (E. C. Andrews).

\* "On *Eucalyptus melanophloia*, F.v.M., and its cognate species." (*Proc. Linn. Soc. N.S.W.*, xxvii (1902), 225.)

"A very common tree all over the Warialda district, both on the hills and on the low lands" (J. L. Boorman); No. 10 (Rev. H. M. R. Rupp); No. 12, the ordinary broad-leaved form, and No. 84, the narrow-leaved form, Warialda (E. J. Hadley).

Common all over the Warialda and Bingera district. Many were killed by the last drought. Yallaroi (Forest Guard Edward Julius); Ashford (W. S. Campbell); Acacia Creek, Maepheron Range (W. Dunn).

#### QUEENSLAND.

Morven (collected for F. M. Bailey); "Silver-leaved Ironbark," "Of no utility," Maryborough (W. A. Williams); "Silver-leaved Ironbark," Brian Pastures, Gayndah (S. A. Lindeman); Rockhampton, narrowish leaves (Amalia Dietrich); Rockhampton, with normal leaves (R. Simmons); "Box tree of the Mackenzie River" (Leichhardt), the narrow-leaved form. A specimen like this shows considerable resemblance to *E. microtheca*, F.v.M.; King's Creek (E. Bowman); "Ironbark," also "Weeping Box," Jericho (H. Deane), leaves medium broad. There is no difference between them. Mr. Deane, a considerable authority on Eucalyptus, labels them "Weeping Box," "Mackenzie River Box—White stem." See p. 71; Stannary Hills (Dr. T. L. Bancroft).

#### WESTERN AUSTRALIA.

"Ironbark." Isdell River (W. V. Fitzgerald). Narrowish leaves, and rather small fruits. Sent as *E. crebra*. I am not aware that *E. melanophloia* has been previously recorded from Western Australia.

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## AFFINITIES.

1. With *E. pruinosa*, Schauer.

This was pointed out by Mueller in the "Eucalyptographia." So far as we know, however, the leaves of *E. pruinosa* are homoblastic. The leaves of *E. pruinosa* are, as a rule, larger, while the fruits are certainly so.

2. With *E. crebra*, F.v.M.

Already referred to under *E. crebra*, p. 67.

3. With *E. microtheca*, F.v.M.

Already referred to. The leaves of *E. microtheca* are much less heteroblastic than those of *E. melanophloia*.

4. With *E. cinerea*, F.v.M.

Bentham says: "It (*E. melanophloia*) sometimes resembles *E. cinerea*, but differs in the bark, the stamens, and the fruit. (*B.Fl.* iii, 221.) I will refer to this affinity, and to *E. cinerea*, when treating of *E. pulverulenta*, Sims.

## DESCRIPTION.

LIV. *E. pruinosa*, Schauer.

In Walpers' *Repert.* ii, 926 (1843). See also F.v.M. in *Fragm.* iii, 132 (1862-3). The descriptions in both these works are in Latin, but in English in *B.Fl.* iii, 213 (1866), and in "Eucalyptographia" with a figure.

Schauer tells us that the original specimen was collected by Ferdinand Bauer. (It was found along the Gulf of Carpentaria in 1802-5). Figure 5a of Plate 54 was drawn from the type in the Vienna Herbarium, lent to me for the purpose.

## Notes supplementary to the Description.

This is the "Silver-leaved Box" of Northern Australia, and Mr. E. Palmer records that its native name is "Kullingal." He also states that the Cloncurry blacks employ the inner bark for rheumatic pains.

Mueller states that this tropical tree is small or middle-sized, and with "box-bark"; he also suggests its use as a fuel-supply tree for the tropics.

## SYNONYM.

*E. spodophylla*, F.v.M. in *Fragm.* ii, 71.

It would appear that his species was never properly described, but the name cannot be ignored. Following is the reference at *Fragm.* ii, 71.

"*E. spodophylla* systematicè divellitur ab *E. pulverulenta* jam corticis textura et staminum brevitate."

It has been distributed under this name in several important herbaria.

## RANGE.

MUELLER (*Eucalyptographia*) states that it is rather frequent in arid country around the Gulf of Carpentaria, and in Arnheim's Land, especially on the sandstone-tablelands, extending southward at least to the sources of the Victoria River, the commencement of Sturt's Creek (Mueller), and of Ord River (A. Forrest), occurring also in the islands of Carpentaria (R. Brown, Bauer, Henne).

It is represented as follows in the National Herbarium, Sydney:—

*Queensland and Northern Australia*.—Mt. Albion (S. Dixon); Ravenswood (collected for F. M. Bailey); Stannary Hills (Dr. T. L. Bancroft); "The Upper Lynd" (Leichhardt); Sweer's Island (Henne).

*North-western West Australia*.—East Kimberley "Apple Gum" (R. Helms). In flower only. Ord River, E. Kimberley (W. V. Fitzgerald), with small fruits and well-exserted valves.

## AFFINITIES.

### 1. With *E. melanophloia*, F.v.M.

Mueller (*Eucalyptographia*) states that it is only with *E. melanophloia* that *E. pruinosa* can be confounded, and he proceeds to indicate the differences. I have referred to the matter under *E. melanophloia*.

### 2. With *E. pulverulenta*, Sims.

Among trees with roundish, sessile, greyish, opposite leaves only *E. pulverulenta* need be alluded to here in reference to their distinguishing marks; but it has its umbels solitary and axillary, its anthers elongated and opening with longer slits, and its fruits flat or convex-rimmed. ("Eucalyptographia," under *E. pruinosa*.)

It seems only necessary to add that *E. pruinosa*, so far as is known at present, is always heteroblastic as regards its leaves. Its leaves are larger than those of *E. pulverulenta*, and it is a tropical, or almost tropical, species, while *E. pulverulenta* grows in elevated districts in New South Wales and Victoria with low winter temperatures.

### 3. With *E. gamophylla*, F.v.M.

The connate leaves, smaller flowers, shorter lid, longer anther slits, and most particularly the sharply triangular seeds, surrounded by a diaphanous membrane, distinguish *E. gamophylla* readily from *E. pruinosa*.—"Eucalyptographia," under *E. pruinosa*.)

A marked rim is present in the fruit in *E. pruinosa*, and the fruits are broader and larger than I have seen them in *E. gamophylla*.

### 4. With *E. pleurocarpa*, Schauer (*E. tetragona*, F.v.M.).

This is another glaucous species which might be brought under review in this connection. The anthers of the two species are different in shape and arrangement, the leaves of *E. pleurocarpa* have a very short petiole, the fruits are very much larger, while the operculum is hemispherical or nearly so. *E. pleurocarpa* is always, so far as we know, never more than a tall slender shrub, native of south Western Australia.

## DESCRIPTION.

LV. *E. Smithii*, R. T. Baker.

In *Proc. Linn. Soc. N.S.W.*, xxiv, (1899), 292, with a figure.

A ribbon-barked tree of considerable size. It has smooth limbs, and most of the butt is smooth.

## SYNONYMS.

1. *E. viminalis*, Labill., var. *pedicellaris*, F.v.M. (in part).
2. *E. Mazeliana*, Naudin, with some doubt.

1. *E. viminalis*, Labill. var. *pedicellaris*, F.v.M. (in part).

See Deane and Maiden in *Proc. Linn. Soc. N.S.W.* xxvi, 141 (1901):—

*E. viminalis*, Labill. var., *pedicellaris*, F.v.M. (*ined.*). Mr. R. T. Baker has described a species (these *Proceedings*, 1899, p. 292) under the name of *E. Smithii*, which, in our opinion, is simply a variety of *E. viminalis* with 6–8 flowers and longish pedicels. It is the *E. viminalis* var. *pedicellaris*, F.v.M., of Herb. Melb. It has rough bark at butt, and notes in regard to it will be found under "Bark" (*supra*, p. 140). It has narrow suckers like normal *viminalis*.

At Ben Bullen there is a clump of trees growing in a low-lying situation. The timber, bark, foliage, and habit are identical, with the exception that the rough bark of var. *pedicellaris* is further up the stem than is the case with the *viminalis* alongside; it is, of course, multiflowered. The trees are all 2–3 feet in diameter, and as regards the rough bark, it varies from 3 feet to 10 feet up the butt in normal *viminalis*, and from 12 or 15 feet up to the first fork and even beyond in var. *pedicellaris*. The most careful examination fails to show any difference in the texture of the rough bark of *E. viminalis* and its variety *pedicellaris*.

I think it is not always possible, in the present state of our knowledge, to separate *E. Smithii* and *E. viminalis* var. *pedicellaris* on herbarium specimens alone. It will be convenient to go into the matter when *E. viminalis* is reached.

2. *E. Mazeliana*, Naudin, *Mém.* 2, p. 41. See footnote p. 89 of this Part.

Following is a translation of Naudin's description of his *E. Mazeliana*:—

Tree very biform (he is referring to the difference in shape in juvenile and adult leaves.—J.H.M.) among the most *rustic* (*rustique*, I hardly understand the full force of this word.—J.H.M.) species of the genus. It has been seen to withstand frosts from 12° to 13° centigrade at Montsauve, Gard, where M. Mazel has cultivated it for several years.

When young, the leaves are opposite, sessile, linear-lanceolate, green and shining, with an average length of 10 centimetres, from 5–7 millimetres broad, and more or less bent like a sickle.

At the early stage it might be confused with the young plants of *E. viminalis*, which are, however, rather variable; it is distinguished from it, however, by its leaves, which are narrower and longer than in the greater number of the individual plants of *viminalis*.

When full-grown the distinctive characteristics are easy to perceive; the alternate and petiolate leaves are long-lanceolate, straight or slightly curved like a scythe, 10–12 centimetres long and 10–12 millimetres broad, often less. It is by the inflorescence and the fruit especially that *E. Mazeliana*

is distinguished from *viminalis*. The axillary and pedunculate umbels are seven-flowered except in the case of abortion or fall of several flower-buds. These latter are ovoid, shortly pedicellate but not quite sessile, with a conical-obtuse operculum the same length as the calyx-tube. The fruit, which is scarcely larger than a grain of pepper, is hemispherical, flattened at the top, and the capsule, which is a little shorter than the calyx-tube, has from 3-4 cells.

This tree, interesting in its rusticity (*rustiaté sic.*—J.H.M.) is still too narrowly distributed. It has been known to attain its full growth and to flower only in the garden of M. Mazel, an amateur gardener, who has greatly helped to introduce and to propagate a large number of exotic plants in Provence.

If *E. Mazeliana* is not *viminalis* and not *E. Smithii*, I cannot say what it is. The only point in the description (so far as it goes) which is not a proper description of *E. Smithii*, is the fruit, which is said to be "flattened at the top," but an unripe specimen may have been described. I have tried for years to obtain specimens, but without success.

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## RANGE.

So far as we know at present, it is restricted to the south coastal districts of New South Wales, the extreme western locality ascertained at present being not further than 60 miles from the sea. It should be looked for further south in New South Wales, and also in the Gippsland gullies, Victoria.

The original localities recorded were Sugar Loaf Mountain, Monga, and Irish Corner Mountain, all near Braidwood. Following are the localities represented in the National Herbarium, Sydney :—

Sugar Loaf Mountain near Braidwood. Type (W. Baeuerlen); "Blackbutt," "White-topped Mountain Ash," Major's Creek (W. Bound); "Jerrigree," Bungendore (Allan Millard); "Jimmy Green" (I do not know whether this is a corruption of the Bungendore name or *vice versa*, or whether they are independent names); Hoskinstown (Samuel Daniel); "White Top," "Peppermint," Nye's Hill, Wingello (J. L. Boorman); "White Ash" only in gullies, Wingello (A. Murphy); Joadja Cross Roads, near Bowral (R. H. Cambage and J.H.M.); Colo Vale (E. Cheel); "Blackbutt," Mt. Kembla (R. H. Cambage); Yeranderie to Mt. Werong, over 3,000 feet, the most westerly locality recorded (R. H. Cambage).

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## AFFINITIES.

LEAVING the Porantheræ for the present, we now take cognizance of two anomalous members of the Renantheræ, *E. Smithii*, R. T. Baker, and *E. Naudiniana*, F.v.M.

As regards *E. Smithii*, Mr. Baker has drawn attention to the fact that its kino gives a turbid solution in cold water, and contains eudesmin, but not aromadendrin. This removes the species from my Ruby Group (of kinos), all of which belong to the Renantheræ. It is, in this respect, with affinity to *E. microcorys*.

The author (*op. cit.*) says :—

In botanical sequence, it probably should be placed between *E. Baeuerlenii*, F.v.M., and *E. viminalis*, Labill., as in the young state the leaves belong to what may be called the "Viminalis Group," and are quite different from those of the "Stringybark Group."

1. With *E. viminalis*, Labill.

Mr. Baker's remarks on the affinities of the two species have already been referred to, and I will reserve further remarks until I come to *E. viminalis*. It appears to come closest, in most characters, to that species, but the anthers are very different. It seems, indeed, to be an anomalous member of the Renanthere.

2. With *E. scoparia*, Maiden.

Its nearest affinity appears to be *E. Smithii*, R. T. Baker, from which it appears to be sharply separated by the markedly smooth bark of the new species. I separate the two trees mainly on that ground, the bark of *E. Smithii* being almost an Ironbark. The timber also of *E. Smithii* appears to be darker.—Maiden, in *Proc. Linn. Soc. N.S.W.*, xxix, 779 (1904). The anthers also are very different.

3. With *E. Sieberiana*, F.v.M.

These two species are known as "Ash," but the bark of *E. Sieberiana* is more of an Ironbark, and its juvenile leaves, buds, fruits are very different.

4. With *E. punctata*, DC.

Mr. Baker says :—"In the chemistry of the oil and kino, this tree approaches *E. punctata*, DC., and a further resemblance is shown in that manna has been obtained from it; this differs in no respects from the manna of *E. punctata*."

The differences are in the bark of *E. punctata*, which is a "Grey Gum"; in its timber, which is red, while that of *E. Smithii* is pale-coloured; in its leaves, which are broader and differently veined to those of *E. Smithii*. It is, indeed, easier, at present, to point out the dissimilarities of *E. Smithii* than its affinities:

## DESCRIPTION.

LVI. *E. Naudiniana*, F.V.M.

In *Australasian Journal of Pharmacy* (Melbourne), July, 1886.

As this publication is not readily accessible to botanists, I publish such portions of Mueller's paper, "Description of an hitherto unrecorded species of *Eucalyptus* from New Britain" as are necessary. Mueller, in a prefatory note, speaks of the plant as being to "all appearance a veritable species of *Eucalyptus*." He saw no fruit and apparently no buds, hence his uncertainty.

*Eucalyptus Naudiniana*.—Branchlets valid, angular; leaves scattered, on short broadish stalks, ovate-lanceolar, acuminate, much paler beneath; their primary veins distant, thin, very spreading and somewhat ascending, the peripheral vein not quite close to the edge of the leaf; veinlets subtle; oil-dots much concealed; panicles ample, terminal or from the upper axils; flowers small, nine or often fewer in each umbel; stalklets angular, as long as the total calyx or somewhat longer; tube of the latter hemispheric, slightly angular; lid hardly longer, almost semiglobular, suddenly produced into a thin beak-like apex; stamens all fertile and all inflexed while in bud; anthers minute roundish-ovate, bursting longitudinally; style short; stigma not dilated; ovary surpassed by the calyx-tube, somewhat convex and angular at the summit.

Near Spacious Bay; J. Turner. (G. Turner, who was with the Rev. Mr. Brown at the time.) The specimens communicated by Ch. Moore, Esq., F.L.S., Director of the Botanic Garden of Sydney. New Ireland, Rev. G. Brown. (This is an error; it should be New Britain, so the Rev. Dr. G. Brown tells me.—J.H.M. A tree attaining a height of about 100 feet. Leaves usually 3-4 inches long,  $1\frac{1}{4}$ - $1\frac{3}{4}$  inches broad, slightly inequilateral, not very thick in texture, dark-green and shining above, quite dull beneath. Panicles measuring from a few to several inches, the majority of their branches not opposite. Total length of the calyces hardly more than  $\frac{1}{8}$  inch. Stamens very numerous. Style only about  $\frac{1}{2}$  inch long. Fruit unknown. This species bears in some respects near affinity to *E. Cloeziana*; but the branchlets are much thicker, the leaf-stalks dilated upwards, the leaves broader, less oblique and of firmer structure, with a soft lustre on the surface, the branches of the panicle and also the stalklets are more angular, while the lid is conspicuously pointed, the ovary less depressed, and the style shorter. The fruit, irrespective of perhaps bark and wood, may also be different.

## Notes supplementary to the Description.

Neither Rich (Asa Gray, see below) nor Mueller saw the buds or opercula of this species, and both had some doubts as to the genus of the plant.

My complete specimens, however, remove all doubt, and the description may be supplemented as follows:—

**Juvenile leaves.**—Branchlets flattened to quadrangular, more or less glandular-prickly; leaves nearly symmetrical, nearly oval, at the base tapering into a short petiole and at the apex into a blunt point, texture thin, paler on the under side, venation marked, particularly on the under side, intramarginal vein not evident, sometimes triplinerved, secondary veins arranged concavely with respect to the midrib and not opposite each other. Ultimate veins reticulate.

**Flower-buds.**—Operculum conical, the calyx-tube about of equal length, which then tapers somewhat abruptly into a pedicel in length about equal to that of the bud.

The tree has a smooth bark, and reddish timber. It is cut for commercial purposes in a local saw-mill.

## SYNONYM.

*E. multiflora*, Rich.

Following is the description, which is not readily available, and therefore I reproduce it:—

*E.?* foliis subalternis petiolatis oblongis acuminatis basi acutis aequaliteris concoloribus laxe penninerviis venulosis costa venisque primariis sub prominentibus; cymis paniculatis multifloris; pedunculis compresso-angulatis; capsulis subglobosis. Hab. near Caldera, Mindanao, one of the Philippine Islands.

The specimens consist of a leafy shoot, and a leafless branch with the inflorescence of the previous season, bearing the persistent capsules. The latter show what appears to be the line of circumscissile dehiscence; otherwise there are no evident grounds for referring the plant to *Eucalyptus*. The leaves are not phyllodineous, and apparently not vertical; they are unequally alternate, oblong, acuminate, or at least acute at both ends, 4 or 5 inches long and 1½ or 2 inches wide, on petioles of half an inch in length, equilateral, chartaceous, thickly pellucid-punctate, dull and of the same hue both sides, loosely feather-veined, the primary veins and the midrib prominent underneath, but impressed above; the veinlets minutely reticulated. Branchlets, especially the fructiferous ones, somewhat angled. The flowers appear to have been in naked, terminal and axillary, paniculate cymes; the peduncles, &c., compressed-angled, many flowered; the pedicels umbellately fascicled in threes and fives, as long as the capsules. The latter are globular; 2 lines in diameter, the summit, above the line from which the limb of the calyx has fallen, convex; there four-valved; within four-celled; each cell containing a large placenta, which has evidently borne numerous seeds. These, however, have all been shed. I thus record the plant, under the name given by Mr. Rich in the collection, since Blume has published one or two *Eucalypti* from the Moluccas and other Malayan Islands, to which this plant may be related.—(A. Gray in *Bot. U.S. Exped.*, 554.)

The type is referred to in the following paper by me:—

“ON THE IDENTIFICATION OF A SPECIES OF *EUCALYPTUS* FROM THE PHILIPPINES.”

In the Botany of the United States Exploring Expedition during the years 1838–1842, under the command of Charles Wilkes, U.S. Navy,<sup>a</sup> there is given<sup>b</sup> an account of a plant found near Caldera, Mindanao, one of the Philippine Islands. Leaves and fruits were available, and Asa Gray says:—“I thus record the plant under the name *Eucalyptus multiflora*, Rich, given by Mr. Rich<sup>c</sup> in the collection.”

Bentham refers<sup>d</sup> to this specimen in the following words:—

A fifth species of *Eucalyptus* from a still more distant region, Mindanao, one of the Philippine Islands, is described by A. Gray in the Botany of the American Exploring Expedition,<sup>e</sup> under the name of *E. multiflora*, Rich, from a specimen in leaf, and with a panicle of old fruits from which the calyx limb and operculum, if any, are fallen away and the open capsules have lost all their seeds. The four-celled (not three-celled) capsule is the only character leading us to suppose that it may be a *Eucalyptus* rather than a *Tristania* or a *Metrosideros*. No mention of it occurs in Blanco's Flora.

It will thus be seen that the very identity of the genus of this plant was doubted by an eminent authority.

A short time ago, through the kindness of the Secretary of the Smithsonian Institution Washington, D.C., I was able to examine Gray's specimen. It is No. 25483 of the U.S. National Herbarium, and as it turns out to be identical with *Eucalyptus Naudiniana*, F. v. Müller, *E. multiflora*, Rich, must fall, because the name is preoccupied (*E. multiflora*, Poiret, probably a synonym of *E. pilularis*, Smith).<sup>f</sup>

There are so few *Eucalypti* found outside Australia that the question of the identity of one found beyond the limits of that continent is of interest, and the occurrence of the genus in the Philippines is now set at rest, and doubtless its range in that group will be ascertained by American botanists.

*E. Naudiniana*, F. v. Müller, is so little known that the following notes in regard to it may be acceptable. It was described by Müller in the “Australasian Journal of Pharmacy,”<sup>g</sup> under the title of “Description of a Hitherto Unrecorded Species of *Eucalyptus* from New Britain.” New Britain is, of course, now a German possession under the name of Bismarck Archipelago.

<sup>a</sup> “Phanerogamia,” by Asa Gray, I, 1854.

<sup>b</sup> Page 554.

<sup>c</sup> William Rich, botanist of the U.S. ship “Relief.” In Captain Wilkes' narrative Mr. Rich's name is given as one who made an excursion from Manila, and he speaks of “our botanical gentlemen botanizing in the forests of Mindanao.”

<sup>d</sup> “Journ. Linn. Soc.” (Botany), X, p. 143.

<sup>e</sup> Page 554.

<sup>f</sup> See “DC. Prod., III, p. 217, under *E. persicifolia*, Lodd.

<sup>g</sup> July, 1886.

A correspondent in that group writes to me :—

*Eucalyptus Naudiniana* is common in Neu Pommern, though not in the Ralum district, where I live. It grows especially on the rivers, from the coast to the mountains, and is so common in the forests that two sawmills have been started especially for this timber. The timber is not so hard as the Australian *Eucalyptus*, but still a good, useful timber.

I know of no locality for the species other than that indicated in this paper. (*Proceedings U.S. National Museum*, Vol. xxvi, No. 1327.)

Then we have a note :—

*Eucalyptus multiflora*, Rich, sp. nov., p. 554 (Wilkes' Exped.).

Hab. near Caldera, Mindanao, one of the Philippine Islands. One of the few species of *Eucalyptus* found out of Australia, and not as yet rediscovered.\* It has been reduced by Maiden to *Eucalyptus Naudiniana*, F. Müll. (Pl. 2). (*Phil. Journ. of Science*, iii, 83, June, 1908.)

A photograph of Rich's type specimen is given.

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## RANGE.

THE Philippine Islands and New Britain (Neu Pommern). The locality New Ireland in the original description is wrong, as I have pointed out. It would be desirable to look out for it also in the Caroline Islands, northern New Guinea, and the Solomons.

Under *E. alba* (*Eucalyptographia*) Mueller records "an *Eucalyptus*-like tree has recently been recorded from New Ireland (Britain) by the Rev. Mr. Brown as forming forests in that island." This *Eucalypt* is *E. Naudiniana*, so Mr. (now Dr.) Brown tells me.

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## AFFINITIES.

It is not easy to state the affinity of this species. Its anthers are somewhat anomalous. In most cases, in this species, the anther-cells are not confluent. At the same time, as regards shape, it is undoubtedly Renantherous. As regards foliage, it is markedly eugenoid.

It is one of the very few extra-Australian species, but it is not closely related to any of them. Indeed, its close affinities to any species are not apparent.

Looking at its large, homogeneous timber and its umbrageous foliage, it is obviously the product of good soil and favourable cultural conditions,—plenty of moisture and adequate shelter.

### 1. With *E. Cloeziana*, F.v.M.

Both species have dense panicles of flowers which have a general resemblance. But otherwise their relations are not close, either in anthers or fruits, nor, as far as I can see, in other respects.

### 2. With *E. microcorys*, F.v.M.

The leaves in both species are thin; those of *E. microcorys* are much narrower. The anthers are much the same, but the fruits are very different.

### 3. With *E. saligna*, Sm.

The two species resemble each other in bark and timber. In foliage and other respects there is less similarity.

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\* Mr. C. B. Robinson, of the Bureau of Science, Manila, has just sent me leafy twigs collected by Dr. Copeland at Mindanao, which beyond reasonable doubt appears to belong to this species.

## DESCRIPTION.

LVII. *E. sideroxylon*, A. Cunn.

FOLLOWING is the earliest record I can find of this species:—

At the base of the range of hills at Mount Maude some tolerable fair specimens of the Western Ironbark, *Eucalyptus sideroxylon*, were noticed, being easily distinguished from its congeners by its extreme rugged, furrowed bark, containing, like others of the Eucalypti, a strong astringent gum. (A. Cunningham's MS. Journal, under date 19th May, 1817.)

Oxley's expedition was then in latitude 33° 25' and longitude 147° 10', *i.e.*, about midway between Condobolin and Wyalong West. Some of these specimens were distributed with Cunningham's name.

The next reference I can find is:—

6th October, 1816 (near Mount Pluto), . . . and among the larger forest trees was a Eucalyptus, allied to, but probably distinct from, the *E. sideroxylon*, A. Cunn., p. 339 (Mitchell's *Trop. Journ. Austral.*, 339).

In the list of plants collected by Mitchell's Expedition, at p. 437 of his work, this plant, referred to at p. 339, is given as *E. sideroxylon* without any qualification. I have seen the specimens in question, and they are what we know as *E. sideroxylon*, A. Cunn.

Then Mueller described a White Gum under the name *E. leucoxyton* in *Trans. Vict. Nat.*, i, 33 (1855). See below, p. 88.

Thereafter, for many years, this "White Gum" was confused with the New South Wales "Ironbark." For example, Bentham in the *Flora Australiensis* (iii, 210), who is followed by Bailey in the *Queensland Flora*. Then Mueller, in *Eucalyptographia*, continues to confuse the two trees. But in the field they could not be considered identical for an instant. Bentham's description of *E. leucoxyton* applies very well to that of *E. sideroxylon*, but requires to be supplemented in the following points:—

	<i>E. sideroxylon.</i>	<i>E. leucoxyton.</i>
Juvenile leaves . . .	Seedlings linear-lanceolate or linear, thenceforward lanceolate.	Cordate or ovate-lanceolate, sessile, glaucous.
Bark . . .	Black, furrowed, and rugged (Ironbark)	Whitish or bluish, smooth (White or Blue Gum).
Timber . . .	Deep red.	Pale brown or white (hence the name <i>leucoxyton</i> ).

The species (*sideroxylon*) may be described in the following words:—

A small, medium-sized or even tall tree, often gnarled. (A "Red Ironbark" or "Mugga.")

**Bark.**—Blackish, deeply furrowed and rugged, usually pulverulent in texture, interspersed with blackish kino grains, the general appearance reminding one of a burnt greasy cake, hence the name "Fat-cke Ironbark." Sapwood externally of a yellowish colour.

**Juvenile leaves.**—Narrow-linear to narrow-oblong, stalked, glaucous.

**Mature leaves.**—Pale-coloured, often glaucous, of the same colour on both sides, thickish, lanceolate, often falcate, with a petiole of half an inch and more. Venation as a rule not prominent, but sometimes prominent, penniveined, the intramarginal vein distinctly removed from the edge.

**Flowers.**—The buds sometimes angular, the operculum pointed, the calyx-tube often sharply separated from the pedicel, which may be .5 cm. in length and longer. Flowers up to 7 and even more in the head, with a common peduncle longer than the pedicel. Filaments bi-coloured, often cream-coloured, but more commonly pink to crimson. Masses of dead filaments often adhere to the nearly ripened capsule.

**Fruits.**—Turbinate to subcylindrical in shape, commonly 1 cm. in length and half that in diameter, with long pedicels. Often tuberculate and with a marked ring round the orifice, which is usually caducous as ripeness supervenes.

*Anthers with terminal pores.*—For reasons of space in arranging the plates, and because of the incompleteness of material of some species, and also because of the development of views as to affinities, it is not convenient, or even possible, at present, to arrange species in this work in strict sequence according to the antheral or, indeed, any other classification. It may be pointed out, however, that the present species affords the first illustration, amongst species already dealt with, of the anther with terminal pores.

Such an anther has been described by Bentham as “truncate,” (*e.g.*, at *B Fl.* iii, 189).

Eucalyptus anthers, much more varied than usually supposed, and so important in classification, may require a whole Part of this work for their elucidation, so I cannot exhaust the subject at this place. I will content myself with the observation that obliquity of attachment of anthers seems to be a character of the terminal-pored series.

*Vernacular Names.*—Its aboriginal name is in very common use, and it is also known as “Red Ironbark” because of its timber, but the timbers of other Ironbarks (*e.g.*, *siderophloia* and *crebra*) are also red. For obvious reasons it is also called “Red-flowering Ironbark.” Sometimes it is called “Black Ironbark,” because of the darkness of its bark. A very common name is “Fat Cake,” or “Fat-cake Ironbark.”

The name “Mountain Ash,” as applied to *E. sideroxyton*, has doubtless crept into the *Flora Australiensis* and other works on Oldfield’s authority. Following is one of his labels, in his own handwriting. Oldfield confused, as regards bark at least, *E. sideroxyton* with the Mountain Ash (*E. Sieberiana*), which in the south-east of New South Wales has bark a good deal like an Ironbark.

Ironbark, or Black Mountain Ash of colonists; tree 180 feet; bark persistent, brittle with dots of gum; dark iron-grey, rough, with prominent ridges; wood very hard. Mountain Hut Range, near Eden, Twofold Bay. (Herb. Barbey-Boissier.)

Oldfield added later, “*Eucalyptus sideroxyton*, A.C.,” with which determination I agree.

*Aboriginal Names.*—By those of Gippsland it is known as “Yerrick.” It was called “Easip” by the aborigines of the Yarra (Victoria). “Yirik” (apparently the same as “Yerrick”) and “Bwurawi” are Gippsland aboriginal names for the Victorian Ironbark, as given by Howitt (“Eucalypts of Gippsland”).

George Caley (Sir Joseph Banks' botanical collector in the Sydney district, 1800-1810) gave "Bargargro" as the aboriginal name for this Ironbark. He also noted the variations of white flowers, small red flowers, and large red flowers, in this species.\*

### Varieties.

Bentham (*B.Fl.* iii, 210) enumerates, under *E. leucoxyton*, two varieties, which, as far as the New South Wales specimens are concerned, are, in part at least, referable to *E. sideroxyton*, A. Cunn. They are :—

- i. "var. *pallens*.—Leaves not so coriaceous and whitish."

I will deal with the forms attributed to *E. sideroxyton* when I arrive at *E. Caleyi*, Maiden. *E. sideroxyton* is, in some districts, and at certain seasons, more or less glaucous, and some specimens are referable to *E. Caleyi*. I am of opinion that var. *pallens* cannot stand.

- ii. "var. *minor*.—Flowers rather smaller and often more numerous at the ends of the branches. Parramatta, Woolls."

I have seen the specimens and do not think that this variety can be maintained, if only because it refers to a mixture of two distinct species. *E. sideroxyton* varies somewhat in the size of the flowers, though not to the extent that *E. leucoxyton* does. The South Australian specimens referred to I will deal with under *E. leucoxyton*.

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## RANGE.

It is confined to Victoria, New South Wales, and Queensland, so far as is known at present. Speaking of New South Wales, Mr. R. H. Cambage states that it rarely occurs at an altitude exceeding 2,000 feet, and shows a decided preference for sedimentary formations. The type locality is, as has already been stated, about midway between Condobolin and Wyalong West.

### VICTORIA.

The confusion between *E. sideroxyton* and *E. leucoxyton* originated in Victoria, where both species occur, and the following unpublished official report of Mr. A. W. Howitt, dated 1895, is useful :—

*The Ironbark* is of two varieties (*leucoxyton* and *sideroxyton*.—J.H.M.) botanically speaking, but in practice there is no difficulty in distinguishing between them.

The variety which is universally known as "Ironbark" grows especially in the neighbourhood of Bendigo, Maryborough, Costerfield, Chiltern, and other places to the north of the Great Dividing Range. At the places named there are State Forests and Timber Reserves, but with the exception of the forest between Costerfield and Rushworth, the Ironbark is practically cut out.

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\* Maiden, in *Agric. Gazette N.S.W.*, 1903, p. 990.

In Gippsland it is found in many parts, for instance : Toongabbie, Bairnsdale, Bruthen, the Lakes Entrance, but nowhere to such an amount as to form the greater part of the forest.

It is therefore nearly cut out. Young forests are, however, growing up in the localities referred to north of the Dividing Range.

The following applies to Gippsland :—

This tree does not form forests in Gippsland, as in other parts of Victoria, but occurs scattered over a wide extent of country, from sea-level up to 2,000 feet. It grows upon various formations, as, for instance, Toongabbie, on recent alluviums, Tertiary clays, and Upper Silurian; at Bairnsdale, upon miocene and later tertiary beds; at Glen Maggie, upon Upper Silurian sandstone; at Upper Freestone Creek, upon Upper Devonian conglomerates; at Noyang, upon Palaeozoic Plutonic rocks; and near Buchan, on Tertiary sands and clays.

I have not observed it further to the westward of Toongabbie, and it varies but little, if at all, in character throughout Gippsland. (Howitt, "Eucalypts of Gippsland.")

Following are some Victorian localities :—

Maryborough, "Rough-barked Ironbark" (J. Blackburne, A. W. Howitt); Heathcote (W. S. Brownscombe); Bendigo (W. W. Froggatt); Jackson's Creek (C. Walter); Goulburn Valley (Sylvester Browne); Red Knob, *via* Metung and Swan Reach, Gippsland, a typical rugged Ironbark (J.H.M.).

NOTE.—In Victoria it is often called the "Rugged-barked variety" (of *leucoxyton*).

#### NEW SOUTH WALES.

Twofold Bay, "Ironbark or Black Mountain Ash" (*B.Fl.* iii, 210). (See Oldfield's label, showing how the erroneous name "Mountain Ash" arose); Pambula and Eden (A. W. Howitt, J.H.M.); Wagonga (J. S. Allan).

"The nearest commercial Ironbark procurable is at a distance of 30 miles east of Braidwood, near Nelligen, and separated by the Coast Range, *viz.*, the Sugar Loaf Mountain. Ironbark is also obtainable at Mericombene, Parish of Milo, 40 miles S.E. of Braidwood, and separated by the Araluen Mountain" (J. V. de Coque); Mudmelong, Araluen (J.H.M.).

Liverpool (A. Rudder); Fairfield (H. Deane); Canley Vale (E. Betcher); Bankstown and Cabramatta, "Bastard Ironbark" (to distinguish it from *E. paniculata*, &c.) (J. L. Boorman); "Pink or Crimson-flowering Ironbark," 18-30 inches diameter, 40-60 feet high, from the vicinity of Parramatta; a beautiful flowering tree, but scarcely to be considered valuable for timber (Sir William Macarthur); Miss A. F. Walker, of Rhodes, Ryde, tells me that *E. sideroxyton* was once common at Five Dock, Parramatta River; George's River (*B.Fl.* iii, 210).

Rankin's Springs, 60 miles north of Whitton (W. S. Campbell); range of mountains dividing the Counties of Bourke and Bland, commencing at the northern boundary of Forest Reserve No. 2,785, County of Bourke (J. Duff).

Adelong (J.H.M.); Gundagai (Forester J. S. Taylor); Big Springs, Wagga district. Diameter 2-3 feet, height 50-60 feet, (J. S. Taylor); "Red Ironbark," Grenfell (District Forester Arthur Osborne, Forester Postlethwaite, R. H. Cambage); Cootamundra to Grenfell (District Forester A. Osborne); "only specimen of Red-flowering Ironbark in my district," 45 miles west of Cootamundra (A. Osborne); Wyalong (A. Osborne); Common on ridges in Murrumbidgee and Lachlan districts (J. Duff); "Moogar," Lachlan River near Condobolin (R. Kidston); Condobolin (J.H.M.); Palesthan, Condobolin (Miss Clements); "Red-flowering Ironbark," Mimosa and Parkes (District Forester A. Wilshire); Trundle (P. J. Holdsworth).

Molong-Parkes (H. Deane); Molong (Dr. Andrew Ross); Cudal (A. Wilshire); Bowan Creek and Sand Creek, Bowan Park (W. F. Blakeley).

Eucharena (J. L. Boorman); Dubbo (H. Deane, J. V. de Coque, J. L. Boorman); Tomingley to Peak Hill (J.H.M.); Minore (J. L. Boorman); Sandy Creek and Bogan (W. Woolls). Auriferous ridges, County Flinders, near Nymagee. "Mugga" (Forest Guard E. F. Rogers); Cobar (W. Woolls); Nymagee. Very red flowers (Dr. J. W. Cox).

Near Cobborah (W. Forsyth); "Ironbark," splits readily, Grattai, Merrindee, and tops of mountains generally, say, 2,000 feet above sea-level, between Mudgee and Wellington (A. Murphy).

Gulgong (J.H.M. and J. L. Boorman); Mudgee (W. Woolls); Rylstone (very glaucous) and Lue (J. L. Boorman); Hawkesbury Agricultural College, Richmond (C. T. Musson and M. Carne); Richmond (H. Deane); Parramatta to Hawkesbury River, scarce (J.H.M.).

"Fat-cake Ironbark," Stroud district (A. Rudder); Narrabri (J.H.M., J. L. Boorman); Bundarra (Forest Guard Gordon Burrow); Murrurundi (J.H.M. and J. L. Boorman); on porphyritic felsite, 11-12 mile posts, Inverell to Tingha (R. H. Cambage); Inverell (Samuel Gray, Gordon Burrow); "Black Ironbark," Howell (J.H.M. and J. L. Boorman); "Fateake," Warialda (Rev. H. M. R. Rupp, E. J. Hadley, J.H.M., and J. L. Boorman); "Fateake," S.E. of Warialda (E. A. Powell, collected for H. Deane). Fruits smaller than the normal species. All the bark is of a very gummy nature. Yagobri, near Warialda (Surveyor E. A. Powell).

This timber is obtainable at Deep Creek, near Bolivia, but not, I believe, very abundantly. (H. Deane). Western slopes of Dividing Range, County of Clive, Tenterfield (A. S. O. Reid).

#### QUEENSLAND.

Darling Downs (F. M. Bailey); Jimbour Station (Sir Joshua P. Bell); "Silver-leaved Ironbark" (not to be confused with *E. melanophloia*). Between Stanthorpe and Warwick (A. Murphy); South Queensland (H. Lan); Mackenzie River and cultivated in Botanic Garden, Rockhampton (R. Simmons).

## AFFINITIES.

1. With *E. leucoxyton*, F.v.M.

This is the species with which *E. sideroxyton* may readily be confused, but I think the remarks offered at p. 82 and Plates 55 and 56 will render confusion not so easy. *E. sideroxyton* is often glaucous, though not so commonly as *E. leucoxyton*.

2. With *E. melliodora*, A. Cunn.

Large flowering and fruiting specimens of *E. melliodora* may, from herbarium specimens only, be sometimes confused with small flowering specimens of *E. sideroxyton*. Both also are drooping trees, but the bark and timber are totally different.

It is an Ironbark, and therefore may be confused with other Ironbarks, but the following table will readily separate them.

	White or She Ironbark ( <i>paniculata</i> ).	Narrow-leaved Ironbark ( <i>crebra</i> ),	Broad-leaved Ironbark ( <i>siderophloia</i> ),	Red Ironbark ( <i>sideroxyton</i> ).
Colour (darkens with age).	Very pale; pink when fresh.	Medium red.	Medium. A little darker than pre- ceding.	Very dark.
Bark ... ..	Often pale-coloured, even grey. Furrows often anastomosing.	Very deeply fur- rowed, inferior in depth only (if at all) to <i>sideroxyton</i> .	Often of a flaky character.	Dark; deepest fur- rowed.
Leaves ... ..	Narrow and medium	Very narrow.	Very broad.	Medium; foliage often sparse.
Flowers... ..	White.	White.	White.	Crimson; sometimes creamy.
Fruits ... ..	Small.	Very small.	Rather large.	Large.

## DESCRIPTION.

LVIII. *E. leucoxylo*n, F.v.M.

MUELLER described this species in the following words:—Arboreous:

**Leaves.**—Alternate, somewhat shining, narrow lanceolate, subfalcate, tapering into a long uncinatè acumen, veined and furnished with pellucid dots; umbels axillary, generally three-flowered, with a thin peduncle.

**Lid.**—Conico-hemispherical, acuminate.

**Tube of the Calyx.**—Semiobovate, somewhat longer than the lid.

**Fruits.**—Semiobovate, hardly contracted at the orifice; the valves of the capsule inclosed.

**Seeds.**—Blackish clathrate.

In grassy plains, from the Avoca to St. Vincent's and Spencer's Gulf.

This is the "White Gum Tree" of the South Australian Colonists. (*Trans. Victorian Inst.*, i, 33 [1855].)

In the following year (1856) Miquel redescribed it, on Mueller's behalf, as follows:—

9. *Eucalyptus leucoxylo*n Ferd. Müller; ramulis teretiuseulis, foliis elongato-lanceolatis sursum angustatis, apiculo incurvo terminatis coriaceis nitidulis penniveniis subreticulatisque, pedunculis axillaribus tri-raro quinque-floris petiolo brevioribus pedicellis aequantibus, floribus 2 lateralibus patentibus, calyce opereuloque rugulosis, hoc depresso-hemisphaerico subulato-attenuato aequilongo. (F. Müller, *Herb. et adnot.*)

Fere ubique in planitièbus locisque montosis, White Gum tree incolarum.

Arbor excelsa, rarius arbuscula 10-12 pedalis (in montium cacuminibus). Rami juniores rubelli, saepe pruinosi; folia obtuse viridia, juniora glauca. "Truncus albus sublaevis, passim striis fuscis." (Dr. Behr.) Filamenta luteo-albida, antherae fuscae. Variat floribus duplo majoribus. (Miq. in *Ned. Kruïdk. Arch.*, iv, 127 [1856].)

It was then described (in Latin, of course) in *Fragm.* ii, 60 (1860), with *E. cosmophylla*, F.M., as a synonym (which seems strange to us now), and the "White Gum" and "Ironbark" combined as heretofore.

Then Bentham (*B. Fl.* iii, 209) redescribed *E. leucoxylo*n, and his description can stand if Mueller's reference to the bark, the synonym *E. sideroxylo*n, and the varieties *pallens* and *minor* be omitted.

We now come to Mueller's figure and description of *E. leucoxylo*n in the "Encalyptographia," and here, again, we must delete (as synonyms) the references to *E. sideroxylo*n and "Ironbark." The figures of the mature fruits of *E. leucoxylo*n are not characteristic.

The late Rev. Dr. Woolls, in his "Note on *Eucalyptus leucoxylo*n, F.v.M. (*Proc. Linn. Soc. N.S.W.*, i [2nd ser.], 859 [1886]), first made clear the confusion of the two species. Before that date he had explained his views to me, verbally and in writing, and probably in writing to Naudin and others, for Naudin in 1883 refers to his views. In my "Forest Flora of New South Wales," Part xiii, plate 49 (1903), I give figures which help to clear up the confusion.

The confusion of a White Gum and Ironbark puzzled Naudin\* a good deal.

It is quite clear (1st Mem., 400) that he includes *E. sideroxyylon* under *E. leucoxyylon*. The juvenile leaves depicted by Mueller in the "Eucalyptographia" for *leucoxyylon* are a great stumbling block, and he suggests some error in labelling in regard to the different seeds he has received from various sources under the name *E. leucoxyylon*. At page 401 he distinctly states that it is the Ironbark which they possess in France.

Following Mueller, instead of Woolls, he looks upon the Ironbark as the type of the species (*leucoxyylon*), and points out the similarity of the growing French trees to those of *E. longifolia*. The flowers in the umbel are from 3 to 9.

This conclusion as to the determination (erroneous) of *E. leucoxyylon* is important, not only because Naudin's observations on the Eucalypts are the most important of those of any French botanist, but because the French are the most assiduous cultivators of the genus in Europe.

Then we turn to 2nd Mem., and we find that Naudin, at p. 36 (still following Mueller), adheres to the opinion that *E. leucoxyylon* is the "Ironbark des Colons australiens," and states his opinion that the juvenile foliage depicted by Mueller in his "Eucalyptographia" plate under *E. leucoxyylon* is referable to another species. Proceeding to discuss the conflicting statements of Mueller and Woolls in regard to *E. sideroxyylon* and *E. leucoxyylon*, he concludes that he is unable to decide on the matter. He adds that he persists in considering his *E. gracilipes* as distinct from *E. leucoxyylon* (*E. sideroxyylon*.—J.H.M.), to which it may be a good deal analogous, and he regarded it possible that it might be the "White Gum" of the Australian colonists.

There is no doubt, however, in my mind, that *E. gracilipes*, Naudin, is *E. leucoxyylon*, F.v.M. (with the *E. sideroxyylon* confusion eliminated). Mueller was wrong in mixing up *E. sideroxyylon* with *E. leucoxyylon*; on the other hand, he was quite right in his figure of the broad juvenile leaves of *E. leucoxyylon* on the "Eucalyptographia" plate. Naudin rejected the juvenile leaves as incorrect for *E. leucoxyylon*, but accepted the Ironbark as correct for that species, and thus was led to found another species.

### Notes supplementary to the Description.

Blue Gums (*leucoxyylon*) are often covered with rough bark here right up into the tree. The bark is white inside, not yellow, and in some parts of the country the young bark is of a dirty yellow after the old falls off, and in others pinker or whiter. It varies very much, according to locality. In the warmer parts it is generally hollow in the centre and more solid than in the cooler parts. (W. Gill, Conservator of Forests of South Australia, *in litt.*, 5th October, 1904.)

\* "Mémoire sur les Eucalyptus introduits dans la région Méditerranéenne." Annales des Sciences Naturelles, 6e Série. Bot T., xvi, pp. 337-430 (1883). (Quoted as 1st Mem.); and

"Description et emploi des Eucalyptus introduits en Europe, principalement en France et en Algérie." Second Mémoire. Antibes, 1891, pp. 1-72. (Quoted as 2nd Mem.)

It is commonly seen flowering and fruiting as a small straggling shrub. The late Mr. Luehmann wrote to me :—

“Near Bacchus Marsh, Victoria, where Baron von Mueller found it, I saw *E. leucoxyton* freely flowering and fruiting at a height of 4 to 6 feet on very poor shingly ground.”

The late Dr. A. W. Howitt called *E. leucoxyton* “White Ironbark” (because of its pale timber) or “Blue Gum,” and gave its aboriginal name as “Yandert.”

Note the glands on the filaments (see figs. 1c, 1f, pl. 56). Mueller first drew attention to this (see his figure in “Eucalyptographia”). I have only seen this glandular appearance on *E. leucoxyton* and *E. Coleyi*, and it should be looked for on other species. Diels figures it on his *E. Forrestiana*.

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## SYNONYM.

*E. gracilipes*, Naudin.

I HAVE already explained how this species arose, and have referred to it briefly in *Proc. Linn. Soc. N.S.W.*, xxviii, 896 (1903).

I give a translation of Naudin’s original description of his species, as I find that it is not readily accessible to Australians :—

Tree very close to *E. leucoxyton*, from which it differs especially in its juvenile state, which attaches it to the biform section. In this early stage, the leaves, which are very much broader and shorter than when full grown, are opposite, sessile, oval-oblong, from 6-8 cm. long, and from 3-4 broad. When full grown they are, as in the generality of species, petiolate, alternate, narrow-lanceolate, pointed, from 10-12 cm. long, and 1-1½ cm. broad. The inflorescence closely recalls that of *E. leucoxyton*. It consists of axillary umbels, generally three-flowered, but often with five and more rarely seven flowers; pendulous, because of the length of the common peduncle and of the pedicels of the flowers. The flower-buds are ovoid, with their opercula almost the length of the calyx-tube, a little enlarged at the base, and terminated by a sharp or curved point. The fruit, which is of the size of a pea, is ovoid-truncate, and its capsule, 3-4 celled, is deeply enclosed.

I do not know from what part of Australia this tree is originally a native, having found it without locality in the garden of M. Huber, at Hyères.

My trees are about five years old, 3 metres high, with slender trunk, which becomes smooth and almost white after the shedding of its first bark. The general tint of the foliage is much lighter than that of *E. leucoxyton*. (2nd Mem., p. 37.)

### Varieties.

This is a variable species, and many varieties have been named in connection with it. In my view, nearly all of them fall to the ground. So far as I know, the named forms are as follows :—

1. Var. *pluriflora*, F.v.M. (Miq. in *Ned. Kruid. Arch.*, iv, 127 [1856]).

This is *E. odorata*, Behr, var. *calcicultrix*, Miquel. See p. 29, Vol. II, of the present work.

2. *β rugulosa*, F.M. (*E. rugulosa*, F. Müll., in schedulis herbariorum).

Florum majorum tubo amplo-obconico ruguloso, foliis longioribus; a vere ad autumnum florens: in vallibus et planitiebus, in Devil's-Country, Adelaide (F.M.), Lofty Range. (Devil's Country, Mount Lofty. The spellings of names of Australian localities are frequently much distorted in Miquel's work.—J.H.M.) (Miq. *loc. cit.*)

I have examined specimens in the Berlin and Vienna herbaria. They seem to me quite normal, with the inflorescence shrunken somewhat in drying. The type is described "calyce operculoque rugulosis."

3. *γ rostellata*, F.M.

Operculo in cornu breve protracto. (*E. rostellata*, Behr, Herb.) Arbor mediocris in planitie arenosa ad oppidulum Tammida (? Tanunda). Ramuli rubelli (Behr). (Miq. *loc. cit.*)

I have not seen an authentic specimen of this so-called variety. Perhaps the opercula resemble those depicted at fig. 3b, pl. 56. I doubt very much whether a variety based on the very variable character of length of operculum can stand.

4. *ε pruinosa*, F.M.

Alabastris ramisque pruinosis, operculo rostellato. Arbor ingens, coma vetustiore nigricante (*E. tristis*, Herb. Müll.). Salt Creek (Behr). (Miq. *loc. cit.*)

I have seen one of the original specimens in the Vienna herbarium. It is a little glaucous, hence the variety-name, but the species is oftener glaucous than not.

5. *η erythrostema*, F.M.

Filamentis sanguineis.—Rarius ad sinum Encounter-Bay (Encounter) et montis Bagle (Bagle.—J.H.M.) range (Stuart et F. Müller) *E. incrassata* var. Müll. Herb. (Miq. *loc. cit.*)

There is a specimen labelled *Eucalyptus incrassata*, Labill., in Miquel's handwriting in the "Plantae Müllerianae" examined by him for the above paper, in Herb. Barbey-Boissier. It is *E. leucoxyton*, F.v.M.

This form is figured by J. Ednie Brown in his "Forest Flora of South Australia," under the name of *E. leucoxyton*, var. *macrocarpa*. "The large-fruited Red-flowering Gum."

Mueller's name cannot stand, from the fact that the flowers are indiscriminately crimson and cream-coloured.

6. Var. *angulata*, Benth. (B.Fl. iii, 210.)

Flowers large, the calyx distinctly angled. Devil's Country (Lofty Range), South Australia (F.v.M.).

The flowers of *E. leucoxyton* are often distinctly angled. This form may be identical with var. *rugulosa*, above. I do not think var. *angulata* is the form with the largest flowers (*macrocarpa*).

7. Var. *pallens*, Benth. (B.Fl. iii, 210.)

I have not seen the type, but the trees usually attributed to this variety are either *E. sideroxyton*, A. Cunn., or *E. Caleyi*, Maiden. See *E. Caleyi*, p. 96, and also p. 84. In any case they are not *E. leucoxyton*.

8. Var. *minor*, Benth. (B.Fl. iii, 210.)

Flowers rather smaller, and often more numerous at the ends of the branches. . . . also several of the South Australian specimens, "White Gum."

See above, p. 84.

The description refers to a mixture of two distinct species, and therefore cannot stand.

This is doubtless, as regards the South Australian specimens, the var. *pauperita*, J. E. Brown. See below.

9. Var. *macrocarpa*, J. E. Brown.

See below.

10. Var. *pauperita*, J. E. Brown.

See below.

The late J. Ednie Brown, in his "Forest Flora of South Australia," devotes no less than four of his large plates to *E. leucoxyton*. They are:—

(a) "The Blue Gum." This may be taken as the normal form.

(b) and (c). Var. *macrocarpa*, J. E. Brown. "The large-fruited Red-flowering Gum" and "The large-fruited White-flowering Gum," respectively. They differ only in the colour of the filaments. On Mueller's authority he refers his *macrocarpa* to Mueller's (Miquel's) *erythrostemata*.

(d) Var. *pauperita*, J. E. Brown. "The Scrubby Blue Gum."

In my view, the variety names *macrocarpa* (see also figs. 11 and 12, pl. 56) and *pauperita* (fig. 10) can alone stand.

As regards var. *macrocarpa*, Mr. Ednie Brown's type specimens have not been preserved, but his figures and the localities "Port Lincoln to the Marble Range" (where I have visited and collected specimens) make it quite clear to what form he refers.

Mr. Walter Gill, the Conservator of Forests of South Australia, in the course of conversation, points out to me that, in his opinion, the var. *macrocarpa* has a different bark to that of ordinary Blue Gum (normal *leucoxyton*). It grows large, and also Mallee-like. The Port Lincoln specimens are bi-coloured. The variety has a seedling which has a petiole, which ordinary Blue Gum has not.

The most important character referred to in Mr. Gill's statement lies in the petiole of the seedling, but the figures on Plate 56 show that we have a gradual transition between the normal form and the variety in this respect. In other words, I do not think it would be justified to raise var. *macrocarpa* to specific rank.

## RANGE.

### SOUTH AUSTRALIA.

THE original species was described from this State, though, as was often the case in the early days, no special locality was given for the type. It is a widely diffused and well known tree in South Australia. Following are some localities of a few specimens:—

Devil's Country, Lofty Range (*E. rugulosa*), Miquel (see above); Adelaide and Mount Lofty Ranges generally; a Gum tree with smooth white bark, yellowish wood. Kapunda (R. H. Cambage); Kuitpo Forest Reserve, near Willunga (W. Gill); Cape Jervis (J.H.M.); South-east South Australia (W. Gill); "White Desert Gum," Tintinnarra (R. H. Cambage).

Variety *pauperita*, J. E. Brown, Mt. Bryan Ranges, near Hallett (W. Gill); Bundalcer (W. Gill and J.H.M.). See also J. E. Brown, *loc. cit.*

Variety *macrocarpa*, J. E. Brown.—Port Lincoln to Wangary (W. Gill and J.H.M.). See also J. E. Brown, *loc. cit.*

### VICTORIA.

The second variety of *E. leucoxyton* is suitably termed "White Ironbark," and it probably represents the variety of this tree from which Baron von Mueller named the species "leucoxyton." Outwardly it has the appearance of a "White Gum," and the wood is light coloured. It is locally called "Grey Gum," "Spotted Box," "Blue Gum." The wood is of inferior quality, used in some places as posts, yet I saw it cut for railway sleepers near Heathcote a few years back.

This tree is not found, as far as I have observed, to the east of Melbourne in the south, or of Rushworth in the north. It is plentiful in the State Forests and Timber Reserves of Bendigo, Maryborough, Wedderburn and Heathcote, &c. It is of but little value, and need not be preserved where other and better Eucalypts can replace it. (A. W. Howitt, in an unpublished report, 1895.)

The small-fruited form or variety *pauperita* is very common in Victoria.

Following are some more or less specific localities for *E. leucoxyton* in Victoria:—

Smooth-barked tree. Darriwill, near Geelong (correspondent of Dr. Woolls); Torquay, near Geelong (J. M. Griffiths); Heathcote (A. W. Howitt); "Smooth-barked Ironbark." Growing side by side with Ironbark (*E. sideroxyton*). Maryborough (J. Blackburne); Smooth bark, Carisbrook, Loddon River (J. Blackburne); "Blue Gum," Bendigo (W. W. Froggatt); Eaglehawk (A. W. Howitt); "White Ironbark," Grampians (C. Walter); "A clear or white-barked tree, known round Horsham and the Upper Glenelg as White Gum. I have never heard it called Ironbark or Blue Gum" (H. B. Williamson); Gerang Gerung (A. W. Howitt); Stawell, red-flowering (A. W. Howitt) his *leucoxyton*  $\beta$ ; Wimmera (F. Reader); Mallee district (C. Walter).

Bremin, Rutherglen (H. B. Williamson). This specimen simulates *E. hemiphloia* (see fig. 9, pl. 56); Heathcote, near Bendigo (W. S. Brownscombe) simulating *hemiphloia* var. *albena*.

The glaucousness of the specimens, which cannot be brought out in the drawing, (see fig. 7, pl. 56), accentuate the similarity. In sending other specimens from the same locality (fig. 4, pl. 56), Mr. Brownscombe says that the tree is known locally as "White Gum" or "Spotted Box."

## NEW SOUTH WALES.

Barham, Deniliquin District. "Bastard Gum" (Osborne Wilshire).

I exhibited some of Mr. Wilshire's specimens before the *Linn. Soc. N.S.W.* in May, 1907, this being the first occasion on which *E. leucoxyton* (not confused with *sideroxyton*) has been recorded for New South Wales.

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## AFFINITIES.

1. With *E. sideroxyton*, A. Cunn. See also p. 82.

There has never been any difficulty in the field as regards this species, and I brought the matter of the difficulty, which sometimes occurs, of separating *E. leucoxyton* and *E. sideroxyton* on herbarium specimens, under the notice of Mr. W. S. Brownscombe, of Melbourne, a well-known investigator of Eucalypts in Victoria, and he makes the following remarks :—

In almost every case the herbarium material of *E. leucoxyton* and *E. sideroxyton* can be readily distinguished from each other, without further reference to the bark, &c., after obtaining a knowledge of the two in their native state. In typical (*sic*) forms the tube of the calyx starts more abruptly from the stalklet in *E. leucoxyton* than in *E. sideroxyton*. The same distinction is carried into the fruit; moreover the rim is more contracted in *E. sideroxyton*.

Mr. Brownscombe's remarks apply to such a specimen as fig. 4, plate 56, received by him from Heathcote. But they certainly do not apply to fig. 7 of the same Plate, which represents fruits of *E. leucoxyton* received from him from the same locality about a year previously. At the same time the character Mr. Brownscombe points out is often true, but, like other Eucalyptus characters, it must be applied with caution.

Referring to *E. leucoxyton* var. *macrocarpa*, I have never seen the fruits of *E. sideroxyton* attain so large a size as do those of *E. leucoxyton*.

2. With *E. hemiphloia*, F.v.M., var. *albens*.

The fruits of *E. leucoxyton* are more pear-shaped, and the ring round the orifice is always present. The anthers, also, of the two trees are different. On the other hand, the foliage of the two trees is a good deal similar; they are often very glaucous, and the habit, bark, and timber are a good deal alike.

3. With *E. cladocalyx*, F.v.M.

The timbers of these two South Australian trees are a good deal similar as far as superficial appearances go. Their other botanical characters are, however, very different.

4. With *E. Bosistoana*, F.v.M.

Already referred to under *E. Bosistoana*, see p. 4 of the present volume. See also p. 3 with respect to some confusion between the two species.

## DESCRIPTION.

LIX. *E. Caleyi*, Maiden.

In *Proc. Linn. Soc. N.S.W.*, xxx, 512 (1905).

A tall Ironbark tree, often glaucous, and finally becoming glabrous, but remaining dull-coloured.

**Vernacular Names.**—Called "Broad-leaved Ironbark" at Howell in comparison with the local "Narrow-leaved Ironbark," which is *E. sideroxylon*, and which is rare in the immediate district. Also called "Silver-leaved Ironbark," but not to be confused with *E. melanophloia*, which is not found in the neighbourhood, but which is exceedingly abundant near Bingera, Inverell, &c.

**Bark** very deeply furrowed and hard, with much less kino in grains throughout the bark than *E. sideroxylon*, and therefore not a true "Fat-cake Ironbark" like that species.

**Timber** deep red in colour, locally esteemed, and apparently a timber of good quality.

**Juvenile leaves** nearly orbicular, 3 inches in diameter being the usual dimensions. The leaves are symmetrical and taper rather abruptly into a petiole of about  $\frac{1}{2}$  inch. Texture thick and coriaceous, dull and even glaucous. Midrib rather prominent, and the intramarginal vein at a considerable distance from the edge. The secondary veins (of which the intramarginal vein is one) numerous, usually about  $\frac{1}{4}$  inch apart, roughly parallel, but converging and finally becoming nearly parallel to the midrib.

**Mature leaves** broadly lanceolar, up to a breadth of 2 inches, and a length twice as great and rather more. Nearly symmetrical, blunt pointed, tapering at the base into a petiole of about an inch. Coriaceous and rather thick, equally dull on both sides; often glaucous. Intramarginal vein at a considerable distance from the edge. The secondary veins rather prominent and wide apart, and disposed at about an angle of 45° to the midrib.

**Buds.**—Operculum conical and of less diameter than the calyx, which tapers much more than does the operculum. The buds often glaucous.

**Flowers** axillary, becoming terminal by reduction of the upper leaves. Up to 7 in the head, the common peduncle rather slender and about  $\frac{1}{2}$  inch in length, each flower on a distinct pedicel. Anthers almost quadrangular in shape, opening in pores nearly terminal, which are a little wider in the direction of the broad portion of the anther. Filaments often tinged red and minutely glandular. In full flower in August (1905).

**Fruits** pear-shaped, slender, tapering into a distinct pedicel. Diameter, say,  $\frac{1}{4}$  inch, with a length about twice as great. Dark brown and glossy when fully ripe. They have a marked dark-coloured thin rim such as is common in *E. sideroxylon* and *E. melliodora*. Valves well sunk, usually half way down the capsule.

This species is named in honour of George Caley, Banks' botanical collector in New South Wales (1800–1810), and whose shrewd observations in regard to another Ironbark have been referred to at p. 494 of the *Proceedings* quoted.

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 RANGE.

THIS species appears to be very widely distributed over northern New South Wales, extending from the Rylstone (Mudgee) district north-east to near the Queensland border, and as far east as Emmaville. The range of the species requires to be more fully defined, but it appears to be found over the greater portion of New England and over a considerable area of the western slopes of this tableland.

Howell (Bora Creek), 19 miles south of Inverell, on the tin-granite (E. C. Andrews, per favour of R. H. Cambage, April, 1904, and April, 1905, in bud and fruit); (J. H. Maiden and J. L. Boorman, August, 1905); Head of the Gwydir (Dr. Leichhardt, circa 1842); it grows chiefly on low ranges along the foot-hills of the Nandewar Range and along the Gwydir (Forest Guard Gordon Burrow); "Mountain Ironbark," Upper Hunter (H. Deane, 1858); "Stunted Ironbark," Murrumbo, Rylstone (R. T. Baker, December, 1893); at Howell it would appear that the trees obtained a finer development; Tingha (J. L. Boorman, June, 1904), with fruits less pear-shaped than those of the type; Emmaville (J. L. Boorman, June, 1904). Very glaucous.

The locality Peak Hill, as given in a note to the original description, was founded on a misapprehension.

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## AFFINITIES.

### 1. With *E. sideroxylon*, A. Cunn.

*E. Caleyi* is sharply distinguished from this species by its broad juvenile foliage, that of *E. sideroxylon* being very narrow. The fruits of *E. sideroxylon* are more globular and warty; the opercula are not constricted. In *E. sideroxylon* (and I have chosen an equally fresh local specimen for the observation) the filaments have a fine line or ridge extending the whole length. In *E. Caleyi* the line is less marked, and extends only for the lower half of the filament.

Let us turn to a reputed variety of *E. sideroxylon*, A. Cunn., viz., var. *pallens*, Benth. "Leaves not so coriaceous and whitish." New England, C. Stuart (B.Fl. iii, 210). I have not seen the type specimens, but have travelled over a good deal of C. Stuart's country (northern New England, Tenterfield to Drake, &c.), and have no doubt, in my own mind, that *E. Caleyi* is the plant referred to. At the same time I cannot state absolutely that it is a synonym without the type. The tree is often as glaucous as it can be, and young lanceolate leaves at the ends of branches are often less coriaceous than the maturer leaves down the branches.

On my showing Mr. R. T. Baker specimens, and informing him that I deemed this tree to be new, he very kindly sent me specimens collected by him at Murrumbo Plains, Goulburn River, north of Rylstone, and informed me that the tree was referred by him and Mr. Smith, in their "Research on the Eucalypts," to *E. sideroxylon*, A. Cunn., var. *pallens*. It will be observed that the authors state that the "oil has little resemblance to that obtained from *E. sideroxylon*."

### 2. With *E. affinis*, Deane and Maiden.

*E. Caleyi* resembles this species in general characters, and even in fruits, but the timbers sharply separate them, that of *E. affinis* being pale.

3. With *E. siderophloia*, Benth., var. *glauca*, Deane and Maiden.

*E. Caleyi* certainly presents some resemblance to this variety. Both forms are glaucous, and the juvenile foliage of both forms has much in common, but the opercula of the var. of *E. siderophloia* are not constricted, while its valves are not only not sunk, but they are exerted.

4. With *E. paniculata*, Sm.

*E. Caleyi* was by Mueller and others sometimes labelled *E. paniculata*, with bud and flower specimens alone available. The inflorescence often, indeed, takes on a paniculate character, and the fruit, when unripe and the rim not defined, is certainly reminiscent of that of *E. paniculata*, but the leaves, ripe fruits, and timber sharply distinguish the species.

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### HYBRIDISM.

Mr. J. E. Carne collected this species at Copeton, with a Box-bark, very different in appearance to that of the normal species. I will describe this specimen when I deal with the subject of hybridism in the genus. Ironbarks seem specially prone to hybridise with the Boxes; and I cannot usefully describe the various hybrids without pictorial illustrations, which are being prepared.

Hybridism in Eucalyptus is a scientific fact, although a few of the instances adduced may still form the subject of controversy.

After I have critically revised the various species of Eucalyptus in the way I am doing, and before I publish my diagrams and tables explaining my views as to their affinities, I propose to devote a Part of this work to the hybrid forms, and shall at all times be grateful to correspondents for specimens illustrating the phenomenon, or believed to do so.

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### Explanation of Plates (53-56).

#### PLATE 53.

##### *E. Ravenstiana*, F.v.M.

- 1*a* and 1*b*. Juvenile foliage. Rockhampton, Queensland. (J.H.M.)  
 2*a*. Leaf in intermediate stage; 2*b*, fruits received by Mr. F. M. Bailey from Rockhampton (collector?).  
 3*a*. Mature leaf; 3*b*, anther. Rockhampton. (Lato A. Thozet.)

##### *E. crebra*, F.v.M.

- 4*a*, 4*b*. Juvenile leaves, near Dubbo. (J. L. Boorman.)  
 5*a*. Broadish mature leaf; 5*b*, anther. Lower Kurrajong. (J.H.M.)  
 6. Rather large fruit. Wybong Creek. (Augustus Rudder.)  
 7. Fruit. Baulkham Hills. (Rev. Dr. Woolls.)  
 8. Fruit not perfectly ripe, showing rim. Windsor. (J. S. Allan.)  
 9. Fruit, nearly ripe, showing marked rim. Capertee. (J.H.M. and J. L. Boorman.)

*E. Staigeriana*, F.v.M.

- 10a. Juvenile leaf; 10b, mature leaf; 10c, buds and flowers; 10d, anther; 10e, fruit from Palmer River, Queensland (type locality). Received from Mr. F. M. Bailey (collector?).
- 11a. Broadish juvenile leaf; 11b, buds, cultivated, R. Simmons, Rockhampton, Queensland.
12. Mature leaf, cultivated, Botanic Gardens, Sydney.

*E. melanophloia*, F.v.M. (first part).

N.B.—The drawings of this species are intended to supplement those of the "Eucalyptographia." I do not repeat "Eucalyptographia" drawings, but sometimes add to them or correct them. In my "Forest Flora of New South Wales" I will figure whole twigs of the normal form of this species. I may, perhaps, be permitted to remind my readers that the present work is a "Critical Revision," and hence a drawing of normal *E. melanophloia*, already conveniently available, would be out of place.

- 13a and 13b. Twig with flowers, and anther of a lanceolate-leaved form of *E. melanophloia*. Bentham looked upon it as a variety of *E. crebra* at *B.Fl.* iii, 222, and this original specimen bears the label, in Bentham's handwriting, "Bark fissured, not shedding, Suttor River, Bowman."
- 14a. Leaf; 14b, buds and flowers of "Box-tree of the Mackenzie, Leichhardt." This tree has a "fissured bark," and was examined by Bentham for *B.Fl.* iii, 222. It is a lanceolate-leaved form of *E. melanophloia*.
- 15a. Leaf; 15b, buds and flowers of the "Gum-topped Box of the Suttor River, Bowman," in Bentham's handwriting, examined by him for *B.Fl.* iii, 222. It is a lanceolate-leaved form of *E. melanophloia*. All these from Kew.

## PLATE 54.

*E. melanophloia* (continued).

- 1a, 1b, 1c. Juvenile leaves. Narrabri, N.S.W. (J.H.M.)
- 2a. Mature leaf; 2b, buds. Bourke, N.S.W. (O. C. McDougall.)
- 3a. Mature leaf; 3b, very small fruits. Narramine, N.S.W. (J.H.M.)
- 4a. Mature leaf; 4b, small fruits. Stannary Hills, North Queensland. (Dr. T. L. Bancroft.)

*E. pruinosa*, Schauer.

- 5a. Reproduction of a portion of the type in the Vienna Herbarium. The original bears the inscription, "Eucalyptus pruinosa, Schauer, in Walp. Repert," in Schauer's handwriting; 5b, a fruit from the type, end on.
6. Anther from a flower from Sweers' Island, Gulf of Carpenteria. Herb. Melb. with the label "Henne?" (Henne was the botanical collector in Landsborough's Expedition.)
- 7a. Angled and ribbed fruits; 7b, quadrangular branchlet. Mt. Albion, Queensland. (S. Dixon.)
8. Very small fruits. Ord River, East Kimberley, W.A. (W. V. Fitzgerald.)

## PLATE 55.

*E. Smithii*, R. T. Baker.

1. Juvenile leaf. Colo Vale, N.S.W. (E. Cheel.)
- 2a. Mature leaf; 2b, buds; 2c, anther; 2d, fruits. Sugar Loaf Mountain, Braidwood, N.S.W. (W. Baeuerlen.)

*E. Naudiniana*, F.v.M.

- 3a. Juvenile leaf; 3b, mature leaf; 3c, buds; 3d, anthers. New Britain or Neu Pommern. (R. Parkinson.)
4. Fruits. Philippines, U.S. Exploring Expedition, 1854.

*E. sideroxylon*, A. Cunn.

5. Seedling plant. Condobolin Hill, N.S.W. (J.H.M.)  
 6. Juvenile leaves. Condobolin. (J. L. Boorman.)  
 7a, 7b. Juvenile leaves. Harvey Range, N.S.W. (J. L. Boorman.)  
 8a. Juvenile leaf; 8b, intermediate leaf. Merrindee (Mudgee to Wellington), N.S.W. (A. Murphy.)  
 The broad juvenile leaf may be evidence of hybridism.  
 9a. Mature leaf; 9b, buds and flowers; 9c, anthers (note their truncate shape) from "Interior of New Holland, Major Mitchell, 1836," which is typical of the species.  
 10. Buds. Condobolin. (J. L. Boorman.)  
 11. Small, smooth fruits. Minere, Dubbo, N.S.W. (J. L. Boorman.)  
 12. Fruits (note the tubercular appearance of the surface and the rims round the orifice, both characters common in this species). Grenfell, N.S.W. (J. Postlethwaite.)  
 13a, 13b. Fruits of the coast form. Cabramatta, N.S.W. (J. L. Boorman.)

## PLATE 56.

*E. leucorylon*, F.v.M.

- 1a. Juvenile leaves, perfectly sessile; 1b, juvenile leaves, showing the rudiment of a petiole; 1c, flowers; 1d, anther, side view; 1e, anther, showing pores and glandular filament; 1f, portion of glandular filament enlarged. Kapunda, S.A. (R. H. Cambage.)  
 2. Juvenile leaf, showing incipient petiole. Mt. Barker, S.A. (J.H.M.)  
 3a. Mature leaf; 3b, buds; 3c, fruits (note that in this species the attachment of the pedicel to the fruit is often abrupt). Adelaide. (Max Koch.)  
 4. Fruits. Heathcote, Victoria. (W. S. Browncombe.) Compare 7, below, with more tapering calyx.  
 5. Fruits from Barham, Deniliquin, N.S.W., the only New South Wales locality so far recorded for this species. (Osborne Wilshire.)  
 6. Fruits, nearly hemispherical. Kapunda, S.A. (R. H. Cambage.)  
 7. Fruits, with pedicels tapering into the fruits. Heathcote, Victoria. (W. S. Browncombe.)  
 8. Fruits, showing the ring at the orifice, common in this and some allied species. Cape Jervis, South Australia. (J.H.M.)  
 9a. Leaf; 9b, buds; 9c, fruits. Bremin, Rutherglen, Victoria. (H. B. Williamson.) These specimens simulate *E. hemiphloia*, cf. plate 50, fig. 21a; plate 51, fig. 3, and other figures on these two plates.

Variety *pauperita*, J. E. Brown.

10. Fruits. Mt. Bryan Ranges, S.A. (W. Gill.)

Variety *macrocarpa*, J. E. Brown.

- 11a. Juvenile leaf, with distinct stalk; 11b, fruits, not quite ripe. Wanilla, Port Lincoln, S.A. (W. Gill.)  
 12a. Juvenile leaf; 12b, single fruit; 12c, three fruits. Between Port Lincoln and Coffin's Bay, S.A. (J.H.M.)

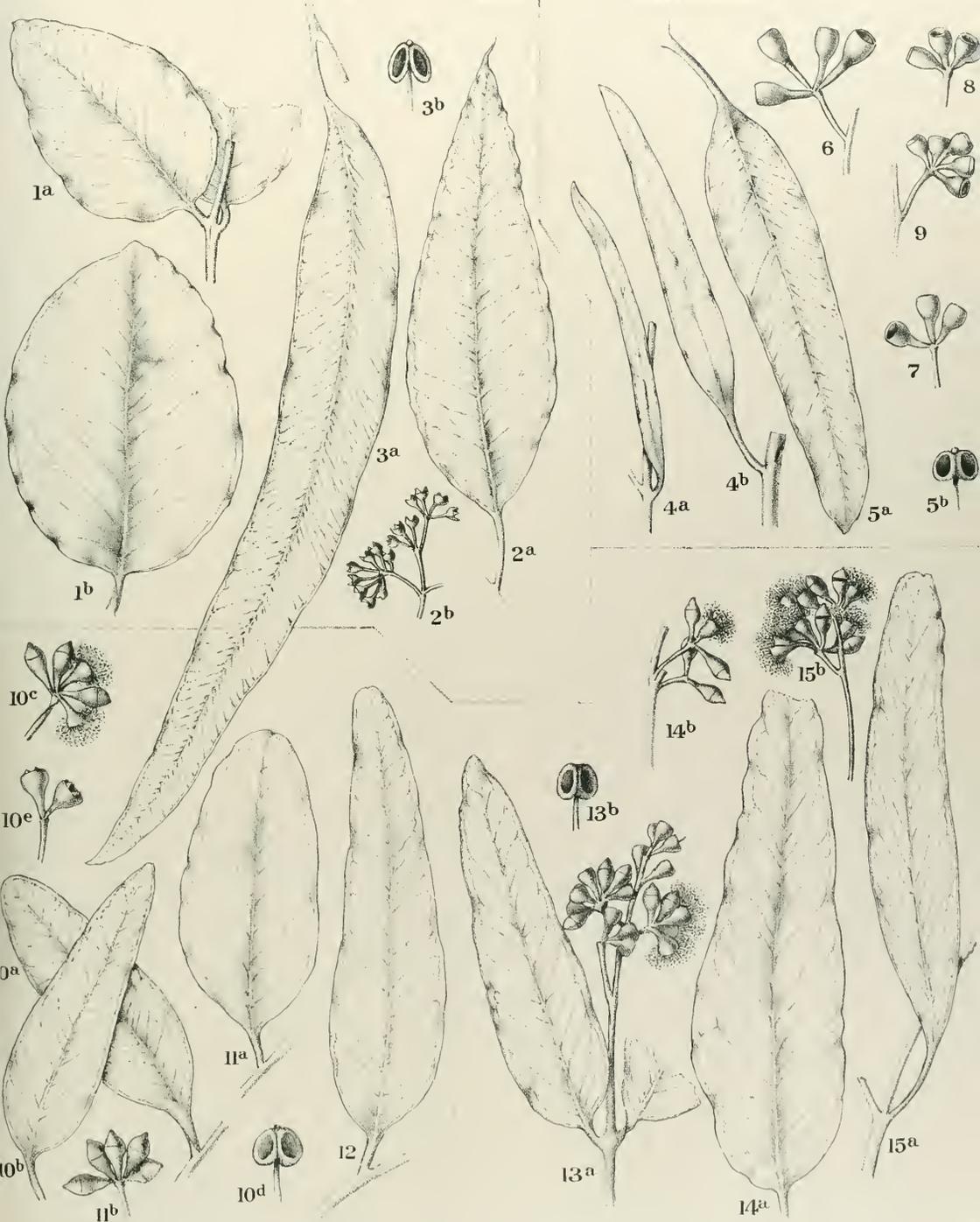
*E. Caleyi*, Maiden.

- 13a. Juvenile leaf; 13b, mature leaf; 13c, buds (note the "egg-in-egg-cup" arrangement); 13d, side view of anther; 13e, anther, showing dehiscence; 13f, fruits, showing rim; 13g, fruits, smaller. All from the type, Howell, N.S.W. (J.H.M. and J. L. Boorman.)  
 14. Fruits. Tingha, N.S.W. (J. L. Boorman.)  
 15a. Leaf; 15b, fruits Rylstone, N.S.W. (R. T. Baker.)  
 16. Fruit, showing cracking of the rim when over ripe. Emmaville, N.S.W. (J. L. Boorman.)

The following species of *Eucalyptus* are illustrated in my "Forest Flora of New South Wales"\* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

<i>acmenioides</i> , Schauer (xxxii).	<i>microcorys</i> , F.v.M. (xxxviii).
<i>amygdalina</i> , Labill. (xvi).	<i>numerosa</i> , Maiden (xvii).
<i>Andrewsi</i> , Maiden (xxi).	<i>obliqua</i> , L'Hérit. (xxii).
<i>Baileyana</i> , F.v.M. (xxxv).	<i>odorata</i> , Behr and Schlechtendal (xli).
<i>Bosistoana</i> , F.v.M. (xliii).	<i>paniculata</i> , Sm. (viii).
<i>capitellata</i> , Sm. (xxviii).	<i>pilularis</i> , Sm. (xxxi).
<i>Consideniana</i> , Maiden (xxxvi).	<i>piperita</i> , Sm. (xxxiii).
<i>coriacea</i> , A. Cunn. (xv).	<i>Planchoniana</i> , F.v.M. (xxiv).
<i>corymbosa</i> , Sm. (xii).	<i>punctata</i> , DC. (x).
<i>dives</i> , Schauer (xix).	<i>regnans</i> , F.v.M. (xviii).
<i>fruticetorum</i> , F.v.M. (xlii).	<i>resinifera</i> , Sm. (iii).
<i>goniocalyx</i> , F.v.M. (v).	<i>saligna</i> , Sm. (iv).
<i>hamastoma</i> , Sm. (xxxvii).	<i>siderophloia</i> , Benth. (xxxix).
<i>hemiphloia</i> , F.v.M. (vi).	<i>sideroxylon</i> , A. Cunn. (xiii). <sup>1</sup>
<i>longifolia</i> , Link and Otto (ii).	<i>Sieberiana</i> , F.v.M. (xxxiv).
<i>Luehmanna</i> , F.v.M. (xxvi).	<i>stellulata</i> , Sieb. (xiv).
<i>macrorrhyncha</i> , F.v.M. (xxvii).	<i>tereticornis</i> , Sm. (xi).
<i>maculata</i> , Hook. (vii).	<i>virgata</i> , Sieb. (xxv).
<i>melliodora</i> , A. Cunn. (ix).	<i>vitrea</i> , R. T. Baker (xxiii).

\* Government Printer, Sydney. 4to. Price 1s. per part (10s. per 12 parts); each part containing 4 plates and other illustrations.

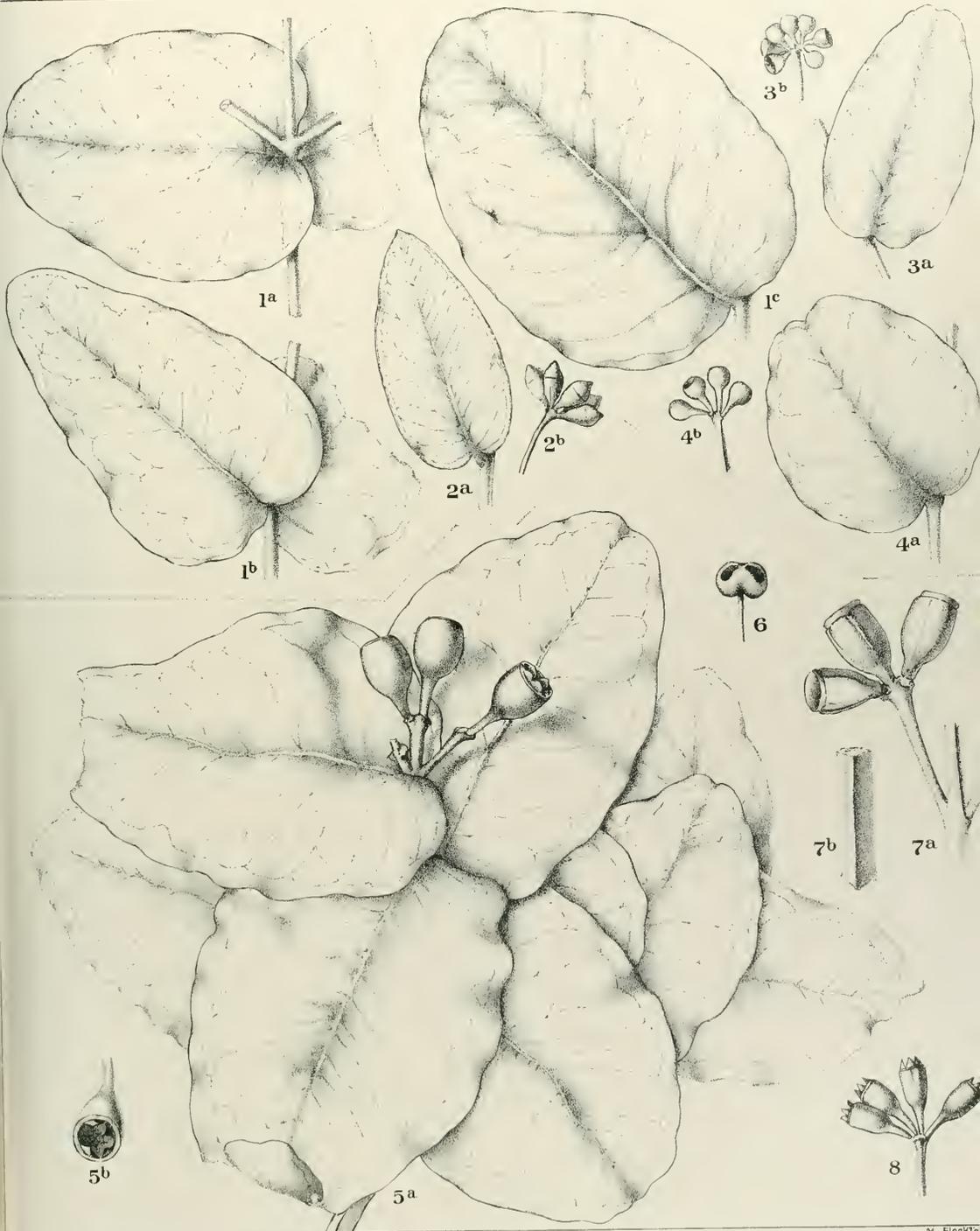


EUCALYPTUS RAVERETIANA, F.v.M. (1-3). E. STAIGERIANA, F.v.M. (10-12).

E. CREBRA, F.v.M. (4-9).

E. MELANOPHLOIA, F.v.M. (13-15).





EUCALYPTUS MELANOPHLOIA, F.v.M.—continued—(1-4).

E. PRUINOSA, SCHAUER (5-8).





EUCALYPTUS SMITHII, R. T. BAKER (1-2).

E. NAUDINIANA, F.v.M. (3-4).





EUCALYPTUS LEUCOXYLON, F.v.M. (1-12).

E. CALEYI, MAIDEN (13-16).

M. Flueckern. det.



# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

• (Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

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VOL. II. PART 3.

Part XIII of the Complete Work.

(WITH FOUR PLATES.)

---

*“Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise.”*

MACAULAY'S "ESSAY ON MILTON."

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# DESCRIPTION.

## LX. *E. affinis*, Deane and Maiden.

*Proc. Linn. Soc. N.S.W.*, xxv, 104 (1900), with a plate.

A tree of moderate size, attaining a height of 80 feet, and a diameter of 2 feet 6 inches.

**Vernacular names.**—"Tallow Wood" at Murrumbidgee, owing to the greasy nature of its wood, and "Black Box" at Stuart Town; "White Ironbark" and "Ironbark Box" at Grenfell and above Mt. McDonald, at the junction of the Abercrombie and Lachlan Rivers, according to Mr. Cambage; "Bastard Ironbark" at Minore (J. L. Boorman).

**Bark.**—To quote from a letter by Mr. R. H. Cambage:—"In appearance it looks half Ironbark and half Box, and has strong affinities to both. Often the butt in old trees is nearly as rough as that of *E. sideroxylon*, but seldom quite, while the upper part resembles *E. albens* (*E. hemiphloia*, var. *albens*); but in general it has a dark brown, fairly rough bark an inch thick, and is easily distinguished from the other trees. The bark is thinner and softer than *E. sideroxylon*, but harder and thicker than *E. albens*."

**Timber.**—Of a medium brown colour, inlocked, hard and tough, greasy to the touch, better esteemed locally than the wood of either *E. hemiphloia* or *E. sideroxylon*, among which it grows.

**Juvenile leaves.**—Alternate, ovate, obtuse, slightly emarginate and mucronate (in our specimens); about 3 inches long by  $1\frac{1}{2}$  broad; intramarginal vein at a considerable distance from the edge.

**Mature leaves.**—Lanceolate, slightly falcate; pale coloured, dull on both sides, rather coriaceous, usually 2 to 3 inches long; veins at an angle of about 30° with the midrib, but inconspicuous except the midrib and the thickened margin; intramarginal vein inconspicuous and at some distance from the edge.

**Peduncles** axillary, flattened at first but nearly terete when the fruit is ripe; with 3 to 7 flowers.

**Buds.**—Shaped like a tip-cat, to use a homely expression, *i.e.*, tapered equally towards base and operculum; somewhat angular, the operculum attenuate. Calyx-tube likewise attenuate, tapering into a short pedicel. Anthers in the bud all folded; stamens white, the outer ones seemingly all fertile; anthers opening in terminal pores. Style and stigma as figured at fig. 6, *E. hemiphloia*, in the Eucalyptographia.

**Fruits.**—Ovate-truncate, tapered at the base, somewhat contracted at the orifice, about 3 lines in diameter, the rim narrow, slightly convex and dark-coloured; the capsule depressed (*loc. cit.*).

---

## RANGE.

BETWEEN Wellington and Dubbo, towards Molong and Parkes, Grenfell, and other parts of the Western districts. It also occurs near Inverell, and it should be especially looked for in New England, and in the Stanthorpe district of Queensland. So far it has only been recorded from New South Wales.

"Tallow tree," Murrumbidgee, Great Western Railway. (Andrew Murphy).  
Type of the species.

"Bastard Ironbark." "Pretty fairly distributed amongst *E. hemiphloia* and *E. sideroxylon*, to which it appears to bear an affinity. Rough, scaly, hard bark, not corrugated, dark brown. Sapwood yellow, centre red. Bark ribbony two-thirds from the base. Tips of branches of a claret colour. Leaves 'atropurpureus.' The whole tree has a graceful pendulous habit." Stuart Town (J. L. Boorman, 1900).

“White Ironbark” or “Ironbark Box.” “Seems to be between *E. albens* and *E. sideroxydon*.” Grenfell, also Grenfell Road from Cowra, and 17 miles east of Parkes (R. H. Cambage, 1900).

“Black Box.” “Fine large trees, sparsely scattered amongst the Ironbark (*E. sideroxydon*) and Box (*E. hemiphloia*, var. *albens*) of the district. Bark rough, slightly suberous, sapwood thin, with dark hard centre, fine timber for most purposes, being exceptionally tough and heavy.” Lue, Mudgee Line (J. L. Boorman).

Inverell District (Forest Guard Gordon Burrow), who writes as follows:—

I am forwarding specimens of bark, wood, twig with buds, and fruit of a tree growing on Forest Reserve 26,227, Parish Cameron, County of Hardinge.

I only know of a few of these trees in this district; they seem to be a hybrid between White Box (*E. hemiphloia* var. *albens*), and Red Ironbark (*E. sideroxydon*). This specimen shows more of the Box than some.

The wood is very hard, and when cut up cannot be distinguished from Ironbark.

There is a rough bark outside the ordinary bark, about 10 to 15 feet up the trunk, which looks like an Ironbark, only much lighter in colour; above that, the ordinary or inner bark looks like Box bark. This tree, like Ironbark, exudes at times a large quantity of kino.

The leaves are more like those of the Ironbark in the locality than those of the Box, though the buds are smaller.

Box in the locality has long finished flowering, but Ironbark, like this hybrid, though long in bud, has not flowered, owing, as I believe, to the late frosts.

I could only secure two very imperfect specimens of fruits.

The wood is a dark red (gets paler on drying.—J.H.M.) almost to the outer edge, particularly towards the butt, where there is only about an inch of white or light sapwood.

The local name is generally “Bastard Ironbark.” I have also heard it called “Bibble,” and more rarely “Ironbark Box.” (14th July, 1906.)

I have also a specimen from Wallangarra (J. L. Boorman), which is imperfect, and is probably this species. The tree should be further sought for.

---

## AFFINITIES.

### 1. With *E. leptophleba*, F.v.M.

In the original description Messrs. Deane and Maiden say:—

The species appears to possess resemblances to the imperfectly-known Ironbark *E. drepanophylla*, F.v.M. The fruits of the latter are, however, sub-cylindrical, the orifice not constricted, the rim different, and the valves slightly exerted when the capsule is perfectly ripe; the leaves are narrower, and the veins finer and more parallel. Further observations on this head may be deferred until *E. drepanophylla* is more perfectly known.

We know more of *E. drepanophylla* now. It is a synonym of *E. leptophleba*, F.v.M. See p. 332, Part X of this work, and p. 67, Part XII. The rim of the fruit of *E. leptophleba* is different, while the huge juvenile leaves of that species are different also. In spite of these differences, the two species are undoubtedly related.

2. With *E. Caleyi*, Maiden. See Part XII of this work.

Twigs of the two species are often a good deal alike. The juvenile leaves of *E. Caleyi* are much more orbicular, the flower buds of *E. affinis* are more angular, and in *E. Caleyi* have an egg-in-egg-cup appearance. Typical *E. Caleyi* is an Ironbark, but (Part XII, p. 97) it may have bark of a more boxy nature. Both are normally glaucous. The anthers of *E. Caleyi* are more pronouncedly terminal.

3 and 4. With *E. sideroxylon*, A. Cunn., and *E. hemiphloia*, F.v.M., var. *albens*, F.v.M.

Messrs. Deane and Maiden, at the publication (1900) of *E. affinis*, wrote:—

The true affinities of our species are, in our opinion, with *E. sideroxylon*, A. Cunn., and *E. hemiphloia*, F.v.M. Roughly speaking, it resembles the inflorescence of *E. hemiphloia*, the fruits of *E. sideroxylon*, while its timber and bark partake of the characters of both.

Mr. Cambage is of opinion that the tree is a hybrid between *E. hemiphloia*, var. *albens*, and *E. sideroxylon*, a view which had already occurred to us. It certainly seems only to be found when the other two trees are present. There are difficulties in the way of recognising hybridism in Eucalypts, and as we propose to treat this subject later on we refrain from being dogmatic on the present occasion.

Below we give an account of some trees which partake of the characters of both an Ironbark, probably in this case *E. siderophloia*, and a Box, *E. hemiphloia*, and here hybridism again suggests itself. (*E. Boormani* is referred to.—J.H.M.) It is curious that in *E. affinis* we have a tree also partaking of the characters of an Ironbark and a Box, but in this case *E. sideroxylon* and *E. hemiphloia* var. *albens*, apparently combine.

In view of the imperfect evidence of hybridisation before us we think it safer to give to *E. affinis* specific rank.

I wrote (*Proc. Linn. Soc. N.S.W.*, xxx, 498 [1905]):—

In that paper some doubt was expressed as to the hybrid origin of *E. affinis*. I desire to say that I have now no doubt as to its hybrid origin. Others and myself have found it growing over large areas of country with *E. sideroxylon* and *E. hemiphloia* var. *albens*. The tree certainly is an intermediate between this species and variety, and I look upon these trees as its parents.

In accordance with the promise made in an earlier page of this work, I shall deal specially with the subject of hybridism in this genus. I intend to devote one or more Parts to the necessary illustrations.

## DESCRIPTION.

LXI. *E. paniculata*, Sm.

In *Trans. Linn. Soc.* iii. 287 (1797).

Following is the original description :—

Operculo hemisphaerico submutico, calyce angulosa, umbellis subpaniculatis terminalibus. This differs from the last in its angular calyx and less pointed operculum, as well as being smaller in all its parts. The umbels do not form so considerable a compound cluster of corymbs, but are collected about the top of the branches into a small panicle, the lowermost of them being axillary.

My specimens were gathered at Port Jackson by Mr. David Burton, and I received them from Sir Joseph Banks' Herbarium.

(In the Cambridge University Herbarium there is a specimen labelled "New Holland, Governor Phillip, ex herb. Lambert").

The species is more adequately described in Bentham's *Flora Australiensis*, iii. 211, and Mueller's *Eucalyptographia*.

## Notes Supplementary to the Description.

*Varieties.* Bentham recognises some varieties :—

1. var. *fasciculosa*. This is *E. fasciculosa*, F.v.M., a valid species, although Mueller (*Eucalyptographia*) concurred in its suppression.
2. var. *angustifolia*. "Leaves narrow and thin, as in some varieties of *E. crebra*." Umbels loose, paniculate, conical. Outer stamens anantherous. New South Wales "narrow-leaved Ironbark," Woolls. This is figured at fig. 21, plate 57. George Caley (collecting in the Sydney district, 1800-10) called this form "Mogargro."
3. var. (?) *conferta*. "Flowers still smaller, like those of *E. gracilis*. Leaves rather short and broad. W. Australia. Drummond (3rd collection ?) Suppl. No. 9." I have not been able to see this specimen, but would suggest that it is a form (*gracilis*) of *E. calycogona*. See p. 81, Part III. At all events it is not *E. paniculata*, which does not occur in Western Australia.

*Timber, &c.*—At the risk of encroaching a little on the scope of my "Forest Flora," I give a note on this valuable tree from the pen of the late Augustus Rudder, forest ranger, whose district was chiefly from Port Stephens to the Manning. He was, in my opinion, one of the best informed forest rangers we ever had.

Perhaps of all our hardwoods, on account of its great strength and durability, and comparative freedom from defects, this may be justly considered to rank first, more especially in its use as piles (where there is no cobra) and girders, and railway sleepers, or in the construction of all bridge-work, or wherever great transverse strength is required, but it has the disadvantage of being very combustible, and is subject to the ravages of white ants (*termites*). This timber varies a good deal in quality, according to soil and

situation, the best and soundest trees, and the largest, being usually found in somewhat scrubby places. In colour it varies from grey to shades of a yellowish colour, or light red and very dark brown when green, but these colours change in drying, sometimes becoming, where dark, much paler, and in the case of pale red or grey, becoming of darker colour. Unfortunately this timber is not very plentiful, but in this district and some others it shows, in places, a readiness to reproduce itself, and the young growth is generally very promising.

*Aboriginal Names.*—George Caley, Sir Joseph Banks' collector in the Sydney district (1800–10), gives the name "Torrangora. (See *Agricultural Gazette*, N.S.W., October, 1903, p. 990.) Bentham's var. *angustifolia* of this species Caley called "Mogargro." "Barremma" (see below, p. 106) is another name. See also "Thattinebark" and "Parragilga" below.

*Vernacular Names.*—It is usually called "White Ironbark" or "Grey Ironbark," because of its comparative paleness. But the palest ironbarks are more or less pinkish when freshly cut, and hence the present one is sometimes called "Red Ironbark" by persons who are careless in such matters.

Sometimes *E. paniculata* is called "Black Ironbark" in common with others, although *E. sideroxyylon* is so named more appropriately. Mr. Rudder says of Black Ironbark :—

Black ironbark is recognised in the County of Gloucester, as also near the Hawkesbury, the name being given on account of the black patches and streaks in the timber, particularly near the butt. This discolouration is not characteristic of any species, I believe. I have observed it in *Eucalyptus paniculata* from the Hawkesbury, and I am not aware whether the timber of any other species of ironbark is similarly discoloured.

To show how careful one must be with vernacular names, I have received twigs or axe-cuts of *E. paniculata* from one district alone (Port Macquarie), with no less than four distinct names at different times, White, Grey, Red, Black Ironbark.

---

## RANGE.

Ironbark country usually consists of poor, stony ridges, not adapted for cultivation, which circumstance will, in a large measure, prevent the destruction of this valuable timber.

It is chiefly found in New South Wales, extending practically along the whole of the coastal strip. It requires a good rainfall, also a moderately high temperature, hence it is not found at high elevations.

I have obtained it almost at the Victorian border. To be definite, I record it herewith from the Moruya district, but I have seen it farther south, although I do not appear to have collected specimens. As a matter of fact, we do not know its extreme southern range, and specimens from Moruya to the Victorian border, giving specific localities, would be very acceptable.

Mueller records it from north-western Victoria under the name of "Box Ironbark." I have never seen a specimen from that State, and in view of the looseness of application of the name "Box Ironbark," I recommend that *E. paniculata* be not accepted as a Victorian plant without further investigation.

It extends to south-coastal Queensland, but its range in that State is not defined as clearly as it should be.

#### NEW SOUTH WALES.

*South*.—Bergalia, Moruya (J.H.M.); Moruya District, "Red Ironbark" (J. S. Allan); Conjola, near Milton (W. Heron); Nowra (J.H.M.).

Copy of a label in Herb. Cant.:—"1, 83, *Euc. paniculata*, Barremma, White or Pale Ironbark, Illawarra, Macarthur. Paris Exhibition, 1855."

This means that this was in a collection of the indigenous woods of the southern districts of New South Wales. Its number was 83 in the Catalogue of N.S.W. Exhibits in the Paris Exhibition of 1855, and 1 in that of the London Exhibition of 1862.

"Barremma" was the aboriginal name of the tree, which was 80-120 feet in height, diameter in inches, 36-48, and Sir William Macarthur's notes are (London Catalogue): "From Illawarra, the most valuable, perhaps, of all the ironbarks, remarkable for its smooth, uniform outer bark, and its very hard, tough, inlocked, strong wood." In the Paris Catalogue he has the note, "with unusually smooth outer bark."

No. 90 of the Paris Catalogue (No. 3 of the London Catalogue) is also "Barremma," and Sir William's note (Paris Catalogue) is "80-130 feet, 36-60 inches diameter. The timber of this rugged-looking tree is of the highest reputation for strength and durability." In the London Catalogue he says: "From Illawarra, differs apparently from the Ironbark of Cumberland and Camden—a strong and most durable timber."

Wingello, also Box Point to Barber's Creek (J.H.M. and J. L. Boorman).

A specimen labelled 123 (b) (Paris Exhibition) and 529 No. 8 (London Exhibition) was called by Sir William Macarthur "Narrow-leaved Ironbark." Diameter in inches, 24-48; height in feet, 60-100. "From Appin, harder and much coarser in the grain than the last" (*crebra*). I also collected *E. paniculata* at Appin.

Otford (R. H. Cambage and J.H.M.); Oatley's Grant, George's River (J.H.M.); Sydney district generally, including Gladesville, Ryde, and Field of Mars Common (H. Deane); Canterbury (E. Cheel), Hurstville and Burwood (J.H.M.), Hornsby (H. Deane).

The following specimens are probably all from the Port Jackson district also:—

- (a) "Port Jackson" (Robert Brown, 1802-5). No. 4,736 of the J. J. Bennett distribution from the British Museum, 1876.

(b) Sieber's No. 468, "Fl. Novæ Holl."

(c) A specimen, not with an original printed label (collected by Sieber), in Herb. Barbey-Boissier, bears the label "No. 477, *Eucalyptus incrassata*, Lab., Nov. Holl." It is *E. paniculata*, Sieb. A fragment, bearing the same number, and with the label "*E. terminalis*, Sieb.," from the Berlin Herbarium, seems to me to be *E. paniculata*, Sm., also.

At p. 65, Part XII, of this work, another *E. terminalis* has been referred to. This is *E. crebra*, there being no *E. paniculata* within a thousand miles of Lizard Island or Thirsty Sound, Queensland.

*West.*—Kurrajong and Parramatta (W. Woolls); Moolah, Kurrajong district, var. *angustifolia* (W. Woolls).

*North.*—In London Catalogue, No. 2, Sir William Macarthur showed a "White Ironbark," variety from Brisbane Water, reported to be more tough and durable, and more pleasant to work than the common Ironbark.

Gosford district (Forest Ranger Martin); Kincumber (R. H. Cambage and J. H. M.); Wyong (J. L. Boorman); Paterson River (J. L. Boorman); Port Stephens (Miss Conolly); Dungog; Stroud to Raymond Terrace; throughout the County of Gloucester (A. Rudder); Taree (E. H. F. Swain).

"Thatinebark" (native name), 2 ft. 9 in. diameter, 80 feet high. Scattered all through this district. Flowers November to January. (Forest Ranger G. R. Brown, Port Macquarie); Wauchope, "Grey Ironbark" (A. Langley); "Grey Ironbark" (*paniculata*) and "Red Ironbark" (*siderophloia*), both found on the Hastings and Macleay. The former predominates on the Hastings, and the latter on the Macleay.

*E. paniculata*, "White or Pale Ironbark," "Parragilga," 80–100 feet high; 2 ft. 6 in. to 3 ft. 6 in. in diameter. In all the forests on the eastern slopes, being more plentiful towards the heads of the rivers and in the northern portion of my district (Forest Ranger Meeham, Bellingen). The same observer also speaks of it: "White Narrow-leaved Ironbark, timber pale-coloured, as also the bark. Hard gravelly ridges; 3–4 feet diameter, 100–150 feet high."

In 1893 I noted "White Ironbark," a few trees on the Bellingen, between the south and north arms. There is no other ironbark on this river. "100 feet to top, 55 feet to first limb," Bellingen Heights (E. H. F. Swain); Woolgoolga (E. H. F. Swain); Lawrence, Clarence River, "Grey Ironbark" (J. V. de Coque); Grafton to Dalmorton (J. H. M. and J. L. Boorman); Casino (District Forester W. P. Pope); Mullumbimby, Brunswick River (H. Deane).

#### QUEENSLAND.

Eight-mile Plains, Brisbane, "Grey Ironbark" (J. L. Boorman); Landsborough, North Coast Railway (P. MacMahon); Maryborough (W. H. Williams).

## AFFINITIES.

1. With *E. fasciculosa*, F.v.M.

See "Eucalyptographia," where the description of *E. paniculata* is mixed up with that of *E. fasciculosa* (deemed by Bentham and Mueller to be a variety of it). I will go into the matter when *E. fasciculosa* is reached.

2. With *E. crebra*, F.v.M.

This is a drooping, narrow-leaved species, with very red timber. It is usually smaller in all its parts than *E. paniculata* while the anthers of the latter are terminal-opening, very different to those of *E. crebra*. The var. *angustifolia* of *E. paniculata* is closest to *E. crebra*.

3. With *E. siderophloia*, Benth. Another Ironbark.

See part X of this work, part 39 of my "Forest Flora," also "Eucalyptographia" under *E. paniculata*.

4. With *E. sideroxylon*, A. Cunn. A "Mugga" or "Red Ironbark," see Part 12 of this work, and Part 13 of my "Forest Flora."

Usually they are different enough, but I have seen very coarse-fruited *paniculata* with a rim to the fruit, showing some transit to *E. sideroxylon*.

5. With *E. melliadora*, A. Cunn.

Mueller has given a caution. See "Eucalyptographia" under *E. paniculata*. See also Part 9 of my "Forest Flora."

In distinguishing an Ironbark from a non-Ironbark, it is convenient in practice to test a twig to the breaking point with the fingers. With a little experience one can generally select an Ironbark in this way, because of its high tensile strength.

6. With *E. bicolor*, A. Cunn. (*E. largiflorens*, F.v.M.).

See "Eucalyptographia" under *E. paniculata*. This is another species with sub-cylindrical fruits. *E. bicolor* is a spreading tree of the interior; *E. paniculata* is confined to the coastal strip, and is more erect in habit. *E. bicolor* has a black, flaky box-like bark, while *E. paniculata* is an ironbark. The latter has a pale timber, while that of *E. bicolor* is deep red.

7. With *E. calycogona*, Turcz. var. *gracilis*, Maiden. (*E. gracilis*, F.v.M.).

I mention this because Mueller in "Eucalyptographia" under *E. paniculata* has mentioned it, and it is probably Bentham's var. (?) *conferta* of *paniculata*, but in practice I see no danger of their being confused.

## DESCRIPTION.

LXII. *E. polyanthemos*, Schauer,

In Walpers' *Repertorium Botanices Systematicae*. Tomus ii, p. 924, *Suppl.* i (1843).

Arborea glauco-virens: foll. coriaceis ovatis subito in petiolum contractis obtusis apiculatis, margine crasso subrevoluto cinctis impunctatis, utrinq. opacis; paniculis axillarib. terminalibq., umbellis 3-5 floris, pedicellis brevib. cupulae clavato-turbinatae continuis; operculo brevissime conico acutiusculo vertici cupulae exangulatae imposito.—Foliorum lamina 2 poll. circiter longa, 2¼ poll. lata, petiolus 8 lin. longus, flores cum pedicello et operculo 3 lin. longi, operculum resinoso-punctatum, stamina brevissima.—In Novae Cambriae australis interioribus septentriones versus ab urbe Bathurst.—A. Cunn., Herb. No. 136, 1822.

I have seen the type; it is referred to below. I would invite attention to Schauer's spelling of his specific name.

It is described in English in *B.Fl.* iii. 214, but the synonyms given (*E. populifolia*, Hook., and *E. populnea*, F.v.M.) must be excluded. See Part X of this work, pages 340 and 343.

Mueller figures the species in "Eucalyptographia" with some slight confusion with *E. Baueriana*, Schauer, which will be referred to when that species is reached.

It is ("Eucalyptographia") stated to be known as "Den" by Gippsland aborigines on Howitt's authority. The use of this aboriginal name might be further inquired into, since I have received "Grey Box" (*E. hemiphloia*, var. *albena*) also under the name "Den" or "Dern" from the same locality. See page 23 of Part XI of this work. Dr. C. S. Sutton gives me "Teering" as the aboriginal name in the Loddon District of Victoria.

## SYNONYMS.

1. *E. Dawsoni*, R. T. Baker.
2. *E. polyanthema*, Schauer, var. *glauca*, R. T. Baker.
3. *E. ovalifolia*, R. T. Baker.
4. *E. ovalifolia*, R. T. Baker, var. *lanceolata*, R. T. Baker and H. G. Smith.

1. *E. Dawsoni*, R. T. Baker, *Proc. Linn. Soc. N.S.W.*, xxiv, 295, 1899, with a plate.

Identical with *E. polyanthemos*, Schauer, var. (c) Baker, *op. cit.*, xxi, 448 (1896).

“Slaty Gum.” Type localities, “Ridges on the watershed of the Gonburn River (R.T.B.); across the Main “Divide” at Cassilis, and north-west of Pilliga” (Professor Warren).

I have given careful attention to this species for many years, but cannot find botanical differences sufficient, in my opinion, to justify the establishment of a second species out of the “Red Box or Slaty Gum” series. I look upon Slaty Gum as large, erect Red Box grown under favourable circumstances. Accompanied by a collector, Mr. J. L. Boorman, I made careful observations. Then I sent Mr. Boorman alone to carefully investigate the trees, and he performed his duty in an intelligent manner. Although satisfied with his reports, I went again into the field with him, and the three trips resulted in the accumulation of a large and varied quantity of botanical material, including timber and bark. I found people indifferent as to the use of the names “Slaty Gum or Red Box,” applying them indiscriminately as a very general rule. More than one timber worker told me they were the same tree, and all the evidence I accumulated points in the same direction. As the confusion in regard to “Red Box and Slaty Gum” has become considerable, I have below given full notes made in the field by my collector and by other observers, and add the following report from him, which was written in the field :—

With reference to your instructions to collect all available evidence in regard to Red Box and Slaty Gum, I respectfully report that I went to Tallawang (some 6 miles from Gulgong), out towards Cobborah, where it grows to fine tall trees on the ridgy ground near to the Reedy Creek; at Gulgong it grows all around the district of a much more stunted growth. At Lue it grows (large trees) about 5-6 miles in a western direction from the railway line; the more stunted forms occur all around the immediate district of Lue. There again at Rylstone, some 5 miles on the Ilford Road, it again reaches to fine trees.

From a personal conviction and from reliable information, the Slaty Gum and Red Box are identical. The term “Slaty Gum” is applied to the more robust trees of the “Red Box,” from the cleaner stems, for these trees have a greater tendency to throw off the bark more regularly, falling in ribbons, and not in “scales,” so to speak, as in the case of the less healthy trees; this is not invariably the case, as exceptions do constantly occur. This (April) seemingly is the season of the year for shedding of the bark. A Mr. Taylor, native of Rylstone (a carpenter), says there is no difference in the timbers or in the habit of the trees, “Slaty Gum” being only larger than “Red Box.” Mr. James Holmes, Gulgong, who pointed out to me the tree at Reedy Creek, calls “Red Gum” and “Slaty Gum” one and the same; Mr. Hatton, living at Coomber, says that “Slaty Gum” is nothing but “Red Box.”

In 1905 Mr. Andrew Murphy, an experienced man, whose chief occupation is the collection of *Eucalyptus* seed, wrote to me: “Last week I went to Rylstone intending to get the Rylstone Slaty Gum, *Eucalyptus Dawsoni*. I could not see any difference between it and *Eucalyptus polyanthema*, and came to the conclusion that they are identical. As I have a supply of *E. polyanthema* on hand, I did not collect more.”

The Rev. Dr. Woolls wrote me in 1891: “The Slaty Gum is the same as Red Box, and has a splendid timber.”

Mr. Baker deals with the matter of Red Box and Slaty Gum in *Proc. Linn. Soc. N.S.W.*, xxi, 448, 1896, and I think the conclusion he then arrived at, to keep the forms to which he referred under *E. polyanthemus*, was sound.

2. *E. polyanthema*, Schauer, var. *glauca*, R. T. Baker.

Mr. Baker does not, under *E. polyanthemos* (*loc. cit.*), name a variety, but at page 431 occurs the following passage:—"The most valued timber is perhaps 'Slaty Gum,' *E. polyanthema*, var. *glauca*, var. nov., and I consider it a distinct gain to the botany of the Colony to have the correct botanical sequence of this valuable tree made clear."

Glaucousness being a character of the species, it seems to me that to call one form *glauca* would be inconvenient and could not be carried out in practice.

3. *E. ovalifolia*, R. T. Baker, *Proc. Linn. Soc. N.S.W.*, xxv, 680, 1900 (*partim*).

"Red Box." Type localities given are Bathurst, Rylstone, and Camboon (R. T. Baker); Hargraves, Mudgee to Wellington (A. A. Suttor); Gerogery (L. Mann).

Mr. Baker (*loc. cit.*) speaks of "the typical *E. polyanthema*, Sch., of Victoria," but the type comes from Bathurst, N.S.W., like that of *E. ovalifolia*.

The full sentence reads, "It differs from the typical *E. polyanthema*, Sch., of Victoria, which has a persistent Box-bark right out to the branchlets, larger and orbicular shaped leaves, and larger fruits. The oils of the two species (*polyanthema* and *ovalifolia*) are not at all identical, but there is a resemblance in their timbers."

I expressed the opinion that some confusion had arisen in regard to Mr. Baker's species. Some bud-bearing twigs kindly presented by Mr. Baker are those of *E. Baueriana*, Schauer, var. *conica*, Maiden, or rather one of those intermediate forms which show that it is impossible to separate *E. Baueriana* from its variety. Mr. Smith's report on the oil (*Proc. Linn. Soc. N.S.W.*, xxv, 682), in which he says that "there is very little difference in the constituents of this oil and that of *E. Fletcheri*, Baker" (*E. Baueriana*, Schauer), seems to bear out that view.

On the other hand, Mr. Baker's label says—" *E. ovalifolia*, R.T.B. Red Box. Hard, red-coloured durable timber; bark rough at base." This is a description of *E. polyanthemos*, Schauer.

I am therefore of opinion that, through inadvertence, *E. ovalifolia*, R. T. Baker, has been partly described from *E. polyanthemos*, Schauer, and partly from *E. Baueriana*, Schauer. Mr. Baker, however, says the statement that we have mixed material is incorrect. (*Proc. Linn. Soc. N.S.W.*, xxviii, 354.)

4. *E. ovalifolia*, R. T. Baker, var. *lanceolata*, R. T. Baker and H. G. Smith, in "Research on the Eucalypts," p. 124.

See also R. T. Baker in *Proc. Linn. Soc. N.S.W.*, xxviii, 355 (1903), where he says: "This tree very probably owes its differentiation to environment, for I have only found it in rich, moist soil."

While I state that I fail to see the propriety of carving out *E. Dawsoni* and *E. ovalifolia* as species distinct from *E. polyanthemos*, it is proper to point out what Mr. Baker says on the other side (*Proc. Linn. Soc. N.S.W.*, xxviii, 355).

I look upon *E. polyanthemos* as a very plastic species. I attach no undue importance to the shape of the leaves, for in some districts they vary from nearly circular to elliptical and thence to lanceolar of various widths. I have been amongst clumps of this species where I have found the shapes of the leaves as variable as in almost any species of the genus. Then their thickness varies a good deal according to soil and situation, while the glaucousness depends upon the elevation and the season of the year. The bark varies greatly as to the roughness and as to the distance it extends along the trunk and branches; while some trees are gnarled and spreading, and others are erect and with a straight, useful trunk. I never could see any difference in the timbers of the various trees considered to be species or varieties.

I have travelled extensively in districts where the trees under discussion are found, and in Plates 58 and 59 have taken pains to try and bring the evidence together pictorially.

*Loc. cit.*, p. 356, Mr. Baker quotes Mr. Deane's expression, "var. *E. polyanthema*." This means, I take it, in herbarium language, that he considers his tree to come under *E. polyanthema*, though it is not strictly typical. It is a common method of expression amongst botanists.

Then he quotes an expression that I used in connection with some Wangaratta, Victoria, specimens, "big trees, glaucous all over," adding "they are certainly not *E. polyanthema*, Schauer, as such an expression could not apply to a Box-barked tree." Why not? I collected the specimens myself on the banks of the King River, in January, 1900, and the trees had Box-bark, and were so white that they looked as if they had been dusted in a flour-barrel. Some similar specimens in the National Herbarium, Melbourne, from the same place (Wangaratta), were labelled *E. polyanthema* by Mueller.

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## RANGE.

So far as we know at present, this species is confined to New South Wales and Victoria. The type came from near Bathurst, and it has an extensive range in the colder, drier districts of the two States. We want further inquiries as to its range, both west and north.

### VICTORIA.

"*The Red Box* (*E. polyanthema*) grows in places all over Victoria. The timber is, however, as a rule, rather small, the boles and limbs crooked, in some places so much so, for instance in the Havelock State Forest, as to be of no value but for firewood." (A. W. Howitt *in litt.*)

"Red Box" with red timber and gnarled greyish boxy bark. Euroa; Lilydale; Buchan, Gippsland. It grows on hillsides. (A. W. Howitt). Red Nob (Metung to Boggy Creek, (J.H.M.). "Bairnsdale Red Box."

Wangaratta, handsome, spreading trees, glaucous all over (J.H.M.), hence sometimes called "Grey Box."

"Hill Box," Mt. Kosciusko Range, red wood (Findlay), probably on the Victorian side (National Herbarium, Melbourne).

"36. *Eucalyptus polyanthemos*, Schauer, l.c. n. 5. Beyond Mount Disappointment (Ferd. Muell.);" is a note by Miquel in *Ned. Kruidk. Arch.*, iv (1856).

Snowy River (R. Rowe); Chiltern (A. W. Howitt); Maryborough (J. Blackburne); Bendigo (W. W. Froggatt).

Red Hill, Heathcote (W. S. Brownscombe). "Habit more upright-growing than the usual form of *E. polyanthemos*. Foliage like Red Box on the lower branches, gradually merging into lanceolate leaves towards the higher branches. Bark like a typical *polyanthemos*." (Note this remark on the variation of width of leaves, which is especially common in this species).

#### NEW SOUTH WALES.

*South.*—Corowa (G. H. Wiburd), Quidong, Bombala. Bark persistent, but deciduous on top of branches. 40–60 feet; 2 to 4 feet. Leaves and buds glaucous. (W. Bäuerlen.)

Tumberumba (Forester Taylor; W. Forsyth). "Red Box," "Round Leaf Gum," "Red Mahogany," Kyamba, Wagga Wagga district (Forester Taylor).

"Red Box," Wagga Wagga District (W. Orr). Mr. Forester Taylor has the following note on some other specimens: "Red or round Shining-leaf Box. Yields a very useful timber of a dark red colour. The only similarity between this and Bimbil (*E. populifolia*) is the roundish shiny leaves, which glisten in the sun." Personally I have never noticed shining, glistening leaves, though in *E. populifolia* this is common enough.

"Round-leaf Gum," Tumut (W. S. Campbell). Tumut (H. Deane). Mr. Deane has the following note: "Deciduous, smooth bark; var. *E. polyanthema*. Very like the Mudgee Slaty Gum. Same as Red Box from Queanbeyan apparently."

"Round-leaved Gum," Tumut (W. W. Froggatt). Some of the leaves tending to lanceolate. The fruits shiny, and showing the cracked appearance at the orifice common in the species. "Red Box," Gilmore-road, Tumut (R. H. Cambage).

"Red Box," Gum-tree Bark, slightly flaky at base. Burrinjuck (R. H. Cambage).

"Red Box" ("Slaty Gum,") Queanbeyan (H. Deane). In fruit, otherwise not to be distinguished from the Bombala specimen. Fruits narrow, tapering at orifice.

Murrumbidgee district. So glaucous as to be called "White Box" (J. Duff).

"Red Box" is a most durable timber, and is extensively used for fencing, bridge building, railway sleepers, and wheelwrights' work. It is almost invariably found in company with Ironbark, and in some parts of my district there is a considerable quantity, but close to Grenfell it is not so common, and is, therefore, not much used (Forester John G. Postlethwaite, Grenfell). Bowning Hill (R. H. Cambage).

West.—"Red Gum or Red Box," Stuart Town (A. Murphy). "Red Box," Stuart Town. "Plentiful all over the district; trees of fair size, with whitish ribbony stems and glaucous tint throughout, leaves and branches pendulous, wood hard but faulty" (J. L. Boorman). Mount McDonald, *via* Cowra (R. H. Cambage and J.H.M.). Bumberry, near Molong (J. L. Boorman).

"Red Box," Apsley, Bathurst (R. H. Cambage). "Red Box," Cow Flat, Bathurst. Typical for *E. ovalifolia*, R. T. Baker (*partim*).

"Interior of Southern Australia, N. from Bathurst." A. Cunningham (Herb. Heward, then Herb. Lemann, now Herb. Cant.). Type of *E. polyanthemos*, Schauer. Examined by me, and absolutely identical with the Stuart Town and Bathurst specimens.

The following entry in Allan Cunningham's manuscript journal refers to *E. polyanthemos*:—

"20th April, 1817. 18 miles W. of Bathurst. A species of Eucalyptus rising about 20 feet, with obovate leaves, inflorescence umbelled and terminal, is at this period just expanding its flowers on the sides of the hills."

Bathurst to Sofala (R. H. Cambage and J.H.M.).

"Round-leaf Red Box" and "Narrow-leaf Red Box." On low land, Merrindee, between Mudgee and Wellington (A. Murphy).

"Slaty Gum of the Mudgee district." Cobborah (District Forester Marriott).

"Red Box," Reedy Creek, near Gulgong. Narrow leaves; big tree, glaucous all over" (J. L. Boorman). "Slaty Gum," Reedy Creek. "Fine large trees growing on slight ridges away from the creek; at this period (April) of the year the stems are pure white with irregular patches of green; the bark is  $\frac{1}{4}$  inch thick, falling away in long ribbons; the leaves and tips of branches are of a mealy whiteness. Sapwood pale yellow, centre red" (J. L. Boorman). "Red Box," Gulgong. "The whole of the tree of a silvery whiteness." A second specimen with leaves from lanceolate to ovate (J. L. Boorman).

"Red Box or Slaty Gum," rarely called "Bastard Box." Gulgong. "Leaves on shoots from nearly orbicular to nearly linear lanceolate" (J.H.M. and J. L. Boorman).

"Slaty Gum," on ridges, Mudgee. "Smooth bark, good wood" (W. Woolls). Note by Dr. Woolls on another specimen:—"Leaves vary, more lanceolate in the large trees. Slaty Gum, *E. polyanthema*."

“‘Slaty Gum’ is considered the best in the district (Mudgee), but unfortunately the supply is not equal to the demand. Grows in the district west of Reedy Creek. Used for all work where toughness is required. Differs from Ironbark, inasmuch as the log when drying at the butt cracks in rings, while Ironbark radiates from the centre” (Forest Ranger Marriott).

Mr. A. G. Hamilton (*Proc. Linn. Soc. N.S.W.*, xii, 277) states that the “Slaty Gum” is common on the ridges at Mudgee, where it does not attain a great size, but on the flats at Tallewang it runs up into splendid trunks, which are much used in bridge building, &c., and the timber is considered very durable.

“Slaty Gum or Red Box,” Lue, Mudgee Line. “Fine large trees, 40 to 60 feet high, patchy or at times quite smooth, white with patches of grey bark; this is more applicable to the large trees; the smaller are more of a scaly nature. The latter designated ‘Red Box’; the larger ‘Slaty’ or ‘Spotted Gum’” (J. L. Boorman).

“Slaty Gum,” Rylstone. “Large tall trees, clean stems, bark falling away in long ribbons, leaving a clean white stem with patches of dark green, the tips of the branches of a mealy, powdery whiteness, sap timber pale yellow, centre red” (J. L. Boorman).

“Red Box,” Rylstone. “Trees not so large as those known as ‘Slaty Gum,’ and the bark is more scaly, but in wood and every other respect identical with Slaty Gum” (J. L. Boorman).

“Red Box,” typical for *E. ovalifolia*, R. T. Baker, Rylstone (R. T. Baker). See H. G. Smith, *Proc. Roy. Soc. N.S.W.*, xxxiv, 290). Labelled indifferently “Slaty Gum,” “Red Gum,” “Red Box,” Capertee. “Some trees large and entirely smooth-barked; others small and stunted, with a ribbony bark. A large tree which was felled showed narrow leaves at the top” (J.H.M. and J. L. Boorman).

Following are some field notes:—

“Cullen Bullen to Capertee. This species reminds one of Yellow Box (*E. melliodora*) slightly—a ribbony gum on young trees, scaly bark when older, at least as far as the first fork and often beyond. Handsome trees; wood red; we then found a tree 3 feet in diameter, and reminding one a good deal of *E. tereticornis*, the smooth part of a yellow cast. The buds of a yellowish cast and often a little glaucous. Little conical opercula. Wood red. Very free flowerer. Fruits conoid” (J.H.M.).

“Slaty Gum,” Bylong Creek, typical for *E. Dawsoni*, R. T. Baker.

“Red Box.” “Mountain Gum. Murrumbidgee, Goulburn River; Camboon; Bylong (R. T. Baker). Three specimens showing transition from lanceolate leaves to ovate.”

## AFFINITIES.

### 1. With *E. populifolia*, Hook.

This is the "Bimbil," "Bible," or "Poplar-leaved Box." *E. populifolia* has shiny leaves, usually more fibrous bark, and a brown timber. The leaves on this species, also, vary a good deal in width, as I have shown at pp. 339 and 342 of Part X of this work. The anthers are very different.

### 2. With *E. Baueriana*, Schauer.

This species has long been confused with *E. polyanthemos*, which is the best evidence that it is necessary to issue a caution on the subject, *e.g.*, "Wood close-grained and twisted, very tough and so hard as to have given rise to the name of Lignum Vitæ for it in some regions of New South Wales" (Woolls). (Mueller in "Eucalyptographia," a passage which really refers to *E. Baueriana*, although under *E. polyanthemos*.) As regards herbarium specimens, those of *E. Baueriana* are less glaucous and often more slaty-looking than *E. polyanthemos*, leaves thinner, the opercula less pointed, and the fruits more conical and with thinner rims. The forester would not confuse the trees for a moment. The bark of *E. Baueriana* is woolly up to the small branches, that of *E. polyanthemos* being usually smooth or ribbony. The timber of *E. Baueriana* is pale brown or brown, while that of *E. polyanthemos* is deep red. The anthers are similar.

### 3. With *E. Rudderi*, Maiden.

A species with narrow juvenile leaves and uniformly lanceolate mature leaves, closely allied to *E. polyanthemos*. The anthers are similar. See *E. Rudderi*.

### 4. With *E. melliodora*, A. Cunn.

Sometimes these two species from bark alone are hard to discriminate. They both may have scaly-box bark at the butt for a considerable distance, thereafter ribbony bark or a "White Gum" appearance.

The bark of *E. melliodora* is more persistent than that of *E. polyanthemos*, the ribbony bark, however, never descending so low down as in the latter. A man might readily be forgiven if he called one *polyanthemos* tree a Box and another a Gum, and as a matter of fact this is commonly done.

*E. melliodora* has a very yellow inner bark and sapwood, with longer and narrower and more pendulous leaves and fewer flowers. The anthers are similar. *E. polyanthemos* has a white sap and red heart wood. *E. polyanthemos* has comparatively narrow leaves at the top of the tree.

5. With *E. tereticornis*, Sm.

In the field *E. tereticornis* and *E. polyanthemos* when fully grown might very readily be confused. The smooth, gnarled trunk, with the bark falling off in patches or in ribbons is common to both species, and knowing them so well I still sometimes consider it prudent to procure a twig to decide the identity of a particular tree. The timber of both trees is red, but the ordinary botanical characters of the two species are very different.

6. With *E. oligantha*, Schauer.

“From Copeland Island, of which species I have not yet seen authentic materials. Seems, according to description, very closely allied to *E. polyanthemos*, differing chiefly in stiffer leaves, somewhat larger flowers, conical lid, and perhaps the as yet unknown fruit” (*Eucalyptographia* under *E. polyanthemos*).

This is a tropical species not likely to be confused with *E. polyanthemos*. The anthers are not truncate, the leaves are larger and coarser, never lanceolate; they are glabrous, the fruits are larger and more urceolate.

## DESCRIPTION.

LXIII. *E. Rudderi*, Maiden.

In *Proc. Linn. Soc., N.S.W.*, xxix, 779 (1904).

"A Red Box, 120 feet high, 2-3 feet in diameter" (A. Rudder, formerly Forester, July, 1885). Mr. District Forester Hardiman also calls it "Red Box." It may perhaps be known as the "North Coast Red Box" by way of distinction.

**Juvenile leaves** not seen in the youngest stage, but seen when still opposite. Medium lanceolate and acuminate, 4-5 inches long and  $1\frac{1}{2}$  broad, with petiole of  $\frac{1}{2}$  inch. The midrib often pink. Intramarginal vein at some distance from the edge, the lateral veins roughly parallel and forming part of a delicate anastomosing arrangement. Texture thin; margin undulate. I have seen no sign of glaucousness so far. Twigs angular.

**Mature leaves.**—These do not appear to differ in any important character from the juvenile ones save in losing their opposite character.

**Buds.**—Arrangement paniculate, the umbels usually 3 to 6 in number, the peduncles rather long, the pedicels short and the calyx-tube tapering gradually into the pedicel; the operculum conoid. When fresh the buds clavate; the operculum dries to a point.

**Flowers** small; anthers small, opening in terminal pores, like *E. polyanthemos* and *E. melliodora*.

**Fruits** small, conoid to subcylindrical, rim thin, and the indentations and fissures (common in *E. polyanthemos*) absent or rare. Valves sessile and 5 in number in the specimens seen.

**Bark.**—"Persistent and like that on the trunk of Grey Box, *E. hemiphloia*" (A. Rudder). The rough bark resembles that of "Brush Box (*Tristania conferta*), but is slightly darker in colour, and extends up to the small branches, further than that of White Box (*E. hemiphloia*)" (J. Hardiman).

**Timber.**—Wood dark red. Timber of a red colour (A. Rudder). Sapwood white, rest of wood red. I cannot perceive any difference between its wood and that of *E. polyanthemos*.

I have a puzzling specimen from R. H. Cambage (No. 1,508, Moor's Gully, Pokolbin). It is a large Box tree of 100 feet. The specimens available are juvenile and mature leaves, a few fruits, also a piece of bark and timber. The timber, however, is decidedly brown and not red, and here is the difficulty. Perhaps the timber has a greater range of colour than has been hitherto suspected.

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 RANGE.

CONFINED to New South Wales so far as we know at present. Following are localities belonging to the Manning and Upper Hunter Rivers:—Cundletown, near Taree (A. Rudder). This tree is by no means plentiful, but occurs in all the forests adjacent to the coast, especially in the Counties of Gloucester and Macquarie. The best I have seen are in the Parish of Bohnock, a few miles from Taree. It appears to favour stony ridges (J. Hardiman); near Coo loongoolook (A. Rudder); Baerami, Upper Hunter (H. Deane).

Following is a locality at the foot of the Blue Mountains :—

At Higgs' Farm, on the left bank of the Nepean, about 4 miles south of the confluence with the Grose opposite Yarramundi (R. H. Cambage and J.H.M.).

Here we have a southern locality :—

Blue Gum Gully, Thirlmere (C. F. Laseron, quoted by R. T. Baker, *Proc. Linn. Soc. N.S.W.*, xxxi, 714).

It is evident that more careful search will extend the range of this species, and we particularly want localities connecting those already given.

## AFFINITIES.

### 1. With *E. polyanthemos*, Schauer.

The juvenile foliage being a character of fundamental importance, I feel I have no option in separating the coast Red Box from *E. polyanthemos*. It seems to stand in the same relation to *E. polyanthemos* that *E. conica* does to *E. Baueriana*, and whether it should be looked upon as a variety of *E. polyanthemos* or a distinct species is a matter of opinion. While I propose the name *E. Rudderi* for it, in honour of Mr. Augustus Rudder, others may be inclined to call it var. *Rudderi* of *E. polyanthemos*.

The principal differences are indicated as follows :—

<i>E. Rudderi.</i>	<i>E. polyanthemos.</i>
Trunk with fibrous bark somewhat like the ordinary Grey Box ( <i>E. hemiphloia</i> ).	Trunk with flaky bark (like <i>E. tereticornis</i> ) or nearly smooth like a Gum.
Juvenile foliage lanceolar. Mature foliage thinner and more uniformly lanceolar.	Juvenile foliage broader, even tending to orbicular.

The above is a note to the original description, and is misleading to the extent that I now do not think it can be viewed as other than a distinct species.

### 2. With *E. Baueriana*, Schauer, var. *conica*, Maiden.

Juvenile leaves of this variety glaucous, thicker than that of *E. Rudderi*, broader, often triplinerved, mature leaves narrower, fruits more conoid, timber brownish.

### 3. With *E. crebra*, F.v.M.

The anthers are different; *E. crebra* is an Ironbark with red timber. The juvenile foliage of *E. crebra* is narrower and not so prominently veined. At the same time fruiting twigs of the two species are often sufficiently similar for a word of caution to be necessary.

### 4. With *E. quadrangulata*, Deane and Maiden.

In the forest *E. quadrangulata* much resembles *E. Rudderi*, Maiden, of the North Coast, partly from its growing in corresponding situations, and also because the tall straight boles and branches of each are covered with similar grey Box-bark; but the juvenile foliage and timber afford a ready means of distinction to the field botanist. (R. H. Cambage in *Proc. Linn. Soc. N.S.W.*, xxxi, 438.)

Mr. Cambage has sufficiently stated the case for the present, and I will refer to the two species when I deal with *E. quadrangulata*.

## DESCRIPTION.

LXIV. *E. Baueriana*, Schauer.

In Walp. *Repert.* ii, 924; *Suppl.* i, 1843.

FOLLOWING is the original description:—

Ramulis patentib. subfastigiatis teretib. ; foll. coriaceis ovatis v. subrhombico-ovatis, basi obliqua in petiolum longum contractis attenuatisve tenuiter acuminatis, margine cartilagineo subrevolutis undulatisq. subglaucescentib. impunctatis reticulatis; umbellis 5-7 floris axillarib. terminalibq. subpaniculatis; pedunculis subteretib. petiolo triplo breviorib. ; pedicellis subangulatis cupulae turbinatae continuis camq. subaequantibus; operculo subconico-hemisphaerico apiculato cupula triente brevior.—Foliorum lamina 2-2½ poll. longa, 1-2 poll. lata, petiolus pollicaris, pedunculus 3-4 lin. metiens; cupula cum pedicello 3½ lineam longa.—In Nova Hollandia legit F. Bauer.

The type is in the Vienna Herbarium (Herb. Musei Caesarei Palatini Vindobonensis). It is in plump bud and expanded flower. It bears a label, in Schauer's handwriting, "*Eucalyptus Baueriana*, Schauer, in Walp. *Repert.*"

Access to the type has enabled me to settle the identity of Schauer's plant. Collected by Ferdinand Bauer, it was doubtless obtained in the Port Jackson district; and it is the *Lignum-vitæ* or Poplar-leaved Box, which was always looked upon by Mueller as a form of *E. polyanthemos*, Schauer, and which, later on, was, as will be indicated presently, recognised as a distinct species.

Bentham (B.Fl. iii, 214, under *E. polyanthemos*) says:—"The tropical specimens to which, from the character given, belongs *E. Baueriana*, Schau., in Walp. *Rep.* ii, 924, have generally smaller flowers and fruits than the southern ones, but do not otherwise differ." Bentham is probably referring to certain tropical specimens he thinks are referable to *E. Baueriana*, which were collected by Bauer near the Gulf of Carpentaria, and which are *E. alba*. Walpers does not say that *E. Baueriana* was collected in the tropics.

Mueller (*Eucalyptographia*, under *E. polyanthema*) says:—"Bentham unites with this [*polyanthea*] *E. Baueriana*, Schauer, the diagnosis of which agrees sufficiently [with *polyanthea*]. . . . Bauer most probably obtained his specimens from the vicinity of Sydney, and not from the tropical regions of Australia." I understand that Mueller never saw a type specimen of *E. Baueriana*, Schauer.

*E. Baueriana*, Miquel (Ned. *Kruidk. Arch.* iv, 137), collected by Charles Stuart in Tasmania, is *E. Gunnii*, Hook. f., var. *acervula*.

*E. Baueriana*, Schauer, may be described in the following words:—

A tree of medium size, with rough dark bark on the trunk and ultimate branchlets. With a rounded head of dense foliage.

**Juvenile leaves** from nearly orbicular to broadly lanceolate in shape, dark green on both sides, thin, margin undulate, the intramarginal vein at a very considerable distance from the edge, venation almost triplinerved at the base, distant from each other, and spreading.

**Mature leaves** ovate to nearly rhomboid-ovate, shortly acuminate, margins undulate, venation rather distant from the edge, subtriplinerved, venation spreading, rather thin in texture. Lamina 2-2½ inches long, 1-2 broad, with a peduncle of 3-4 lines.

**Flowers** five to seven in the axils of the leaves, the buds tapering gradually into the very short pedicels, the opercula conical and pointed, the anthers very broad, truncate, and sometimes so widely opened as to almost lose the appearance of pores terminally dehiscent. (Here we have evidence of transit between the Eucalypts with truncate anthers and the *E. hemiphloia* group of anthers.)

**Fruits** conoid, often widened at the flat, thin rim, capsule sunk.

### Notes Supplementary to the Description.

*Aboriginal Names.*—George Caley (collector for Sir Joseph Banks, 1800-10) gives the name of this species in the Sydney District (Counties of Cumberland and Camden) as "Nectaring" Box or "Berryergro." Later on Sir William Macarthur gives the name "Boorayero-Gourroo" as the equivalent of the "True or Yellow Box of Camden." It is probable that "Berryergro" and "Boorayero" are the same name, though what Macarthur's "True or Yellow Box of Camden" is, is uncertain, as herbarium specimens were not always carefully preserved in the early days. In my "Forest Flora of New South Wales," vol. i, 131, I have identified a specimen as *E. hemiphloia*, F.v.M., and the name may prove to be more or less synonymous with "Box." The matter may perhaps be cleared up as additional herbarium specimens collected by Sir William are discovered.

## SYNONYMS.

1. *E. subrotunda*, R.Br.
2. *E. polyanthemos*, Benth., non Schauer.
3. *E. Fletcheri*, R. T. Baker.

### 1. *E. subrotunda*, R.Br.

I do not know whether Brown described this species. Even if it is a *nomen nudum*, I think it right to draw attention to it, following the useful example of some contributors to the "Journal of Botany," and others, in drawing attention to names which have been extensively inscribed in important herbaria. The use of such names should, however, be very carefully restricted.

### 2. *E. polyanthemos*, Benth., non Schauer.

As already indicated, *E. Baueriana* was, both by Bentham and Mueller, looked upon as a form of *E. polyanthemos*. It will be observed that in exhibition literature and other publications our "Lignum-vitæ" is referred to *E. polyanthemos* by other authors as well.

Howitt's remarks under *E. polyanthemos* in the top paragraph of page 96, *Trans. Roy. Soc. Vict.*, ii (1890), refer to *E. Baueriana*.

### 3. *E. Fletcheri*, R. T. Baker, *Proc. Linn. Soc. N.S.W.*, xxv, 682 (1900).

This is absolutely typical for *E. Baueriana*, Schauer.

## RANGE.

(Typical Form).

It extends from eastern Victoria along eastern New South Wales to southern Queensland. It has been found in coastal New South Wales as far north as Singleton, and then there is a great gap until New England, near Stanthorpe, in Queensland, is reached. It is obvious that connecting localities require to be searched for.

### VICTORIA.

This is a tree formerly known in Victoria as *E. polyanthemos*, being included, with the Red Box, under that name, by Mueller. The late Dr. A. W. Howitt deserves the credit of working out the range of *E. Baueriana* in Gippsland. In that portion of Victoria it is known as "Cabbage Box." It occurs about Metung, Nowa Nowa (an arm of Lake Tyers), Heyfield, and Bairnsdale, on the littoral strip about the Lakes' entrance, also on river flats only. It does not occur in South Gippsland.

I found it called "Apple Box" around Metung, and have received it from the Werribee River from the late C. Walter.

### NEW SOUTH WALES.

George's River (collected by Robert Brown, 1802-5). Distributed from the British Museum at least as early as 1876, under the number 4,734, under the name of *E. subrotunda*, and also that of *E. polyanthemos*, Schauer).

Grose River and banks of Nepean River, near its confluence with the Grose. Robert Brown collected here about May, 1803, and January, 1805. Mr. R. H. Cambage and I collected it here

North Richmond, near the Hawkesbury Agricultural College (C. T. Musson). Richmond (W. Woolls). Dr. Woolls always called it *Lignum vitæ* or Poplar-leaved Box. The three last localities are near to each other.

Penrith (J.H.M. and J. L. Boorman). St. Mary's, South Creek (R. T. Baker). Type of *E. Fletcheri*.

All the above localities are Sydney to the Blue Mountains.

"Blue Box," Bankstown and Cabramatta (J.H.M. and J. L. Boorman); Liverpool (H. Deane); Edensor Park, Liverpool (J.H.M.); Glenfield to Minto and George's River (J. L. Boorman).

Thirlmere (W. Cunco). Co-type of *E. Fletcheri*. Also collected by R. H. Cambage. Milton (R. H. Cambage), who furnishes the note: "Bark rough up to ultimate branchlets." Mr. J. S. Allen, Inspecting Forester of the district, says that it occurs from Milton to Eden.

I collected it about Pambula. At the saw-mill there it is known as "Black Box," because of the dark foliage of the tree. The timber is much valued locally, though in this district it is rare to get a log large enough for milling purposes.

The rough bark is up to the ultimate branchlets. It is hard to grub out, and it suckers badly. It seems to be usually found in good land. It also goes by the names of "Round-leaf Box" and "Brown Box."

The above are localities south coastal from Sydney.

Putty, *via* Singleton (A. C. Barwick, through R. T. Baker). This is the only New South Wales locality north of Sydney recorded.

#### QUEENSLAND.

"A Box-tree growing 13 miles out from Stanthorpe, with bark like *hemiphloia*, and continuing rough out to the young limbs. Timber very hard. Fruits very large." (A. Murphy).

#### Variety *conica*, Maiden.

In *Proc. Linn. Soc. N.S.W.* xxvii, 216 (1902). *E. conica*, Deane and Maiden, *ib.* xxiv, 612 (1899).

Following is the original description:—

A Box of medium size; a pretty, graceful tree, with pendulous branches.

**Vernacular names.**—"Fuzzy Box," "Bastard Box," "Yellow Box," "Grey Box" or "Woolly Butt," "Apple Box,"

**Bark.**—Of the ordinary "box" character, but in districts where the two trees grow together rougher than that of *E. hemiphloia*; persistent in all cases, right on to the small branches.

**Timber.**—Reddish-yellow, and very tough when dry; much redder than ordinary Box (R. H. Cambage). [It is brown as compared with that of *E. polyanthemos*, or Red Box.]

**Juvenile leaves.**—Pale green, not glaucous; broadly ovate; the intramarginal vein considerably distant from the margin, and, with the midrib, giving the leaf a triplinerved appearance.

**Mature leaves.**—Lanceolate, ultimately narrow-lanceolate, and, say, 4 inches long by half an inch broad; varying, however, in length and width, and some branchlets including very wide leaves; the intramarginal vein is distinctly removed from the edge of the leaf, although this is of course less marked in the case of narrow leaves; the venation is oblique, but few of these secondary veins are as prominent as the intramarginal vein. The foliage is drooping and has frequently long stalks.

**Buds.**—Clavate, the calyx-tube greatly exceeding the operculum in size; the operculum nearly hemispherical, with a small umbo; the calyx-tube tapering gradually to the common point of attachment to the stalk, the buds being sessile.

**Flowers.**—This is a very floriferous species; the inflorescence is arranged in panicles of several inches, the individual umbels having a maximum of six or seven flowers. Stigma hardly dilated; anthers small, opening in terminal pores, all fertile and inflected in the bud.

**Fruits.**—Narrow conical (hence the specific name), tapering to the point of attachment of the common stalk. Often not quite symmetrical, and somewhat pear-shaped. Greatest length, say,  $\frac{3}{8}$  inch by, say,  $\frac{5}{8}$  inch broad. Thin rim; the valves, which are three or four and very small, are deeply sunk. Of a pale brown colour and shining.

Contrasted with *E. Bauermania*, Schauer, the chief characters of the variety appear to be:—Larger, more erect tree, foliage narrower and pendulous, fruits smaller. Although different enough at first sight as regards the typical forms, the present form is indubitably, in my opinion, the western or usually narrow-leaved form of *E. Bauermania*, but it insensibly connects with the typical species found on the coast or tablelands. The type species has also more glaucous leaves than the (usually) more interior form. Further, the often broad juvenile leaves, and the broad mature leaves especially common on the northern table-land present, to me, an insuperable barrier to keeping the two forms apart as distinct species.

## RANGE.

Found in much of the country west of the Dividing Range and its spurs, forming, with *E. hemiphloia*, *E. odorata* and other species, much of the "Box" in the western country.

### NEW SOUTH WALES.

West of Wyalong, "Apple Box" (R. H. Cambage). "White Box," Wyalong (District Forester Osborne).

"Bimble Box," Grenfell (District Forester Arthur Osborne). The mistake of confusing this with the true Bimble Box (*E. populifolia*), or rather of applying this name to a second Eucalypt, is common in the district, and should be discouraged.

Weddin Forest Reserve (J.H.M.); Young (W. W. Froggatt); Cowra, a "Box" with persistent bark on small branches (H. Deane). Banks of the Lachlan, 6 miles south-east of Cowra; also 2 miles north-east of Cowra, a "Grey Box" or "White Box" (R. H. Cambage). "Grey Box, drooping branches, bark rougher than *hemiphloia* or its var. *albens*. Resembles *Stuartiana* so much that on the Lachlan it is called 'Apple Box.' Wood much redder (*sic*) than ordinary Box; grey bark to top of branches." Two miles north-east of Cowra (R. H. Cambage).

"Morongle trees." Sent by G. W. Orr from Morongle Creek, near Cowra. Said to be the blacks' name, but now not in use. "Box" or "Apple" (R. H. Cambage).

Murga (H. Deane); Forbes district (H. Deane; also R. H. Cambage); Parkes (H. Deane). "This is what I think is the 'Blue Box,' only the capsules are much smaller than those I got in Queensland (Stanthorpe)." Forbes (A. Murphy).

Eumungerie, Dubbo District, "White Box," (Assistant Forester A. R. Samuels). "Tall pendulous trees of 40-60 feet; 4-6 feet in diameter. Known locally as Blue Box and Fuzzy Box. Grows in moist sandy localities." Dubbo (J. L. Boorman). Dubbo (R. H. Cambage, also J. V. de Coque). It is the "Grey Box, No. 2" of Mr. de Coque's notes. "Blue Box," Minore (J. L. Boorman). Tomingley, Peak Hill, Narromine and Dubbo (J. H. M.).

Bidden Road, 7 miles northerly from Gilgandra, sucker leaves broadish (R. H. Cambage, No. 1,091).

"Fuzzy Box," Wellington. "Formerly looked upon as *E. largiflorens*." (Received from Rev. Dr. Woolls with this information.) Banks of Mitchell's Creek, between Gulgong and Wellington (A. Murphy). The juvenile leaves very thin, showing marked venation, and rather narrow.

Gulgong (J.H.M. and J. L. Boorman). In swampy or low-lying country, rarely on hills; sometimes known as "Bastard Box." With broader leaves than those of the Dubbo trees; the juvenile leaves identical with those of the coast form, even if not quite so broad. The stems of the suckers are yellow, turning red later.

The tree has a glaucous cast of foliage like *E. polyanthemos*; the surrounding trees of *E. hemiphloia*, F.v.M., var. *microcarpa*, Maiden, are glabrous. Known locally as "Fuzzy Box," or "Bastard Box," with rough bark up to the branchlets. The fuzziness or woolliness of the bark is a useful diagnostic character in this species. The timber is hard to cut, but more chippy and short grained (brittle) than *E. hemiphloia*. It is locally esteemed as a durable timber and a valuable firewood. The bark and timber appear to be in no way different from the coast or typical form.

Merriwa (J.H.M. and J. L. Boorman), with much *Loranthus* on it. On the river flats and taluses of the ridges—a usual situation.

Clarence Siding, Blue Mountains (J. L. Boorman).

The above are western localities, and the Blue Mountains locality brings this form much nearer Sydney than it was previously known to occur.

Following are northern localities:—

"A Box-tree. Bark not so woolly as on Lachlan River trees; same red twigs. About  $\frac{1}{4}$  mile south of cemetery, on granite, 2,800 feet above sea-level, Tingha" (R. H. Cabbage, No. 993).

Bolivia.—Bark persistent to smallest branches (H. Deane). With broadish leaves.

Wallangarra, abundant. Flowering in the broadish-leaved stage. With pink filaments in some flowers (J.H.M. and J. L. Boorman).

Acacia Creek, Macpherson Range (W. Dunn). Some specimens with broadish leaves.

The broadish leaved forms of var. *conica*, almost as broad as that of the typical form, are especially common in northern localities.

#### QUEENSLAND.

Wilson's Peak, Macpherson Range, on the Queensland as well as the New South Wales side of the border (W. Dunn and J.H.M.).

Wallangarra, on the Queensland as well as the New South Wales side of the border (J. L. Boorman and J.H.M.).

Texas, with quite narrow leaves (J. L. Boorman).

## AFFINITIES.

### 1. With *E. polyanthemos*, Schauer.

That it is liable to be confused with this species is evident when it is borne in mind that eminent botanists have confounded them. Following are some points in which they differ:—

- a. The bark of *E. Baueriana* is fibrous, "fuzzy," or woolly; that of *E. polyanthemus* being, as a rule, ribbonly rather than box-like.
- b. The wood of *E. Baueriana* is pale brown, and that of *E. polyanthemus* red.
- c. The leaves of *E. Baueriana* are thinner, and the rim of the fruit likewise thinner than that of *E. polyanthemus*.

2. With *E. hemiphloia*, F.v.M.

The fruits of this species are sub-cylindrical, not conical as is the case with *E. Baueriana*. The var. *conica* of *E. Baueriana* is more likely to be confused with the western form of *E. hemiphloia* (var. *microcapa*, Maiden), than are the coast forms. *E. hemiphloia* has the true box-bark. The timber of *E. hemiphloia* is paler than that of *E. Baueriana*.

3. With *E. bicolor*, A. Cunn.

The two species are confused in some herbaria. *E. bicolor* is a western species, and can only be confused with the var. *conica* of *E. Baueriana*. But their fruits will readily separate them; the timber of *E. bicolor* is red. Both species have subfibrous ("box") bark.

4. With *E. Rudderi*, Maiden.

This species is, as regards herbarium specimens, very likely to be confused with var. *conica*. The foliage of *E. Rudderi* is thinner, the fruits less conical, and the timber red.

5. With *E. Stuartiana*, F.v.M.

Its resemblance to var. *conica* on the Lachlan River is so close that it goes under the name of "Apple Box," *E. Stuartiana* being known as "Apple." The leaves of *E. Stuartiana* are thicker and longer, the fruits have exsert valves, and the fruit is paler and altogether inferior.

## DESCRIPTION.

LXV. *E. cneorifolia*, DC.

In *Prod.* iii, 220 (1828), with fig. in DC. *Mém. Myrt.* t. 9.

Following is the original description:—

34. *E. cneorifolia*, operculo hemisphaerico submutico cupula turbinata breviora, pedunculis teretiuseculis axillaribus petioli longitudine, floribus 5-7 capitatis, foliis lineari aut oblongo-lanceolatis mucronatis basi aequaliter attenuatis coriaco-crassiusculis. Nova-Hollandia ad oram orientalem et in insula à Gallis Decrès dictâ. Alabastra cum operculo 4 lin. longa obtusa ad apicem pedunculis sessilia. Petioli 4 lin. longi. Fol. 2 poll. longa 6 lin. lata, nervo medio unico prominulo. (v.s.)

On making inquiries in regard to this species at the De Candollean Prodromus Herbarium, I became indebted to M. Casimir De Candolle for two specimens, with the following information:—

34. Sub *E. cneorifolia*, DC., species duæ manifestæ adsunt in Hb. Prodromi, a DC. confusæ, quarum altera foliis *lineari* lanceolatis (vide diagnosis), altera foliis *oblongo*-lanceolatis gaudet, ceterum nervatione, colore, habitu, dimensionibus facile distinguenda.

1. Species foliis *lineari*-lanceolatis habitu virgato, &c.

Eucalyptus  
Nlle Hollande, ile Decrès  
Musée de Paris, 1821.

2. Species foliis *oblongo*-lanceolatis etiquette originale.

Eucalyptus viminalis  
Nouvelle Hollande, Côté orientale  
Musée de Paris, 1821.

No. 1 is *E. cneorifolia*, DC., as we understand it now.

No. 2 appears to be *E. dumosa*, A. Cunn. (*incrassata*, Labill.), which grows within a stone's throw of plenty of *E. cneorifolia* on Kangaroo Island.

My identification of No. 2 may, perhaps, give a clue to Bentham's remarks:—

This comes near to some narrow-leaved forms of *E. dumosa*, but the fruit is quite different, nearer to that of *E. oleosa*, and the anthers are very much smaller. (*B.Fl.* iii, 217.)

It was subsequently described in English by Bentham (*B.Fl.* iii, 217), who quotes the species "DC. *Prod.* iii, 220, and *Mém. Myrt.* t. 9, from the char. and fig.," and as a synonym gives "*E. santalifolia*, F. Muell., in *Trans. Vict. Inst.*, 35, partly." Mueller's localities for *E. santalifolia* are "In the mallee scrub on the Murray River, on St. Vincent's and Spencer's Gulfs." It will be observed that he included plants from localities hundreds of miles apart under the same description,

and in distributing specimens of *E. santalifolia* more than one species could easily be sent out under such a method. At all events, if the localities are correct, the description of *E. santalifolia* cannot include *E. cneorifolia*, which is confined to Kangaroo Island, so far as we know at present. I have referred to the *E. santalifolia* conundrum at pages 199, 200 of Part VII, Vol. 1, of this work.

Bentham's description of *E. cneorifolia* is quite satisfactory, except as regards the anthers, which, instead of being described as "very small, nearly globular, with distinct parallel cells," should be described as "large anther, the individual anther masses smallish, but the cells wider and thicker at the base, and with a moderately large gland at the back. The filament attached at the base, or nearly so." *E. oleosa* has a very similar anther.

Mueller (*Eucalyptographia*) makes *E. cneorifolia*, DC., a synonym of *E. stricta*, Sieb., and his remarks in the text may be read in conjunction with my own entitled "The confusion between *E. stricta*, Sieb., and *E. cneorifolia*, DC.," at page 279, Part IX, Vol. 1 of this work.

Mueller omits *E. cneorifolia*, DC., from his "Second Census," apparently continuing to hold the view that it is conspecific with *E. stricta*, Sieb., a view he could not have held had he studied the species in the field.

The wood (of *E. cneorifolia*) is exceedingly tough and rigid. Fishermen prefer it for "preels" (short pieces affixed to their fish-lines to keep the snooded hooks away from the principal line). Wine-makers like the wood for plugs for their vats, as the wood does not batter and split when hammered. The trees are mallees. In some places stems may be cut 12 inches in diameter, but usually they are as thick as a man's arm. (A. Molineux, *in litt.*)

---

## SYNONYMS.

(*E. gneorifolia*, G. Don, in *Gen. Syst.* ii. 820, and *E. enervifolia*, Walp., *Rep.* ii, 164, are misprints for *E. cneorifolia*, DC.).

1. *E. stricta*, R.Br. non Sieb.
2. *E. hypericifolia*, Link.
3. *E. myrtiformis*, Naudin (probably).

1. *E. stricta*, R.Br. non Sieb.

The specimens from Kangaroo Island labelled *E. stricta* by Robert Brown (Iter 1802-5) were described by him in MS., and a number of specimens were distributed under that name. They are referable to what was described as *E. cneorifolia*, DC., later on, and consequently not identical with Sieber's *E. stricta*.

2. *E. hypericifolia*, Link.

M. Casimir de Candolle, owner of the De Candollean Herbarium, has had the kindness to send me a specimen with the following information:—

45. *E. hypericifolia* (Dum-Cours. f) Lk. Etiquette originale.

*Eucalyptus hypericifolia* Dum. (a)  
Mr. Otto, 1826.  
Jardin de Berlin. (b)

(a) Manus Ottoni.

(b) Manu Seringei Conservatori.

Obs. Il n'existe pas, dans l'Herbier du Prodromus, d'échantillon authentiquant l'espèce de *Dumont-de Courset*. Le rameau stérile qui s'y trouve, représente la plante de *Link* et a trait, par conséquent aux 4 dernières lignes de l'article 45 du Prodromus.

The vague original description is as follows:—

*E. hypericifolia* Link. Enum. 2, p. 30, quam ex hort. berol. sine flore recepi, habet folia alterna brevissima petiolata feri linearia utrinque acuminata coriacea sub lente punctulata. An eadem?

I am of opinion that this specimen (*E. hypericifolia*, Link) is referable to *E. cneorifolia*, DC. *E. hypericifolia*, Dum-Cours, doubtfully referred to Link's species, is probably referable to *E. Risdoni*.

3. *E. myrtiformis*, Naudin, 2nd Mem. p. 50.

Copy of a label in Herb. Mus. Paris:—" *Eucalyptus myrtiformis*, Naudin, Villa Thuret, Alpes Maritimes. Cult. M. Naudin. Reçu en Mars 1890."

This is probably *E. cneorifolia*, DC., but the anthers are not ripe. Are flowers and fruits available for examination?

M. Naudin knows only one plant, a shrub growing at the Villa Thuret. He points out that the buds remain two years before opening—a not uncommon thing with *Eucalypts* in Australia.

---

## RANGE.

It is confined to Kangaroo Island, South Australia. Mr. Walter Gill, Conservator of Forests in that State, has informed me that he has not collected it on the ironstone formation, and that he has only found it on limestone country—20 miles from Queenscliff is the furthest he has found it.

Mr. Gill adds: "Mr. Hartland Strawbridge, resident on the island for some time, has found it abundantly in the Hundreds of Dudley, Menzies, MacGillivray, and Haines. Speaking broadly, it is the eastern end of the island which grows it most, as the Hundreds indicated form a group of the eastern part. It further appears that while in these Hundreds it does occur on ironstone country as well as limestone—yet it is seldom seen much where the *Yucca* (*Xanthorrhœa*) grows on the ironstone. I think I am right in saying it is not usually plentiful on ironstone. I know I saw none for many, many miles when years ago I went westward to De Mole River all on ironstone country."

## AFFINITIES.

1. With *E. virgata*, Sieb. var. *stricta*, Maiden (*E. stricta*, Sieb.).

I have drawn attention to the subject twice already, and also refer to Part IX, where *E. virgata* is depicted and described. Furthermore, *E. virgata* is confined to New South Wales, and *E. cneorifolia* to Kangaroo Island.

2. With *E. santalifolia*, F.v.M.

I have made some observations on the subject already, and will refer to the confusion in synonymy when I come to *E. pachyloma*, Benth. There is no close affinity between the two species.

3. With *E. incrassata*, Labill. (vars. *conglobata*, R.Br., and *dumosa*, F.v.M.).

The superficial resemblance between the ripe fruits, in dense clusters, and those of *E. incrassata*, var. *conglobata*, is remarkable. The ripe buds, "egg-in-egg-cup," also display a considerable resemblance to those of var. *dumosa*. The narrowness of the leaves, and the redness of the timber, however, sharply separate *E. cneorifolia* from any form of *E. incrassata*.

4. With *E. decipiens*, Endl.

Fruiting twigs of the narrow-leaved form of *E. decipiens* may be superficially so similar to those of *E. cneorifolia* that a word of caution is necessary. The mature leaves of *E. decipiens* are normally much wider, and so also are the juvenile leaves. The opercula of *E. decipiens* are much longer, and more acute. The timber of *E. decipiens* is brittle, softer, paler, and not lasting, and the bark is of the "woolly-butt" class, which that of *E. cneorifolia* is not.

5. With *E. uncinata*, Turcz.

Here again a word of warning may be necessary, for imperfect herbarium material of the two species may perhaps be confused. The mature leaves are often equally narrow, but the juvenile leaves of *E. uncinata* are broader. The leaves of the latter species are less rich in oil. The filaments of *E. uncinata* have a kink which is not observable in those of *E. cneorifolia*. The timber of *E. uncinata* is browner.

6. With *E. angustissima*, F.v.M.

This is another narrow-leaved species, and I will refer to the affinity to *E. cneorifolia* when I come to *E. angustissima*.

## Explanation of Plates (57-60).

## PLATE 57.

*E. affinis*, Deane and Maiden.

1. Juvenile leaves. Stuart Town, N.S.W. (A. Murphy.)
2. Juvenile leaf, a little further advanced, but still in the opposite stage. Stuart Town. (J. L. Boorman.)
- 3*a*. Mature leaf; 3*b*, angular buds; 3*c*, anther, showing dehiscence; 3*d*, fruits, angular, and not quite ripe, of "Tallow-tree." Murrumbidgee, N.S.W. (A. Murphy.)
- 4*a*. Small fruits, showing rim; 4*b*, small fruits of "White Ironbark." Grenfell-road, from Cowra, N.S.W. (R. H. Cambage.)
5. Fruits, 7 miles east of Parkes, N.S.W. (R. H. Cambage.)
6. Coarse, angular fruits of "Black Box." Lue, N.S.W. (J. L. Boorman.)
7. Fruits, rather spheroidal in shape, probably referable to *E. affinis*, though with some doubt. Wallangarra, New South Wales-Queensland border. (J. L. Boorman.)

*E. paniculata*, Sm.

- 8*a*. Twig, with leaf, buds, and flowers; 8*b*, anthers. Collected by Robert Brown at Port Jackson, 1802-5, and distributed by the British Museum under the number 4,736.
- 9*a*. Leaf; 9*b*, large fruits (by no means rare in the species); 9*c*, small fruits, all from Ryde, Port Jackson (J.H.M.)
- 10*a*. Leaf; 10*b*, flowers; 10*c*, anther of Sieber's "Fl. Novæ Holl., No. 468." See p. 107.
11. Juvenile leaf. Wingello, N.S.W. (J.H.M.)
12. Bulbous swelling in seedling. Woy Woy, N.S.W. (A. Murphy). This swelling is very common in seedlings belonging to this genus, and the cause has not been investigated so far as I am aware. It is presumably to be attributed to the action of bacteria.
13. Tapering fruits. Casino, N.S.W. (District Forester W. P. Pope.)
14. Sub-cylindrical fruits. Wyong, N.S.W. (J. L. Boorman.)
15. Fruits, showing rim. Nowra, N.S.W. (J.H.M.)
16. Fruits, showing slight exertion of valves, which is not rare in this species. Wingello, N.S.W. (J.H.M. and J. L. Boorman.)
- 17*a*. Small fruits, showing marked rim; 17*b*, end view of a fruit. Conjola, N.S.W. (W. Heron.)
18. Small fruits. Kincumber, N.S.W. (R. H. Cambage and J.H.M.)
19. Very small fruits with distinct rim and valves distinctly exerted. "Grey Ironbark." Williams River district. (J. L. Boorman.)
20. Small fruits, valves distinctly exerted. "Grey Ironbark." Eight-mile Plains, Brisbane, Queensland. (J. L. Boorman.)
21. Flowering twig of a slender, narrow-leaved form, which is apt to be confused (from superficial examination) with *E. crebra*. Moolah, Kurrajong district, N.S.W. (Rev. Dr. Woolls.) This is var. *angustifolia*, Benth. See p. 104.

## PLATE 58.

*E. polyanthemos*, Schauer.

1. Twig drawn from a co-type of the species. "Interior of Southern Australia, north of Bathurst. A. Cunningham." (Herb. Heward.)
- 2*a*. Mature leaf; 2*b*, buds. Mt. McDonald, near Cowra, N.S.W. (J.H.M. and J. L. Boorman.)
- 3*a* and 3*b*. Mature leaves (note the comparative difference in width); 3*c*, fruits, "Red Gum" or Red Box." Stuart Town, N.S.W. (A. Murphy.)
4. Mature leaf, "Slaty Gum." Dubbo, parish of Blackheath. (District Forester C. Marriott.)

- 5a. Intermediate leaf ; 5b, mature leaf of "Slaty Gum," "Red Gum," "Narrow-leaved Red Box," from Merrindee (Mudgee to Wellington), N.S.W. (A. Murphy.)
- 6a. Juvenile leaf ; 6b, mature leaf, "Round-leaved Red Box." Merrindee. (A. Murphy.)
- 7a. Mature leaf ; 7b, buds ; 7c, fruits of type specimen of *E. ovalifolia*. R. T. Baker, Cow Flat, Bathurst, N.S.W.
- 8a and 8b. Mature leaves, and 8c, fruits of *E. ovalifolia*, R. T. Baker, Rylstone, N.S.W. (R. T. Baker.)
- 9a and 9b. Mature leaves ; 9c, buds ; 9d, fruits of type specimen of "Slaty Gum," *E. Dawsoni*. R. T. Baker, from Eylong, N.S.W.
- 10a. Juvenile leaf ; 10b, mature leaf ; 10c, fruits ; 10d, end view of a fruit ; 10e, 10f, anthers. "Red Box" or "Slaty Gum." Gulgong, N.S.W. (J.H.M., and J. L. Boorman.)
- 11a and 11b. Mature leaves of "Slaty Gum." Reedy Creek, near Gulgong. (J. L. Boorman.)
- 12a. Mature leaf ; 12b, fruits, "Slaty Gum." Rylstone. (J. L. Boorman.)
- 13a, 13b. Mature leaves, "Slaty Gum" or "Red Box." Lue, Mudgee Line. (J. L. Boorman.)

## PLATE 59.

*E. polyanthemus* (continued).

1. Juvenile leaf. "Red Box." Red Nob, Metung to Boggy Creek, Victoria. (J.H.M.)
- 2a. Intermediate leaf ; 2b, mature leaf, "Red Box." Bairnsdale, Victoria. (A. W. Howitt.)
- 3a. Mature leaf ; 3b, fruits, "Red Box." Wangaratta, Victoria. (J.H.M.)

*E. Rudderi*, Maiden.

- 4a. Juvenile leaf ; 4b, intermediate leaf. Taree, N.S.W. (District Forester Hardiman.)
- 5a. Mature leaf ; 5b, buds ; 5c, anther ; 5d, fruits. Taree. (Augustus Rudder.)

*E. Baueriana*, Schauer.

6. Juvenile leaf. Thirlmere, N.S.W. (R. H. Cambage.)
7. Juvenile leaf. Penrith, N.S.W. (J. L. Boorman.)
- 8a, 8b. Mature leaves ; 8c, buds ; 8d, anther from type, labelled "Eucalyptus Baueriana, Schauer in Walp. Repert," in Schauer's handwriting in the Vienna herbarium. The original was probably collected at George's River or Grose River, near Sydney.
- 9a, 9b, not perfectly ripe fruits, from junction of Grose and Nepean Rivers, where Robert Brown and Ferdinand Bauer are known to have collected in 1803. (R. H. Cambage, and J.H.M.)
10. Fruits, with short pedicels. North Richmond, N.S.W. (close to the locality of 9). (C. T. Musson.)
- 11a. Fruits ; 11b, end view of same. Stanthorpe, Queensland. (A. Murphy.)
12. Buds with pointed opercula. Ulladulla, N.S.W. (R. H. Cambage.)

## PLATE 60.

*E. Baueriana*, Schauer, var. *conica*, Maiden.

- 1a. Juvenile leaf ; 1b, mature leaf ; 1c, buds ; 1d, fruits. Merriwa, N.S.W. (J.H.M., and J. L. Boorman.)
- 2a, 2b. Juvenile leaves, "rather old." 6 miles south-east of Cowra. (R. H. Cambage.)
3. Mature leaf (note its width). Harvey Range. (J. L. Boorman.)
- 4a. Mature leaf ; 4b, buds ; 4c, fruits, Wallangarra (New South Wales-Queensland border). (J. L. Boorman.)
5. Juvenile leaf, rigid and thick. Dubbo, N.S.W. (R. H. Cambage.)
6. Intermediate leaf, showing great comparative breadth. Gulgong, N.S.W. (J.H.M., and J. L. Boorman.)
- 7a, 7b. Mature leaves ; 7c, front and back view of anther ; 7d, fruits. Dubbo, N.S.W. (J. L. Boorman.)
- 8a. Mature leaf ; 8b, buds. Tomingley to Narromine, N.S.W. (J.H.M.)
9. Mature leaf (note its width). Morongle Creek, near Cowra, N.S.W. (R. H. Cambage.)
10. Juvenile leaf. Mitchell's Creek (Gulgong to Wellington), N.S.W. (A. Murphy.)

*E. cneorifolia*, D.C.

- 11a. Twig bearing buds; 11*b*, bud, enlarged; 11*c*, fruits, being reproductions of portions of the original drawings of *Eucalyptus cneorifolia*, DC, in "Mémoire sur la Famille des Myrtacées" par Aug. Pyr. De Candolle (1842). Pl. 9.

The fruits are probably those of *E. cneorifolia*, and the mix-up is referred to at p 280, Vol I of this work, as well as in the present Part.

12. On the original of this specimen in the De Candollean (Prodromus) herbarium are the following notes:—

(a) "34 (see DC, *Prod.* iii. 220. J.H.M.) Sub *E. cneorifolia*, D.C., species duæ manifestæ adsunt in Hb. Prodromi, a DC. confusæ &c."

(b) "Eucalyptus Nlle Hollande, ile Decrès, Musée de Paris, 1821."

(c) "(1) Species foliis *linearis-lanceolatis habitu virgato*, &c."

This is the plant we know as *E. cneorifolia*, D.C.

13. This is drawn from another plant in the Prodromus herbarium. It bears the notes—

(a) "45. *E. hypericifolia* (Dum. Cours) Lk. Etiquette originale."

(b) "*Eucalyptus hypericifolia*, Dum. (Manus Ottoni)."

(c) "Mr. Otto, 1826, Jardin de Berlin (Manu Seringei Conservatori)."

The upper surface of this leaf shows channelling, and the plant is what we now know as *E. cneorifolia*, D.C.

- 14a. Juvenile leaf; 14*b*, mature leaf; 14*c*, 14*d*, anthers; 14*e*, fruits of "Narrow-leaf" Hog Bay, Kangaroo Island, S.A. (J.H.M.)

- 15a. Buds, with calyx broader than operculum; 15*b*, fruits. These were from a different individual to 14, but the species is the same. From same place and date.

16. Twig of *E. myrtiformis*, Naudin. Villa Thuret, Alpes Maritimes, France. (Cult. Naudin.)

*E. marginata*, DC.

17. In Part VIII, fig. 1, pl. 40, a seedling of *E. calophylla*, R. Br., was depicted as *E. marginata*, Sm., through inadvertence. A figure of a seedling of *E. marginata*, Sm., is now given.

The seedling of this species is different to that of any other species of the genus with which I am acquainted, in the matter of its mainly subterranean petioles (which in some cases are three in number).

The seedling is described in the following passage, but it will be observed that there is no reference to the subterranean petiole, nor does the figure show such:—

"The long petioles show a transition to a still more remarkable type occurring in *E. marginata* (fig. 343), in which the hypocotyl is subterranean and extremely short, while this deficiency is compensated for by the length of the petioles. The lamina is orbiculate, cuneate and trinerved, resembling a *Brassica*." Lubbock "On Seedlings," i, 526.

The backs of the cotyledon leaves show a slight purple tint.

The hypocotyl is, in this species, a mere thickening at the "root-commencement," and at this point the distance of the insertion of the petioles of the cotyledon leaves to the ground-line is considerable. As a rule, the hypocotyl, or hypocotyledonary portion of the stem, is measured from the ground-line to the insertion of the petioles of the cotyledon leaves.

The following species of Eucalyptus are illustrated in my "Forest Flora of New South Wales"\* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

<i>acenioides</i> , Schauer (xxxii).	<i>microcorys</i> , F.v.M. (xxxviii)
<i>amygdalina</i> , Labill. (xvi).	<i>numerosa</i> , Maiden (xvii).
<i>Andrewsi</i> , Maiden (xxi).	<i>obliqua</i> , L'Hérit. (xxii).
<i>Baileyana</i> , F.v.M. (xxxv).	<i>odorata</i> , Behr and Schlechtendal (xli).
<i>bicolor</i> , A. Cunn. (xliv).	<i>paniculata</i> , Sm. (viii).
<i>Bosistoana</i> , F.v.M. (xlili).	<i>pilularis</i> , Sm. (xxxi).
<i>capitellata</i> , Sm. (xxviii).	<i>piperita</i> , Sm. (xxxiii).
<i>Consideniana</i> , Maiden (xxxvi).	<i>Planchoniana</i> , F.v.M. (xxiv).
<i>coriacea</i> , A. Cunn. (xv).	<i>punctata</i> , DC. (x).
<i>corymbosa</i> , Sm. (xii).	<i>regnans</i> , F.v.M. (xviii).
<i>dives</i> , Schauer (xix).	<i>resinifera</i> , Sm. (iii).
<i>fruticetorum</i> , F.v.M. (xlii).	<i>saligna</i> , Sm. (iv).
<i>goniocalyx</i> , F.v.M. (v).	<i>siderophloia</i> , Benth. (xxxix).
<i>hæmastoma</i> , Sm. (xxxvii).	<i>sideroxyylon</i> , A. Cunn. (xiii).
<i>hemiphloia</i> , F.v.M. (vi).	<i>Sieberiana</i> , F.v.M. (xxxiv).
<i>longifolia</i> , Link and Otto (ii).	<i>stellulata</i> , Sieb. (xiv).
<i>Luehmanniana</i> , F.v.M. (xxvi).	<i>tereticornis</i> , Sm. (xi).
<i>macrorrhyncha</i> , F.v.M. (xxvii).	<i>virgata</i> , Sieb. (xxv).
<i>maculata</i> , Hook. (vii).	<i>vitrea</i> , R. T. Baker (xxiii).
<i>melliodora</i> , A. Cunn. (ix).	

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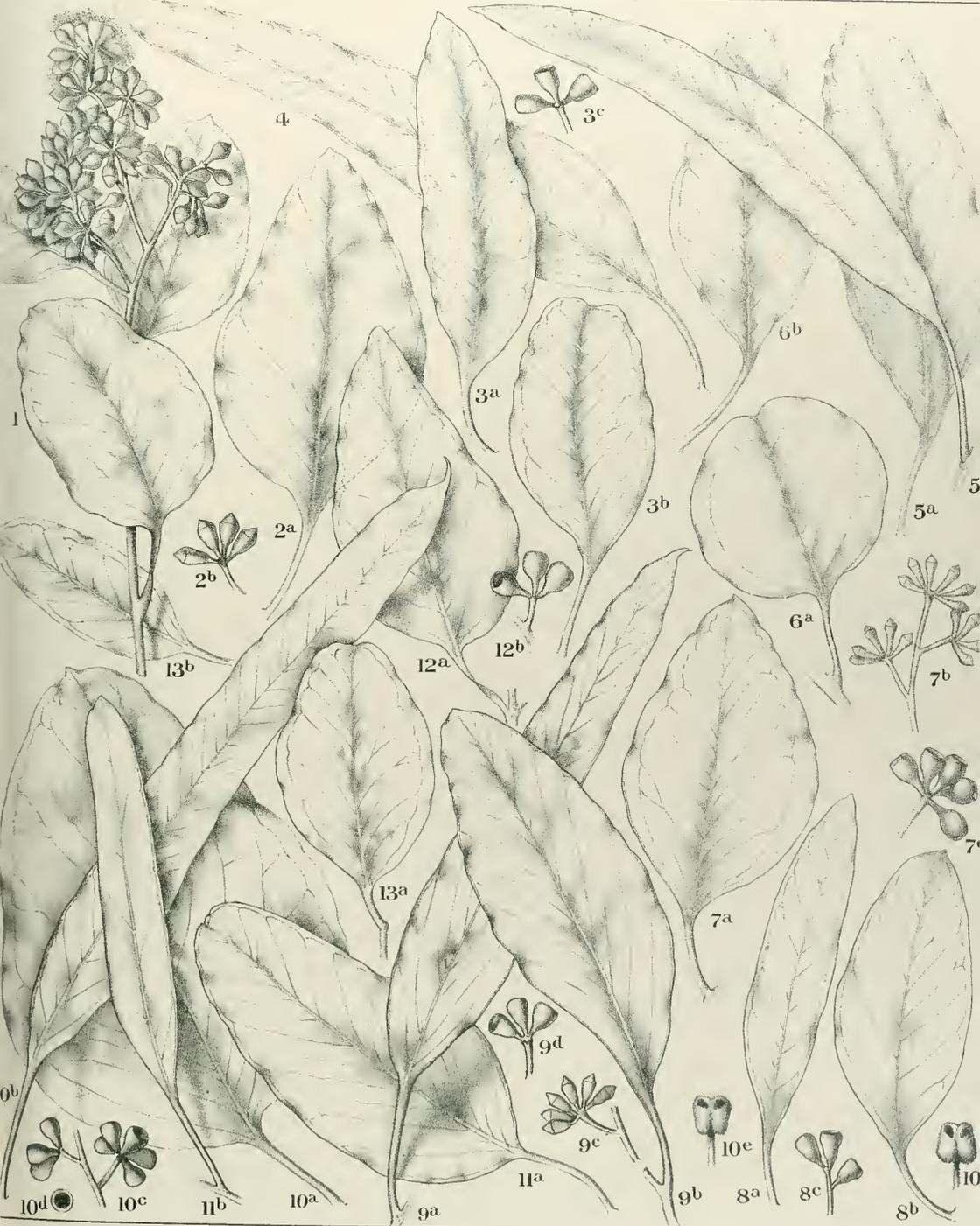
\* Government Printer, Sydney. 4to. Price 1s. per part (10s. per 12 parts); each part containing 4 plates and other illustrations.



EUCALYPTUS AFFINIS, DEANE AND MAIDEN (1-7).

E. PANICULATA, SM. (8-21).





EUCALYPTUS POLYANTHEMOS, SCHAUER.

(See also Pl. 59.)



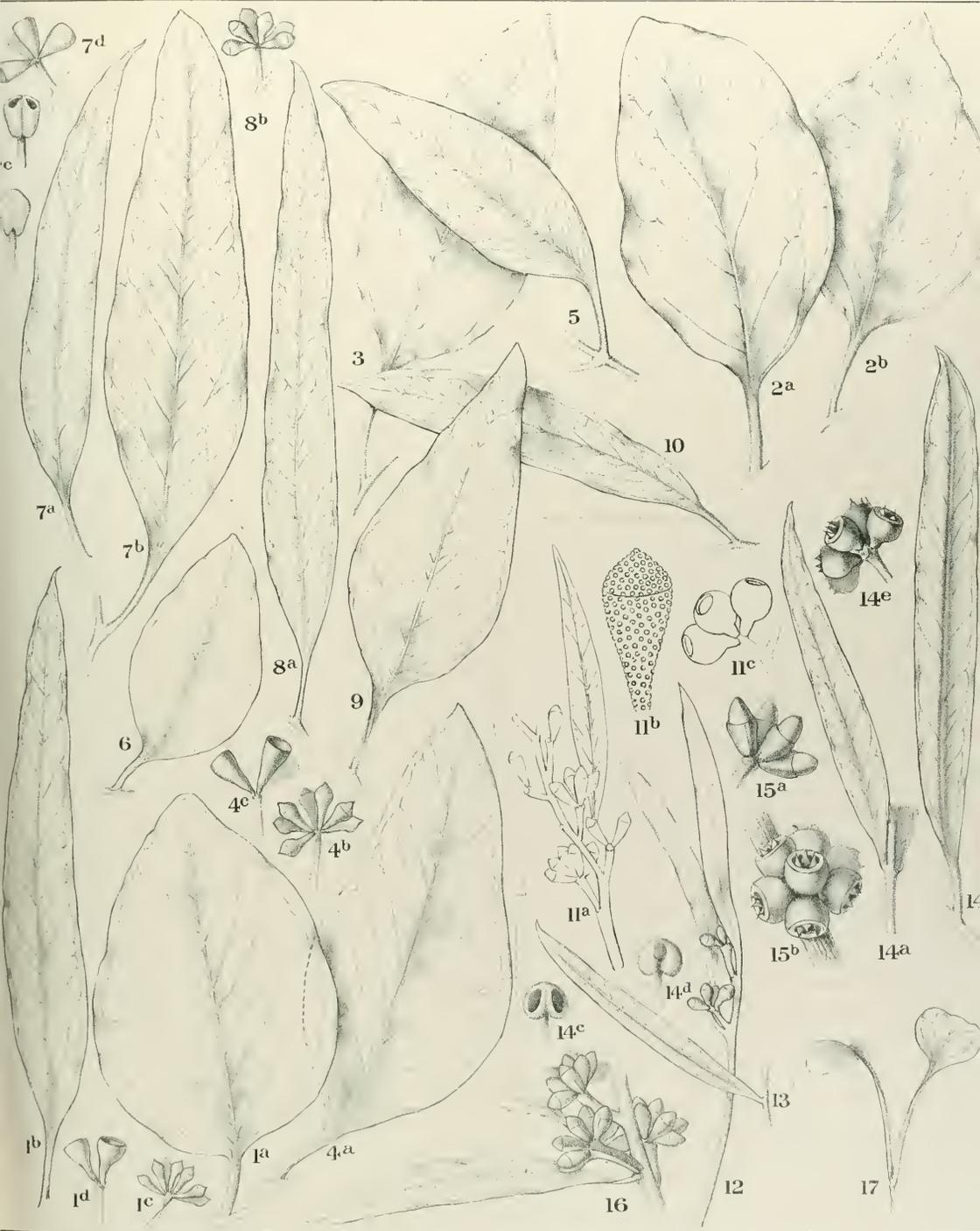


EUCALYPTUS POLYANTHEMOS, SCHAUER (1-3). See also Pl. 58.

E. RUDDERI, MAIDEN (4-5).

M. FLORENCE





EUCALYPTUS BAURIANA, SCHAUER, var. conica, MAIDEN (1-10).

E. CNEORIFOLIA, DC. (11-16).



# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

(Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

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VOL. II. PART 4.

Part XIV of the Complete Work.

(WITH FOUR PLATES.)

---

*“Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise.”*

MACAULAY'S "ESSAY ON MILTON."

---

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# DESCRIPTION.

## LXVI. *E. melliodora*, A. Cunn.,

By Schauer, in Walpers' *Repertorium Botanices Systematicæ*, ii, 924 (1843).

FOLLOWING is the original description:—

*E. melliodora* A. Cunn. Herb. No. 57:—Schauer MSS.—Arborea glaucescens; ramulis pendulis teretib.; foll. coriaceis anguste lanceolatis subfalcatis in petiolum attenuatis acuminatis, margine incrassatis impunctatis concolorib. opacis; pedunculis axillarib. 3–5-floris petiolo duplo breviorib. pedicellisq. compressis, his cupula paullo longiorib.; operculo coriaceo subhemisphaerico vix apiculato cupula obconica triente breviori. Foliorum lamina  $2\frac{1}{2}$ –3 pollices longa, 6 lin. circiter lata, pedunculus 3 lin. metiens, operculum 1 lineam altum cupulae concolor flavescenti-virens. Flores mel redolentes. In Novæ Cambriæ Australis plagis interioribus occidentem versus frequens.

It was more fully described by Bentham in B.Fl. iii, 210. The name “Red Gum,” given to this tree on the authority of Adamson (*loc. cit.*) is erroneous and arose out of local confusion with *E. rostrata*, Schlecht.

A specimen in Herb. Cant., ex herb. Lindl., is labelled:—“No. 74, Eucalyptus, Nangus [Gundagai district, N.S.W.—J.H.M.], Yarra of the Natives.” If the native name be correctly applied, then *E. melliodora* bears it in addition to *E. rostrata*.

The bark of the tree varies a good deal. Often sub-fibrous or “box-like,” as the Australian expression is, this fibrousness varies in texture, and also in the distance up the trunk to which it extends. It is quite pardonable, especially in the case of a stranger coming into a fresh district, to confuse *E. melliodora* with *rostrata*, *tereticornis*, and even *polyanthemos* until a casual view of the trees has been checked by a closer examination.

There is a fairly full account of *E. melliodora*, with an illustration, in Part IX of my “Forest Flora of New South Wales,” to which my readers may be referred.

*E. melliodora* is a very uniform species, taking it altogether, but sometimes we have broadish leaves, and occasionally quite narrow leaves—*e.g.*, from the Lachlan and other parts of New South Wales. Leaves may be as small as 2–3 inches long and  $\frac{3}{4}$  inch wide. As the tops of trees are approached it is very commonly the case (not only as regards this species) that the leaves diminish in size. This is a precocious flowering species, and when it flowers in a shrubby state the leaves are often large. It has glaucous and broader leaves in cold situations.

As northern New South Wales is approached the species has often coarser fruits, and the timber is reputed more durable. In southern New South Wales the trunks are often ringy, with shakes throughout the log; but going north, straighter stems and better logs are available.

## SYNONYM.

*E. cœrulescens*, Naudin, 2nd Mem., p. 47.

A label in Herb. Mus. Paris reads:—" *Eucalyptus cœrulescens*, Naudin, du Bois du Boulogne d'Alger, Février, 1883. Type. Ech. fructifère venant de la Villa Thuret (Alpes Mar.)." In flower and fruit. A second label reads: " *Eucalyptus cœrulescens*, Ndn., Villa Thuret, Nov., 1889. Ch. Ndn." In bud only. They are referable to *E. melliodora*, A. Cunn.

I have received similar specimens from MM. Vilmorin, Andrieux, and Cie. M. Naudin (2nd Mem.) recognised the affinity of this plant to *E. melliodora*, but he distinguishes *E. cœrulescens* by the shorter leaves, "and perhaps better by its general glaucescence." I may point out that *E. melliodora* is often glaucous.

- a. *E. patentiflora*, Miq., quoted by Bentham (B.Fl. iii, 210) as a synonym of *E. melliodora*, A. Cunn., is by Mueller (*Fragm.* ii, 64) stated to be *E. viminalis*, Labill.
- b. " *Eucalyptus radiata*, Sieber, vicinity of Hunter's River, New South Wales," in Wilkes' *U.S. Expl. Exped.*, 1838-42 (*Botany*, Asa Gray, i, 553), No. 25,474, U.S. Nat. Herb., is *E. melliodora*, A. Cunn.

## RANGE.

This species, very commonly known as "Yellow Box," but largely passing under the name of "Yellow Jacket" in addition, occurs in Victoria, New South Wales, and Queensland.

As regards Victoria, the late Dr. A. W. Howitt informed me that it grows in a scattered manner over almost the whole of that State, lowlands and highlands alike, but nowhere exclusively as a forest. I fully expect to hear it recorded from South Australia.

Specific localities are now given for the first time for Queensland, and further search requires to be made for it in that State.

## VICTORIA.

Lilydale (A. W. Howitt); Upper Yarra (C. Walter); Wando Vale (J. G. Robertson); Goulburn Valley (Sylvester Browne); Bonnie Doon and Toongabbie, Gippsland (A. W. Howitt); Snowy River (Mueller); Mymiong Ranges (C. Walter);

Beechworth (Falek); Long Gully (Cassilis township), and throughout the upper part of Tambo Valley and its tributaries (H. Hopkins); Grampians (C. Walter, H. B. Williamson); Chiltern (A. W. Howitt); Bendigo (W. W. Froggatt); Heathcote (J. Blackburne, W. S. Browncombe); Compton's Creek, near Costerfield—Graytown Road (W. S. Browncombe); Maryborough (J. Blackburne).

#### NEW SOUTH WALES.

*South and South-western Localities.*—Deniliquin (O. Wilshire, District Forester); Moama (Forest-Guard W. N. Watson); Corowa (Assistant Forester Geo. Wiburd).

Narrandera (Forest-Ranger Taylor); Wagga Wagga (W. W. Froggatt, J.H.M.); Wagga Wagga, Tareutta (W. Forsyth); Adelong Crossing (Rev. Dr. Woolls); Wyalong (J. L. Boorman); Young to Weddin (J.H.M.).

Tumut (W. W. Froggatt); Burrinjuck (J. L. Boorman); Gidley, Bungendore (A. W. Howitt); Yass (W. W. Froggatt); Kennmore, near Goulburn (J.H.M.); Marulan (J. L. Boorman); Barber's Creek (H. J. Rumsey).

Araluen Valley (J.H.M.); Sassafras—Nowra Road (J. L. Boorman); Bullio to Wombeyan (R. H. Cabbage and J.H.M.).

“Bourrayero Gourroo” of the aborigines, the True or Yellow Box of Camden, according to the late Sir William Macarthur.

*Western Localities.*—Bogan Gate (J. L. Boorman); near Borenore (H. Deane); Eurow Peak, Eugowra, and Trundle (P. J. Holdsworth); Forbes district (H. Deane); Lachlan and Murrumbidgee River districts generally (J. Duff); Cowra (Forest-Ranger Stephenson); Manildra (J. L. Boorman); Lyndhurst (J.H.M., J. L. Boorman); Molong (W. S. Campbell); Bumberry (J. L. Boorman).

Kanimbla Valley, Mt. Victoria (J.H.M.); Cox's River and thence to Fish River and Sidmouth Valley, on the old track to Bathurst (R. H. Cabbage and J.H.M.); Rydal to Mt. Victoria (J. L. Boorman); Jenolan Caves (W. F. Blakely); “New Holland, A. Cunningham, Hookerian Herbarium, 1835;” presented by Kew, probably type, and obtained near Bathurst; Bathurst (W. S. Campbell, J.H.M.); Perth (J. L. Boorman); Forest Reefs, Orange (R. H. Cabbage); Bowan Park, near Cudal (W. F. Blakely).

Found on banks of rivers, creeks, and slopes of ranges; likes good soil, Talbragar, &c. (Forest-Ranger Martin); Dubbo (C. J. McMaster); Minore and Harvey Ranges (J. L. Boorman); Mt. Harris, near Warren (J. L. Boorman); Narromine (Assistant Forester A. R. Samuel); Nyungan (District Forester C. Marriott).

Luc and Capertee (J. L. Boorman); Mudgee (H. Deane); Gulgong (J. L. Boorman, J.H.M.); Bylong Creek, Goulburn River (R. T. Baker); Merriwa (J. L. Boorman and J.H.M.); near Cobborah (W. Forsyth).

Narrabri (J. L. Boorman, J.H.M.); Beloudgong, Warrumbungle Ranges (W. Forsyth); Coonabarabran (J. L. Boorman).

*Northern Localities.*—Scone and Moonan Flat (J. L. Boorman and J.H.M.); Woolooma Mountain, *viâ* Belltrees, Scone (H. L. White); Stewart's Brook (J.H.M.); Attunga (James Brogan); Nundle (J. L. Boorman, J.H.M.); Apsley River, Walcha district (E. Bêche); Tia Cañon, not seen descending the cañon; also 16 miles east of Walcha, and sparingly in to Walcha (J.H.M.).

Armidale (E. Bêche); Donald, Armidale (George Champion); Emmaville and Deepwater (J. L. Boorman); Glen Innes (H. Deane, Forest-Guard Stewart); Stonehenge, Glen Innes (G. Morris Simpson); Tenterfield to Sandy Flat (J.H.M.); Drake (E. C. Andrews); Acacia Creek, Macpherson Range (W. Dunn).

Gunnedah (J. L. Boorman); Warialda (Forest-Guard Edward Julius, J. L. Boorman); common on the flats, Warialda to Bingera and Inverell (J.H.M.); Inverell, Ashford, and Fraser's Creek (J. L. Boorman, J.H.M.).

#### QUEENSLAND.

Texas (J. L. Boorman); Stanthorpe (Rev. J. H. Simmonds, A. Murphy, J. L. Boorman). The finding of this species in the Stanthorpe country was predicted in my "Forest Flora of New South Wales," vol. i, p. 197.

## AFFINITIES.

I have already referred to the fact that on the bark and general appearance of the tree, *E. melliodora* is sometimes confused with *E. rostrata*, *E. tereticornis*, and *E. polyanthemus*. An axe-cut will show the difference in a moment, as the timbers of the three species mentioned are red, while that of *E. melliodora* is pale, almost yellowish, and dries to a pale brown, the inner bark being bright yellow. The habit of *E. tereticornis* is more erect, while the foliage of *E. polyanthemus* is usually much broader.

### 1. With *E. Bosistoana*, F.v.M., also called "Yellow Box."

The inner bark of this species is whitish, while that of *E. melliodora* is bright yellow. The juvenile leaves of *E. Bosistoana* are broad, while those of *E. melliodora* are more elliptical. The fruits of *E. Bosistoana* are usually larger and have more numerous valves, while the anthers are not terminal or truncate, as are those of *E. melliodora*.

2. With *E. odorata*, Behr.

This has already been alluded to at p. 36, Part XI of this work. The two species are often a good deal alike—*e.g.*, in the foliage, with the intramarginal vein at some distance from the edge, the shape of the buds and of the fruits; but the two species are sharply separated by their anthers.

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**HYBRIDISM.**

The Boxes seem to have a special tendency to hybridise with the Ironbarks.

Mr. J. L. Boorman and I collected at Murrurundi, in May, 1902, specimens which appear to be hybrids between *E. sideroxylon* and *E. melliodora*.

I have a different hybrid between the same species from the Inverell district from Mr. Forest-Guard Gordon Burrow, both of which will be figured and described when I deal with hybridism in this genus.

## DESCRIPTION.

LXVII. *E. fasciculosa*, F.V.M.

Trans. Vict. Inst., 34 (1855).

FOLLOWING is the original description :—

Arborescent; leaves alternate, opaque, glaucescent, elongate—lanceolate, curved, gradually tapering into an uncinatè acumen, thinly veined, destitute of pellucid dots; umbels paniculate, few-flowered, nearly hemispherical, minutely apiculate, thin and smooth; tube of the calyx clavate, obconical, angular, glandulose, contracted at the top, gradually tapering into a short pedicel, three times longer than the lid; fruits obconico-campanulate, slightly contracted at the orifice; valves of the capsule inclosed, seeds clathrate.

On barren ridges along St. Vincent's Gulf, on the Gawler River, in the Mount Lofty Ranges and Bugle Ranges, and on Encounter Bay.

The following year it was described in the following way :—

37. *Eucalyptus fasciculosa*, Ferd. Müll.: ramulis tenuibus viridulis superne saltem angulatus, foliis longiuscule petiolatis e basi acutâ inæquali elongato-lanceolatis rigidule et uncinatim apiculatis marginibus leviter incrassatis, costâ utrinque distinctâ, venis subobtectis, umbellis axillaribus terminalibusque subpaniculatim confertis, 4-8 floris, floribus breviter pedicellatis, calycis-tubo obconico, operculo semiglobo apiculato pallido quam tubus duplo breviorè.

In nemore Pine-forest prope Roolands-flatt, Villmaga, Galway-town (F. Müller) (misprints for Rowland's Flat, Willunga, Gawler Town, Gawler.—J. H.M.).

Frutex. Petioli  $\frac{3}{4}$  poll. longi. Folia 4-5 poll. longa,  $\frac{3}{4}$ -1 lata. Pedunculi  $1\frac{1}{2}$ -2 lin. longi. Pedicell. subquadrangulares. Calycis tubus tenuiter punctatus eum pedicello 2 lin. æquans." (Miq. in *Ned-Kruidk. Arch.*, iv, 138-9 (1856).

It was then referred to by Bentham in B.Fl. iii, 212, as a variety of *E. paniculata*, Sm.; and Mueller ("Eucalyptographia"), under *E. paniculata*, perpetuated the error.

All the following refer to *E. fasciculosa* :—

In South Australia it is a White-gum Tree, seldom rising there above 30 feet, even often of less height, with the outer layers of bark deciduous, leaving the stem grey and white-mottled and smooth (McEwin). It flowers in a shrubby state already . . . . . the flowers of the variety *fasciculosa* are smaller, the lid is proportionately shorter and still more thinly membranous.

The period of flowering seems a long one, at least that of the variety in South Australia, where blooming panicles have been gathered from December to May; they are not much scented. (Mueller in "Eucalyptographia," under *E. paniculata*.)

*E. fasciculosa* is not included in Tate's "Flora of Kangaroo Island," *Proc. Roy. Soc. S.A.*, vi, 157; but *E. largiflorens* (*E. bicolor*), Cygnet River, Waterhouse, is included instead. *E. fasciculosa* is not recorded in Tate's "Plants of Extra-tropical South Australia." It is the plant figured by J. E. Brown in his "Forest Flora of South Australia," under the name of *Eucalyptus paniculata*, Sm., the "Panicle-flowered White Gum."

It may be redescribed in the following words :—

A tree of small or medium size, bark smooth, or somewhat flaky at the butt, timber deep reddish-brown.

Juvenile leaves broad, nearly ovate, venation marked, and with the intramarginal vein remote from the edge.

**Mature leaves** with a twisted petiole of about 2 cm., lanceolate, often somewhat falcate, often 10-15 cm. long by 2-5 cm. broad, equally green on both sides, coriaceous, venation not prominent, pinniveined, margin thickened and intramarginal vein distinctly removed from the edge.

**Flowers**.—Inflorescence paniculate. Buds somewhat angular, the opercula bluntly conical, the calyx tapering gradually into a short pedicel, the common peduncle thin and angular. Flowers 5 to 7 in the head. Anthers terminal-pored.

**Fruits**.—Sub-cylindrical or conoid, about 75 cm. long, tapering into a short pedicel. Valves well sunk, the rim thin and often cracked.

Mr. Walter Gill, Conservator of Forests, Adelaide, says that in South Australia, this tree goes under the names of "Scrub Gum," "Hill Gum," "Sand Gum," "Pink Gum," and that he prefers the last name. It is the "White Gum" or "Dwarf White Gum" of Behr and many others.

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## SYNONYM.

*E. paniculata*, Sm.; var. *fasciculosa*, Benth.

"Flowers rather smaller than *E. paniculata*, operculum usually short." (B.Fl. iii, 212.)

The following description of a plant from Bethany, South Australia, by Schlechtendal, referred by him to *E. paniculata* belongs to *E. fasciculosa* :—

180. *Eucalyptus paniculata*, Smith, DC. Prodr., 111, p. 220, n. 33 (?). Specimen Siberianum in pl. Nov. Holl. exs. n., 468, sub nomine *E. terminalis* editum, quod *E. paniculate* proximum videtur, a nostra quoque specie haud longe . . . p. 659, distat quæ differre videtur: ramulis foliisque gracilioribus, floribus paullo minoribus, alabastro magis globoso, nec angulis 4 elevatis e pedicello orientibus notato, extus magis rugoloso (an exsiccatione?), operculo depressiore, acutiusculo quidem, staminibus longioribus (in planta Siberiana flores pauci jam aperti) calycis tubo deflorato campanulato. Folia variabilia 2-5½ poll. longa, 4-7 lin., lata alia valde elongata angustata, alia lanceolata latiora, longius breviusve petiolata, petiolo ad ¾ poll. interdum longo, utrinque attenuata, margine crassiusculo, venis et nervo marginali ex iis orto leviter prominulis. Inflorescentia ex umbellulis trifloris cymose composita quasi terminalis. Alabastra 3 lin. longa. Stamina 4 lin. longa, stylis iis dimidior brevior stigmatibus orbiculari depresso convexo.

Am Gebirge bei Bethanien, November. (Schlechtl., in *Linnea*, xx, 658.)

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## RANGE.

This species appears to be restricted to South Australia and Kangaroo Island.

*South Australia*, Lofty, Bugle, and other ranges along St. Vincent's Gulf (F. Mueller). Banks of the Three-Well River [on Kangaroo Island.—J.H.M.] (Waterhouse); White Gum (Behr). B.Fl. iii, 212.

The following localities are given by Mueller in the "Eucalyptographia" for *E. paniculata*, var. *fasciculosa*.

On dry, particularly sandy ridges, and also on stony ranges near the Murray River and St. Vincent's Gulf (Mueller), at Lacepede Bay (Babbage), and some intermediate places, also in Kangaroo Island (Waterhouse).

Following are additional South Australian localities:—Onkaparinga River, near Willunga (Mueller), the type locality; Kuitpo Forest Reserve, near Willunga (W. Gill); Houghton (G. McEwin, from Nat. Herb., Melb.); Mount Lofty Range (Dr. J. B. Cleland); Aldgate (J.H.M.); Sandy Creek, near Gawler (W. Gill); between Mount Barker and Murray Bridge (M. Holtze); Tatiara Country (R. H. Cambage); also the following localities quoted by J. E. Brown: Tea-tree Gully to Mount Pleasant, and Kangarilla, near Clarendon (R. Tate); Bloomberg and Para Wirra (J. E. Brown).

**Kangaroo Island.** Banks of the Three-Well River (Waterhouse); Western Cove, Nepean Bay: "A gum 40 feet high; trunk grey, bark corky,  $\frac{1}{8}$  inch thick, but thickening to  $\frac{1}{4}$  inch in old trees." (Prof. Tate, 1882, and recorded by him in *Proc. Roy. Soc., S.A.* vi, 157, as *E. largiflorens*.)

Timber Creek and Retta's Lagoon (Dr. and Mrs. R. S. Rogers); Middle River (Edwin Ashby).

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## AFFINITIES.

### 1. With *E. paniculata*, Sm.

The differences have been indicated to some extent already. *E. paniculata* is a straight-growing Ironbark, while *E. fasciculosa* is a somewhat gnarled and even stunted White Gum.

### 2. With *E. intertexta*, R. T. Baker.

These will be dealt with when *E. intertexta* is figured. The readiest method of separating them is by the anthers if flowers be available, for they resemble each other very strongly in timber, bark, foliage, fruits.

### 3. With *E. Baueriana*, Schauer, var. *conica*, Maiden.

The bark is fibrous (box-like) in this variety and smoothish in *E. fasciculosa*; the timber of the former is pale-brown, and that of the latter deep reddish-brown. The juvenile leaves of var. *conica* are thinnish and narrower, the mature leaves are thinner, the operculum is shorter in comparison with the calyx. The anthers of the two trees are a good deal similar, and buds and fruits often display considerable resemblance—so much so that they can be readily confused.

## DESCRIPTION.

LXVIII. *E. uncinata*, Turczaninow.

FOLLOWING is the original description :—

*Eucalyptus uncinata*. Caule, ramis, ramulisque teretibus cortice fusco; foliis alternis petiolatis lineari-lanceolatis, glaucis, subpellucidis punctatis marginatis, basi longe attenuatis, apice in acumen uncinatum productis; capitulis multifloris pedunculatis, inferioribus remotiusculis, superioribus in racemum densum collectis; pedunculis petiolos subaequantibus; pedicellis fere nullis; cupula turbinata tereti aut vix angulosa; operculo conico obtusiusculo cupulam subaequante staminibus exsertis (albidis). Alabastra parva, magnitudine illorum *E. robustae*, folia 2-3 poll. longa, latitudine majore  $2\frac{1}{2}$  lin. non excedente. Drum. 3, n. 66. Turcz. in *Bull. Soc. Nat. Mosc.*, xxii, pt. 2, p. 23 (1849).

It will be observed that the type is No. 66 of Drummond's third collection.

This is repeated, word for word, in Walpers' *Annales Botanices Systematicae*, ii, 620 (1843).

It was then described by Bentham, in *B.Fl.* iii, 216, and afterwards figured and described by Mueller in the "Eucalyptographia." The narrow-leaved specimen at the right of the plate is *E. leptophylla*, Miq. (*E. olcosa*, F.v.M.; var. *leptophylla*, F.v.M.)—in other words, the narrow-leaved form of *E. uncinata*. I have heard doubts expressed as to the validity of *E. uncinata* as a species, but such doubts are quite unnecessary. It is, however, not a very well-known species even yet, being confused with other Mallees.

*E. uncinata* is one of the species in which the juvenile form of foliage often remains side by side with the mature foliage. The leaf is often hooked (uncinate), but this is by no means a universal character.

The anthers are not terminal truncate like those of *E. melliodora*, *paniculata* and others, but (see Fig. 1*b*, Plate 62) of an allied and peculiar shape, for which I propose the name semi-truncate.

The kink in the filament is well exhibited in this species and does not occur in the flowers of many others.

## VARIETIES.

Bentham suggests three varieties :—

1. Var. *latifolia*, Benth., Drummond, 4th Coll., No. 76 (*B.Fl.* iii, 216).

I have had a drawing prepared of Drummond's specimen in the Cambridge Herbarium. A sufficient portion is figured at 2*a* of Plate 62. It is not in ripe fruit.

I collected specimens from the Kalgan Plains, north of the Kalgan River, Western Australia, which match Drummond's specimen in every detail. It seems to me a stunted, precocious form of the type, with, on the same shrub or clump of shrubs, leaves of the normal width and leaves broad, and with the pedicels absent or nearly so. These shrubs flowered while the leaves were in the broad opposite-leaved state. Specimens are figured at 3*a*, 3*b* of Plate 62.

The variety does not seem to be a strong one, running imperceptibly into the type, and I see no advantage in retaining it.

The species varies a good deal in the width of the leaves, as may be seen from examination of Plate 62.

Specimens from Cut Hill, York, Western Australia (O. H. Sargent, 433), have broad leaves—*e.g.*, 4.5 cm. long and 1.5 cm. broad; but the flowers are distinctly pedicellate and not sessile as those of the true var. *latifolia*. They were gathered from a clump of shrubs of typical *uncinata*.

### 2. Var. (?) *major*, Benth.

Flowers larger, contracted into very short, thick pedicels, the peduncles more flattened. Fruit rather larger, scarcely contracted at the orifice, the rim broader and flatter, the valves not acuminate.—Murchison River, *Oldfield*. (B.Fl. iii, 216.)

I have figured at 15*a*, *b*, *c*, Plate 62, a specimen from the Herbarium Boissier of Geneva, which I have no doubt is this supposed variety. The leaves have in part a bluish-green cast, and have very indistinct venation. I would like to see juvenile leaves of this form, which is one that we know very little about. I have not been able to get particulars of the living shrubs or trees.

### 3. Var. *rostrata*, Benth.

Flowers more distinctly pedicellate, the operculum acuminate and longer than the calyx.—Phillips Range, *Maxwell*; Murchison River, *Oldfield*, also *Drummond*, 5th Coll., n. 186. (B.Fl. iii, 216.)

I have figured Drummond's specimen at Fig. 15, Plate 66, Part XV (not yet published) of this work. I consider it to be a form of *E. oleosa*, and will discuss the matter when I come to that species.

I have collected *E. uncinata* at Hopetoun, Western Australia, with an acuminate operculum longer than the calyx (and therefore answering the description of var. *rostrata* to that extent), but it is different to Drummond's specimen, and I look upon it as a coarse form of *E. uncinata*. (See Fig. 14, Plate 62.)

This specimen came not far from the place whence Maxwell's specimen was obtained; but I have seen neither Maxwell's nor Oldfield's specimens, and it is quite possible Bentham may have included plants of two species under his variety.

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## SYNONYMS.

1. *E. leptophylla*, F.v.M. (often quoted as *E. leptophylla*, Miq.).
2. *E. desertorum*, Naudin.

### 1. *Eucalyptus leptophylla*, Ferd. Müll. MSS.

*E. perforata*, Behr, Herb. partim.—Anne *E. xanthonema*, Turczanin., Bull. de Moscou, xx, p. 163 (?) frutex gracilis glaber, ramulis rubellis vel flavescens, foliis latolincaribus in acumen tenui excurrentibus coriaceis frequenter pellucido-punctatis, umbellis axillaribus 3-7 floris, calycis tubo obconico-campanulato operculi flavescens late conici mutici sublaevis longitudine, fructibus parvis cyathimorphis.

Nova Hollandia australis, Murray-scrub, aestate florens (Dr. Behr).

Frutex humanae altitudinis, folia 2-3 poll. longa,  $1\frac{1}{2}$ -2 raro 3 lin. lata, costa utrinque [p. 124] distincta nec tamen prominens, venae obtectae. Pedunculi  $1-1\frac{1}{2}$  lin. longi; flores subsessiles. Calycis tubus 1 lin. longus.—E. viminali proxima, foliis angustioribus et opereulo acutiore et longiore differt. Stirpes Novo-Hollandae a Ferd. Mullero collectas determinavit, F. A. G. Miquel. (*Nederlandsch Kruidkundig Archief*, iv, 1859, p. 123.)

2. *E. desertorum*, Naudin, 2nd Mem., p. 56.

Copy of a label in Herb. Mus., Paris: "*Eucalyptus desertorum*, Naudin, (fragments de l'exemplaire typique). Originaire des déserts de l'Australie intérieure. Cult. à la Villa Thuret, Antibes (Alpes Maritimes). M. Naudin, 1859." A shrub, flowering abundantly the third year from seed. It is *E. uncinata*, Turcz.

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## RANGE.

It has been recorded from all the States except Tasmania and Queensland. It is a dry-country species, and one does not expect it to be found in Tasmania, but it is certainly worth looking for in Queensland—say at the extremest south-western angle, near the New South Wales-South Australian border.

### WESTERN AUSTRALIA.

We know it from Fremantle, the York district, on the Great Southern Railway (*e.g.*, Tambellup), and many places near the south coast, on the eastern gold-fields, and as far west as Tammin. Then we have a few localities connecting with the Murchison. But it is obvious we have many connecting localities to find yet, so that we cannot define its range.

Following are some specific localities:—

"Thin-leaved Mallee," Subiaco Beach, near Fremantle (Dr. J. B. Cleland); erect bushy shrub, 5-8 feet high, rocky ground, limestone hills, 3 miles south of Fremantle (W. V. Fitzgerald).

The following specimens from southern localities have the pedicels absent or very short:—

Shrub of 6-9 feet, Tambellup (Dr. L. Diels, No. 2,313). Kalgan Plains, in bud, only a flower or two, also in fruit; narrow leaves; juvenile leaves glaucous; a round-headed, many-stemmed shrub of a few feet, with red buds; sometimes a spindly, rather erect shrub (J.H.M.); Cape Riche (Dr. Diels, No. 3,464); Deeside, Lake Muir, a coarse form, some leaves with a bluish-green cast (A. Muir); Israelite Bay (Miss S. Brooke).

Shrub of about 8 feet, Cut Hill, York, on ironstone (O. H. Sargent, Nos. 427 and 429).

Coolgardie (L. G. Webster, E. Kelso); 50 miles north-west from Knutsford, Elder Exploring Expedition, 1891 (R. Helms); Cunderdin and Kellerberrin (W. V. Fitzgerald); Tammin (J.H.M.); "Whipstick Mallee," a shrub, 8 to 10 feet high, growing on sand plains, Coweowing (Max Koch, No. 985); a small tree with a dark bark, Watheroo Rabbit Fence in forests (Max Koch, Nos. 1,612 and 1,612 *b*); Murchison River (Oldfield), in flower only, and apparently the normal form.

#### SOUTH AUSTRALIA.

Cape Jervis, just across Backstairs Passage is Kangaroo Island. It is abundant here, and say 10 feet high. (J.H.M.)

Harriet River and Timber Creek, Kangaroo Island (Dr. R. S. and Mrs. Rogers). It has not previously been recorded from that island.

Murray Bridge (R. H. Cambage and J.H.M.). This is the narrow-leaved small-fruited form common in the Murray district in South Australia and the Ninety-mile Desert generally. It was named originally by Mueller, *E. oleosa*, var. *leptophylla*. *E. uncinata* with leaves and fruits of the typical size is common enough in the same district.

A shrub, or, when growing in favourable conditions, a tree. Widely distributed over the Ninety-mile Desert, Cooke's Plains (Max Koch); Emu Flat, near Keith Railway Station, Ninety-mile Desert (W. Gill); Lake Hindmarsh (C. Walter); "Red Mallee," Nackara, north-east of Terowie (W. Gill).

Port Lincoln to Coffin's Bay; only seen sparingly along the road—*e.g.*, at 15–16 miles; timber reddish rather than brown (J.H.M.); Port Lincoln district, on Streaky Bay Road, 2 miles from Wanilla Forest Reserve (W. Gill); Yorke's Peninsula (Tepper); Sandhills east of Ooldea, Transcontinental Railway Survey, between South and Western Australia (Henry Deane).

#### VICTORIA.

Only known from the vicinity of the Murray River, and the Mallee country generally. Grows mostly under 20 feet in height. Hardly found off the sand-hills, where it grows in company with *E. incrassata*. Euston (N.S.W.) to Mildura and Swan Hill (W. S. Browncombe); Swan Hill (W. Ross); Dimboola (St. Eloy D'Alton, F. Reader); Nhill (St. Eloy D'Alton); Height about 20 feet. Stem smooth and white. diameter 2 to 3 inches. Inglewood (J. Blackburne).

#### NEW SOUTH WALES.

It is a rare species in this State, so far as is known at present. I have it from Mount Hope to Euabalong (R. H. Cambage); Nymagee (J. L. Boorman). It is also common along the Murray River, at least as far east as Swan Hill.

In B.Fl. iii, 216, we have it recorded as "In the Euryalean Scrub of the interior (Fraser)." This would be on Oxley's expedition, whose furthest west was 144½ degrees east longitude and 34 degrees south.

## AFFINITIES.

### 1. With *E. oleosa*, F.v.M.

Affinity undoubtedly exists, although typical forms seem different enough. Mueller named a narrow-leaved form of *uncinata*, *oleosa* var. *leptophylla*, and he confused the species on other occasions, pardonably enough—indeed his original description of *E. oleosa* had to be amended to exclude some *E. uncinata*. The buds of the two species are often a good deal alike.

The valves of *E. uncinata* are so exerted, fairly frequently, as to strongly resemble a small-fruited form of *E. oleosa*. *E. oleosa* has a fruit which tends to be urceolate; this I have not noticed in *E. uncinata*. The juvenile leaves of the former species are larger and broader. The timber of *E. uncinata* is brown, less rarely of a reddish cast; the timber of *E. oleosa* is redder, often very red. The twigs and branches of *E. uncinata* are often markedly red, and hence it is sometimes called "Red Mallee" for that reason, and not because of the colour of the timber.

Diels and Pritzel, in "Engler's Jahrb.," xxxv, 438 (1905), remark: "Formæ quaedam ad *E. oleosam* transitum efficiunt, an hybridæ (?)."

### 2. With *E. decurva*, F.v.M.

This affinity is mentioned by Mueller ("Eucalyptographia," under *E. uncinata*), because of the kink in the filament in *E. uncinata* (also occurring in *E. falcata*, and not in *E. decurva*, as stated by Bentham). The shrubs are, however, as unlike as they can well be; and inasmuch as there has been a good deal of confusion as to what *E. decurva* is, I defer my remarks until Part XVI of this work is reached, when it will be found I have figured *E. decurva* on Plate 70.

### 3. With *E. micranthera*, F.v.M.

As suggested by Bentham in B.Fl. iii, 218, who says, "possibly a form of *E. uncinata*." Under *E. uncinata* ("Eucalyptographia") Mueller refers to the affinities of *E. uncinata* and *E. micranthera*.

In *Proc. Aust. Adv. Science*, vii, 533 (1898), Luehmann goes further, and says that *E. micranthera* is a variety of *E. uncinata*.

I dissent from this view. *E. micranthera* is an imperfectly known species, but I have a figure of the unique specimen in the Melbourne Herbarium, and will discuss *E. micranthera* in relation to *E. uncinata* when I am in a position to reproduce my drawing in this work.

4. With *E. cladocalyx*, F.v.M. (*corynocalyx*, F.v.M.)

Bentham (B.Fl. iii, 216) and Mueller, in "Eucalyptographia," under *E. uncinata*, refer to the kink in the filament in these species, but it would be difficult to find any other resemblance.

5. With *E. calycogona*, Turcz., var. *gracilis*, Maiden.

"This species has much the habit of *E. gracilis*, but is very different in stamens and fruit." (B.Fl. iii, 216.)

Both are slender leaved Mallees of about the same size. There is certainly danger in confusing the two species in the bush, particularly when full material is not available. The timber of the var. *gracilis* is of a more decided cigar-brown.

6. With *E. decipiens*, Endl.

These two species are sometimes confused in herbaria, but the anthers are very different. It would not be possible to confuse them in the bush. I will deal with the matter under *E. decipiens*. (See page 152.)

## DESCRIPTION.

LXIX. *E. decipiens*, Endl.

FOLLOWING is the original description :—

Foliis alternis ellipticis ovatis obovatisve mucronatis obsolete crenatis, pedunculis axillaribus terminalibusque teretiusculis petiolo brevioribus, floribus 5-15 capitatis, operculo conico cupulam triente superante. King George's Sound (Hügel).

Facies omnino *E. obovatae*, Labill., Nov. Holl., t. 153, sed operculi forma et longitudine distinctissima. (*Enumeratio* plantarum quas in Novæ Hollandiæ ora Austro-Occidentali ad Fluvium Cygnorum et in Sinu Regis Georgii collegit Carolus Liber Baro de Hügel, 49 [1837]). The Myrtacæ by Endlicher.

Then we have the species more amply described :—

7. *Eucalyptus decipiens*, Endl., fruticosa; laevis; foliis coriaceis, alternis, subrotundis ellipticis oblongis lanceolatisve, in petiolum attenuatis, breviter acuminatis, pallide virentibus, opacis; capitulis axillaribus, 8-12 floris, confertis; pedunculo subtereti; pedicellis hypanthio continuis subnullis vel brevissimis; hypanthio turbinato, fauce brevi; operculo conico, in apicem subcornutum contracto, nitidulo, hypanthio triente circiter longiori. Endl. Enum. pl. Hügel, pag. 49, n. 155.

Variat: (a) *latifolia*. foliis subrotundis ellipticis oblongisve. *E. decipiens* Endl. l.c. (v, in H. C. Vindob.)

(b) *angustifolia*. foliis lanceolatis. Herb. Preiss, sine No.

In glareosis sterilibus collium Wuljenup promontorii Cape Riche, Novembri, a. 1840, florens lecta Herb. Preiss, No. 241.

"Frutex 8-10 pedalis." *Folia* quoad figuram maximopere variabilia.

*Hypanthium* cum pedicello 2-2½ lin. longum, cum operculo fuscum, nitidumque.—Forma *latifolia*, a nob. L. B. de Hügel lecta, *E. ovatae*, Lab., tantopere similis est, ut pro eadem habuerim, nisi operculi forma repugnaret. Lehmann, *Plante Preissiana*, pp. 129-130, i, 1845.

It will be observed that the type was collected at King George's Sound, and that it is the broad-leaved form of the species ("facies omnino, *E. obovatae*, Labill., Nov. Holl., t. 153.") I received the loan of the type from the Vienna Herbarium, and have figured portions of it at Figs. 1a 1b of Plate 63.

Lehmann calls this normal or broad-leaved form, variety *latifolia*, and the narrow-leaved form (Herb. Preiss, No. 241), of which I have a specimen, variety *angustifolia*.

Lehmann describes it as shrubby, but Bentham corrected this, and I have seen it a tree 3 feet in diameter of trunk, and doubtless it is larger.

Bentham (B.Fl. iii, 218) describes *E. decipiens* correctly, as with "leaves ovate, ovate-lanceolate or lanceolate." Mueller ("Eucalyptographia") figures *E. decipiens*, but with leaves narrower than those of the type.

As to the variety *angustifolia* of Lehmann, I am of opinion that it cannot be usefully maintained, as the width of the leaves varies a good deal in the same tree, or clump of trees. I travelled extensively over *decipiens* country, and particularly noted its variation. Some remarks on individual specimens will be found at page 151.

*E. decipiens* may be described in the following words:—

Varies from a shrub to a small or large tree. It is usually a twisted or gnarled small tree, a denizen of sour land, but on the banks of rivers and creeks it attains the height of 60 or 70 feet, with a stem-diameter of 3 feet, but it is never an erect tree. Known as Swamp—or Floode.—Gum.

**Bark**, fuzzy fibrous, the outer layers softish, flaky and furrowed, reminiscent of that of the Apple of the Eastern States (*Eucalyptus Stuartiana*, F.v.M.).

**Timber**, dull pale brown, liable to gum-veins, cracks radially, is brittle and perishable, and of no ascertained economic value.

**Juvenile leaves**.—Thick, equally green on both sides, nearly circular to obovate, obovate, and spatulate. Margin slightly crenulate, often emarginate, sometimes with a mucrone.

Intramarginal vein at some distance from the edge, penniveined as regards the lateral ones.

**Mature leaves** ovate, ovate-lanceolate or lanceolate, acuminate, rarely exceeding 4 inches, and often under 3, rather thick, the fine diverging veins scarcely conspicuous; the intramarginal ones usually at a distance from the edge.

**Peduncles** short, mostly axillary, terete or slightly flattened, each with a head of six to twelve sessile flowers.

**Calyx-tube** turbinate, about 2 lines long, the border usually prominent in the bud.

**Operculum** conical or acuminate, from a little longer to nearly twice as long as the calyx-tube. Operculum often curved, and sometimes the calyx-tube almost winged.

**Stamens** inflected in the bud, anthers creamy yellow, thick and globular, somewhat broader at the base, and hence, to that extent, reminding one of the *Renanthera*.

**Filament** thickish. Gland small and on top, and situated a little to the front. Dehiscence round or oval.

In old anthers, when the pollen falls out, the pollen-sacs collapse more or less, and the anther openings tend to become parallel.

**Fruit** broadly turbinate, pear-shaped or globose, truncate, 3 lines in diameter or rather more, contracted at the orifice, the rim rather broad, flat or scarcely convex, the capsule more or less sunk, but the points of the valves usually protruding.

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## RANGE.

This species is confined to Western Australia, and is recorded from the vicinity of Fremantle, Cranbrook on the Great Southern Railway, and the Kalgan River, near King George's Sound. We want specimens from intermediate localities.

Bentham (B.Fl. iii, 218) gives:—

“Sand plains, Kalgan River (Oldfield), and eastward toward Cape Riche (Harvey, Drummond, 3rd Coll. Suppl., n. 14, Preiss. n. 241), all apparently the shrubby form,” but I have seen it a tree 3 feet in diameter on the Kalgan River.

He adds : " the arboresecent one, Limestone Hills, Swan River, and Banestee River, on the road to King George's Sound, " Flooded Gum " (Oldfield) ; swamps about Tulbrinup Lake (Maxwell)."

The plant varies a good deal in size, and I know of no botanical differences between the shrubby and arboresecent forms of the species, which seem purely a matter of environment.

Following are some notes made by me while standing before the trees on flats, Kalgan Plains, near the Porongorups, and on the banks of the Kalgan River :—

*a.* Called " Swamp Gum " or " Flooded Gum." Occurs on flats. The best tree in the bush for leaves to blaze up, hence fires are commonly made of the green branches. Trunk up to 3 feet in diameter. In its depauperate form, a straggling unhandsome tree with brittle branches. Has no great length of trunk. Timber not used, bad to burn. " Moitch " is the aboriginal name for the tree, as given to me by Mr. William Dunn, an old resident.

*b.* There are very large rather fine-looking trees near the Kalgan River ; the stunted ones are in swamps on plains. It has box-like bark, which reminded me of the bark of the apple tree (*E. Stuartiana*) of the east coast. The timber is not used for anything ; it is very difficult to burn.

*c.* I came across a tall thicket of this species on Gaalgugup Hill, with small fruits in heads all down the stalks. Leaves medium lanceolate, and somewhat thickish in texture. The species is variable in various ways.

Diels and Pritzel (Engler, *Jahrb.*, xxxv, 438, 1905) did not see the tall tree form of this species.

In specimens collected by me at the Porongorups, near the edge of the Kalgan Plains, I observed (1) opercula distinctly curved and fruits compressed as to be conoid and valves non-exsert ; (2) buds broadened out at the base so as to be almost winged, and some of the fruits with the rims thin.

All of the specimens display considerable variation in width of leaf—many of them would meet the requirements of var. *angustifolia*, while others have leaves as broad as those of the typical form. I repeat that I cannot see that a variety *angustifolia* would be justifiable or useful in practice.

The above are from the South Coast district ; the following are from near Fremantle and Perth.

Erect shrubs, 8–12 feet, forming thickets on limestone rocks, near Fremantle, (W. V. Fitzgerald). In this specimen also we have an admixture of leaves of width varying from lanceolate to broadly ovate. Near Claremont (between Fremantle and Perth) on limestone (Cecil Andrews, Dr. J. B. Cleland) ; North Beach, near Fremantle (Dr. J. B. Cleland).

## AFFINITIES.

1. With *E. concolor*, Schauer. (See below, p. 155.)
2. With *E. uncinata*, Turcz.

The species is allied in its fruit to *E. uncinata* and *E. oleosa*, and almost intermediate between them as to stamens, differing from both in foliage and in the shape of its sessile flowers. (B.Fl. iii, 218.)

The two species (*decipiens* and *uncinata*) are totally different in the bush, the former being a straggly, fibrous barked, rotten Swamp Gum, and the latter a spindly, whip-stick Mallee, with narrow leaves, a broom-top appearance, and smooth, slightly ribbonry stems. The anthers of *E. uncinata* are semi-terminal and the filaments kinked, and that species rarely has acuminate opercula.

3. With *E. oleosa*, F.v.M. (See paragraph above.)

*E. oleosa* is a Mallee or tough-stemmed small tree, with red, durable wood; the fruit has a tendency to be spherical or urceolate, while that of *E. decipiens* is more truncate. The tips of the valves of the fruits of *E. oleosa* are more exsert, more subulate, and have less tendency to be joined at their tips. Other differences can be readily indicated by a study of Part XV and Plate 65 (not yet issued).

## DESCRIPTION.

LXX. *E. concolor*, Schauer.

FOLLOWING is the original description :—

Arbuseula ; laevis ; tota pallidissime viridis ; foliis rigidulis, alternis oblongo lanceolatis, in petiolum contractis, acuminatis, nitidulis ; capitulis axillaribus, 5-8 floris ; pedunculo tereti-usculo vel compresso, petiolo breviori ; hypanthio sessili, subcampanulato ; inferne angulato, fauce brevi ampliata ; operculo e basi breviter conica in acumen cornutum contractum, crassiusculum, hypanthio quadrante longius.

In colle calcareo prope coloniam Freemantle, Decembri M.a. 1838 florens. Herb. Preiss. No. 225 ; in glareosis porrectis regionum interiorum Australie meridionali-occidentalis No. 243, sterilis.

“ Arbuseula 8-12 pedalis.” Folia 4-5 poll. longa, 1-1½ poll. lata, inaequilatera. Hypanthium 3 lin., operculum 4 lin. longum. Germen vertice conico emersum, 4 loculare.—Proxime affinis *E. capitellata* Sm., quae, habitu quidem valde similis, differt : operculo conico vix constricto, obtuso, hypanthium longitudine vix aequante. (Lehmann in “Plante Preissiana,” i, 129.)

It will be noted that the type was collected on limestone hills near Fremantle, and that it reminded the describer of *E. capitellata*, Sm.

Mueller (*Fragm.* ii, 42) describes the species, and Bentham also does so in B.Fl. iii, 247.

Mueller keeps *E. decipiens* and *E. concolor* separate in the *Second Census*, and Luehmann (*Proc. Aust. Ass. Adv. Science*, vii, 532-3) keeps them apart and refers to them very briefly in his “Dichotomous key” :—

Capsule raised above the rim.

Operculum conical, flowers closely sessile, *E. decipiens*.

\* \* \* \* \*

Operculum conical or acuminate, longer than the calyx.

Flowers sessile, *E. concolor*.

Mueller does not figure *E. concolor* in the “Eucalyptographia.”

It may be described in the following words :—

A tree of 30 to 40 feet with a smooth bark, according to Oldfield. Usually a small tree or tall shrub, with much of the aspect of *E. decipiens*, but coarser and more rigid in all its parts. Branchlets angular.

**Juvenile leaves**, similar to those of *E. decipiens*.

**Mature leaves**, ovate-lanceolate to lanceolate-acuminate, often 4 to 5 inches long, thick and rigid, the fine diverging veins numerous and parallel, but scarcely conspicuous, the intramarginal one nearer the edge than in *E. decipiens*.

**Peduncles** short axillary, broad and flat but thick, each with a head of six to twelve or more sessile flowers.

**Calyx-tube** turbinate, thick and often angled, but otherwise smooth, about 3 lines long.

**Operculum**, conical or acuminate, rather longer than the calyx-tube.

**Stamens** inflected, the anthers large and white, opening in parallel slits ; a very large gland at the back of each, but showing at the top and somewhat in front. The anthers quite distinct from those of *E. decipiens*.

**Fruit** globose truncate, about 4 lines diameter, contracted at the orifice, the rim broad, flat, or slightly convex, the capsule sunk, but the points of the valves usually protruding. Specimens, with fruits with barely protruding valves, display great similarity to the fruits of *E. capitellata*, Sm.

## RANGE.

It is confined to Western Australia, and we know its habitats very imperfectly. Near Fremantle, *Preiss* No. 225 (the type).

Bentham adds the following localities:—Doubtful Island Bay and shady ravines, Point Irwin (Oldfield); Drummond, 4th Coll., No. 77.

I have not the type from near Fremantle, but believe I have every form of *E. decipiens* from that neighbourhood. I have no indubitable *E. concolor* from the Fremantle district, and, in view of its frequent confusion with *E. decipiens*, suggest that it be very carefully searched for in that neighbourhood, and careful notes made on the spot.

I have before me Drummond's 4th Coll., No. 77, quoted by Bentham for *E. concolor*. It matches precisely specimens collected by me at the Porongorups, on the Kalgan Plains, about 35 miles from Albany.

Dr. L. Diels' specimens (No. 3,504), "Cape Riche in rupestribus calcareis," from the same district, are similar.

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## AFFINITIES.

### 1. With *E. micranthera*, F.v.M.

*E. micranthera* is only known from one or two specimens in bud and flower. What this species is will be better understood when I figure it, but the foliage and inflorescence of these two species are a good deal similar, and the anther of *E. micranthera* is very small, not with parallel dehiscence, and the top of the filament is wavy or serrulate.

### 2. With *E. incrassata*, Labill.; var. *conglobata*, R.Br.

*E. concolor* much resembles *E. incrassata*, var. *conglobata*, in general appearance of herbarium specimens, but the anthers are very different; the fruits of the latter have a narrower rim, while the buds are more or less longitudinally furrowed, and have blunter opercula.

### 3. With *E. falcata*, Turcz.

On the limestone, near Fremantle, occur small trees, which have been referred to various species. They present some resemblance to *E. concolor*. I have named them *E. falcata*, and Fremantle is a new locality for this species, so far as I am aware. Illustrations are necessary to explain the affinities and differences of the two species, which will be gone into in Part XV.

4. With *E. goniantha*, Turcz.

In B.Fl. iii, 248, Bentham speaks of a variety "with the calyx tapering into a very short pedicel, as in *E. goniantha*, but smooth as in *E. concolor*. Doubtful Island, Peninsula, and Cape Arid (Maxwell)."

I leave the reference as I find it, as I have not seen the specimens referred to, and the Director of Kew, under date 29th August, 1911, informs me that they are not in that herbarium. For *E. goniantha*, Turcz., which is not closely allied to *E. concolor*, see Plate 18, and p. 103, Vol. I, of this work.

5. With *E. decipiens*, Endl.

I invite attention to the following two specimens, collected by Dr. L. Diels, and distributed by him under the number 2,963. They were both collected at Cranbrook, a few miles north of Albany, on the Great Southern Railway.

*a.* "2-5 metres, cortice cinereo, pr. Cranbrook in arenosis fruticosis." This particular specimen, in fruit only, is quite typical for *E. decipiens*. Small sessile fruits, with distinctly exert valves.

*b.* In fruit and bud. Fruits rather larger than the preceding specimen, and all the leaves (of which there are fifty on my specimens), except one, lanceolate. This particular leaf is as broad as that of 1 *b* of Plate 63. The curved buds are those commonly seen in *E. decipiens*, but the anthers are those of *E. concolor*. They are not absolutely typical, but they are certainly much nearer to those of typical *E. concolor* than they are to those of *E. decipiens*. I therefore place this specimen with *E. concolor*.

As regards (*a*), I am on the horns of a dilemma. It is so typical for *E. decipiens* that no tyro would hesitate on the matter; but if I place it with that species, I am compelled to separate two specimens placed under the same number by an experienced collector like Dr. Diels, and to say that this specimen shows that *E. decipiens* is indeterminable, except with flowers.

At present the only character on which I can separate *E. concolor* from *E. decipiens* is on the anthers, which I have described elsewhere.

Fremantle is the type locality for *E. concolor*, but all the specimens collected by my friends and myself in that locality are *E. decipiens*.

I cannot see any difference in the juvenile foliage of the two species, nor in the appearance of the trees as I saw them. But I did not find *E. concolor* as a large tree as I did in the case of *E. decipiens*.

It is evident that *E. concolor* requires further investigation, and its relations to *E. decipiens* should be further ascertained. This is work to which I invite the attention of my colleagues in the Western State.

## DESCRIPTION.

LXXI. *E. Clœziana*, F.v.M.

In *Fragmenta* xi, 44 (November, 1878).

THIS is in Latin, and an abbreviated translation will be found in Bailey's "Queensland Flora." ii, p. 620.

Following is a more literal and fuller translation of the original description, with *italics* as given by Mueller in the original:—

Arborescent, with slender slightly angular branches, with *chartaceous ovate—or elongated—lanceolate leaves, unequally green on both sides*, penniveined with rather distant and thin veins, long-acuminate, slightly curved and transparently dotted with oil glands, the intramarginal vein rather distant from the edge, *with a very rich many-flowered panicle*, with mostly 4 to 6-flowered umbels, with terete or slightly angular peduncles, the ultimate ones very short, with a semi-ovate not angular calyx-tube, about as long as the pedicels, with a *depressed hemispherical operculum, at least half as long as the calyx-tube*, and very obtuse, with stamens all fertile, inflexed in bud, *with very small nearly globular anthers* longitudinally dehiscent, style much exserted, and a not dilated stigma, with hemispherical-turbinate young fruits, not angular, 3- or 4-celled, with the margin of the rim rather thin, valves not exsert; seeds not winged. In coastal mountains at Rockingham Bay, Queensland.—*Dallachy*.

**Tree.**—About 30 feet high. According to the discoverer's observations, occasionally nearly leafless.

**Bark.**—Cracked, scaly, blackish. Perhaps belonging to the Schizophloie.

**Wood.**—Hard.

**Petioles.**—Slender;  $\frac{1}{3}$  to  $\frac{2}{3}$ -inch long.

**Leaves.**—Three to 5 inches long,  $\frac{3}{4}$  to  $1\frac{1}{2}$  inch broad, deep green above, pale green below; the primary veins distinct above, just visible below.

**Panicles.**—Lateral and perhaps also terminal, dense, much-branched. *Ultimate peduncles* mostly hardly, a few lines long, rather stout.

**Pedicels.**—Rather thick, before flowering about  $1\frac{1}{2}$  lines long.

**Flowers.**—Fragrant.

**Unopened calyces.**—Globular-ovate, little, or hardly more than 2 lines long to the line of separation from the operculum.

**Filaments.**—Very slender; capillary, whitish, conspicuously longer than the calyx-tube, attaining 4 lines.

**Anthers.**—About one-fifth of a line long; somewhat cordate at the base, verging into truncate-ovate.

**Style.**—About 2 lines long.

**Fruit.**—Apparently small; ripe fruit not seen.

The connection of this species with its nearest allies can hardly be settled in absence of ripe fruits, but it seems to me it belongs to the series of *E. crebra*. *E. crebra* and *E. drepanophylla* are separated from it by the more narrow leaves, pale green on both sides, and with closer and finer veins, by the more slender peduncles and few-flowered umbels, the acute operculum, the calyces conspicuously attenuate at the base, and the shorter stamens and style. *E. siderophloia* is distinguished from it by the thicker and one-coloured leaves, the veins of which nearly reach the margin, the flowers more numerous in the umbel the higher and acuter operculum. From *E. microtheca* it is distinguished by the characters from which it is distinguished from *E. crebra*, to which may be added the exertion of the valves.

Mueller only saw unripe fruits, and I can supplement the description in this and other respects, as follows:—

**Fruits** nearly hemispherical in shape, 1 cm. in diameter, surface usually white-dotted, rim very thin, and the valves well exert.

**Juvenile leaves** papery-thin, dark green on the upper page, and very pale green on the lower, ovate-acuminate, about 5 or 6 cm. long, and 2-2.5 broad, intramarginal vein close to the edge, the midrib prominent, also the lateral veins, which vary from nearly at right-angles to an angle of 45 degrees to the same, and curving towards the apex of the leaf.

Foliage like that of *E. Clōziana*, with texture thin, and the upper and lower pages differing much in colour, is indicative of good soil, moisture, and shade, and good growing conditions generally.

**Timber** pale-coloured, drying yellowish-brown, fissile, rather coarse and wavy in the grain.

**Bark** flaky-fibrous and furrowed.

Mr. P. MacMahon says "the bark is remarkable—brown, deeply furrowed, flaky, like a brown flaky *siderophloia*, but, of course, not hard. It is a very striking tree."

Local name "Messmate" on the North Coast line, where it is cut for the mills.

Dr. T. L. Bancroft gives the name "Dead Finish" at Stannary Hills, in the Cairns district.

The term "Dead Finish" is usually applied in Australia to an impenetrable scrub which bars further progress, but Dr. Bancroft (Bailey, *Qld. Agric. Jour.*, Dec., 1908, p. 293) explains it as follows as regards this species:—

Bushmen, when making a damper, found good cinders or coals could be obtained by burning pieces of this wood, but when the coals were raked about preliminary to placing the damper in the ashes they went out. As long as you left the fire alone it burnt well enough, but when interfered with went black.

The species was named in honour of Prof. Clōez, of Paris, a distinguished chemist, who worked on Eucalyptus oils, and who published the following early researches on Eucalyptus oil:—

I. Examen chimique des feuilles d'Eucalyptus globulus, 1869.

II. Etude chimique de l'Eucalyptol, 1870.

---

## SYNONYMS.

1. *E. stannariensis*, Bailey.

2. *E. Stuartiana*, of MacMahon and others, non F.v.M.

1. *E. stannariensis*, Bailey, in *Queensland Agricultural Journal*, xxi, 293 (December, 1908).

A specimen of the type of *E. Clōeziana* (received from the late Mr. C. Walter, who obtained it from Baron von Mueller) and of *E. stannariensis* (received from Dr. T. L. Bancroft), are figured side by side on Plate 64.

The leaves of Dr. Bancroft's specimens are narrower, on the whole, from those of the type specimens of *E. Clöeziana*, but I can find no botanical difference between them.

2. *E. Stuartiana*, of MacMahon and others, non F.v.M.

This is the Queensland Messmate, figured, a photograph of a trunk (Plate XXXII), and described (p. 46) by P. MacMahon in his "Merchantable Timbers of Queensland." He speaks of "its durability as exceedingly great," and thus has contributed to the exaggerated value that strangers attribute to the wood of *E. Stuartiana*.

---

## RANGE.

It is confined to Queensland so far as we know at present.

J. Dallachy originally found it in the mountains at Røekingham Bay—*i.e.*, near Cardwell.

Dr. T. L. Bancroft collected it at Stannary Hills, a little to the north—*i.e.*, a few miles to the south-east of Cairns.

The late Mr. P. MacMahon, Director of Forests, Queensland, sent it to me from Landsborough, where it is cut in the mills. He also sent it from Cooran, near Gympie. He says, "it is rather gregarious and likes rather good soil."

Mr. F. M. Bailey sent it to me from Cooroy several years ago. All these three localities are on the North Coast line, from 50 to 100 miles from Brisbane, thus bringing its range several hundreds of miles to the south. Intermediate localities remain to be ascertained, and there is no doubt that it is very much more extensively distributed in Queensland than was at one time supposed.

---

## AFFINITIES.

Mueller has in the description already referred to its relations to *E. crebra*, F.v.M.; *E. drepanophylla*, F.v.M.; *E. siderophloia*, Benth.; *E. microtheca*, F.v.M. I hardly think it can be confused with any one of these species, but Mueller was casting about for an affinity for *E. Clöeziana*, which I think is nearer to *E. Naudiniana*, F.v.M.

1. With *E. crebra*, F.v.M.

This is a narrow-leaved species, with narrow juvenile foliage and small fruits. It is an Ironbark, with red timber.

2. With *E. leptophleba*, F.v.M.; (*E. drepanophylla*, F.v.M.).

This species is better known now. See the figures on Plate 48, the notes in Part X (Vol. i), and supplementary notes in Part XII (Vol. ii), p. 67.

The fruit of *E. leptophleba* is more cylindrical and rimmed, the foliage is larger, thicker, and differently veined, the buds are different, and the anthers are very different. Added to this, the coarse non-bicolor juvenile foliage of *E. leptophleba* is totally different to the foliage of *E. Clöeziana*.

3. With *E. siderophloia*, Benth.

Here again we have a red-timbered Ironbark. The juvenile foliage is very broad and thick. The species is "coarse," the colouring of the leaves is the same on both sides, the opercula very acuminate, and the fruits of a different shape.

4. With *E. microtheca*, F.v.M.

This is a dry country species, with nearly smooth bark, very red timber, pale narrow leaves, with very different venation, and fruits so small that they cannot be confused with those of *E. Clöeziana*.

5. *E. Naudiniana*, F.v.M.

I have given notes on the four species that Mueller mentioned, and at the same time I think that the affinities of *E. Clöeziana* are not clear. I place it nearest to *E. Naudiniana*.

Both have broadish, petiolate, thin juvenile leaves, with markedly different colours on upper and lower pages, said colours being usually persistent in the environment which usually occurs in this species. The species are, however, sharply separated by the small fruits of *E. Naudiniana* and the anthers, which are renantherous in that species, while the timber of *E. Naudiniana* is reddish, and that of *E. Clöeziana* is pale-coloured, superficially drying to yellowish-brown.

6. With *E. acmenioides*, Schauer.

This is another species which, when growing under "brush" conditions as do *E. Clöeziana* and *E. Naudiniana*, remind one of the former.

The delicate bi-color foliage certainly is much alike in both species, but that of *E. acmenioides* often becomes narrower and thicker. The colour and properties of the two timbers appear to much resemble each other, but the fruits, thin-rimmed and a good deal alike in the two species, have the important difference that those of *E. acmenioides* have the valves non-exsert. The anthers of *E. acmenioides* are renantherous.

7. With *E. microcorys*, F.v.M.

It is perhaps as close to this species, which is another thin-leaved species, with markedly bi-color juvenile and even mature leaves. *E. microcorys* is renantherous and its fruits are different in shape, while its fibrous bark is very different, as is also its timber.

## DESCRIPTION.

LXXII. *E. oligantha*, Schauer.

FOLLOWING is the original description:—

Schauer MSS.—Fruticosa, ramulis, patentib., rigidibus teretib. foll., coriaceis subrotundo, ovatis in petiolum contractis obtusis nervulosis, venosisq., subpellucide crebre punctatis untrinq. subopacis; paniculis terminalib. ex unbellis nonnullis trifloris conferta, pedunculis teretib., brevib.; cupula hemisphaerico turbinata in pedicellum ipsi subaequalem contracta operculo. . . . (?) Folia  $2\frac{1}{2}$ –3 poll, longa  $2\frac{1}{4}$ – $2\frac{1}{2}$  poll, lata, cupula ampliuscula cum pedicello 5 lin. metiens—in insula Copeland Island adoras septentrionales Novae Hollandiae consista. A. Cunn, Herb. No. 250–1818 (Walpeis' *Repert.*, ii, 926, 1843).

Bentham (B.Fl. iii, 213) then gave a description of the species from such material as was available.

Mueller (in "Eucalyptographia," under *E. polyanthema*) says:—

Of this species *E. oligantha* I have not seen authentic material, but it seems, according to the description, closely allied to *E. polyanthema*, differing chiefly in stiffer leaves, somewhat larger flowers, conical lid, and perhaps the (as yet unknown) fruit.

I have not even yet seen mature fruits, but from the unripe fruits available (see Plate 64) it is safe to predict that the ripe fruit, when collected, will be urceolate in shape.

The juvenile foliage will be obviously very coarse and nearly orbicular, with the intramarginal vein a good distance from the edge.

The anthers are described by Bentham, and I find that drawings made in Sydney of the anthers taken from the type collected by Allan Cunningham, and some specimens collected by Mr. Fitzgerald, when subjected to similar conditions are indistinguishable. The filaments are rather short.

---

RANGE.

It has only been collected from Copeland Island in the year 1819 by Allan Cunningham, when with Captain P. G. King's voyage of circumnavigation of Australia. This is now called Copeland Islet, a small wedge-shaped islet 125 feet high, in the bight of Mountnorris Bay—lat.  $20^{\circ} 29' S.$ , long.  $132^{\circ} 45' E.$  It is off the Northern Territory. It is used by Malays during the trepang season for boiling and drying out fish.

Mr. W. V. Fitzgerald has also collected it between Tabletop Mountain and Artesian Range, W.A.

## AFFINITIES.

Bentham (B.Fl. iii, 213) says :—

Until the fruit is known, the precise affinities of this species cannot be determined. It is very unlike any other one I have seen.

1. With *E. polyanthemus*, Schauer.

In B.Fl. iii, 213, Bentham placed *E. oligantha* (provisionally, of course) between *E. pruinosa* and *E. polyanthemus*.

Mueller's remarks in regard to *E. polyanthemus* have already been quoted.

*E. polyanthemus* is figured at Plates 58 and 59, and the exceptionally large juvenile foliage of that species may, as regards herbarium specimens, remind one of *E. oligantha*; but, as a rule, both the juvenile and mature foliage of *E. polyanthemus* are much smaller than those of *E. oligantha*. The fruits of *E. polyanthemus* are smaller and of a different shape, while the anthers of the two species are very different. The former is confined to New South Wales and Victoria; the latter is a tropical species.

2. With *E. pruinosa*, Schauer.

Bentham has implied the affinity. There is certainly some affinity. As regards the anthers, they are not very dissimilar.

The foliage of *E. pruinosa* is sessile, while that of *E. oligantha* has long petioles. The fruits of *E. pruinosa* are not urceolate or only very slightly so; the opercle of the buds are more conical.

We know so little about *E. oligantha* as regards its size (fruticose, as first described), habit, bark, timber, and habitat, that one is restricted in making comparisons with other species.

3. With *E. populifolia*, Hook. (see Plate 48).

There is affinity in the young foliage and in the anthers, but the fruits are much smaller, and the mature foliage is smaller, narrower, and not shiny; still there is undoubtedly affinity between the two species.

4. With *E. alba*, Reinw.

This is another tropical large-leaved species, and the two undoubtedly resemble each other in some respects. As regards anthers, however, it is very different to *E. alba*, which has a long narrow anther (with gland at back not showing at front) belonging to the *incrassata* group.

I prefer to postpone comparison of these two species until I figure *E. alba*.

5, 6, 7. With *E. hemiphloia*, F.v.M., &c.

Some of the species to which it is closely allied antherally, are *E. hemiphloia*, F.v.M., *E. odorata*, Behr, and *E. Thozetiana*, F.v.M. (see Part XI), but the affinities do not otherwise appear to be close. There is also some tendency in the fruits of *E. hemiphloia* to be urceolate. The buds are very different. The same remark may be made as regards the fruits of *E. Thozetiana*, but both juvenile and mature leaves of that species are narrow.

## Explanation of Plates (61-64).

## PLATE 61.

*E. melliodora*, A. Cunn.

- 1*a*. Juvenile foliage; 1*b*, twig with buds, flowers, and mature foliage; 1*c*, fruits. Rocky Hall, Eden to Bombala, South eastern N.S.W. (J.H.M.)
- 2*a*. Leaf; 2*b*, bud and flower; 2*c*, anther, from a specimen from the Kew Herbarium, labelled "Type of *E. melliodora*, New Holland, A. Cunningham, Hooker, 1835."
- 3*a*. Leaf; 3*b*, fruits. Mudgee, N.S.W. (Henry Deane.)
4. Very narrow juvenile leaf. Lachlan River, N.S.W. (J. Duff.)
5. Intermediate leaf. Colomba, South-eastern N.S.W. (W. Baeuerlen.)
6. Mature leaf. Gulgong, N.S.W. (J. L. Boorman.)
- 7*a*. Mature leaf, taken from a flower-bearing twig; 7*b*, fruits. (Victoria, no more definite locality, A. W. Howitt.)
- 8*a*. Coarse buds, short leaf; 8*b*, coarse fruits. Armidale, N.S.W. (E. Betehe.)
9. Short, blunt, mature leaf, taken from a flowering twig. Upper Tarcutta, N.S.W. (Forest Ranger Taylor.)
10. Plump buds, showing pointed opercula. Lyndhurst, N.S.W. (J.H.M. and J. L. Boorman.)
11. Small fruits. Maryborough, Victoria. (J. Blackburne.)
12. Small sub-cylindrical fruits. Warialda, N.S.W. (J. L. Boorman.)
13. Spheroid fruits. Manildra, N.S.W. (J. L. Boorman.)
14. Pear-shaped fruits. Mount Harris, near Warren, N.S.W. (J. L. Boorman.)

*E. fasciculosa*, F.v.M.

15. Leaf in the intermediate stage. Sandy Creek, near Gawler, S.A. (W. Gill.)
16. Broadish leaf and fruits, "Pink Gum." Kuitpo Forest Reserve, near Willunga, S.A. (W. Gill.)
- 17*a*. Leaf with buds; 17*b*, anthers; 17*c*, fruits from piece of type in Nat. Herb., Melb. Willunga, S.A. (F. Mueller.)

## PLATE 62.

*E. uncinata*, Turcz.

- 1*a*. Portion of J. Drummond's No. 66, type of *E. uncinata*, Turcz. Drawn from a specimen in the Oxford Herbarium.
- 2*a*, 2*b*. Portions of J. Drummond's No. 76, type of *E. uncinata*, Turcz., var. *latifolia*, Benth.
- 3*a*. Coriaceous juvenile leaves; 3*b*, mature leaf; 3*c*, buds, almost winged. These leaves show that in *E. uncinata* the juvenile leaves sometimes persist to maturity—in other words, that we have dimorphism. Kalgan Plains, north of the Kalgan River, W.A. (J.H.M.)
- 4*a*. Mature leaves; 4*b*, leaf still in the opposite stage; 4*c*, mature leaf. Kalgan Plains, W.A. (J.H.M.)
5. Juvenile leaf. Port Lincoln, S.A. (W. Gill.)
- 6*a*, 6*b*, 6*c*, 6*d*. Juvenile leaves, varying in shape. Murray Bridge, S.A. (R. H. Cabbage and J.H.M.)
- 7*a*, 7*b*, 7*c*. Leaves in the opposite stage; 7*d*, mature leaf. Deeside, Lake Muir, W.A. (T. Muir, in Nat. Herb., Melbourne.)
- 8*a*. Broad, mature leaf; 8*b*, characteristic bent filaments (enlarged). Cut Hill, York, W.A. (O. H. Sargent.)
9. Narrow juvenile leaves. Euston to Mildura, Vic. (W. S. Brownscoube.)
10. Mature leaf, thick, coarse form. Oil glands very prominent. Cape Jervis, S.A. (J.H.M.)
- 11*a*. Leaf; 11*b*, bud and flowers of *E. uncinata* (*E. leptophylla*, F.v.M. type).
12. Leaf of "Thin-leaved Mallee," Subiaco Beach, near Fremantle, W.A. (Dr. J. B. Cleland.)
13. Very narrow leaf, Victoria. (G. S. Perrin, through A. W. Howitt.)
- 14*a*. Mature leaf; 14*b*, buds, the operculum acuminate, and longer than the calyx; 14*c*, fruits. Hope-toun, W.A. (J.H.M.) Still it is not the var. *rostrata*, Benth., of *E. uncinata*. (B Fl. iii., 216.) See p. 144.
- 15*a*. Twig, bearing buds; 15*b*, expanded flowers; 15*c*, fruits of a specimen from the Murchison River, W.A. (Oldfield, in the Cambridge Herbarium.) It is a coarse form, with the aspect of *E. incrassata*, var. *dumosa*. It may be var. (?) *major*, Benth., of *E. uncinata*.

16. Immature fruit, showing rims. Dimboola, Vic. (F. Reader, in Herb., Melb.)  
 17. Small fruits, 50 miles N.W. of Knutsford, W.A. (R. Helms, Elder Exploring Expedition.)  
 18. Coarse fruit. Port Lincoln, S.A. (W. Gill.)  
 19a. Small buds; 19b, young fruits, "Narrow-leaf Mallee." Mount Hope to Euabalong, N.S.W. (R. H. Cabbage.)  
 20a. Buds, with nearly hemispherical opercula; 20b, fruits. Nymagee, N.S.W. (J. L. Boorman.)  
 21. Buds, with very pointed opercula. (Compare 14b.) Cowcowing, W.A. (Max Koch.)

## PLATE 63.

*E. decipiens*, Endl.

- 1a. Fragment of a flowering twig; 1b, fragment of a twig in early fruit, from the type in the Vienna Herbarium. King George's Sound. (Hügel).  
 2a. Fragment of a flowering twig; 2b, anthers, from a portion of a co-type of *E. decipiens*, var. *angustifolia*. Schauer, in the Paris Herbarium. Swan River district. (Riv. des Cignes, Preiss, No. 241, 1843.)  
 3. Mature leaf of var. *angustifolia*. Near Stirling Range, W.A. (J.H.M.)  
 4a. and 4b. Juvenile leaves, varying in size; 4c, intermediate leaf; 4d, mature leaf; 4e, buds (head of 15 flowers); 4f, flat-topped fruits; 4g, spheroidal fruits. All from the Porongorups, W.A. (J.H.M.)  
 5. Juvenile leaf, with pointed apex. Desmond, near Ravensthorpe, W.A. (J.H.M.)  
 6. Small fruits. Gaalgup Hill, Porongorups. (J.H.M.)  
 7a. Juvenile leaf; 7b, mature leaf; 7c, bud and flowers; 7d, fruits. Near Claremont Asylum, Perth, W.A. (practically a type locality of *E. concolor*). (Dr. J. B. Cleland.)  
 8a, 8b. Fruits with markedly exerted valves. Cranbrook, W.A. (Dr. L. Diels, No. 2,963.) Transit to *E. concolor*.  
 9a. Buds and expanding flowers; 9b, fruits; 9c, fruit enlarged to show the exerted valves touching at the tips. Porongorups. (J.H.M.)  
 10. Small domed immature fruits, near foot of Stirling Range, W.A. (J.H.M.)

*E. concolor*, Schauer.

11. Fragment of Drummond's No. 77. Type of *E. concolor*, Schauer.  
 12a. Flowers; 12b, anthers; 12c, leaf with fruits of *E. concolor*, Schauer. Cape Riche, W.A. (Dr. L. Diels, No. 3,504.)

*E. Cloëziana*, F.v.M.

- 13a. Juvenile leaves; 13b, fruits with well-exserted valves. Landsborough, Q. (P. MacMahon.)  
 14a. Buds with pointed opercula; 14b, fruits of *E. stannariensis*, Bailey. Stannary Hills, North Queensland. (Dr. T. L. Bancroft.)

## PLATE 64.

*E. Cloëziana*, F.v.M.

- 1a. Leaf; 1b, inflorescence; 1c, anthers of type of *E. Cloëziana*, F.v.M. Rockingham Bay, Queensland. (J. Dallachy, through C. Walter.)  
 2a. Leaf; 2b, inflorescence; 2c, anthers of type of *E. stannariensis*, Bailey, Stannary Hills, North Queensland. (Dr. T. L. Bancroft.)

*E. oligantha*, Schauer.

- 3a. Buds, flowers and leaf; 3b, anthers of a specimen from Copeland Island, Gulf of Carpentaria, 1819 (Allan Cunningham). Drawn from a specimen in the Herbarium, Royal Gardens, Kew, by Miss M. Smith.  
 4a. Flowers and leaf; 4b, anthers; 4c, young fruit. Between Tabletop Mountain and Artesian Range, W.A. (W. V. Fitzgerald.)

The following species of Eucalyptus are illustrated in my "Forest Flora of New South Wales"\* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

<i>acmenioides</i> , Schauer (xxxii).	<i>melliodora</i> , A. Cunn. (ix).
<i>amygdalina</i> , Labill. (xvi).	<i>microcorys</i> , F.v.M. (xxxviii)
<i>Andrewsi</i> , Maiden (xxi).	<i>numerosa</i> , Maiden (xvii).
<i>Baileyana</i> , F.v.M. (xxxv).	<i>obliqua</i> , L'Hérit. (xxii).
<i>bicolor</i> , A. Cunn. (xliv).	<i>odorata</i> , Behr and Schlechtendal (xli).
<i>Boormanii</i> , Deane and Maiden (xlv).	<i>paniculata</i> , Sm. (viii).
<i>Bosistoana</i> , F.v.M. (xliii).	<i>pilularis</i> , Sm. (xxxi).
<i>capitellata</i> , Sm. (xxviii).	<i>piperita</i> , Sm. (xxxiii).
<i>Consideniana</i> , Maiden (xxxvi).	<i>Planchoniana</i> , F.v.M. (xxiv).
<i>coriacea</i> , A. Cunn. (xv).	<i>punctata</i> , DC. (x).
<i>corymbosa</i> , Sm. (xii).	<i>regnans</i> , F.v.M. (xviii).
<i>dives</i> , Schauer (xix).	<i>resinifera</i> , Sm. (iii).
<i>fruticetorum</i> , F.v.M. (xlii).	<i>saligna</i> , Sm. (iv).
<i>goniocalyx</i> , F.v.M. (v).	<i>siderophloia</i> , Benth. (xxxix).
<i>hæmastoma</i> , Sm. (xxxvii).	<i>sideroxylon</i> , A. Cunn. (xiii).
<i>hemiphloia</i> , F.v.M. (vi).	<i>Sieberiana</i> , F.v.M. (xxxiv).
<i>longifolia</i> , Link and Otto (ii).	<i>stellulata</i> , Sieb. (xiv).
<i>Luehmanniana</i> , F.v.M. (xxvi).	<i>tereticornis</i> , Sm. (xi).
<i>macrorrhyncha</i> , F.v.M. (xxvii).	<i>virgata</i> , Sieb. (xxv).
<i>maculata</i> , Hook. (vii).	<i>vitrea</i> , R. T. Baker (xxiii).

---

\* Government Printer, Sydney. 4to. Price 1s. per part (10s. per 12 parts); each part containing 4 plates and other illustrations.



EUCALYPTUS MELLIODORA, A. CUNN. (1-14).

E. FASCICULOSA, F.v.M. (15-17).

A. Flockton. c.





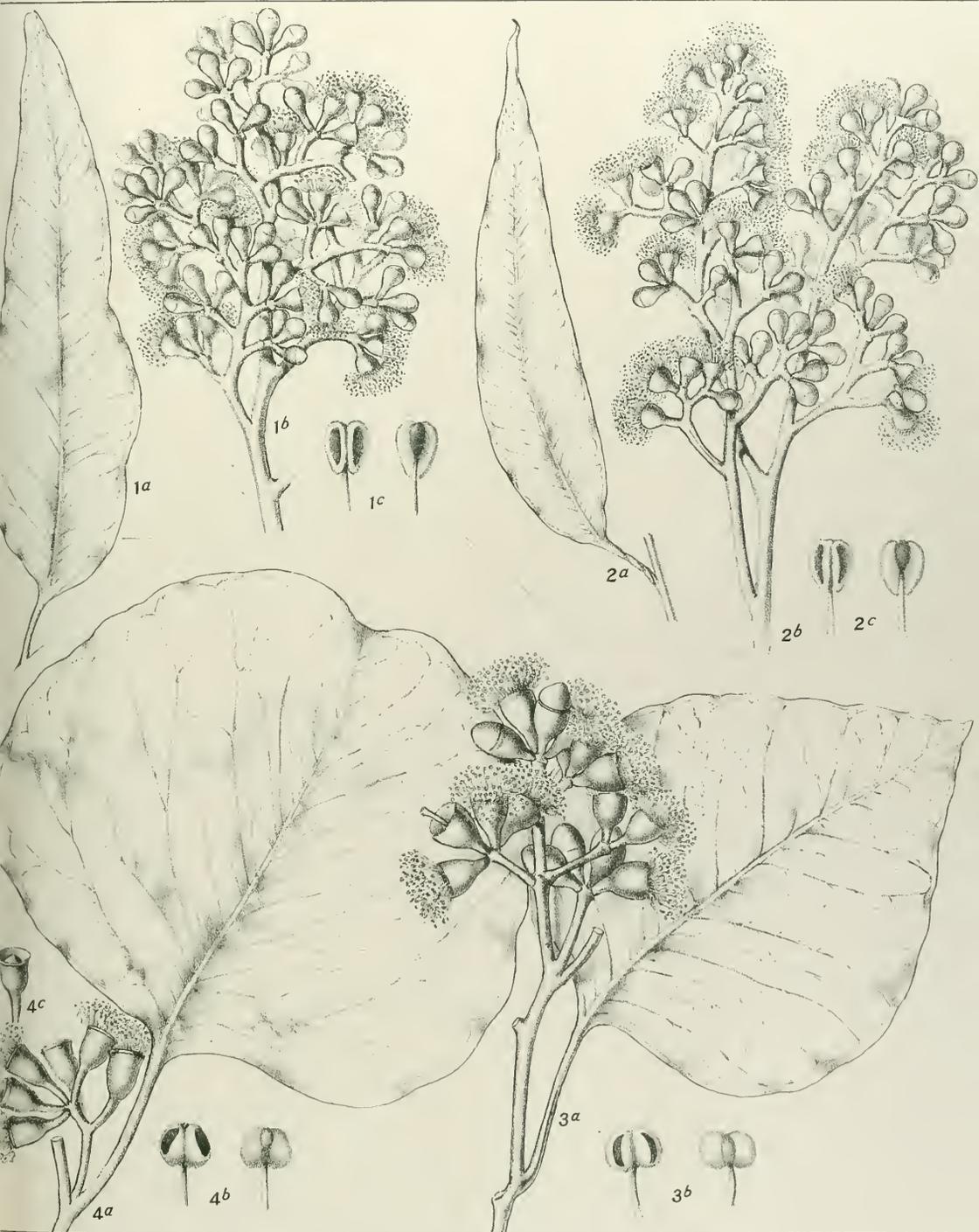
EUCALYPTUS UNCINATA, TURCZ.





EUCALYPTUS DECIPIENS, ENDL. (1-12).  
 E. CLOËZIANA, F.v.M. (13-14). See Pl. 64.





EUCALYPTUS CLOËZIANA, F.v.M. (1-2). See Pl. 63.

E. OLIGANTHA, SCHAUER (3-4).



# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

(Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney)

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VOL. II. PART 5.

Part XV of the Complete Work.

(WITH FOUR PLATES.)

---

*“Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise.”*

MACAULAY'S "ESSAY ON MILTON."

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## DESCRIPTION.

### LXXIII. *E. oleosa*, F.v.M.

FOLLOWING is the original description:—

10. *Eucalyptus oleosa*, F. Müll. *E. perforata*, Behr, Herb. ex parte. *Eucalypto strictae*, Sieb. affinis. Marble Range (Wilhelmi); Murray Scrub (Dr. Behr).

Frutex, ramulis angulatis, foliis anguste lanceolatis vel sublinearibus in acumen uncinatum tenuae vulgo sphacelatum excurrentibus, basi attenuatis, ut plurimum inaequi-lateralis, coriaceis crebro pellucido-glandulosis, venis subobtectis erecto-patulis, umbellis axillaribus, 4–10-floris pedunculo angulato sustentis, floribus breviter pedicellatis vel subsessilibus, operculo conico-hemisphaerico obtusiusculo tubum obconico-turbinatum subaequante.

“Frutex hominem altus, coma laetissime viridi nitente” (Behr). Ramuli angulati albedo-pallidi vel juniores saturate fusculi. Petioli 3–4 lin. longi in sicco luteoli. Folia  $1\frac{1}{2}$ –2 $\frac{1}{2}$ , vulgo circiter 2 poll. longa, 2–3 lin. lata, recta vel obliqua. Pedunculi 2 lin. vix aequantes. Calyx  $1\frac{1}{2}$  lin. aequans, haud raro operculo sublongior, pallidus. Filamenta pallida. (Miq. in *Ned. Kruidk. Arch.* iv, 128 [1856].)

The localities given are South Australian. The description given is not satisfactory, since it refers to mixed material. It was subsequently more fully described, in Latin, by Mueller, in *Fragmenta* ii, 56, but again with mixed material. It was clearly defined by Bentham in B.Fl. iii, 248, and by Mueller in the *Eucalyptographia*.

Bentham quotes *Fragm.* ii, 56 (partly) as the original description, while Mueller himself, at that place, quotes “F.M. in *Miq. Stirp. Nov. Holl.* 31,” which is the same reference as *Ned. Kruidk. Arch.* iv, 128, already quoted by me.

#### Notes Supplementary to the Description.

It is a Mallee, and it may attain the dignity of a small or medium-sized tree. Its trunk has roughish bark at the butt, but the upper portion and the branches are smooth.

The colour of the timber is of a reddish brown, with the reddish colour predominating more or less.

Normally the juvenile leaves are broad or broadish, but they vary in width, so that in some exceptional instances they may be narrower.

The operculum is usually pointed-tapering, but sometimes rounded and even almost hemispherical.

Occasionally the buds almost assume the “egg-in-egg-cup” shape, reminding one of *E. salubris* and a few other species in this respect.

A common character is the subulate tips of the valves, which are well exert as a rule.

## Varieties.

There are two fairly well marked varieties :—

1. Var. *longicornis*, F.v.M.
2. Var. *glauca*, Maiden.

### 1. Var. *longicornis*, F.v.M. "A Morrel." "Poot."

This form was described by Mueller in *Fragm.* xi, 14, and raised by him (with doubt) to the rank of a species under the name of *E. longicornis* in his "Report on the Forest Resources of Western Australia," p. 12, and fig. 13.

He says: "It agrees with the York Eucalypt (*E. loxopheba* or *fecunda*) in its bark." At p. 7 of the same work he describes the bark of the York Eucalypt as "persistent and rough." Of course, the latter is a well-known species.

Variety *longicornis* is a glabrous form, and, in my view, it is identical with a tree called "Poot."

My attention was first directed to "Poot" by Mr. Andrew Murphy, of Sydney, whose collector (Mr. Louis Dillon) sent him some seed from Broome Hill. This was in 1905, and I have never lost sight of the matter since. It was described as a tree 3 feet in diameter, the timber used for wheelwrights' work, and it does not split well. In my trip to Western Australia in 1909 I visited Broome Hill specially to see this tree. Following are some notes made by me on the spot :—

Grows on good land; on the best land. A large tree. Dark grey, narrow furrowed or hard "box" bark, covering the whole of the trunk up to the first fork and the larger branches. It looks like a black-barked tree.

The smaller branches slightly ribbony and smooth. It is erect and attains a large size, up to 6 feet diameter. Timber reddish. Good burner.

A good many people look upon Poot as identical with Morrel. (See below, p. 176.) At the same time opinion is divided on this subject in Western Australia. I had not the opportunity of seeing Poot and Morrel alongside each other, and of cross-examining people on the spot as to their supposed identity.

The Morrel, as I saw it, has a smoother and more flaky bark, and is less erect in habit than Poot. It is a glaucous Gold-fields tree mainly, and I believe both var. *longicornis* and var. *glauca* run into each other, and both to some extent bear the same name ("Morrel").

Mr. William Duun, of the Porongorups, informs me that Poot occurs north of Stirling Range, on the Salt River, and extensively in the direction of York. That it is a very hard timber, harder even than Yate (*E. cornuta*), which is usually quoted as the standard of great hardness.

Mr. Van Zoolikum, of Katanning, informed me that "Parker Gum," found in the York district, is identical with Poot, and that it was named after a Mr. Parker, forbear of some respected legal gentlemen in Perth. I have not seen indubitable specimens of "Parker Gum," but would like to do so.

Mr. H. F. Johnston, Surveyor-General, Perth, is one of those who are of opinion that Poot "is a Morrel."

Mr. Johnston states there are two Morrels, the ordinary one and a second, with no trace of red in the timber, but with timber somewhat like York Gum, which he calls Yorrel. Probably we have an instance of hybridism here, but I have not seen the specimens.

I have opened out a very interesting subject, and should very much like to obtain small axe-cuts, showing bark and wood, and also twigs showing buds, flowers and fruits, and also juvenile leaves, of each of the trees referred to, in order that the various points raised may be cleared up.—(Maiden, in *Journ. W.A. Nat. Hist. Soc.*, iii, 170, 1911.)

The matter is further dealt with under "Affinities," p. 176.

Following is a note by Mueller :—

*E. longicornis*, F.v.M., the Morrell tree, is perhaps a mere variety of *E. oleosa*. The wood is nearly as dark as that of *E. marginata*; it is remarkably hard, and used for rafters, shafts, naves, spokes, harrows, and all kinds of wheelwrights' work. Straight and lasting rails up to twenty-five feet in length can be obtained from young trees.—(Mueller, *Forest Resources of Western Australia*.)

The above use of the term "Morrel" for variety *longicornis*, as well as for variety *glauca*, points to the close relations of the two forms.

2. Var. **glauca**, Maiden (*Journ. W.A. Nat. Hist. Soc.*, iii, 171, 1911).

“Morrel” (the glaucous or Gold-fields form); “Morrel” (sometimes spelt “Morrell”) is the native name of the tree. It is pronounced “Moral”; called also “Blackbutt” on the eastern gold-fields.

Seventy miles north of Kalgoorlie I took notes, on the spot, of a tree, as follows:—

A medium-sized tree, say 1 foot in diameter, a White Gum with blotched bark and more or less short flaky ribbons on the trunk, with a little of the roughness at the butt.

Colour of timber, rich reddish brown and very tough. A felled Morrel shows long tough splinters.

Tips of valves connected as in *E. oleosa*.

It is usually glaucous (typical var. *longicornis* is always glabrous). The buds and fruits are coarser than those of var. *longicornis*, the operculum is more or less rostrate (particularly in dried specimens), i.e., it does not taper gradually as in the case of var. *longicornis*. While all the forms of *E. oleosa* run into each other, I am of opinion that the arboreal glaucous gold-fields form merits a varietal name as much as var. *longicornis* does, and therefore I have proposed the name var. *glauca* for it. Figures are desirable to show the relations of the various forms, and these will be found on Plate 66. (*Loc. cit.*)

## SYNONYMS.

1. *E. socialis*, F.v.M.
2. *E. laurifolia*, Behr.
3. *E. socialis*, F.v.M., var. *laurifolia*, F.v.M.
4. *E. turbinata*, Behr et F.v.M.
5. Note on *E. cneorifolia*, DC.
6. Note on *E. perforata*, Behr.

1. *E. socialis*, F.v.M.

Following is the original description:—

20. *Eucalyptus socialis*, Ferd. Müll., fruticosa, ramulis compresso-angulatis, foliis lineari-lanceolatis vel lanceolatis acumine uncinato terminatis, rigide coriaceis, glaucis, punctatis, venis parallelo-patulis supra subsperpicuis, pedunculis lateralibus et axillaribus 3-6 floris compressis, pedicellis calycis tubum obconico-hemisphaericum aequantibus vel brevioribus, operculo e basi semiglobosa sensim in rostrum conicum attenuato quam tubus flavescens paullo latiore et fere duplo longiore.

Occurrit alabastris majoribus et minoribus, pedicellis longioribus vel brevioribus nec non foliis duplo angustioribus, forma latifolia *E. laurifoliam* præbet. Capsularum valvae sulculatae ex hypanthio denique truncato globoso emergentes. (F. Müll. mss.)

In sylvâ Pine forest prope Gawler-town; frequenter ultra Salts Creek, ubi plagas sterilissimas tegit et illa fruticeta Scrub dicta ex parte format. Fl. vere et aestate.

Folia 2-3 poll. longa,  $\frac{1}{2}$ - $\frac{3}{4}$  lata. Pedunculi  $2\frac{1}{2}$  lin. longi; pedicelli  $1\frac{1}{2}$ , calycis tubo vulgo vix 2 lin.; operculum circiter  $2\frac{1}{2}$  lin. aequans. Flores ochroleuci fere inodori. Folia saturate viridia opaca subtilissime punctata. Huc spectat *E. laurifolia* Behr Herb., foliis opacis, floribus ochroleucis inodoris, formam latifoliam exhibens. (In Miq. *Nederl. Kruïtk. Arch.* iv, 132, 1856).

I have seen the type, which is figured at 17, Plate 65. It is a narrow-leaved form of *E. oleosa*.

2. *E. laurifolia*, Behr.
3. *E. socialis*, F.v.M., var. *laurifolia*, F.v.M.

For the references to these two names, see under *E. socialis*.

I look upon *E. laurifolia* as a form intermediate between *E. oleosa* and *E. Gillii*, nov. sp., which I describe at page 177.

4. *E. turbinata*, Behr et F.v.M.

Following is the original description:—

33. *Eucalyptus turbinata*, Behr et Müll., fruticosa, ramulis junioribus rubris angulatis, foliis e basi obliqua ovato-lanceolatis angustato-acuminatis crasse coriaceis glaucis, costa utrinque distincta, venis subobtectis, pedunculis axillaribus et lateralibus 4-7 floris petiolo duplo brevioribus pedicellis triplo longioribus, calycis tubo campanulato operculi semi-globoso conici acutiusculi longitudine.

In sylvia Pine Forest trans flumen Salts Creek, fl. aestate (Dr. Behr).

Prope *E. punctatum* DC. *Prodr.* l.c. p. 217 *Mem. Myrt.* Tab. 4, insereuda. "Frutex magnitudine arboris mediae; rami recentiores atrorubri." Petioli 4-6 lin. longi. Folia 3-4½ poll. longa. Pedunculi 1½-2 lin. longi raro plus quam 7-flori. Pedicelli brevissimi. Alabastra operculata 2 lin. longa (in Miq. *Nederl. Kruidk. Arch.* iv, 137, 1856).

The type is in Herb. Melb. (ex herb. Sonder) and is *E. oleosa*. It is figured at 9, Plate 65, and is a broadish (not extreme) form of the species.

5. Mueller says that the synonymy of this species includes *E. cneorifolia*, DC. *Prod.* iii, 220, and B.Fl. iii, 217, so far as the plant from the arid scrubby ridges of Kangaroo Island (Ile Decrès) is concerned (*Eucalyptographia*, under *E. oleosa*).

I have not been able to confirm this statement by examination of actual specimens, *i.e.*, that some *E. cneorifolia* has been included under *E. oleosa*. It is, however, likely enough, especially considering the imperfect material some of the early workers prior to Bentham did not hesitate to name. At page 129, Part XIII, of the present work I have stated that *E. cneorifolia* appears to be confined to Kangaroo Island.

In B.Fl. iii, 217, Bentham refers certain specimens "Beyond Salt's Creek and near Port Lincoln, *Mueller*," to *E. cneorifolia*. As will be seen on reference to page 171, both these are quoted localities for *E. oleosa* (including *E. socialis* and *E. turbinata*). Therefore, for these localities under *E. cneorifolia*, *loc. cit.*, *E. oleosa* should probably be read.

6. *E. perforata*, Behr (as quoted in the original description of *E. oleosa*).

Behr's material was evidently much mixed, since some of his *E. perforata* was also referred to *E. gracilis*, F.v.M. See Vol. i, Part III, p. 81, of the present work.

Part of his material is also referable to *E. odorata*, Behr and Schlecht. See page 30, Part XI (Vol. ii), of this work.

# RANGE.

## (Typical Form.)

It is a dry country species, occurring sparsely in Western and South Australia (both States of comparatively low rainfall), in Victoria near the Murray, and in New South Wales in the western or drier portion. It has not been found in Queensland so far.

### WESTERN AUSTRALIA.

I did not see much of the typical form in Western Australia.

A small tree at Pindar (Murchison line) is nearly typical. It has a rough, dark, flaky bark and smooth limbs. The timber is dark (cigar) brown, but the tree is quite pipy; the timber is, however, darker than *oleosa* usually is, which is reddish brown, but that may be owing to the age of the tree. Only young buds and ripe fruit found, and very few trees were seen.

Some small trees at Ravensthorpe, west of Esperance, have small fruits, and are not very dissimilar to specimens of *E. oleosa* collected from localities of the type, but the juvenile foliage is remarkably narrow. It is so narrow that it excites suspicion that we have here a different species, but the other characters are those of true *E. oleosa*, and we have already many instances of considerable variation in regard to juvenile foliage. The Ravensthorpe trees should be watched, as the specimens taken by me may prove to be extremes. See fig. 12, Pl. 65.

At Comet Vale (*via* Kalgoorlie) I noticed a small erect, rigid gum, leaves very thick, fruits a little more pear-shaped than usual. In bud and ripe fruit. It is a coarse form of *E. oleosa*, and I did not find this particular form anywhere else. See fig. 13, Pl. 65.—(Maiden, in *Journ. W.A. Nat. Hist. Soc.*, iii, 170, 1911.)

In addition, I have seen specimens from the following places:—

Avon District (No. 599, Dr. E. Pritzel); Cut Hill, York, shrub of 8 feet (No. 433, O. H. Sargent); Eucla (J. D. Batt), in Herb. Melb., see fig. 11, Pl. 65; 70 miles from Fraser Range, Western Australia,—Elder Exploring Expedition (R. Helms, 8th November, 1891).

At page 124 of Part IV, Vol. i, of the present work, in the detailed description of Plate 22, the following words occur:—

3a. Unripe fruits; 3b, ripe fruits of *E. fecunda*," Schauer. "Red Sandstone Hill, Minara, Murchison River," W.A., Herb. Kew. (Herb. Hookerianum, 1867). "Flora Australiensis." Named by Mr. Bentham, iii, p. 232.

4a. Leaf; 4b, fruits of *E. fecunda*, Schauer. "No. 3,295, W. Australia, 2nd July, 1901 (L. Diels)." Leaves very thick.

At page 115 we have—

"Red Sandstone Hill, Minara, Murchison R., W.A. (Oldfield)." Herb. Syd. ex Herb. Kew.

"3,295, frutex  $\frac{1}{2}$ -1 m. alt. Greenough River in fruticetis limoso-arenosis. (L. Diels, 27'01.)"

All the specimens are imperfect but identical, and I followed Bentham, who named the Minara and some other Murchison River specimens *E. fecunda*. I find that this is erroneous, and that the specimens figured and referred to in the above paragraphs properly belong to *E. oleosa*, F.v.M.

## SOUTH AUSTRALIA.

The co-types came from the Marble Range and Murray Scrub, in this State. "Red Mallee" (*E. oleosa*) is widely diffused in South Australia.

I have seen it from the following localities :—

Port Lincoln (W. Gill), also with rounded operculum from the same locality (W. Gill); Point Kirton, Port Lincoln, the fruit sometimes with the tips of the valves not exert (J.H.M.); Parilla Forest Reserve, between Port Lincoln and the Marble Range (W. Gill).

The above localities are practically those of the co-type.

"Red Mallee," about one mile S.W. of Mannum, near the River Murray (W. Gill); Murray Scrub (J. M. Black); Murray Bridge (R. H. Cambage and J.H.M.).

The type of *E. socialis*, F.v.M. comes from "versus fluv. Murray" (Mueller); Dublin Scrub (J. M. Black); Desert, Tintinarra (R. H. Cambage).

The above localities are practically those of the second co-type.

Flinders Range (No. 570, Max Koch); Flinders Range near Quorn (No. 532, Max Koch); Flinders Range, Mount Remarkable (W. Gill); "Red Mallee" Nackara Forest (W. Gill); near Roseworthy Agricultural College (W. Gill, A. J. Perkins); Pinnaroo (W. Gill); Crystal Brook, the southern point of Flinders Range (W. Gill).

Cape Jervis (J.H.M.) with opercula of intermediate length.

Venus Harbour, also Murat and Denial Bays, also Fowler's Bay (all Dr. R. S. Rogers). In both the two last localities with opercula not very long. Streaky Bay (H. Deane).

At page 118 (Part IV, vol. i) of this work I referred to a specimen in bud only collected by Robert Brown at "Bay iii," and I doubtfully attributed it to a form between *E. fœcunda* and *incrassata*.

"Bay iii" is Fowler's Bay,\* South Australia, and the specimen referred to is undoubtedly *E. oleosa*, F.v.M. I may mention that I collected specimens the very image of Robert Brown's from "Bay iii" at Cape Jervis, near Kangaroo Island, in January, 1907, and I have since ascertained that buds like these are common enough on the South Australian coast.

Following have large fruits :—

"Water Mallee." Sandhills east of Ooldea, and also at Ooldea, north of Fowler's Bay, Transcontinental Railway Survey (between South and Western Australia) (H. Deane).

Following has small fruits :—

"Peeneri" (native name) Mallee, water bearing, *i.e.*, the roots, if cut into portions and drained, yield drinking water. Sandhills east of Ooldea. Mr. Deane

\* See p. 107 of my "Sir Joseph Banks; the Father of Australia" (1909), where is a list of the places at which Robert Brown touched and collected.

points out that this Mallee has a vertical growth,—no drooping of the leaves, and that it is very rare, only one patch having been seen in a journey of 140 miles from Port Augusta.

Grosse's Range, Central Australia (Revs. Schwarz and Schulze, ex herb. Melb.).

The type of *E. turbinata*, Behr, comes from "Pine Forest across Salt's Creek" (near Gawler), Dr. Behr. (Miq. *Ned. Kruidk.*) (ex herb. Melb.)

#### VICTORIA.

Swan Hill (Dr. Griffiths, ex herb. Melb.), with short operculum and narrow leaves. Nyaah, Narrung, Euston, Mildura. "Variable in the size and shape of the calyces more especially. Leaves sometimes becoming inclined to the narrow-lanceolate form. Grows generally over sand-rises and plains alike." (W. S. Brownscombe). Bunbang near Euston (J. Blackburne).

As regards Victoria, it would appear to be confined to the vicinity of the Murray River, so far as we know at present.

#### NEW SOUTH WALES.

I have it from the following localities in this State:—

Abbott's Tank, near Balranald (C. J. McMaster); Lower Lachlan River, two specimens respectively, "Smooth-barked tree," "Rough-barked tree" (correspondents of H. Deane); Condobolin (R. H. Cabbage); Wyalong (H. Deane, J. G. Postlethwaite); Coolabah and Girilambone with moderately narrow juvenile leaves (R. W. Peacock, J. L. Boorman, J.H.M.); Cobar (Rev. Dr. Woolls, R. H. Cabbage, L. Abrahams, J. L. Boorman); Wittagoona, near Cobar (L. Abrahams); Nymagee (Dr. J. Wharton Cox, J. L. Boorman); Mount Boppy (J. L. Boorman).

I shall be glad to receive specimens from other localities.

#### Variety *longicornis*, F.v.M.

Mueller labelled specimens from "Upper Swan River," "Morrel" and "*E. oleosa*, var. *longicornis*." These match his figure 13, in his "Report on the Forest Resources of Western Australia," exactly.

Other specimens which match the figure very closely are:—

Broome Hill, Great Southern Railway, "Poot" (Dr. A. Morrison, Louis Dillon, J.H.M.).

"Morrel," Quairading, H. St. B. More (communicated by O. H. Sargent under his No. 718).

Carnamah, Victoria District (Dr. A. Morrison); Coolgardie (L. G. Webster).

Specimens with fruit of a tree with narrow leaves and shorter peduncles and pedicels than the type, from Cowcowing (Max Koch), appear to be referable to this form. (See fig. 4, Pl. 66.)

Imperfect specimens with nearly sessile fruits, "Blackbutt, tall tree forming forests" are related to this variety (No. 5,454, L. Diels).

Variety **glauca**, Maiden.

## WESTERN AUSTRALIA.

This is the ordinary glaucous or Gold-fields form of *E. oleosa*, known as "Morrel." Specimens collected by me about 70 miles north of Kurrawang and also at Kalgoorlie, September, 1909, may be taken as the type. See fig. 8, Pl. 66. Comet Vale (J.H.M.). See fig. 9, Pl. 66.

Grounds of Kalgoorlie Hospital (Dr. J. B. Cleland).

Coolgardie (R. Helms, C. L. Webster).

"Tree 50 feet high, bark rough, greyish and persistent at base of trunk, smooth and whitish upwards. Stamens sulphur yellow. "Morrell." "Blackbutt" of Gold-fields," near Kanowna and Kurrawang (W. V. Fitzgerald).

Depôt Hill, Elder Exploring Expedition, 10th November, 1891 (R. Helms).

"Small tree of 20-30 feet. A Mallee. Trunk with a rough bark, upper branches smooth. Coweowing (No. 1,001, Max Koch).

"Arbor 25 m. alt (say 80 feet) cortice cinereo foliis glaucis; floribus ochroleucis." Coolgardie (No. 5,470, L. Diels).

Coolgardie pr. Kanowna (No. 1,703, L. Diels). Both these specimens were referred to var. *longicornis* by Dr. Diels.

Tammin (L. Diels, No. 2,854) is glaucous, but the buds and fruits are smaller than those of the type. See fig. 6, Pl. 66.

The following specimens vary somewhat from the type, chiefly in being less glaucous:—

Coolgardie (E. Pritzel, No. 916); East of York (L. Diels, No. 5,018); Sand Plains, Watheroo, Victoria District (A. Morrison); Port Gregory (L. Diels, No. 5,718) (see fig. 7, Pl. 66); Sand plain, Ebbano, east from Mingenev (A. Morrison).

The following specimens illustrate the confusion which has arisen between *E. oleosa*, F.v.M., and *E. decurva*, F.v.M.

A. Copies of labels in herb. Melb. in Mueller's handwriting:—

- (1) (*Euc. oleosa*, F.M.) *Eucalyptus decurva* (Bth part. non), Ferd. Mueller. South West Bay (Antherae globosae). (*E. oleosa*, var.)
- (2) (*Euc. oleosa*, F.M.) *Eucalyptus decurva* (Bth part. non), Ferd. Mueller. Western extremity of the Great Bight, W.A.

The specimens are *oleosa*, var. *glauca*. The words in brackets were written later than the other words. The letters "Bth" of course stand for "Bentham."

B. Bentham has two determinations of Drummond's No. 186 (5th Coll.). See fig. 15, Plate 66:—

- (1) *E. uncinata* Thunz., var. *rostrata*, Benth. (B.Fl. iii, 216).
- (2) *E. decurva*, F.v.M., or rather Benth., non F.v.M. (B.Fl. iii, 249).

I have seen the specimens, and they are identical.

The largest specimen of No. 186, and the only one I have ever seen with an operculum (all other specimens having only leaves and flowers), is in the Cambridge Herbarium, and I took a drawing of it. It shows a twig both angular and round. The anthers are those of *E. oleosa*, and the long tapering calyx is that of var. *glauca*. The leaves and also the "paint brush" arrangement of the stamens are also those of *E. oleosa*.

There is a specimen of No. 186 in the Melbourne Herbarium labelled "*E. decurva*." The names *E. uncinata*, Turcz., var. *rostrata*, Benth., and *E. decurva*, Benth. non F.v.M., are both synonyms of *E. oleosa*, var. *glauca*.

#### SOUTH AUSTRALIA.

Sandhills east of Ooldea, also at Ooldea, Transcontinental Railway Survey, Port Augusta, S.A., to Kalgoorlie, Western Australia (Henry Deane).

## AFFINITIES.

MUELLER (*Eucalyptographia*) stated that the precise relation of the following to *E. oleosa* is not yet clearly understood, viz., the Morrel (*E. longicornis*), the Salmon-barked Eucalypt (*E. salmonophloia*), the Gimlet-wood or Fluted Eucalypt (*E. salubris*), besides *E. leptopoda* and *E. decipiens*. We know more about these species now; but since Mueller published his note as he did, it may be convenient to take references to them *seriatim*. I have already dealt with *E. longicornis* (*oleosa*, var. *longicornis*).

### 1. With *E. salmonophloia*, F.v.M.-

The characters (of *E. longicornis*) which separate it from *E. salmonophloia* are, the persistent bark, the longer and more pointed operculum, the longer style, the larger fruit. (Mueller, *Fragm.* ii, 14, description of *E. longicornis*).

Mueller further says:—

The nearest affinity of the Salmon barked Eucalypt is to *E. oleosa*, but it differs in its entirely smooth bark, the smaller flowers and fruits, and the shorter and also blunter lid of the calyx. (*Forest Resources of Western Australia*, p. 13.)

Diels and Pritzel (Engler's *Jahrb.*, xxxv, 443, 1904) consider that *E. salmonophloia* is more closely related to *E. gracilis* than to *E. oleosa*.

Mr. H. G. Smith (*Proc. Roy. Soc. N.S.W.*, xxxix, 25) says, "Mr. R. T. Baker . . . informed me that on botanical evidence of buds, fruit, leaves, and timber, he could distinguish no difference between *E. salmonophloia* of Western Australia and *E. oleosa* of this State."

Again . . . "the leaves of *E. salmonophloia* were forwarded to this Museum for investigation, and the oil of this species was found to consist of the same constituents as had previously been obtained from *E. oleosa*, and allowing for rather more pinene in the oil of *E. salmonophloia* practically no difference could be determined between the oils of these two species." . . . . .

Then Mr. Smith deals with the constituents of the barks of the two species, although he points out that they vary considerably in thickness.

He then makes the deduction—

*E. salmonophloia* and *E. oleosa* being apparently the same tree in different forms of growth, it is probable that the latter is a stage in the slow and permanent degeneration of the larger tree.

In the Abstract of Proceedings of the Society, 3rd May, 1905, p. iv, Mr. Smith also says :—

From botanical and chemical evidence it is assumed that *E. salmonophloia* of Western Australia and *E. oleosa* of New South Wales belong to the same species.

Now all this is an interesting contribution to the data which are being collected in regard to Eucalyptus affinities, and which I hope to bring together and analyse in the final Part of this work, but *E. oleosa* and *E. salmonophloia* are not so closely related as Mr. Smith's statements would lead most people to think.

I would point out that *E. oleosa* and *E. salmonophloia* have differences of an important character. Some differences have been pointed out by Mueller, and following are more or less important :—

	<i>E. oleosa.</i>	<i>E. salmonophloia.</i>
	A variable species.	Varies very little, so far as we know.
Size ... ..	Shrub or small tree.	Large tree.
Bark ... ..	Rough on butt, sometimes very rough.	Smooth.
Timber ... ..	Reddish-brown.	Red, paler than <i>E. oleosa</i> .
Juvenile leaves ...	Usually broad, rarely narrow, but never as narrow as those of <i>E. salmonophloia</i> . Glauous on both sides.	Narrow lanceolate, shining on both sides.
Mature leaves ...	Glauous to glabrous.	Narrower than <i>oleosa</i> . Yellowish green.
Buds ... ..	Usually with a far longer operculum than <i>salmonophloia</i> .	.....
Anthers ... ..	Large, opening widely, but more at the front, than does <i>salmonophloia</i> . Gland at the back large.	Large, opening widely to the base. Gland at top small. A broader anther than <i>oleosa</i> , nearer <i>hemiphloia</i> than <i>oleosa</i> .
Fruits ... ..	.....	Smaller and more flat-topped than <i>oleosa</i> .

## 2. With *E. salubris*, F.v.M.

This is a smooth, green-barked, fluted tree shaped like a gigantic gimlet, and quite different in appearance to any other Eucalypt that I have seen. The "egg-in-egg-cup" buds of *E. salubris* resemble the appearance sometimes seen in *E. oleosa*.

I will deal with affinities when I deal with *E. salubris*.

## 3. With *E. leptopoda*, Benth.

The narrow lanceolate foliage and the shape of the fruit of this species at once separate it from *E. oleosa*. I will make further remarks when I describe *E. leptopoda*.

## 4. With *E. decipiens*, Endl.

Comparison of Plate 63, Part XIV, and Plate 65 of the present Part shows that the similarity is not great. The leaves of *E. decipiens* are broader as a rule,

and differently veined; the shape of the buds different as a very general rule. The fruits of *E. decipiens* have the tips of the valves almost invariably exerted, while the shape is different from *E. oleosa*. *E. oleosa* is a shrub or small tree, with smooth bark for the most part, and reddish, strong, durable wood; that of *E. decipiens* has sub-fibrous bark, and pale-coloured, brittle, readily perishable wood. *E. oleosa* is a somewhat erect plant, preferring dry situations, while *E. decipiens* is a straggly "Swamp Gum."

This is the last of the species brought into comparison with *E. oleosa* by Mueller.

5. With *E. concolor*, Schauer.

*E. concolor* has sessile or nearly sessile heads of flowers, with strap-shaped peduncles. The fruits of both species may be spherical, but the protrusion of the valves is less marked in *E. concolor*.

The anthers of *E. concolor* have been described at page 153, Part XIV.

6. With *E. falcata*, Turcz.

Cursory examination of the plates of this Part shows the affinity of *E. oleosa* with *E. falcata*, and it is evident that *E. oleosa*, var. *longicornis* most closely connects with *E. falcata*, var. *ecostata*. The leaves, the shape of the buds, the fruits, all emphasise the affinity; and although I do not think a shrub of *E. oleosa* or a sheet of *E. falcata* specimens would be confused by a botanist who has given the slightest attention to the subject, the strong affinity is there, and confronts us with the question which perpetually presents itself to the student of Eucalyptus: How much variation do I require to constitute a species or a variety?

7. With *E. decurva*, F.v.M.

Reference (*ante*, p. 172) has already been made to the confusion which has arisen between *E. oleosa* and *E. decurva*. I will further discuss the relations of these species when I figure *E. decurva* in Part XVI.

8. *E. uncinata*, Turcz., has for synonyms *E. leptophylla*, Miq., in *Ned. Kruidk. Arch.* iv, 123; *E. oleosa*, F.v.M., Miq., l.e. 127; *Fragm.* ii, 56 (partly).

Mueller mixed up *E. oleosa* (as regards the narrow-leaved form) and *E. uncinata* pardonably enough; indeed, he named a narrow-leaved form of *uncinata* *E. oleosa*, var. *leptophylla*. It is well to clear up these puzzling old references, and I have drawn attention to the matter in Part XIV, page 143.

*E. uncinata* and *E. oleosa* afford instances (not common in Eucalyptus) of juvenile leaves maintaining their character as far as the flowering or fruiting stage. (See also *E. uncinata*, Part XIV, page 143)

9. With *E. incrassata*, Labill., var. *dumosa*, F.v.M.

The foliage of the species (*E. oleosa*) is that of *E. dumosa*, but it is well distinguished by the longer pedicels, the shape of the calyx, the thinner operculum, and the shape of the fruit. (B.Fl. iii, 249.)

Speaking of Murray River (Victoria) specimens, Mr. W. S. Browncombe says:—"Typical forms of *E. oleosa* and *E. incrassata*, var. *dumosa*, are very much alike from a distance, in their habit and shape of leaf, but *E. oleosa*, in the colour of the leaf, assumes a more saturated green."

The anthers are very different. The young foliage (and often the mature foliage) of *E. oleosa* is glaucous, the buds of *E. oleosa* are commonly with rostrate opercula, those of var. *dumosa* are usually longitudinally marked; the fruits of *E. oleosa* are more spherical, and have awl-like protruding tips of the valves.

10. With *E. fœcunda*, Schauer.

*Ante*, p. 169. I have adduced evidence that *E. oleosa* and *E. fœcunda* have been confused, and therefore a word of warning is necessary. At the same time they are not closely related. The leaves are sometimes similar, but the veins are more spreading in *E. fœcunda*. The fruits incline to be spherical in *E. oleosa*; they are more cylindrical in *E. fœcunda*. The tips of the valves are exert in the former species.

11. With *E. cornuta*, Labill.

In trying to ascertain the meaning of the word "Poot," the following communications to *The Western Mail* (Perth) of the 15th January, 1910, are of interest:—

"Farmer" (Katanning) says that, to the best of his belief, the name "Poot" is of aboriginal origin, and is applied by old bushmen to either Morrel or Yate. There is a close outward resemblance between these two trees, although of course they are quite distinct.

Mr. Fred Brockman, Chief Surveyor, says that while the Yate of the Albany district and the Morrel of the Eastern districts are quite distinct in outward characteristics, the two varieties seem to imperceptibly merge into one another, so that in places it is difficult to decide whether the trees are Yate or Morrel.

He suggests the theory that the timbers Yate from the South Coast and Morrel from the Eastern district have met (say, in the latitude of Katanning), that from the common point a process of hybridising has proceeded, spreading northward until Yate is lost in Morrel, and south until Morrel is lost in Yate; that this hybridising is not perfectly regular, and that the name of Poot has been used in the South Coast districts to distinguish from the Yate that part of the forest which has most markedly retained the characteristics of the Morrel. As a result of this, the man from the South Coast would naturally apply the name Poot to the Morrel of the more northern area.

I would, however, point out that the species *E. oleosa* and *E. cornuta* are not closely related, and that Yate (*E. cornuta*) differs from Poot or Morrel (*E. oleosa*) in the following very obvious characters:—

Yate has a pale-coloured timber and has buds with remarkably long opercula; the shapes of the fruits of the two species are very different. The leaves and anthers are also very different.

### Hybridism.

I believe I have evidence of hybridism between this species and *E. incrassata*, var. *dumosa*. Discussion and a figure of this form will be referred to when hybridism is considered.

## DESCRIPTION.

LXXIV. *E. Gillii*, n. sp.

FOLLOWING is the description:—

Frutex gregaria vel arbor parva, glauca, "Mallee" formans.

Lignum hepaticum, cortice glabro.

Folia cordata, apice saepe acuminato; circiter  $1\frac{1}{4}$  inch (3 cm.) lata et  $1\frac{1}{2}$  inch (4 cm.) longa.

Operculum longum, cupulâ in brevem pedicellum terminans umbellis usque ad 8 plusve minusve in capitulo, in uno pedunculo  $\frac{1}{2}$  inch. Antheræ similes ad eas *E. oleosa*.

Fructus similes ad eas *E. oleosa* varietatis glauca.

A gregarious, glaucous shrub or small tree forming a dense growth of Mallee, the timber red or reddish-brown, and the bark smooth; branchlets usually rounded.

**Juvenile leaves.**—Not seen.

**Mature leaves.**—Cordate, sessile or very short stalked, the base cordate, amplexicaul or rounded, the apex often acuminate. Common dimensions are  $1\frac{1}{4}$  inch broad and  $1\frac{1}{2}$  inch long. Of uniform colour on both sides. Midrib prominent, the lateral veins scarcely visible and penniveined, the intramarginal vein not close to the edge.

**Flowers.**—The buds with calyx-tube slightly urceolate, particularly on drying, the operculum rostrate, the shape of the bud resembling that of *E. oleosa*, var. *glauca*. The calyx-tube tapers into a short pedicel, the heads of flowers up to 8 and more in number, on a common peduncle of half an inch. Stamens inflected in the bud, the filaments pale yellow, the anthers similar to those of *E. oleosa*.

Fruits similar to those of *E. oleosa*, var. *glauca*.

I name it in honour of Mr. Walter Gill, Conservator of Forests, of South Australia, from whom I originally received specimens of this form in 1900.

## Notes Supplementary to the Description.

The colour of the leaves is always silver, or "blue" if you like, but "silver" seems better to me. It seems very like your New South Wales Silver-leaved Stringybark, *E. pulverulenta*, in a general way, though I am fully aware such a resemblance is purely superficial,—what I mean is that it seems to be our South Australian silver-leaved tree just as that is yours.

The only local name I could pick up was "Curly" Mallee, its curly or twisted growth making it hard for stockmen to ride through it. (W. Gill.)

The general height of the trees is about 20 feet, and the trunks and limbs rather crooked. The largest diameter of any of the trunks did not exceed 8 inches. (H. W. Garling, Broken Hill, N.S.W.)

## SYNONYMS.

1. *E. socialis*, F.v.M., var. *laurifolia*, F.v.M.
2. *E. laurifolia*, Behr. Both in part.

Under the original description of *E. socialis*, F.v.M. (which is a narrow-leaved form of *E. oleosa*, F.v.M., ante, p. 167), Mueller twice speaks of a broadish-leaved form of it which he refers to *E. laurifolia*, Behr, which he suggests may be a broad-leaved form of *E. oleosa*, F.v.M. This form does not strictly belong to *E. Gillii*, but is the petiolate broad-lanceolate form which is intermediate between *E. oleosa* and *E. Gillii*.

## RANGE.

It occurs, so far as we know at present, in certain drier parts of South Australia and also in the Broken Hill district of New South Wales, also in dry country. I have received a few leaves and fruits from Burracoppin, Western Australia, from Dr. J. B. Cleland, which may possibly belong to this species. It should be looked for in dry country.

Following are the localities known to me so far :—

*South Australia.*—I have just returned from a most interesting trip 80 miles east of Farina to the Flinders Ranges west of Lake Frome, about 400 miles north of Adelaide, at a place called Umberatana.

It covers scores of acres on the poor hill and rise sides on travertine limestone and schert country and looks like a great blue or silver blanket over the country. *E. oleosa* is the only other Mallee anywhere within hundreds of miles. (W. Gill.)

I have received the same form from Mr. Gill from Laura and Wirrabara, and from Mt. Lyndhurst from Max Koch.

*New South Wales.*—About 50 miles north of Broken Hill, between Tarrawangee and Corona, on the banks of a small creek. These trees cover an area of about 2 acres, and beyond one other lot, I have not seen any in other parts of my district. (Assistant Forester H. W. Garling, Broken Hill.)

The same plant was received from Euriowie, Broken Hill (J. E. Carne, through R. H. Cambage).

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## AFFINITIES.

### 1. With *E. oleosa*, F.v.M.

Its relations to this species are very close, and the two species seem to bear the same relation to each other that do *E. amygdalina*, Labill., and *E. Risdoni*, Hook. f., and other "pairs" of species, e.g., *E. apiculata*, Baker and Smith, and *E. virgata*, Sieb.

*E. Gillii* is at the "broad-leaved" end of a series, the extreme narrow-leaved end being represented by the narrow-leaved form, which is not rare, of *E. oleosa*.

Some botanists may look upon it as a *latifolia* form of *E. oleosa*, but I think it is sufficiently distinct to merit specific rank.

*E. laurifolia*, Behr, is a petiolate, comparatively narrow-leaved Eucalypt which is a transit form between *E. oleosa* and *E. Gillii*.

### 2. With *E. pulverulenta*, Sims.

Glauconsness is a matter of environment mainly, but the general similarity of this species to *E. Gillii* does not entirely depend on this. The leaves are a good deal alike in shape, but the buds and fruits are very different. Scrubs of *E. pulverulenta* and *E. Gillii* resemble each other a good deal except that the bark of the stems of the former are more fibrous.

Other species with not dissimilar cordate leaves are *E. Risdoni*, Hook. f., *E. setosa* Schauer, and there are others, but they have no close relations to *E. Gillii*.

## DESCRIPTION.

LXXV. *E. falcata*, Turcz.

FOLLOWING is the original description:—

*Eucalyptus falcata* ramis teretibus; foliis alternis, basi acutis, apice longe acuminatis, linear-acuminatis, falcatis obscure punctatis glaucis trinerviis; nervis lateralibus margini approximatis; umbellis axillaribus 6-8 floris, foliis brevioribus; pedunculis deflexis petiolos multo superantibus, pedicellis clavato-angulatis; operculo conico acuto cupulam longitudine quadruplo excedente, eaque angustiore.

Nova Hollandia. Drum. (J. Drummond) coll. n. 70. (Turcz. in *Bull. Soc. Nat. Mosc.*, 20, 1847, pt. 1, p. 163.)

It was afterwards described by Bentham in B.Fl. iii, 248. It is not figured in the "Eucalyptographia."

## Notes supplementary to the Description.

The type is Drummond's 3rd Coll. No. 70, which I received on loan from the Oxford Herbarium, and caused a careful drawing to be made of it. Bentham (B.Fl. iii, 248) gives the furrowing of the calyx-tube as a character, and quotes Maxwell's specimens, "plains north and south of the Stirling Range."

The operculum is in the typical form much narrower in diameter at the junction with the calyx-tube. The fruits also are furrowed (or ribbed).

The juvenile foliage of this species has not before been described.

The juvenile leaves are slightly glaucous, equally pale-coloured on both sides, ovate or oval to broadly ovate, with or without a shortly and bluntly pointed apex. Size up to say 3 inches long by 2 inches broad, petiolate, the midrib conspicuous and the lateral veins not inconspicuous, penniveined and arranged at about an angle of 30° with the midrib, the intramarginal vein distinct, and well removed from the edge.

The term falcate, which gives the name to the species, originally referred to the mature leaves, but it is not specially appropriate.

This species exhibits a kink in the filaments of the stamens, a character which is best known in the case of *E. uucinata*.

Standing opposite the shrubs at Hopetoun I made the following notes:—  
"A Mallee of 10-15 feet, with very slender stems. Of somewhat drooping habit. Reminds one of *E. oleosa* in size and tint (yellowish) of flowers. Has large stamens. Opercula long and somewhat curved."

Following is a variety:—

Var. **ecostata**, Maiden.

The calyx-tube of this species is often free or nearly so from furrowing (or ribbing), and the same applies to the fruits. I propose to constitute a variety for this form, and give it the name *ecostata*.

In the variety there is often not an abrupt transition between the calyx-tube and the operculum as in the normal form.

The variety is not a strong one, since there is frequent and absolute transition between it and the species. It seems, however, desirable that the form should have a name, particularly as fruits of this species, and perhaps of the variety, have entered into the confusion which for so long gathered around *E. decurva*, F.v.M., and which I will clear up when I come to that species.—(*Journ. W.A. Nat. Hist. Soc.*, Vol. iii, 173, January, 1911.)

## RANGE.

It is confined to Western Australia as far as we know. I know it from the following localities:—

Between Albany and Williams River (Webb).

“Porongerup (Porongorup) Ranger” (Range), *Maxwell*. Specimen received from Mueller labelled “Type of *E. decurva*, F.M.,” and received by me from Herb. Barbey-Boissier, Geneva.

The locality is identical with “Plains to the north and south of Stirling Range, *Maxwell*,” as quoted in B.Fl. iii, 248. As a matter of fact Maxwell did not collect it on the Porongorups proper, but on the low sandy undulations which gradually slope into the plains between this range and that of the Stirling Range and beyond. I have collected it myself in various sand-plains localities (Kalgan River Plains) in the vicinity of the Stirling Range. The nearest locality for *E. falcata* to the Porongorups proper would be 4 or 5 miles, and “Porongorups” is quoted as a convenient name-place. Local people speak of this short range as the Porongorups.

Yetmerup, north side of Stirling Range (A. Morrison); Toll’s Creek, Stirling Range (A. Morrison); Stirling Range (Diels, 2,959, distributed as *E. decurva*); Stirling Range (Louis Dillon); Hlopetoun (J.H.M.), with normal and also very large fruits.

Var. **ecostata**, Maiden.

Where I have collected it myself, I have always found this variety more or less interspersed with the normal form.

It is represented in the National Herbarium, Sydney, by the following specimens:—

Kalgan Plains (N.B.—These plains are between the Porongorups and the Stirling Range) (J.H.M.). Between Warrungup and Ellen’s Peak, Stirling Range (A. Morrison).

Hopetoun, formerly known as Mary Ann Harbour. It is on the South Coast, between Albany and Esperance (J.H.M.).

Nine miles west of Bullabulling (which is itself 18 miles west of Coolgardie). (W. V. Fitzgerald.)

Limestone, near Fremantle (Cecil Andrews). Limestone Hills, Fremantle (W. V. Fitzgerald). I have discussed this Fremantle form below, page 182.

## AFFINITIES.

### 1. With *E. goniantha*, Turcz.

The similarity as regards the corrugation of the calyx-tubes of the buds is obvious, but the opercula of *E. fulcata* very rarely indeed show any trace of corrugation. The fruits of *E. goniantha* are still unknown. The anthers of *E. goniantha* are closer allied to *E. oleosa* and *E. fulcata* than to *E. incrassata*. I will refer to the matter when dealing with *E. goniantha* in Part XVI.

### 2. With *E. oleosa*, F.v.M.

*E. fulcata* and *E. oleosa* undoubtedly have close relations, and they seem to connect through the var. *longicornis* of the latter. I have briefly referred to the matter at page 175.

### 3. With *E. uncinata*, Turcz.

Comparison of Plate 62, Part XIV, and Plate 68, of the present Part, shows that the affinities between the two species are neither numerous nor close. But in one point they are similar, and that is they are two of the few species which have a kink in the filament of the stamens.

### 4. With *E. concolor*, Schauer (*ante*, this page, also Part XIV, p. 154).

I have referred to certain small trees at Fremantle which appear to have been confused with that species, and on that occasion I announced that they belonged to *E. fulcata*, which is a new locality for the species. The buds and fruits, while distinctly ribbed in some specimens, are not typical for the species, and may be included in my variety *coostata*.

The flowers and fruits of the Fremantle specimens are almost sessile, the pedicels and peduncles being alike short, but a similar shortening is sometimes observable in *E. fulcata*. The peduncles are strap-shaped in *E. concolor*. Perhaps because of the kink in the filament, they have been distributed as *E. uncinata*, but this character is now known to be present in a few other species. The style is more persistent than in *E. concolor*, while the subulate tips of the valves are shorter in *E. concolor*, and perhaps also a little broader.

The shape of the fruits is more spherical in *E. falcata* than in *E. concolor*, while the rim of the fruit is usually more truncate in the latter species.

I have not the juvenile leaves of the Fremantle Eucalypt, and so cannot continue the comparison further.

Mr. Fitzgerald describes his Fremantle specimens as "Erect or straggling habit, 10 to 20 feet thick (presumably a slip of the pen for high), 1 foot diameter, bark greyish and smooth." The Fremantle trees much exceed in diameter anything I have ever seen for *E. falcata* in the district which produced the type.

I have already (under *E. concolor*, Part XIV, p. 154) explained that I have not been able to obtain *E. concolor* from the Fremantle district,—I have not been able to see Preiss' No. 225, the type. I continue, therefore, without the fullest information in regard to *E. concolor*, and until I see the type, or matched specimens, I must necessarily speak with some reserve in regard to the affinity between *E. concolor* and those Fremantle specimens I have referred to *E. falcata*.

The anthers of *E. falcata* (typical) and *E. concolor* (Diels' No. 3,504) are alike.

#### 6. With *E. decipiens*, Endl.

There is some similarity between the Fremantle specimens just referred to (under *E. concolor*) and *E. decipiens*. The shape of the buds points in this direction, but there is no ribbing in *E. decipiens*,—on the other hand, it is sometimes absent in *E. falcata*, var. *ecostata*. The fruit of *E. decipiens* is less close to the Fremantle specimens than are those of typical *E. concolor*. The tips of the valves of *E. decipiens* are usually sunk.

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### Explanation of Plates (65-68).

#### PLATE 65.

*E. oleosa*, F.v.M.

- 1*a*. Juvenile leaves; 1*b*, buds and mature leaf; 1*c*, fruits; 1*d*, anthers. Murray Bridge, South Australia (practically a type locality). (R. H. Cambage and J. H. Maiden).
  - 2*a*. Buds; 2*b*, fruits. "Red Mall e," 1 mile S.W. of Mannum, near River Murray, South Australia (practically a type locality). (W. Gill.)
  3. Intermediate leaf. Near Mildura, Victoria. (W. S. Browncombe.)
  - 4*a*. Buds; 4*b*, fruits; 4*c*, mature leaf; 4*d*, buds; 4*e*, fruits; 4*f*, buds; 4*g*, fruits (rim thicker); 4*h*, buds. All from Port Lincoln, South Australia. (J.H.M.) Note the variation in the buds, and all from practically the same tree.
  5. Fruits, flat-rimmed. Tintinnarra Desert, South Australia. (R. H. Cambage.)
  - 6*a*. Buds; 6*b*, fruits. Cape Jervis, South Australia. (J.H.M.)
  - 7*a*. Buds; 7*b*, fruits. Murat and Denial Bays, South Australia. (Dr. R. S. Rogers.)
  - 8*a*. Buds; 8*b*, fruits. Venus Harbour, South Australia. (Dr. R. S. Rogers.)
- Nos. 6, 7, 8. All from coastal localities, and to show variation in opercula.
9. Type (leaf, bud, and flowers) of *E. turbinata*, Behr. "Pine Forest across Salt's Creek, S.A. Dr. Behr." Miq. in *Ned. Kruidk. Arch.* iv, 137. See page 168.

- 10a. Mature leaf ; 10b, buds ; 10c, fruits, of the "Peeneri" Mallee. Sandhills east of Ooldea, South Australia. (H. Deane.)
- 11a. Buds ; 11b, fruits. Eucla, W.A., at the S.A. border. (J. D. Batt.)
- 12a, 12b, 12c, 12d. Juvenile leaves ; 12e, mature leaf ; 12f, buds ; 12g, fruits. All from the same tree. Ravensthorpe, W.A. (J.H.M.) Note the narrow juvenile leaves.
- 13a. Leaf and buds (cf 4d) ; 13b, fruits. Comet Vale, *via* Kalgoorlie, W.A. (J.H.M.)
- 14a, 14b. Juvenile leaves ; 14c, pear-shaped fruit. Nymagee, N.S.W. (J.H.M.)
15. Narrow juvenile leaves. Mt. Boppy, N.S.W. (J. L. Boorman.)
- 16a, 16b, 16c. Juvenile leaves. Coolabah, N.S.W. (J. L. Boorman.)
- 17a. Mature leaf ; 17b, flowers, of type of *E. socialis*, F. Müll, "versus flum. Murray, Nov. Holl. Austr. Dr. Ferd. Müller." Note the narrowness of the leaf. See page 167.
- 18a. Mature leaf ; 18b, buds ; 18c, fruits. Dublin Scrub, S.A. (J. M. Black.) A narrow-leaved form like that formerly called *E. socialis*, F.v.M.

## PLATE 66.

*E. oleosa*, F.v.M.

- 1a. Mature leaf ; 1b, buds ; 1c, unripe fruits. Swan Hill, Victoria, in National Herbarium, Melbourne. (Dr. Griffiths.) Compare 17 and 18, Plate 65.
- 2a. Mature leaves, buds, and flowers ; 2b, anthers ; 2c, fruits of a form which is not typical. Watheroo rabbit fence, W.A. (Max Koch.)
- 3a. Mature leaf and flowers ; 3b, fruits. Murchison Road, W.A. (Oldfield.) N.B.—These specimens are identical with Nos. 3 and 4 of Plate 22, Part IV, which, following Bentham, was there called *E. fœcunda*, Schauer. For an explanation of the matter, see page 169.

*E. oleosa*, F.v.M., var. *longicornis*, F.v.M.

- 4a. Mature leaf and buds ; 4b, fruits, of the type of *E. oleosa*, F.v.M., var. *longicornis*, F.v.M. Upper Swan River, W.A. (National Herbarium, Melbourne. Collected by whom ?)
5. Mature leaves and fruit of a tree with narrow leaves and shorter peduncles and pedicels than the type, but apparently referable to var. *longicornis*. Cowcowing, W.A. (Max Koch.)

*E. oleosa*, F.v.M., var. *glauca*, Maiden.

- 6a. Buds ; 6b, fruits. Near Tammin, W.A. (Dr. L. Diels, No. 2,854.) Form with narrow leaves.
7. Buds. Port Gregory, W.A. (Dr. L. Diels, No. 5,718.) Nos. 6 and 7 connect var. *longicornis* with var. *glauca*.
- 8a. Juvenile leaves ; 8b, mature leaves ; 8c, buds ; 8d, fruits of the type. Kalgoorlie, W.A. (J.H.M.)
- 9a. Mature leaf ; 9b, buds. Comet Vale, 62 miles north of Kalgoorlie, W.A. (J.H.M.)
10. Fruit, somewhat urceolate. Coolgardie, W.A. (C. L. Webster.)
- 11a. Buds ; 11b, anthers ; 11c, pear-shaped fruits with valves not much exsert. Coolgardie. (R. Helms.)
- 12a. Buds ; 12b, fruits, somewhat urceolate. Sandplain, Elbano, east from Mingenew, W.A. (A. Morrison.)
- 13a. Leaf and buds ; 13b, large urceolate fruits. Cowcowing, W.A. (Max Koch.)
- 14a. Mature leaf ; 14b, buds (note that the operculum is of slightly greater diameter than the calyx-tube. Compare 9b) ; 14c, fruits, very large and broad-rimmed. Sandhills, east of Ooldea, S.A., on the Transcontinental Railway Survey, Port Augusta, S.A., to Kalgoorlie, W.A. (H. Deane.)
15. Twig of Drummond's No. 186, W.A. For my remarks on this specimen, see page 172.

## PLATE 67.

*E. oleosa*, F.v.M., var. *longicornis*, F.v.M. "Foot." See p. 166.

- 1*a*, 1*b*. Juvenile leaves. Broome Hill, W.A. (L. Dillon.); 1*c*, Buds; 1*d*, anthers; 1*e*, fruits. Broome Hill, W.A. (J.H.M.)  
 2. Buds, ovoid in shape, and with long pedicels. Coolgardie. (L. C. Webster.)

*E. Gillii*, Maiden, and forms allied thereto.

- 3*a*. Twig, with mature leaf and buds; 3*b*, fruits; from a typical specimen of *E. laurifolia*, Behr. (*E. socialis*, Ferd. Mull., in Mueller's handwriting; *E. oleosa*, in Bentham's handwriting.) Near Gawler Town, S.A. (National Herbarium, Melbourne.)  
 4*a*. Twig, with mature leaves and buds; 4*b*, fruits. Wirrabarra, S.A. (W. Gill.)  
 5. Twig, with mature leaf and fruits. Probably Burracoppin, W.A. (Dr. J. B. Cleland.)  
 These petiolate-leaved specimens (3-5) are, in my opinion, transit forms between *E. oleosa* and *E. Gillii*.  
 6. Mature leaf and fruits of *E. Gillii*, with rather narrow leaves. Mount Lyndhurst, S.A. (Max Koch.)  
 7*a*. Twig, with mature leaves and buds; 7*b*, anthers; 7*c*, fruits. Umberatana, Flinders Range, S.A. (W. Gill.) Type of *E. Gillii*.  
 8. Twig, with mature leaves, buds, and flowers. Euriowie, Broken Hill, N.S.W. (J. E. Carne, per R. H. Cambage.) This is *E. Gillii*.  
 9. Twig, with mature leaves and fruits. Broken Hill District, N.S.W. (Assistant Forester H. W. Garling.) This is *E. Gillii*.

## PLATE 68.

*E. falcata*, Turcz.

- 1*a*. Mature leaf and buds; 1*b*, flowers; 1*c*, stamens with the filaments inflected at an angle; 1*d*, anther; 1*e*, immature fruits; 1*f*, ripe fruits; 1*g*, ripe fruit, end on. All from the type, viz., No. 70, J. Drummond, W.A.  
 2*a*. Buds; 2*b*, anther; 2*c*, leaf and immature fruits; 2*d*, mature fruits with short pedicels. All from Stirling Range, W.A. (Louis Dillon.)  
 3*a*. Leaf and buds; 3*b*, fruits. From "South West Australia." (National Herbarium, Melbourne.)

*E. falcata*, Turcz., var. *ecostata*, Maiden, and forms allied thereto.

- 1*a*. Mature leaves; 4*b*, flowers; 4*c*, fruits. Received from Herbar Barbey-Boissier, Geneva, Switzerland, with the following label:—" *E. oleosa*, F.v.M. Type of *E. decurva*, F.v.M. (an error. J.H.M.) Porongrup Ranges, W.A., Maxwell." For an account of the confusion in regard to *E. decurva* and *E. falcata*, see page 180.  
 5*a*. Mature leaves; 5*b*, fruits. "S.W. Australia." (W. Webb.) From a specimen in the National Herbarium, Melbourne, labelled by Mueller "*E. decurva*" (scratched out) "*E. oleosa*, var."  
 6*a*. Juvenile leaf; 6*b*, mature leaf; 6*c*, buds; 6*d*, buds, with shorter opercula; 6*e*, buds with still shorter opercula; 6*f*, anther; 6*g*, stamens, with filaments inflected at an angle; 6*h*, immature fruits; 6*i*, mature fruits. All from the same clump of trees at Hopetoun, W.A. (J.H.M.) Type of var. *ecostata*, Maiden.  
 7. Mature fruits with projecting rim. Stirling Range, W.A., "ad latera collium lapidosa" (L. Diels, No. 2,989). Sent out with the label "*E. decurva*, F.v.M., frutex 1-2 m. alt." See page 180.  
 8. Juvenile leaf, Porongrup, W.A. (J.H.M.)  
 9*a*. Mature leaf; 9*b*, very large fruits. Hopetoun, W.A. (J.H.M.)  
 10*a*. Mature leaf; 10*b*, anther; 10*c*, immature fruits. Between Warrungup and Ellen's Peak, Stirling Range, W.A. (A. Morrison.) This is a shrub, and seems to connect *E. falcata*, var. *ecostata*, with "Foot." See page 180, and Plate 67.

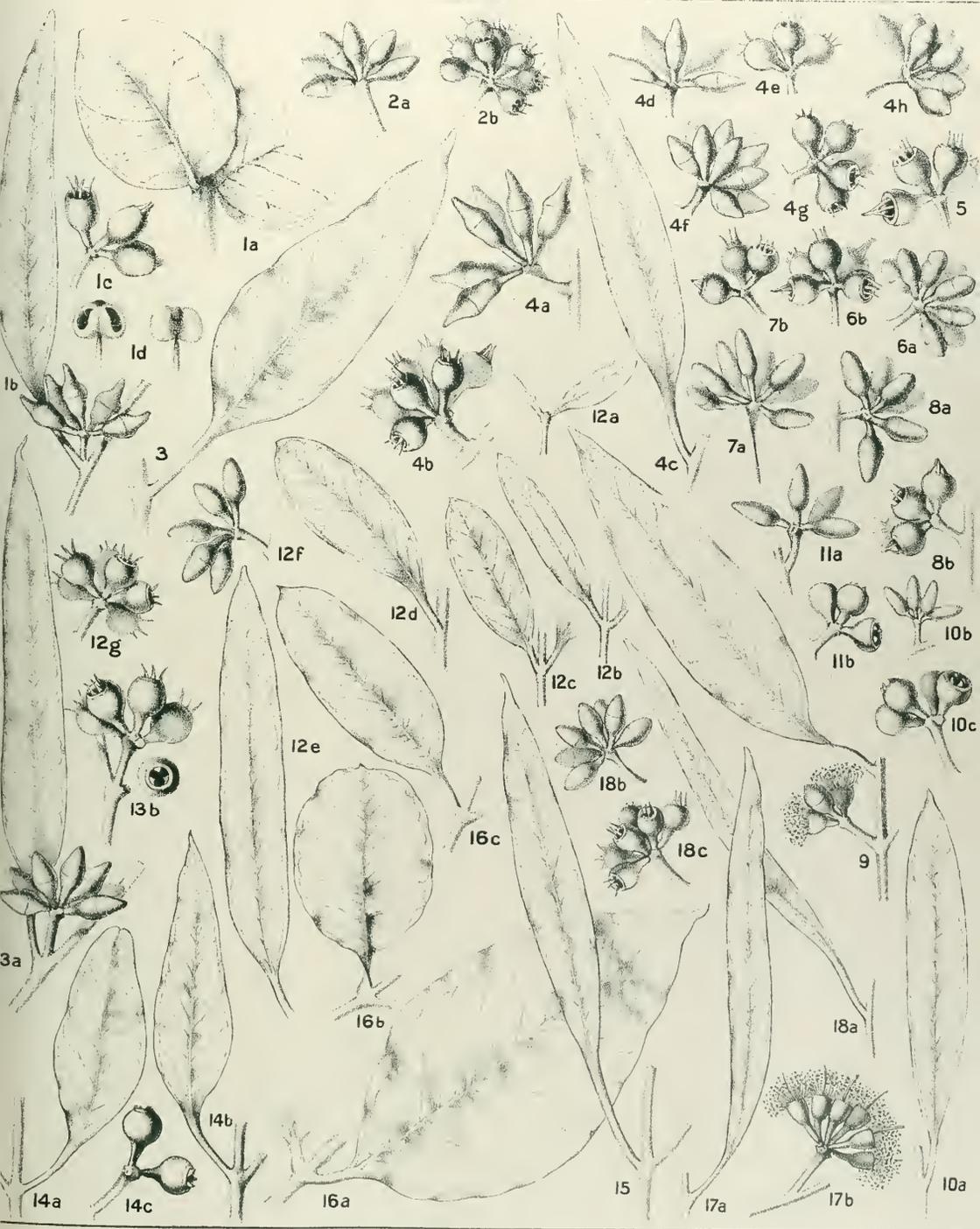
The following species of Eucalyptus are illustrated in my "Forest Flora of New South Wales"\* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

<i>acacioides</i> , A. Cunn. (xlviii).	<i>melliodora</i> , A. Cunn. (ix).
<i>acmenioides</i> , Schauer (xxxii).	<i>microcorys</i> , F.v.M. (xxxviii)
<i>amygdalina</i> , Labill. (xvi).	<i>numerosa</i> , Maiden (xvii).
<i>Andrewsi</i> , Maiden (xxi).	<i>obliqua</i> , L'Hérit. (xxii).
<i>Baileyana</i> , F.v.M. (xxxv).	<i>odorata</i> , Behr and Schlechtendal (xli).
<i>Behriana</i> , F.v.M. (xlvi).	<i>paniculata</i> , Sm. (viii).
<i>bicolor</i> , A. Cunn. (xliv).	<i>pilularis</i> , Sm. (xxxix).
<i>Boormanii</i> , Deane and Maiden (xlv).	<i>piperita</i> , Sm. (xxxiii).
<i>Bosistoana</i> , F.v.M. (xliii).	<i>Planchoniana</i> , F.v.M. (xxv).
<i>capitellata</i> , Sm. (xxviii).	<i>populifolia</i> , Hook. (xlvii).
<i>Consideniana</i> , Maiden (xxxvi).	<i>punctata</i> , DC. (x).
<i>coriacea</i> , A. Cunn. (xv).	<i>regnans</i> , F.v.M. (xviii).
<i>corymbosa</i> , Sm. (xii).	<i>resinifera</i> , Sm. (iii).
<i>dives</i> , Schauer (xix).	<i>saligna</i> , Sm. (iv).
<i>fruticetorum</i> , F.v.M. (xlii).	<i>siderophloia</i> , Benth. (xxxix).
<i>goniocalyx</i> , F.v.M. (v).	<i>sideroxydon</i> , A. Cunn. (xiii).
<i>hæmastoma</i> , Sm. (xxxvii).	<i>Sieberiana</i> , F.v.M. (xxxiv).
<i>hemiphloia</i> , F.v.M. (vi).	<i>stellulata</i> , Sieb. (xiv).
<i>longifolia</i> , Link and Otto (ii).	<i>tereticornis</i> , Sm. (xi).
<i>Luehmanniana</i> , F.v.M. (xxvi).	<i>virgata</i> , Sieb. (xxv).
<i>macrorrhyncha</i> , F.v.M. (xxvii).	<i>vitrea</i> , R. T. Baker (xxiii).
<i>maculata</i> , Hook. (vii).	

---

\* Government Printer, Sydney. 4to. Price 1s. per part (10s. per 12 parts); each part containing 4 plates and other illustrations.





E. OLEOSA, F.v.M.

M. F. DICKSON, DEL.



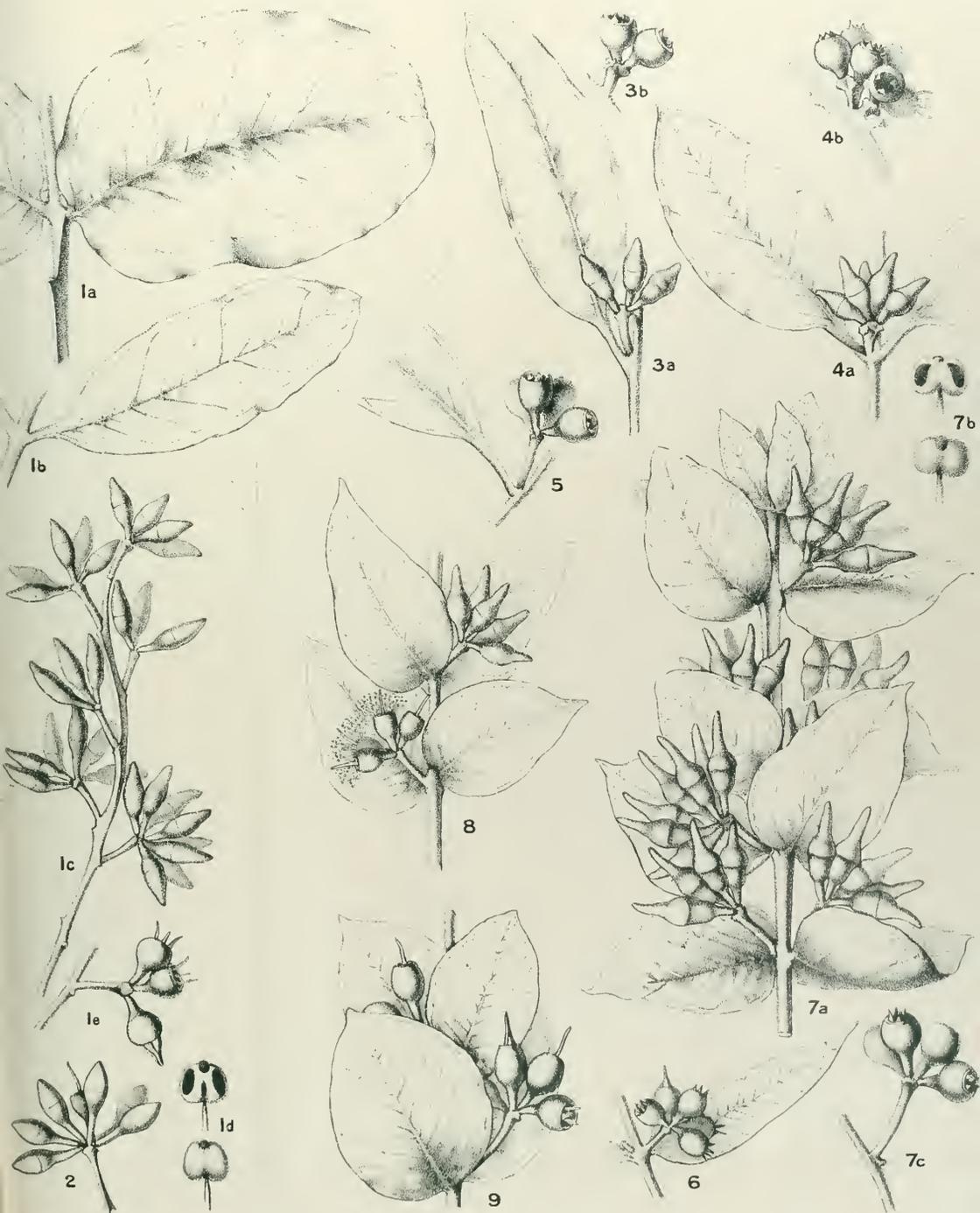


M. Floerke.

*E. OLEOSA*, F.v.M. (1-3).

*E. OLEOSA*, VAR. *LONGICORNIS*, F.v.M. (4-5).

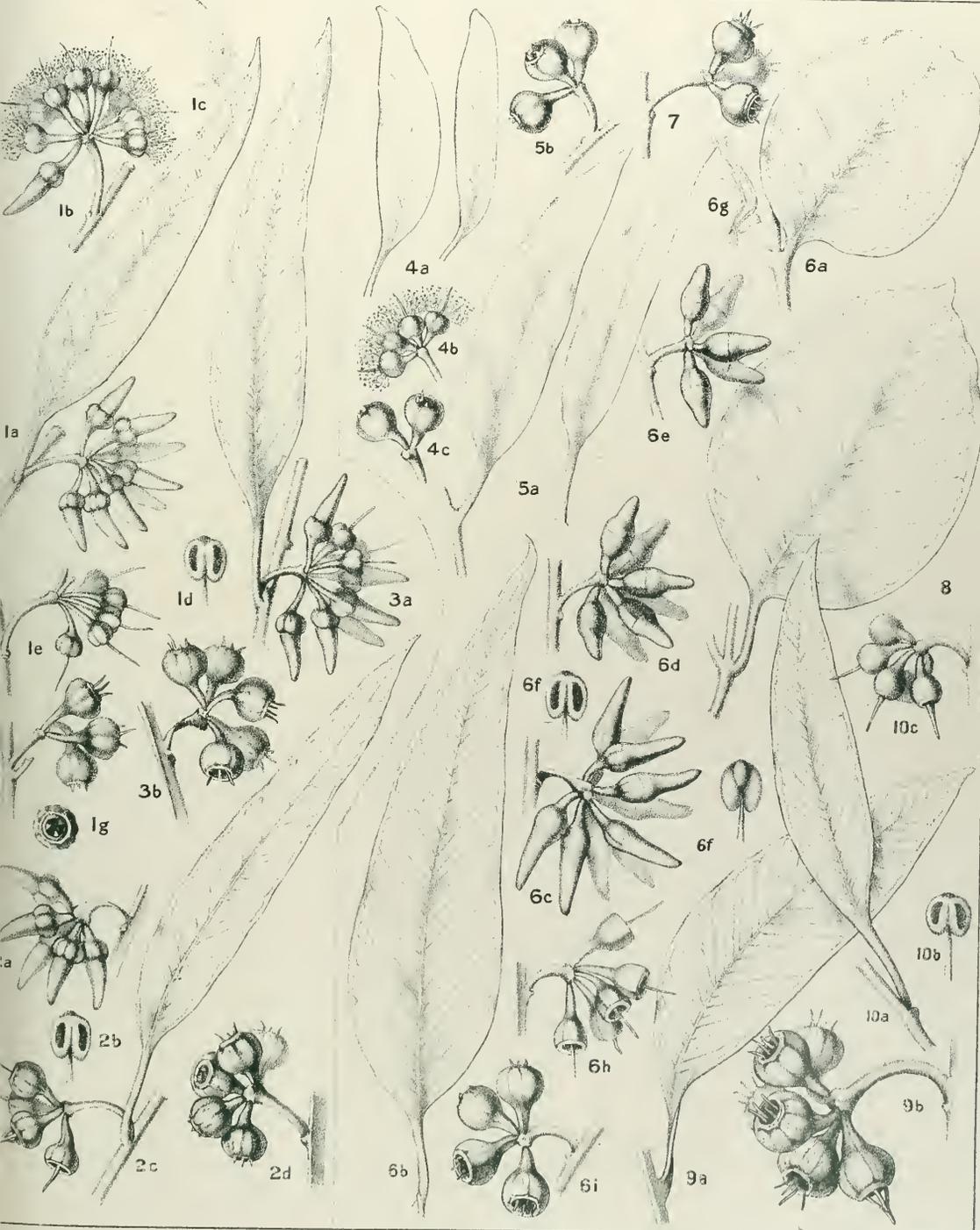




*E. OLEOSA*, VAR. *LONGICORNIS*, ("Poort"), (1, 2).

*E. GILLII*, MAIDEN, (6-9). Transit Forms, *E. oleosa* to *E. Gillii*, (3-5).





*E. FALCATA*, TURCZ., (1-3).

*E. FALCATA*, VAR. *ECOSTATA*, MAIDEN, (4-10).



# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

(Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney)

---

VOL. II. PART 6.

Part XVI of the Complete Work.

(WITH FOUR PLATES.)

---

*“Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise.”*

MACAULAY'S "ESSAY ON MILTON."

---

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---

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## DESCRIPTION.

### *E. oleosa*, F.v.M., var. *Flocktoni*, Maiden.

An erect, many-stemmed shrub of 6-8 feet. Branchlets somewhat angular. Juvenile leaves unknown.

Mature leaves coriaceous, thick, equally green on both sides, dull to slightly glossy, petiolate, lanceolate to broadly lanceolate (common dimensions are, petiole 1-2 cm., leaf 10 cm., breadth 2-3 cm.).

Flowers pendulous, up to 7 in the umbel, with a common peduncle of 1 cm. and pedicels of half that length, calyx subcylindrical (about 1 cm. long), operculum tapering, constricted when dry, of slightly greater diameter than the calyx at the line of junction (about 6 cm. long). Anthers similar generally to those of the *oleosa* group, but less broad at the base than that of typical *oleosa*. Pistil long, as long or longer than the stamens, stigma not dilated.

Fruits urceolate, furrowed longitudinally but irregularly, much constricted at the orifice and tapering gradually to a rather short pedicel, of greatest diameter midway between the orifice and the pedicel, 1 cm. in length, with a diameter of .75 cm., the valves well sunk within the capsule, or the ends of the slender tips of the same nearly approaching the orifice, rim narrow and furrowed.

Its closest affinity appears to be to *E. oleosa*, F.v.M., and to the var. *glauca* described in Part XV, but the fruit renders it sufficiently different from any other form of *E. oleosa*.

Esperance, W.A., Lindley L. Cowen, January, 1902. Desmond, near Ravensthorpe, W.A., J. H. Maiden, November, 1909; apparently not abundant.

I have named this form in honour of Miss Margaret Flockton, the accomplished artist of my "Critical Revision of the genus *Eucalyptus*" and "Forest Flora of New South Wales."—*Journ. W.A. Nat. Hist. Soc.*, Vol. iii, Jan. 1911.

---

## AFFINITIES.

This is one of the puzzling forms that make one hesitate whether to call it a variety of an existing species or a new one. Although I label it a variety, it will be a convenient arrangement to compare it with other forms.

### 1. With *E. oleosa*, F.v.M.

The anthers resemble each other in var. *Flocktoni* and in the normal species, but they are not absolutely identical. The opercula (Fig. 2b, Plate 69) resemble those of most forms of *E. oleosa*. The urceolate shape of the fruits of var. *Flocktoni* has resemblances in var. *glauca* (see Figs. 10, 12b, 13b of Plate 66, for example). The tips of the valves are, however, not exsert, as in *E. oleosa*, while corrugation of buds and fruits (see 1c and 1d, Plate 69) is absent in the normal form.

*E. oleosa*, from the Murchison River, Western Australia, has been confused with *E. fecunda* (see page 163, Part XV), and with *E. decurva* (see page 193 of the present Part). Some of the fruits are a little constricted and exhibit some resemblance to those of var. *Flocktoni*.

2. With *E. falcata*, Turcz.

This is observable in the corrugation of buds and fruits, *e.g.*, 1c and 1d, Plate 69, but (see Plate 68) *E. oleosa*, var. *Flocktoni*, and *E. falcata* are sufficiently distinct.

3. With *E. decurva*, F.v.M.

I have received from Professor Ewart a specimen from Herb. Melb., labelled "On the level plains, south from Stirling Range. Shrub 10 feet, 14th January, 1862. *E. oleosa*, F.v.M., var. *Eucalyptus decurva*, Benth., partim, non Ferd. Mueller." It is *E. oleosa*, var. *Flocktoni*.

This locality is Kalgan Plains or thereabout, and the collector was probably Maxwell. The reference to Bentham is explained under *E. decurva*, this Part, p. 191, for Bentham confused Mueller's *E. decurva* with *E. falcata*.

Another specimen, "Peppermint," Murchison River, Western Australia (Oldfield)" (see fig. 3, Plate 69) was included doubtfully in *E. decurva* by Bentham, and connects the present variety with *E. oleosa*.

A third specimen, Cowcowing, Western Australia (Max Koch), figured at 3, Plate 69, is also a connecting form.

It will be seen from the above that Bentham confused *E. falcata* and *E. decurva* because of the incomplete material at his disposal, and since *E. oleosa*, var. *Flocktoni*, was one of the forms so confused, I direct attention to the matter. Compare fig. 2, Plate 70 (*E. decurva*), and the strong resemblances will be at once evident.

At the same time the anthers of the two forms sharply separate them.

4. With *E. torquata*, Luehm.

The variety *Flocktoni*, especially in its most corrugated form (*e.g.*, figs. 1c, 1d of Plate 69), certainly resembles *E. torquata*, Luehm. (see 6a and 6c, Plate 13, Part IV), but the anthers sharply separate the two Eucalypts, while other differences are apparent.

5. With *E. incrassata*, Labill.

Attention may be invited to the figures of *E. incrassata* buds at 1a, and fruits at 2a, Plate 15, Part IV of the present work. There is undoubted external similarity to *E. oleosa*, var. *Flocktoni*, but the anthers separate the two forms.

## DESCRIPTION.

LXXVI. *E. Le Souefii*, sp. nov.

Arbor mediocriter alta.

Cortex rimosa basi arboris majore parte trunci et omnibus ramis levibus.

Lignum brunneum.

Ramuli angulares.

Folia juvenes ovato lanceolata, glauca, crassa, plerumque 10 cm. longa et 7 cm. lata, perfoliata, conspicue venosa.

Folia matura lanceolata, petiolata, plerumque 10 cm. long et 2 cm. lata, petiolis 2 cm., coriacea, concoloria, vena peripherica a margine remotiuscula, costa media prominens, penniveniis.

Opercula conoidea plerumque cupulâ diametro excedens, alabastra costis numerosis approxime parallelis vel alis.

Fruetus prope hemisphaerici, circa 1 cm. diametro, numerosis costis vel prope leves.

Margo latiuscula, valvis exsertis.

A tree of medium size.

**Bark** flaky at the butt, the greater portion of the trunk and the whole of the branches smooth.

**Timber** cigar-brown in colour.

**Juvenile leaves** branchlets angular. Leaves ovate-lanceolate to ovate, glaucous, coarse, say 10 cm. long by 7 cm. broad in some specimens, petiolate, thick, venation distinct, rather more prominent on the underside, venation spreading, becoming more pinnate as growth proceeds, margin of leaf thickened, and intramarginal vein distinctly removed from the edge, oil dots obvious in the early stage.

**Mature leaves** lanceolate, petiolate, commonly 10 cm. long and 2 broad, with petioles of 2 cm., coriaceous, equally green on both sides, the intramarginal vein distinct from the edge, midrib prominent, feather-veined.

**Flowers** shortly pedunculate in the axils of the leaves, peduncles flattened and about 1 cm. long, pedicels short or almost absent, up to seven in the head, opercula conoid, and usually of greater diameter at the point of junction with the calyx-tube, the buds with numerous roughly parallel ridges or wings.

Anthers opening in parallel slits with gland at back. Belonging to the same series as *E. incrassata*.

**Fruits** nearly hemispherical, about 1 cm. in diameter, with numerous longitudinal ribs, or nearly smooth. Rim broadish, valves exsert.

Named in honour of Mr. Ernest Le Souef, Director of the Zoological Gardens, Perth, who furthered my botanical expedition to Western Australia (1909), by every means in his power.

## RANGE.

This species occurs in Western Australia. The type comes from Kalgoorlie (J. H. Maiden). I have also collected it from a Wood Line about 70 miles north of Kurrawang, while I have received it from Dr. A. Morrison, who obtained it from Hampton Plains, near Coolgardie (E. Lidgley).

## AFFINITIES.

1. With *E. corrugata*, Luchmann.

*E. Le Souefii* possesses considerable external resemblance to another "corrugated" species, *E. corrugata*, Luchmann, and the anthers are nearly similar. The buds are different in shape, the opercula being very dissimilar not only in shape, but in the circumstance that its diameter is greater at the point of junction to the calyx-tube. It appears to be intermediate between *E. corrugata* and *E. incrassata*.

2. With *E. goniantha*, Turcz.

From *E. goniantha*, Turcz., it is sharply separated by the anthers, which belong to the *E. oleosa* series in that species.

3. With *E. Griffithsii*, Maiden.

From *E. Griffithsii*, Maiden, it is separated by the buds and fruits, and by the narrow juvenile leaves of that species.

## DESCRIPTION.

*LXXVII. E. Clelandi*, sp. nov.

Arbor mediocriter alta, "Blackbutt" nota.

Cortex basi arboris rimosa, major pars trunci et omnes rami teretes. Ramuli glauci.

Lignum brunneum, durissimum.

Folia pendula. Folia juvenes ovato-acuminata, glauca, concoloria venæ non prominulæ præter costam mediam, vena peripherica a margine distincte remota.

Folia matura angustato--lanceolata, 12 cm. longa, 1·5 cm. lata, glauca, coriacea, venæ non prominulæ, lateribus penniveniis, vena peripherica a margine parum remota.

Alabastra longis operculis corrugatis, calycis tubus leniter corrugatus v. lævis.

Operculum calycis tubo diametro leniter excedens.

Fructus subcylindrici, circiter, 5 cm. longi, valvis leniter exsertis.

A tree of medium size, one of several known in Western Australia as "Blackbutt."

**Bark** hard-flaky or fibrous-flaky and blackish at butt, the rest of the trunk and all the branches smooth. Branchlets glaucous, as likewise the whole of the saplings.

**Timber** cigar-brown, very hard.

**Foliage** more or less pendulous.

**Juvenile leaves** ovate-acuminate, pedunculate, equally glaucous green on both sides, venation not conspicuous, except the midrib, intramarginal vein distinctly removed from the edge.

**Mature leaves** narrow-lanceolate, 12 x 1·5 cm. being common dimensions, petiolate, dull green, coriaceous venation not conspicuous, lateral veins feather-like, intramarginal vein hardly removed from the edge.

**Buds** with long corrugated opercula, the calyx-tube but slightly corrugate or smooth. Diameter of the operculum slightly exceeding that of the calyx-tube at the line of junction.

**Fruits** numerous, very glaucous, nearly sessile on a common peduncle of about 1 cm. Sub-cylindrical in shape, about 5 cm. long, valves slightly exsert.

I have named it in honour of Mr. A. F. Cleland, Civil Engineer, of Kurrawang, who gave me facilities for travel on the private line of a company with which he is connected, where I collected this and other imperfectly known trees, and of Dr. J. Burton Cleland, nephew of the above, who made many botanical investigations in Western Australia before coming to Sydney.

## SYNONYM.

*E. goniantha*, Turcz., var. *Clelandi*, Maiden, in *Proc. West. Aust. Nat. Hist. Soc.*, iii, 176.

This slip of the pen would have been corrected had I been favoured with a proof of my paper, but this inadvertence took place through a change in the management of the society.

## RANGE.

Type from Goongarrie, 65 miles north of Kalgoorlie, Western Australia.

Collected also at Lannin's timber camp, then (1909) nearly 70 miles north of Kurrawang.

---

## AFFINITIES.

The precise position of this species cannot be stated in absence of anthers, but I have spared no pains to endeavour to get flowers, and have failed. I have followed the precedent of an eminent botanist (Bentham) in naming a eucalypt (*cæsia*) in absence of flowers.

1. With *E. Le Souefii*, Maiden.

It possesses obvious external similarities to *E. Le Souefii*, but it would be mere assumption to tack it on to that species as a variety, since the anthers might belong to a different series. Its relation to *E. goniantha*, Turcz., is probably less close.

2. With *E. calycogona*, Turcz., var. *celestroides*, Maiden.

When I found *E. Clelandi*, I found another somewhat similar tree, *E. calycogona*, var. *celestroides*, which is another of the numerous "Blackbutts." The smooth bark of the former is more interlocked than that of the latter. For notes on var. *celestroides*, see Part III, p. 79, and discussion of further affinities of *E. Clelandi* must be postponed until flowers are available.

## DESCRIPTION.

LXXVIII. *E. decurva*, F.v.M.

THE original description will be found in *Fragm.* iii, 130 (1863), and, as confusion has arisen in regard to it, I give a translation.

Shrubby, branches soon terete, pruinose, *leaves* alternate or irregularly opposite, moderately petiolate, ovate-or falcate-lanceolate, acuminate with a hooked point, equally coloured on both sides, indistinctly and distantly penniveined, imperforate, the marginal vein obscure and distant from the margin, solitary few-flowered axillary or lateral umbels, with rather slender slightly compressed peduncles, *pedicels recurved* about as long as the calyx, shorter than the peduncle, *narrow-campanulate calyx-tubes nearly twice as long as the hemispherical finely apiculate operculum, but hardly so broad, anthers cordate-ovate, fruits truncate-ovate, without ribs, gradually contracted towards the orifice, with included valves and wingless seeds.*

In shrubby places near Perongerup (Porongorups), Western Australia. MAXW. (Maxwell).

Tall glabrous shrub. *Leaves* rather shining, mostly 2 to 4 inches long,  $\frac{1}{3}$  to 1 inch broad, intensely green, finely veined. *Peduncles*  $\frac{1}{2}$  to 1 inch long, not rarely deflexed in age. *Calyx-tube* about three lines long, brown as well as the operculum. *Filaments* yellowish in the dried state, the longest hardly three lines long. *Fruit* about five lines long. *Fertile seeds* much larger than the sterile ones, blackish, nearly oblique-tetradric.

Then Bentham describes it in *B.Fl.* iii, 249, but, as I shall show presently, he confused it in part with *E. falcata*, Turcz., while "A specimen in fruit only from Murchison River, Oldfield, (which) looks like the same species" (*B.Fl.* iii, 249) is *E. oleosa*, F.v.M.

Then Mueller makes the following statement:—

*E. decurva* (*Fragm. phytogr. Austral.*, iii, 130) is recognised already by its elongated anthers, which are very evidently longer than broad, opening with parallel narrow slits, quite agreeing with those of genuine species of the series Parallelanthere, but Bentham's description of *E. decurva* in the *Flora Australiensis*, iii, 249, refers extensively to such varieties of *E. oleosa* as verge to *E. falcata* and *E. goniantha*, all of which, with *E. concolor*, should in the antheral system be placed close to *E. decipiens* among the Micranthere. (*Eucalyptographia, E. gracilis*.)

It is a tall, spindly Mallee-like shrub of 10–15 feet. The upper parts of the branches are glaucous, which make it somewhat conspicuous. The branchlets are red.

The juvenile foliage is now recorded for the first time. It is nearly elliptical-ovate, stem-clasping, lobed at the base, slightly glaucous, equally green on both sides. Some leaves are about  $2\frac{1}{2}$  inches long by  $2\frac{1}{4}$  broad.

## RANGE.

The species is confined to Western Australia, so far as we know at present.

Following is the label in Mueller's handwriting on the type :—

“*Eucalyptus decurva!* Ferd. Mueller. East from Perongerup. Maxw.”  
(Maxwell). The specimen I have seen is in bud only.

Following is a copy of the label of the same specimen in Maxwell's handwriting :—

“Shrub, east from the Perongerups. Bark smooth. Ten feet. Very much like the East Mt. Barren Eucalypti.”

I collected it in the same place or district, *i.e.*, in various parts of the Kalgan Plains, between the Porongorups and the Stirling Range.

Diels (No. 3,420) collected it practically in the same place, *viz.*, between King George's Sound and Cape Riche.

E. Pritzel (No. 469) gives “South West Plantagenet,” which is still the same district.

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## AFFINITIES.

### 1. With *E. falcata*, Turcz.

So much confusion has arisen between the two species that it will be useful to clear the matter up.

As stated in *Fragm.* iii, 130, the type of *E. decurva*, F.v.M., was collected by Maxwell near the Porongorups. Other Eucalypts were collected by the same collector at the same place. Some years ago I received a fragment of a plant stated to be the type, from the Herbarium Barbey-Boissier at Geneva, and, with it in my hand, hunted in the vicinity of the Porongorups for it. I matched this particular specimen absolutely, but found it to be *E. falcata*, Turcz. (See p. 180, Part XV.)

Speaking of the stamens of *E. decurva*, F.v.M., Bentham says, “Stamens slender, inflected with an acute angle.” (*B.Fl.* iii, 197.) And again, “Stamens about 3 lines long, the filaments slender and acutely inflected as in *E. uncinata* and *E. corynocalyx*; anthers very small, globular, with distinct parallel cells.” (*B.Fl.* iii, 249.)

The stamens described are those of *E. falcata*. The filaments of *E. decurva* are not inflected at an acute angle.

Then we have:—

*Eucalyptus decurva*, F.v.M. (*B.Fl.* iii, 249).

In statu typico a priori facile distinguitur, sed formis intermediis variis eacum connectam esse videtur.

Vidinus frutices 1–3 m. alt. non nisi per distr. Stirling in arenosis sparsos floribus ochroleucis hinc inde purpureo-suffusis onustos m. Jul.; pr. Warriup formam ad *E. oleosam*, F.v.M., vergentem (D. 3,420), ad latera collis. Suckey's Peak formam typicam (D. 2,989). (Diels and Pritzel, *Engler's Jahrb.*, xxxv (1905), p. 443.)

In the above passage the form of *E. decurva* (D. 3,420) stated to show transit to *E. oleosa* is the true *E. decurva*, while the "forma typica" (D. 2,989), is really *E. falcata*.

If my readers will compare Plate 68, Part XV, with figures 1 and 2 of the present Part, no further difficulty will arise in the future as to the confusion of *E. decurva* and *E. falcata*. The trouble doubtless arose originally through some mixing of specimens of what were at the time very rare species, a mixing that can be readily understood by one who has been over the ground, since the two species grow in the same localities, and the plants present a somewhat similar appearance. The confusion originally arose with fruiting specimens—there is a more marked difference between the buds. The filaments and anthers are different.

## 2. With *E. oleosa*, F.v.M.

Bentham (*B.Fl.* iii, 249) quotes Drummond's 5th Coll. 186 (in addition to the type collected by Maxwell) as *E. decurva*, F.v.M.

He also calls the same specimen *E. uncinata*, var. *rostrata* (*B.Fl.* iii, 216).

I have (fig. 15, Plate 66, and p. 173, Part XV) stated that, in my opinion, Drummond's specimen is *E. oleosa*, var. *glauca*. It is this variety which presents the closest similarity to *E. decurva*, but the buds and fruit are of a different shape, and those of *E. decurva* are more drooping, while the anthers of *E. decurva* are not closely related to those of *E. oleosa*, but have a greater resemblance to those of the *E. incrassata* group.

I have already referred to the fact that Bentham (*B.Fl.* iii, 249) refers certain Murchison River specimens of Oldfield to *E. decurva*, or rather states that they "look like the same species."

These specimens are doubly unfortunate, for (*B.Fl.* iii, 253) they were referred to *E. fecunda* also. They really belong to *E. olcosa*, and I have cleared the matter up at p. 169, Part XV, while they are figured at 3a and 3b, Plate 22, Part IV.

They are in fruit only, and the reference is pardonable enough. They are, however, less pendulous, rather smaller, have the valves rather more exsert and the styles more persistent; the leaves are also more shiny than those of *E. decurva*.

3. With *E. cladocalyx*, F.v.M.

*E. decurva* reminds one of the droop of flowers and shape of buds of *E. cladocalyx*, but the anthers and the fruits are very different.

4. With *E. doratoxylon*, F.v.M.

*E. decurva* is the complementary species to *E. doratoxylon*, the most obvious difference between them being the broader leaves and larger inflorescence generally of the former species.

5. With *E. incrassata*, Labill.

The figures of *E. decurva* in this Part may be compared with those of *E. incrassata* in Part IV.

6. With *E. leucoxylon*, F.v.M.

This species has also a more or less decurved inflorescence (see fig. 13a, Plate 55). The shape of the fruits is also a good deal similar, but in *E. leucoxylon* the fruit tends to crack round the rim when ripe, which has not been noted so far in *E. decurva*. *E. leucoxylon* is a large tree, and differs in many respects from *E. decurva*.

## DESCRIPTION.

LXXIX. *E. doratoxylon*, F.V.M.

It was originally described in *Fragmenta*, ii, 55 (1860). The specific name begins with a capital D in the original.

It was then described in English by Bentham (*B.Fl.* iii, 249).

It is figured and described by Mueller in the *Eucalyptographia*.

**Notes supplementary to the Description.**

It is usually a shrub, but Mueller quotes Mr. Thomas Muir as stating that its trunk attains 3 feet in diameter. The bark is stated to be greenish white.

The striæ in the fruits depicted in the *Eucalyptographia* may be misleading. The ripe fruits are quite smooth, and of course there is shrivelling in unripe fruits, but nothing approaching striation.

The flowers are depicted as erect; all that I have seen are pendulous, like the buds.

## RANGE.

The species has not been found out of Western Australia.

Maxwell originally obtained it at a place called Kojoneerup, which I cannot trace, and would suggest that it is in the vicinity either of the Stirling Range, or of the Russell Range, where Mueller stated Maxwell collected it.

*E. buprestium* was found in the same locality (*Eucalyptographia*); the spelling is Kojonerup in *B.Fl.* iij, 206.

The names of the old collectors are sometimes omitted from modern maps, or so altered in spelling that one fails to recognise them. At the same time, they are obviously of importance to the botanist.

In Hooker's *Journ. Bot.*, i, 247 (1849) and subsequent pages, is a letter from James Drummond, dated Cape Riche, 29th October, 1848. He is giving an account of his collecting trip, "principally on the Perongarup and Toolbranup Hills

(Stirling Range), and in the vicinity of Cape Riche." He speaks on several occasions of collecting on "Congineerup, near the east end of the mountain," and with other context.

I would suggest that "Kojoneerup" and "Congineerup" refer to the same place. Congineerup is evidently not part of the Stirling Range, although it may be in the same district.

The localities given by Bentham are Lucky Bay, *R. Brown* (this is a few miles south-east of Esperance.—J.H.M.), Sullinup (I would suggest that this is a copy of bad handwriting for "Stirling."—J.H.M.) Ranges and Russell Range (a little north-west of Israelite Bay.—J.H.M), *Maxwell, Baxter, Drummond*, 3rd Coll. No. 69, 4th Coll. No. 97.

Mueller (*Eucalyptographia*) adds the localities, Cape Arid, also "Mount Lindsay" (north of Wilson's Inlet.—J.H.M.), "extending to the most south-eastern sources of Swan River (*Muir*), mostly in rich soil along brooks, reaching the summits of mountains up to 3,000 feet elevation."

I have seen the following specimens:—

No. 4,792. *R. Brown*. South Coast, 1802–5. Probably Lucky Bay. I have also seen a specimen, labelled in Brown's handwriting, "Bay 1," which we know to be Lucky Bay.

No. 69. Drummond in Herb. Cant. in bud only.

"Bell Gum," Kalgan, Western Australia (Oldfield). In Herb. Barbey-Boissier. This locality is near the Stirling Range, and the name "Bell Gum" was given partly in allusion to the shape of the fruit, but chiefly because of its pendulous habit.

Red Gum Pass, Stirling Range (Dr. A. Morrison).

"Blue Gum," Wilson's Inlet, Western Australia (Oldfield), in Herb. Cant.

Then we have:—

"In dist. Eyre a sinu Esperance Bay septentrionem versus præcipue alluvia argillaceo-arenosa subnitrosa occupat (D. 5,335)" (Diels and Pritzel, Engler, *Jahrb.*, xxxv (1905), p. 443). So that the known localities extend from the Russell Range in the east to Mount Lindsay in the west, thence to Cape Arid, Lucky Bay, Esperance Bay to the Stirling Range, thence going north to the sources of the Avon, say a few miles east of Pingelly.

It will thus be seen that many gaps require to be filled as regards the range of this interesting species.

## AFFINITIES.

1 and 2. With *E. decurva*, F.v.M., and *E. falcata*, Turcz.

Bentham (*B.Fl.* iii, 250) says "Allied in many respects, especially in the inflorescence and shape of the flowers to *E. decurva*; this species is readily distinguished by the leaves mostly opposite, and by the stamens."

This may be termed a complementary species to *E. decurva*, and decurved peduncles are observable in both species. The leaves of *E. doratoxylon* are narrower, and the fruits smaller. (See Plate 70.)

As regards Bentham's remarks, it must be borne in mind that he confused *E. decurva* with *E. falcata* (*ante*, p. 191). *E. doratoxylon* has not the ribbed calyx-tube of *E. falcata*, nor the long operculum, while the shape and size of the fruits is different.

## DESCRIPTION.

LXXX. *E. corrugata*, Luehmann.

*Victorian Naturalist*, Melbourne, xiii, 168 (1897).

A tree attaining about 30 feet in height, with a smooth, ashy-grey bark.

**Leaves** on rather long petioles, mostly narrow-lanceolar, slightly falcate, narrowed at the base, acuminate, 3 inches to 4 inches long,  $\frac{1}{2}$  inch to rarely  $\frac{2}{3}$  inch broad, rather thick, dark green and very shining on both sides, black-dotted, the lateral veins rather numerous and spreading but hardly visible without a lens, the marginal vein close to the edge.

**Peduncles** axillary or lateral, nearly terete, about half an inch long, bearing an umbel of 3 to 5 shortly pedicellate flowers.

**Calyx-tube** hemispherical, with 6 to 8 very prominent ridges, about  $\frac{1}{2}$  inch across, brownish, shining.

**Operculum** hemispherical, with ridges similar to those of the calyx.

**Stamens** mostly inflected in bud; anthers oblong, opening by parallel longitudinal slits.

**Fruit** hemispherical, not much larger than the flowering calyx, mostly 4-celled, nearly flat-topped, the valves shortly protruding.

Golden Valley, in the interior of Western Australia. W. A. Sayer.

This species is evidently allied to *E. incrassata*, but none of the forms of that species have such high ridges, nor the same hemispheric shape of the calyx and operculum. *E. pachyphylla*, which has also prominent ribs, can be easily distinguished by the broader dull-coloured leaves, as well as other characters.

## Notes supplementary to the Description.

The late Mr. Luehmann says nothing about the prominent ridges of the fruit (see 6a, 7c, Plate 70), perhaps leaving them to be presumed from the description of the calyx-tube.

The juvenile foliage is still unknown.

## RANGE.

So far as I know, this species has never been collected far from the place where it was originally found. This is Golden Valley, which is near Southern Cross, Western Australia.

I collected it about 5 miles from Southern Cross, going northerly. A tree of medium size, glaucous at the time of my visit (September).

## AFFINITIES.

### 1. With *E. incrassata*, Labill.

Mr. Luehmann drew attention to this. The corrugation in the organs of *E. incrassata* can be seen in Plate 14. After the first proofs of Plate 70 had been printed off I found a few immature stamens in my Southern Cross specimens and figured them at 7c. The anthers are what I know as "incrassata" anthers.

### 2. With *E. Le Souefii*, Maiden. (See Plate 69.)

In this case the operculum is very different, as has been pointed out (*ante* p. 188). Here are two forms, and there are others, which belong to the *E. incrassata* group, and different botanists may hold different opinions as to whether we should constitute a wider *E. incrassata*, with many varieties. Until Western Australia (not to mention other States) is very much better explored botanically, it seems desirable to give specific names to some of these forms.

### 3. With *E. pachyphylla*, F.v.M.

Mr. Luehmann drew attention to this, but he did not give the name of the author. It is not, however, *E. pachyphylla*, F.v.M., p. 101, Part IV, nor *E. pachyphylla*, A. Cunn., p. 103 of the same Part, both of which are forms of *E. incrassata*.

It is doubtless another *E. pachyphylla*, F.v.M., viz., that which is figured in the *Eucalyptographia*, and which is thought by some to be a form of *E. pyriformis*, Turcz. It has been figured at 6a and 6b of Plate 75, which will be published in Part XVII of this work. Fruits, buds and anthers are very different; the two species have raised ribs on buds and fruits; this presents their greatest similarity.

### 4. With *E. goniantha*, Turcz.

Diels and Pritzel (Engler's *Jahrb.*, XXXV (1905), p. 443) drew attention to the strong affinity between these two species. The buds and flowers of *E. goniantha* are alone known. As will be seen from fig. 1a, Plate 18, Part IV, the opercula and the buds generally are very different.

## DESCRIPTION.

LXXXI. *E. goniantha*, Turcz.

THE original description will be found in *Bull. Soc. Nat. Mosc.*, xx, pt. i, p. 163 (1847), and is set out at p. 103, Part IV, of the present work. So it need not be repeated at this place.

It was afterwards described by Bentham at *B.Fl.* iii, 248.

All that we know of this species is contained in Bentham's description.

Unless further information is contained in labels in any of the herbaria, it is not even known whether it is a shrub or a tree.

The description of the juvenile foliage, &c., as recorded under *E. goniantha*, Turcz., in my paper, *Journ. W.A. Nat. Hist. and Science Soc.*, iii, 175, should be deleted. It mainly refers to *E. Le Souefii*, and was inserted in that place through a slip of the pen, while through inadvertence I received no proof of the paper.

## SYNONYM.

*E. incrassata*, Labill., var. *goniantha*, Maiden.

In page 103, Part IV, I made this variety, but my view was erroneous.

## RANGE.

It is confined to Western Australia. Bentham (*B.Fl.* iii, 248) gives the following localities:—King George's Sound or to the eastward, *Collie*, *Baxter*, *Drummond*, 3rd Coll. No. 71; Franklin River, *Maxwell* (in fruit only, with rather broad leaves).

The species is evidently rare, for in my recent journeys I could not find it, although I made diligent search. I should be very grateful if any of my readers could give me a precise locality from which I could procure it. Kew has not Maxwell's specimen, nor any fruiting specimen of the species. I have been unable to see a fruit in any herbarium.

## AFFINITIES.

1. With *E. incrassata*, Labill.

Mueller drew attention to this affinity (p. 103, Part IV) and I need not reprint his statement here.

2. With *E. oleosa*, F.v.M.

From the point of view of the anthers the affinity of *E. goniantha* is with *E. oleosa* and not with *E. incrassata*.

3. With *E. falcata*, Turcz.

Its closest affinity seems to be with this species. More can be said when the fruit of *E. goniantha* is discovered.

## DESCRIPTION.

LXXXII. *E. Stricklandi*, Maiden.

In *Journ. W.A. Nat. Hist. Soc.*, iii, p. 175 (1911).

FRUTEX creditus est; ramuli glauci; folia matura pallida, concoloria postea nitida, coriacea, crassa, petiolata, lanceolata; flores sessiles pedunculo latissimo planoque. Operculum prope ovoideum, calycis tubus distincte expansus costam prominentem formans. Calycis tubus operculo equilongus (1 cm.), costatus expansusque, duabus costis prope alas formantes. Videtur *E. incrassata* in antheris forsan approximanda. Fructus, sub-cylindrici; lenissime, urceolati; sessiles, circiter, 1.5 cm. longi et 1 cm. in diametro.

Probably a shrub, but no particulars furnished. Branchlets, glaucous. Juvenile leaves not seen.

**Mature leaves** pale dull green on both sides, afterwards glossy on both sides, coriaceous, thick, petiolate, lanceolate. (The few leaves seen, up to 10 cm. long, and 2-3 cm. broad.)

**Flowers**—The buds three to six in the umbel as seen, sessile on a very broad flat peduncle 1-1.5 cm. long. Opercula nearly ovoid, the calyx tube markedly expanded at the line of junction, forming a well-defined ridge, and forming an "egg-in-egg-cup" arrangement. Calyx-tube of about the same length as the operculum (1 cm.) ridged and flattened, so that two of the ridges almost form wings.

Long narrow anther, with long narrow gland, filament nearly at the base; is related to *E. incrassata* as regards anthers, but closer to *E. Campaspe*, Moore, and *E. diptera*, Andrews, so far as we have evidence at present. Filaments dry red.

**Fruits** sub-cylindrical, very slightly urceolate, two equi-distant sharp low ridges or wings, sessile, about 1.5 cm. long by 1 cm. in diameter, rim grooved and narrow, valves (four in the specimens seen) with their tips below the orifice.

It is a remarkable plant, is probably small, and is worthy of cultivation for its handsome and striking flowers. It is named in honour of His Excellency Sir Gerald Strickland, K.C.M.G., Governor of Western Australia.

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RANGE.

Confined to Western Australia, so far as we know. It has only been found on the Hampton Plains Estate, east of Coolgardie, where it was found by Mr. E. Lidgley, and communicated to me by Dr. A. Morrison.

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AFFINITY.

With *E. grossa*, F.v.M.

The closest affinity of this species is to *E. grossa*, F.v.M., from which it differs in the peculiar shape of the buds, and to a less extent in the fruits. The filaments of the new species dry red, while they appear to always remain yellow in *E. grossa*.

I cannot see my way to assume that it is a variety of that species.

## DESCRIPTION.

LXXXIII. *E. Campaspe*, S. le M. Moore.

In *Journ. Linn. Soc.*, xxxiv, 193 (1899).

FOLLOWING is a translation of the original description:—

A large much-branched shrub with shortly petiolate lanceolate leaves, obtusely acuminate, straight or slightly falcate, peduncles axillary or extra-axillary and abbreviated, broadly winged, two to six-flowered, with pedicels shorter than the calyx-tube, the calyx-tube broad-turbinate, with a nearly hemispherical umbonate operculum little longer than the calyx-tube. Anthers oblong-ovate, distinctly dehiscent, with an ovary little shorter than the calyx-tube, covered at the top.

Hab. Gibraltar (Western Australia), flowers in the month of October.

About 4 metres high. Leaves 6 to 11 cm. long, at the middle 1 to 2 cm. broad, gradually contracted towards the base on both sides, with a whitish bloom, the midrib very conspicuous, especially underneath, the side-nerves inconspicuous, forming an obscure and incomplete network, the marginal nerve close to the margin, occasionally obscure, the petioles 1 cm. long. Peduncles .6 to .8 cm. long, .3 to .4 cm. broad, covered with a white bloom, as well as the branchlets, pedicels, and calyces. Pedicels not beyond .2 cm. long. Calyx-tube .4 cm. long, .6 cm. diameter, conspicuously marginate. Operculum .6 cm. long, shortly and obtusely mucronate. Stamens 1 cm. long, inflexed in the bud; anthers .12 cm. long. Capsules unknown.

#### Notes supplementary to the Description.

Mr. Moore could only spare me the material depicted at 2a, 2b, 2c, but I have since obtained further specimens, including the fruits.

At p. 120, Part IV of this work, is a photograph of a forest scene near Coolgardie. The tree to the left is *E. torquata*, Luehmann, while the small or medium-sized tree to the right is *E. Campaspe*, Moore, and is described by Dr. L. C. Webster, who took the photograph, as "a White Gum with ribbony bark."

The juvenile foliage is at present unknown.

The anthers open very widely in parallel slits, the dehiscence often tearing the anther-cell wall at both top and bottom. The gland often fills up the back of the anther, and the two edges of the cells may not enclose it, as in *E. diptera*.

The filament is at the base of the anther.

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## RANGE.

It was found at Gibraltar, Western Australia, by the describer (Gibraltar is in lat. 31° 3' S., and long. 120° 59' E., and is, say, 15 miles south-west of Coolgardie), and later on by Mr. (now Dr.) L. C. Webster, a few miles out of Coolgardie, more definite locality not stated. Also by Ernest Lidgley, Block 59, Hampton Plains Estate, east of Coolgardie.

It was first found (recorded as *E. obcordata*, Turcz., in *Proc. Roy. Soc. S.A.*, xvi, 358) by Mr. R. Helms, 40 miles from Fraser's Range, 5th November, 1891 ("Elder Exploring Expedition"), which is about 100 miles south-east of Coolgardie.

## AFFINITIES.

### 1. With *E. rudis*, Endl.

Mr. Moore suggests the affinity of his species to *E. rudis*, and *op. cit.*, p. 193, he uses the following words:—

The affinity would seem to be with *E. rudis*, Endl., which is a tree with broader leaves on longer petioles; it has neither the short conspicuously winged peduncles nor the sub-sessile flowers; moreover, its operculum is longer and conical.

I do not think the resemblance is at all close; however, the comparison can be well deferred until I figure *E. rudis*.

### 2, 3, 4. With *E. torquata*, Luehmann, *E. diptera*, Andrews, and *E. incrassata*, Labill.

It would appear that the stamens most closely resemble those of the first two species.

The stamens also resemble those of *E. incrassata*, but not so closely as those of the species named. A difference between the *E. Campaspe* and *E. incrassata* stamens, so far as we know at present, is in the longer gland of *E. Campaspe*, the filament at the base of *E. Campaspe*, whereas in *E. incrassata* it is much further up. They also appear to vary in the dehiscences; in *E. Campaspe* the anther-cell walls often split from top to bottom (see 4b, Plate 71), while in *E. incrassata* it would appear that the dehiscence never proceeds so far.

The affinity of *E. Campaspe* is not very close to any of these species; it would appear to be as close to *E. diptera* as to any, but we require full material of both species, including timber, and to examine *E. Campaspe* and other species in the bush, before we can speak fully as to affinities.

### 5. With *E. incrassata*, Labill., var. *conglobata*, another Eucalypt which has hemispherical fruits with exerted valves and strap-shaped peduncles. (See Plate 17, Part IV.) It is, however, non-glaucous. The opercula are different, and so are the stamens.

### 6. With *E. annulata*, Benth. (*E. cornuta*, Labill., var. *annulata*, F.v.M.)

In this species or variety, which, by the way, is not glaucous, we have hemispherical fruits, and a strap-shaped peduncle. The tips of the valves are much more protruded in *E. annulata*; the operculum is totally different; the filaments are yellowish and long in *E. annulata*, and dry reddish in *E. Campaspe*.

7. With *E. alba*, Reinw.

The buds of the two species are often alike in shape, but this is the only morphological similarity I can see.

8. *E. pleurocarpa* is one of the most glaucous (almost mealy) of all West Australian species, and is mentioned only for that reason, for *E. Campaspe* is especially glaucous.

## DESCRIPTION.

*LXXXIV. E. diptera*, Andrews.

*Journ. W.A. Nat. Hist. Soc.*, i, 42 (1904).

A slender tree of 10-20 feet. Branches terete, of a dark-red colour; branchlets angular.

**Leaves** on petioles of  $\frac{1}{2}$ -1 inch, linear-lanceolate, falcate, 3 inches long and  $\frac{1}{4}$ - $\frac{1}{2}$  inch broad. The midrib and thickened margins prominent, the reticulate veins not conspicuous, the intramarginal one close to the edge. Oil glands copious.

**Flowers** small, sessile, generally in clusters of three.

**Calyx-tube** about 4 lines long and equally broad, the lower part flattened, and continuing to the top in the form of two wings.

**Operculum** fallen from all the specimens collected.

**Stamens** numerous, white, about 5 lines long, acutely inflected in the bud; anthers oblong, the cells back to back.

**Ovary** with conical summit; style about 3 lines long, thick, clavate.

**Fruit** not seen in advanced state.

This species belongs to the series *Normales* and the sub-series *Subsessiles*. It does not appear to have any very close ally. The shape of the calyx is very peculiar; the rim is almost circular when seen from above, though the two sharp keels just appear, but the base is closely compressed, being 2-3 lines long, and only  $\frac{1}{2}$  line broad where it is attached to the branch.

Mr. Andrews found this species in flower north of Esperance, in October, 1903.

## Notes supplementary to the Description.

The stamens collected are very few and poor, the plant having just flowered off. Therefore one must be careful in describing them and making generalisations. The anthers open widely in parallel slits. There is a large gland filling up the back of the anther. The two cells appear to join together, almost covering over the back of the anther. The filament is attached to the base of the anther.

## RANGE.

Mr. Andrews found it 40 or 50 miles north of Esperance, on the road to Norseman, and it has not been found since. Esperance is, of course, on the South coast of Western Australia, about 230 miles east of Albany.

## AFFINITIES.

Mr. Andrews has observed that *E. diptera* does not appear to have any very close ally, and while it certainly has allies, we cannot say what they are at present. The figure on Plate 71 has been prepared from the whole of the material at his disposal. There are no juvenile leaves, no opercula, and the fruit is not perfectly ripe. But it can be seen that it is a very distinct species.

1. With *E. incrassata*, Labill., var. *conglobata*.

Buds in this variety are sometimes winged; we know nothing of the opercula of *E. diptera*. The fruit of *E. diptera* is very different, and the leaves are wider.

2. *E. obcordata*, Turcz., var. *nutans*, has winged buds and fruits, but it has also strap-shaped peduncles, and many other differences.

3. With *E. Oldfieldii*, F.v.M.

The nearly sessile-flowered twig of *E. Oldfieldii* var., figured on the right hand of the *E. Oldfieldii* plate of the "*Eucalyptographia*," bears a superficial resemblance to *E. diptera* so far as we know it, but only superficial.

4. With *E. Griffithsii*, Maiden.

This also is a winged species, so far as the bud is concerned, but reference to Plate 71 shows that there is no further resemblance.

## DESCRIPTION.

LXXXV. *E. Griffithsii*, Maiden.

In *Journ. W.A. Nat. Hist. and Science Soc.*, iii, 177 (1911).

FOLLOWING is the original description:—

“White Gum” magnus, foliis juvenilibus angustis, glauco-viridibus concoloribus, venis obscuris præter costam mediam. Foliis maturis confertis angusto-lanceolatis, vel lanceolatis, 10 cm. longis, 2 cm. latis, petiolo 2–3 cm. longo eodem colore utraque pagina, margine calloso, venis lateralibus plumosis.

Gemmis apicibus planis costatis duabis costis fere in alis dilatatis, floribus ternis, antheris magnis longisque, a tergo glandula ovale. Fructibus magnis conoidis, valvulis aperte exsertis, margine plana.

A large White Gum, attaining a trunk diameter of 2 feet, timber reddish-brown in colour, and esteemed for fuel.

**Juvenile foliage** thick, narrow-lanceolate, petiolate, but not seen in the strictly opposite stage. Dull green, the same colour on both sides, oil dots fine and numerous, intramarginal vein not obvious and not far removed from the thickened margin. Venation, except the midrib, obscure.

**Mature foliage** thick, narrow lanceolate or lanceolate, 10 cm. long, 2 cm. broad, with a petiole of 2 cm. are common dimensions; glabrous or glaucous, equally green on both sides, intramarginal vein near edge, or forming the thickened margin, midrib distinct, lateral veins feather-like.

**Buds** flat-topped, corrugated, with two of the ribs broadened almost into wings, so as to give the buds the appearance of having broad pedicels. The common peduncles rounded or only slightly flattened. In threes.

**Flowers**—Stamens white, but bases of filaments pinkish. Anthers very large and long, with an oval-shaped gland at the back.

**Fruits** large, conoid, capsule white, valves distinctly exsert, rim flat. Corrugated, two of the ridges usually dilated almost to wings. Immature fruits with these wings forming flattened pedicels, and giving the fruits an almost sessile appearance. As maturity approaches, the fruits become more hemispherical at the base and the nearly round, comparatively slender pedicels become accentuated from the fruits. The common peduncle often 2 cm. long and nearly round.

In addition, it may be said that the timber, like that of so many of the Western Australian gold-fields trees, may be of a cigar-brown colour. The bark is somewhat ribbony, box-sealy at butt.

It is named in honour of my friend, John Moore Griffiths, of Melbourne, who has taken an active interest in my work for nearly thirty years.

*E. Griffithsii* is referred to in Part IV of my “Critical Revision” as a form of *E. incrassata*, with blunt opercula and large subconical fruits. Figured at 5a to 5d of Plate 15 of that Part.

---

 RANGE.

It is confined to Western Australia.

The type comes from Kalgoorlie, where, as a large tree, it is now very scarce, because of the great demand for timber of every kind for the mines and for ordinary domestic purposes all over the Eastern Gold-fields.

It also is found at Kurrawang, and at about 60 or 70 miles north of that township. It will probably be found over a fairly large area, but there is very little settlement over much of the country in question. I have collected it at the above places. Mr. R. Helms found it some years previously at Coolgardie.

## AFFINITIES.

### 1. With *E. corrugata*, Luehmann.

Its closest affinity appears to be *E. corrugata*, Luehmann, from which it is sufficiently separated by the more numerous and more accentuated corrugations of the buds and fruits and the smaller fruits of *E. corrugata*.

### 2. With *E. incrassata*, Labill.

It belongs to the *E. incrassata* series as regards anthers, and that affinity is borne out by examination of other morphological characters. It is, however, sharply separated from that species by the narrow juvenile foliage.

At the same time we want further juvenile foliage of this species in order to get thoroughly representative specimens.

### 3. With *E. Campaspe*, Moore.

The anthers seem very close to this species, even closer than to those of *E. incrassata*, but of course we are dealing with sparse material, and should be careful as regards generalisations.

## DESCRIPTION.

LXXXVI. *E. grossa*, F.v.M.

In Bentham's *Flora Australiensis*, iii, 232.

THE description is given at Part IV, p. 104, of this work, where I reduced it to a variety of *E. incrassata*, Labill. After further consideration, I think it desirable to consider it as a species, at all events until such time as we know more about a number of closely related congeners.

It is figured on Plate 18, Part IV, from a cultivated specimen, but Professor Ewart having lent me a portion of the type which had disappeared from the Melbourne Herbarium for a period, I figure it on Plate 72.

We still want the juvenile foliage and ripe fruits from uncultivated specimens.

## SYNONYMS.

1. *E. pachypoda*, F.v.M.

For a description and other particulars, see Part IV, p. 104, of this work.

2. *E. incrassata*, Labill., var. *grossa*, Maiden (*loc. cit.*).

## RANGE.

It has only been found in Western Australia. Bentham gives the locality, "Phillip River and its tributaries (Maxwell)."

Diels and Pritzel say of it :—

Frutex 1-3 m. alt., ramis late divaricatis, foliis late viridibus, floribus ochroleucis prœditus orientem versus montes Fraser's Range appropinquare videtur.

In distr. Coolgardie meridionali a Grasspatch septentrionem versus in fruticetis lutoso-arenosis fl. m. Nov. (D. 5,285). Engler's *Jahrb.*, xxxv, 441 (1905).

This statement brings the range somewhat to the north-east of the former one. Grass Patch is between Esperance and Norseman.

## AFFINITY.

With *E. incrassata*, Labill.

These species are certainly closely related, as already observed.

When we know more about other species belonging to the same series, we may return to the subject.

## DESCRIPTION.

LXXXVII. *E. Pimpiniana*, sp. nov.

Frutex 3-5 altus, "Mallee" vocata. Folia matura pallida, concoloria, præcrassa, lanceolata, ovato-lanceolata, ovata vel elliptica. Vena peripherica margini incrassata contigua vel congruens. Venæ non prominulæ. Folia circiter, 7.5 c.m. x 2.5 c.m., petiolus 2 cm. longus. Fructus pyriformes vel sub-cylindrici, aliquando orificio lenissime constricti, aliquando lenissime distensi juxta orificium, circiter 1.5 cm. longi et 1 cm. lati.

Mature leaves pale coloured, dull on both sides, petiolate, very thick, lanceolate to ovate-lanceolate, ovate or elliptical, intramarginal vein identical with the slightly thickened margin, or but slightly removed from the edge. Venation, other than the midrib, inconspicuous, lateral veins feather-like, at about an angle of 45° with the midrib. Oil dots minute, and numerous, resembling black spots under the lens.

Average dimensions of the leaves, 7.5 by 2.5 cm. ; and the length of petiole, 2 cm.

Anther broad, the openings wide, and with a large gland at the back.

Fruits pear-shaped to sub-cylindrical, sometimes slightly constricted at the orifice, and sometimes slightly distended one-third of the distance from the mouth ; about 1.5 cm. long by 1 cm. broad. Three or four celled, the points of the valves deeply sunk below the orifice, rim well marked though not broad.

Several in an umbel, the rounded pedicel, which only slightly tapers from the fruit, varying in length from one-half to the whole length of the fruit.

The fruits pendulous and the common peduncle rounded (hardly flattened and never approaching strap-shape) exceedingly long (commonly 4 cm.).

The proposed specific name is from the native name of the plant.

The material of this species is so scanty that for a long time I hesitated to describe it as new. But it seems sufficiently distinct from what appears to be its nearest congener that I think it is in the interests of science to give it a separate name.

I do not like describing a species on such imperfect material, but I bear in mind Bentham's justifiable example with *E. cæsia*, and a description with a figure will, sooner or later, lead to the collection of a full suite of specimens.

The material consists of mature leaves, a ripe fruit (no seeds), together with a number of more or less ripe fruits *in situ*, and a few anthers. There are the remains of a number of anthers, but insects had destroyed most of them.

---

RANGE.

Only known from one locality at present. It was collected by Mr. Henry Deane, M.A., M. Inst. C.E., Consulting Engineer to the Commonwealth, while inspecting the trial survey of the Transcontinental Railway between Port Augusta, South Australia, and Kalgoorlie, Western Australia, in June, 1909.

Mr. Deane's notes are "Dwarf Mallee, 3 to 5 feet only. 'Pimpin' (native name), Sand-hills east of Ooldea, South Australia" (*i.e.*, north of Fowler's Bay).

## AFFINITIES.

### 1. With *E. incrassata*, Labill.

From the material available its closest affinity appears to be *E. incrassata*. This is borne out by the shape of the anther (the anthers of several species are, however, closely allied or identical).

The foliage seems different from that of *E. incrassata*, while the shape of the fruits and the long peduncles seem to show difference also.

### 2. With *E. sepulcralis*, F.v.M.

The fruits remind one somewhat of those of *E. sepulcralis*, a not very well known species. In that species, however, the fruit has a tendency to be ovate, and in *E. Pimpiniana* to be obovate. The anthers are different, as also the leaves, and the size of the tree.

## DESCRIPTION.

LXXXVIII. *E. Woodwardi*, Maiden.

In *Journ. W.A. Nat. Hist. and Science Soc.*, iii, 42 (1910).

FOLLOWING is the original description :—

Arborea 13-15 m. (40-50 pedes) alta, cortice glabre base rimosiore, glaucissima.

Folia matura crassa rigidaque, late lanceolata, petiolata, circiter 10-15 cm. longa, 4-5 lata inconspicue venosa, venis lateralibus angulo circiter 45° approxime parallelis.

Alabastrum magnum, pedunculatum, subcostatum calyce urceolato, operculo hæmisphærico rostro obtuso. Antheræ cellis parallelis adnatis, glandula magnô dorso.

Fructus urceolatus vel prope campanulatus, subcostatus circiter 15 mm. longus, similis in maxima latitudine, margo prominens, 5-valvulis, valvularum apicibus æquis cum orificio.

Videtur *E. inæressata* varietati *angulosæ* et *E. cæsiæ* forsan approximanda.

A tree of 40-50 feet, bark smooth, somewhat scaly at the butt, all parts very glaucous, almost mealy (except perhaps the oldest leaves). The foliage contains a good deal of a not very agreeably smelling oil.

**Juvenile leaves** not seen in the early stages. In an intermediate stage petiolate, ovate to ovate-acuminate, venation distinct though not very prominent, midrib channelled, lateral veins making approximately an angle of 45° with the midrib and roughly parallel, intramarginal vein at a considerable distance from the edge.

**Mature leaves** very thick, rigid, and glaucous, both sides of the leaf identical, nearly symmetrical, petiolate (petioles about 2 cm.), broadly lanceolate or ovate-acuminate, tapering to a not very fine point, commonly 10-15 cm. long by 4-5 broad, midrib distinct, usually thickened margin, venation fine and not readily made out, but very similar in position to that of the intermediate leaf.

**Buds and flowers**—Buds large, pedunculate, calyx and operculum slightly ribbed, calyx urceolate, the operculum hemispherical and tapering rather abruptly into a blunt beak. Flowers not seen expanded but anthers removed from three-quarter ripe buds, with parallel cells joined together for their whole length, and with a large gland at the back.

**Fruits**—On rounded common peduncles about 15 mm., the pedicels about 5 mm.; up to 7 in the umbel, each fruit sharply separated from the pedicel, urceolate or nearly bell-shaped, about 15 mm. long and the same in greatest width: rim well defined, 5-valved (in the specimens seen) with the tips of the valves flush with the orifice.

In honour of Bernard Henry Woodward, director of the Museum and Art Gallery, Perth, who, by the supply of photographs and specimens, and in other ways, has helped me in my monograph of this genus.

## RANGE.

One small patch seen, 120 miles east of Kalgoorlie, Transcontinental Railway Survey. Collected by Henry Deane, M.A., M. Inst. C.E., Consulting Engineer, May, 1909.

Found also by R. Helms at Camp 63, 60 miles south of Victoria Spring, Western Australia, 27th September, 1891.

## AFFINITIES.

Its closest affinity appears to be with :—

1. *E. incrassata*, Labill., var. *angulosa*, Benth.

But *E. incrassata* and its varieties have foliage glabrous and even shiny, except that the juvenile foliage is sometimes slightly glaucous. Its inflorescence is sessile on a broad flat peduncle, while the buds are more ribbed, the operculum more tapering; the fruits also are more cylindrical, usually more ribbed, and the valves are sunk.

The anthers are a good deal similar (and, indeed, to anthers of other species of the same group).

2. With *E. caesia*, Benth.

This species was collected by Drummond, and is imperfectly known, only buds, fruits and leaves being available. We have Bentham's description, and until *E. caesia* is again collected (so far as I know only Drummond has found it) we must be in doubt as to some of its relationships. But, as compared with *E. Woodwardi*, the leaves are very much smaller and less coarse, the fruits are much larger and constricted a little at the orifice, and not widened at the orifice (bell-shaped) like *E. Woodwardi*.

There is less ribbing of buds and fruits. Furthermore, in *E. caesia* there is a very broad, smooth rim. The two species are probably closely related, but I think that they are quite distinct.

Its relations with some other very glaucous species may be indicated as follows :—

3. With *E. miniata*, A. Cunn.

This species has also the buds more or less ribbed. But they are sessile, and the fruits are larger and of a different shape; the leaves are thinner, and have the venation more marked than those of *E. Woodwardi*.

4. *E. Campaspe*, S. le M. Moore.

The foliage is much smaller, the buds are nearly sessile, rounded in shape (ovoid), the fruits nearly hemispherical, and the valves slightly exsert.

5. *E. pleurocarpa*, Schauer (*E. tetragona*, F.v.M.).

The foliage of this and *E. Woodwardi* are often a good deal similar, and so they might be confused in the bush. The branchlets and buds are a good deal more angular, and the calyx is toothed, the fruit is larger and more cylindrical. *E. pleurocarpa* belongs to the Section Eudesmie, and the anthers are different.

6. *E. pruinosa*, Schauer.

It has some general resemblance to the above species in its glaucousness and (sometimes) size of fruit, but the two species differ sharply in anthers and foliage (the leaves of *E. pruinosa* are sessile).

## ILES STÉRILES.

I am indebted to Dr. L. Diels for the following note:—

As suggested by your remark on p. 117, Part IV, I avail myself of the opportunity to set forth my views about the locality "Iles Stériles" recorded by Baudin's Expedition. Having gone through several of the old original books, I am satisfied (with you) that this name has never been used in published literature. At the same time, there is no doubt to me that it is a translation of the Dutch "Dorre Eylandt" (barren island), and means, in a broader sense, those three islands called nowadays Dirk Hartog Island, Dorre Island, and especially Bernier Island, in Shark's Bay. These islands, being discovered by Dirk Hartog in 1616, were more thoroughly explored, for the first time, by the expedition of Baudin. They are fully described in Perron's and L. de Freycinet's report of this voyage ("Voyage de découvertes aux Terres Australes," Paris). There is a quite detailed paragraph on their vegetation in this book. It is safe to suppose that several species have been collected on Bernier Island. I think the species labelled "Iles Stériles" came from there; for all of them we are aware of belong to the flora of sandy dunes on limestone formation, just as it is met with on these islands; for instance, *Eucalyptus ficuoides*, which was collected again near Shark's Bay by Milne (v. p. 115 of your Revision); further *Beyeria cyanosceus*, Bth. (*Flor. Aust.* vi, 66), this plant has been collected again on Dirk Hartog's Island by Naumann (in Herb. Berlin); and, even more deciding, *Scholtzia leptantha*, Benth. We have this plant from "Iles Stériles" in Herb. Berlin, communicated by the Paris Museum, as to herb. R. Brown (vide Bth. *F. Aust.*, iii, 70). Now the same species was collected near Shark's Bay by Milne, on Dirk Hartog's Island by Naumann, on dunes near Carnarvon by myself. The whole evidence leads me to the conclusion that "Iles Stériles" are those (really exceedingly barren) islands in Shark's Bay. The name, then, is an extension of the old Dutch "Dorre Eylandt," which meant only one of them. That this informal, rather provisional naming has been retained on the labels, while the official report has only the valid names (Ile Dirk Hartog, Ile Dorre, Ile de Bernier), is not surprising when one considers how very little care was taken about correct labelling by the old botanists.

## Explanation of Plates (69-72).

## PLATE 69.

*E. oleosa*, F.v.M., var. *Flocktoni*, Maiden.

- 1*a*, 1*b*. Mature leaves; 1*c*, buds; 1*d*, 1*e*, fruits of the type. Desmond, near Ravensthorpe, Western Australia. (J.H.M.)  
 2*a*. Mature leaf; 2*b*, bud and flowers; 2*c*, anthers; 2*d*, fruits from co-type. Esperance, Western Australia. (L. L. Cowen.)  
 3*a*. Mature leaf; 3*b*, fruits much less corrugated than those of the type. Murchison River, Western Australia. (Oldfield.)  
 4*a*. Fruit, smaller in size and less corrugated; 4*b*, anther. Cowcowing, Western Australia. (Max Koch.)  
 Figures 3 and 4 are connecting links between *E. oleosa* and var. *Flocktoni*, and form part of the evidence that the latter form, dissimilar as it looks at first sight, cannot be given specific rank.

*E. Soucfei*, n. sp.

- 5*a*. Juvenile leaf; 5*b*, intermediate leaf; 5*c*, mature leaf. Kalgoorlie, Western Australia. (J.H.M.)  
 6*a*, 6*b*. Buds; 6*c*, 6*d*, fruits. Nearly 70 miles north of Kurrawang, Western Australia. (J.H.M.)  
 7. Anther, from a tree near Kurrawang. (J.H.M.)

*E. Clelandi*, n. sp.

- 8*a*. Juvenile leaf; 8*b*, intermediate leaf; 8*c*, mature leaf; 8*d*, buds; 8*e*, fruits of the type. Goongarrie, Western Australia. (J.H.M.)

## PLATE 70.

*E. decurva*, F.v.M.

- 1*a*. Juvenile leaves; 1*b*, mature leaf; 1*c*, fruits. Kalgan Plains, Western Australia. (J.H.M.)  
 2*a*. Mature leaf; 2*b*, buds; 2*c*, flowers; 2*d*, anthers; 2*e*, fruits. King George's Sound, Western Australia. (Diels' No. 3420).

*E. dorato-cylou*, F.v.M.

3. Fragment of type. Drawn from a specimen of Drummond's No. 69 "Swan River, 1845," in the herbarium of the University of Cambridge.  
 4*a*. Juvenile leaves; 4*b*, buds; 4*c*, anther; 4*d*, fruits. Red Gum Pass, Stirling Range, Western Australia. (A. Morrison.)  
 5. Flowering twig. King George's Sound, Western Australia. (Collector of Mueller, name not given.)

*E. corrugata*, Luehmann.

- 6*a*. Mature leaf; 6*b*, bud; 6*c*, fruit, from the type in National Herbarium, Melbourne. Golden Valley, 200 miles east of Perth, Western Australia. (Sayer.)  
 7*a*. Mature leaf; 7*b*, buds; 7*c*, immature anthers taken from an unopened bud; leaf and fruits. Southern Cross, Western Australia. (J.H.M.)

## PLATE 71.

*E. Stricklandi*, sp. nov.

- 1*a*. Mature leaf; 1*b*, buds and flowers; 1*c*, anthers; 1*d*, fruits, Hampton Plains Estate, Coolgardie, Western Australia. (E. Lidgey.) Type.

*E. Campaspe*, S. le M. Moore.

- 2*a*. Mature leaf; 2*b*, buds and flower; 2*c*, anthers. Fragment of the type, given to me by Mr. Moore.  
 3*a*. Twig, with buds and flower; 3*b*, anther; 3*c*, fruits. Coolgardie, Western Australia. (L. C. Webster.)  
 4*a*. Twig, with buds and flowers; 4*b*, anthers. Forty miles from Fraser's Range, 5th November, 1891 Elder Exploring Expedition. (R. Helms.)

*E. diptera*, Andrews.

- 5*a*. Flowering twig; 5*b*, anther; 5*c*, fruit, showing the two wings. All drawn from the type in the possession of Mr. Andrews. North of Esperance, Western Australia. (C. R. P. Andrews.)

*E. Griffithsii*, Maiden.

- (Figs. 5*a*, *b*, *c*, *d*, of Plate 15 also belong to this species, and the figures of Plate 71 are supplementary).  
 6*a*. Intermediate leaf. Oil glands very distinct, dull surface; 6*b*, 6*c*, mature leaves, glaucous; 6*d*, buds, showing wings; 6*e*, anthers. Kalgoorlie, Western Australia. (J.H.M.) Drawn from the type.

## PLATE 72.

*E. grossa*, F.v.M.

- 1*a*. Flowering twig; 1*b*, anthers. Drawn from the type in the National Herbarium, Melbourne. Phillip River, near Mount Desmond, Western Australia. (Maxwell.)  
 Compare 2*a*, *b*, *c* of Plate 18.

*E. Pimpiniana*, Maiden.

- 2*a*. Twig, bearing fruits; 2*b*, anthers. Sand hills, east of Ooldea, South Australia. Transcontinental Railway Survey (Henry Deane). Type.

*E. Woodwardi*, Maiden.

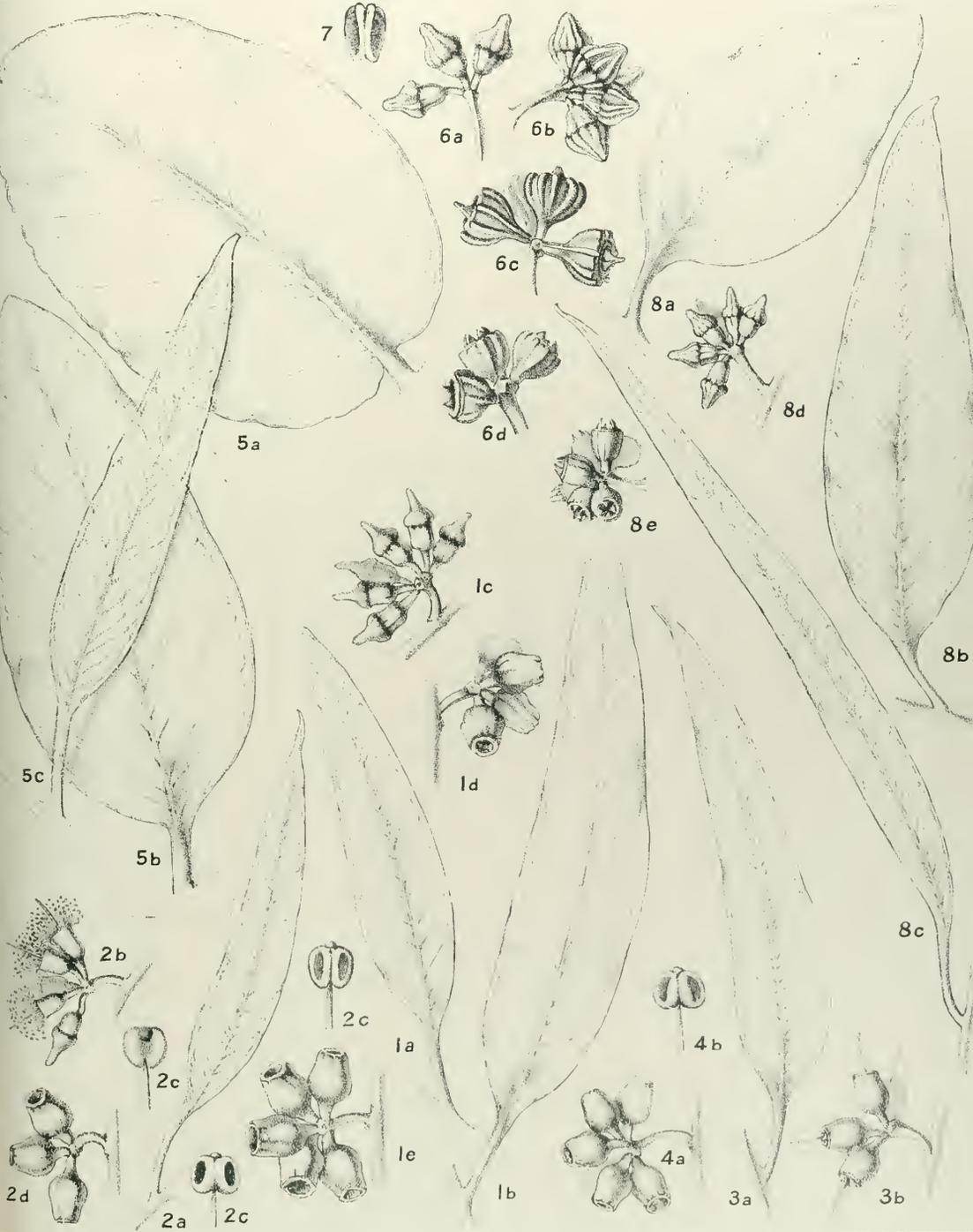
- 3*a*. Intermediate leaf; 3*b*, mature leaf; 3*c*, buds; 3*d*, anthers; 3*e*, fruits. 120 miles east of Kalgoorlie, Western Australia. Transcontinental Railway Survey (Henry Deane). Type.

The following species of *Eucalyptus* are illustrated in my "Forest Flora of New South Wales"\* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

- |  |  |
|--|--|
| <i>acacioides</i> , A. Cunn. (xlviii).     | <i>melliodora</i> , A. Cunn. (ix).             |
| <i>acmenioides</i> , Schauer (xxxii).      | <i>microcorys</i> , F.v.M. (xxxviii)           |
| <i>amygdalina</i> , Labill. (xvi).         | <i>numerosa</i> , Maiden (xvii).               |
| <i>Andrewsi</i> , Maiden (xxi).            | <i>obliqua</i> , L'Hérit. (xxii).              |
| <i>Baileyana</i> , F.v.M. (xxxv).          | <i>odorata</i> , Behr and Schlechtendal (xli). |
| <i>Behriana</i> , F.v.M. (xlvi).           | <i>paniculata</i> , Sm. (viii).                |
| <i>bicolor</i> , A. Cunn. (xliv).          | <i>pilularis</i> , Sm. (xxxi).                 |
| <i>Boormanii</i> , Deane and Maiden (xlv). | <i>piperita</i> , Sm. (xxxiii).                |
| <i>Bosistoana</i> , F.v.M. (xliii).        | <i>Planchoniana</i> , F.v.M. (xxiv).           |
| <i>capitellata</i> , Sm. (xxviii).         | <i>populifolia</i> , Hook. (xlvii).            |
| <i>Consideniana</i> , Maiden (xxxvi).      | <i>punctata</i> , DC. (x).                     |
| <i>coriacea</i> , A. Cunn. (xv).           | <i>regnans</i> , F.v.M. (xviii).               |
| <i>corymbosa</i> , Sm. (xii).              | <i>resinifera</i> , Sm. (iii).                 |
| <i>dives</i> , Schauer (xix).              | <i>saligna</i> , Sm. (iv).                     |
| <i>fruticetorum</i> , F.v.M. (xlii).       | <i>siderophloia</i> , Benth. (xxxix).          |
| <i>goniocalyx</i> , F.v.M. (v).            | <i>sideroxyton</i> , A. Cunn. (xiii).          |
| <i>hæmastoma</i> , Sm. (xxxvii).           | <i>Sieberiana</i> , F.v.M. (xxxiv).            |
| <i>hemiphloia</i> , F.v.M. (vi).           | <i>stellulata</i> , Sieb. (xiv).               |
| <i>longifolia</i> , Link and Otto (ii).    | <i>tereticornis</i> , Sm. (xi).                |
| <i>Luehmanniana</i> , F.v.M. (xxvi).       | <i>virgata</i> , Sieb. (xxv).                  |
| <i>macrorrhyncha</i> , F.v.M. (xxvii).     | <i>vitrea</i> , R. T. Baker (xxiii).           |
| <i>maculata</i> , Hook. (vii).             |  |

\* Government Printer, Sydney. 4to. Price 1s. per part (10s. per 12 parts); each part containing 4 plates and other illustrations.

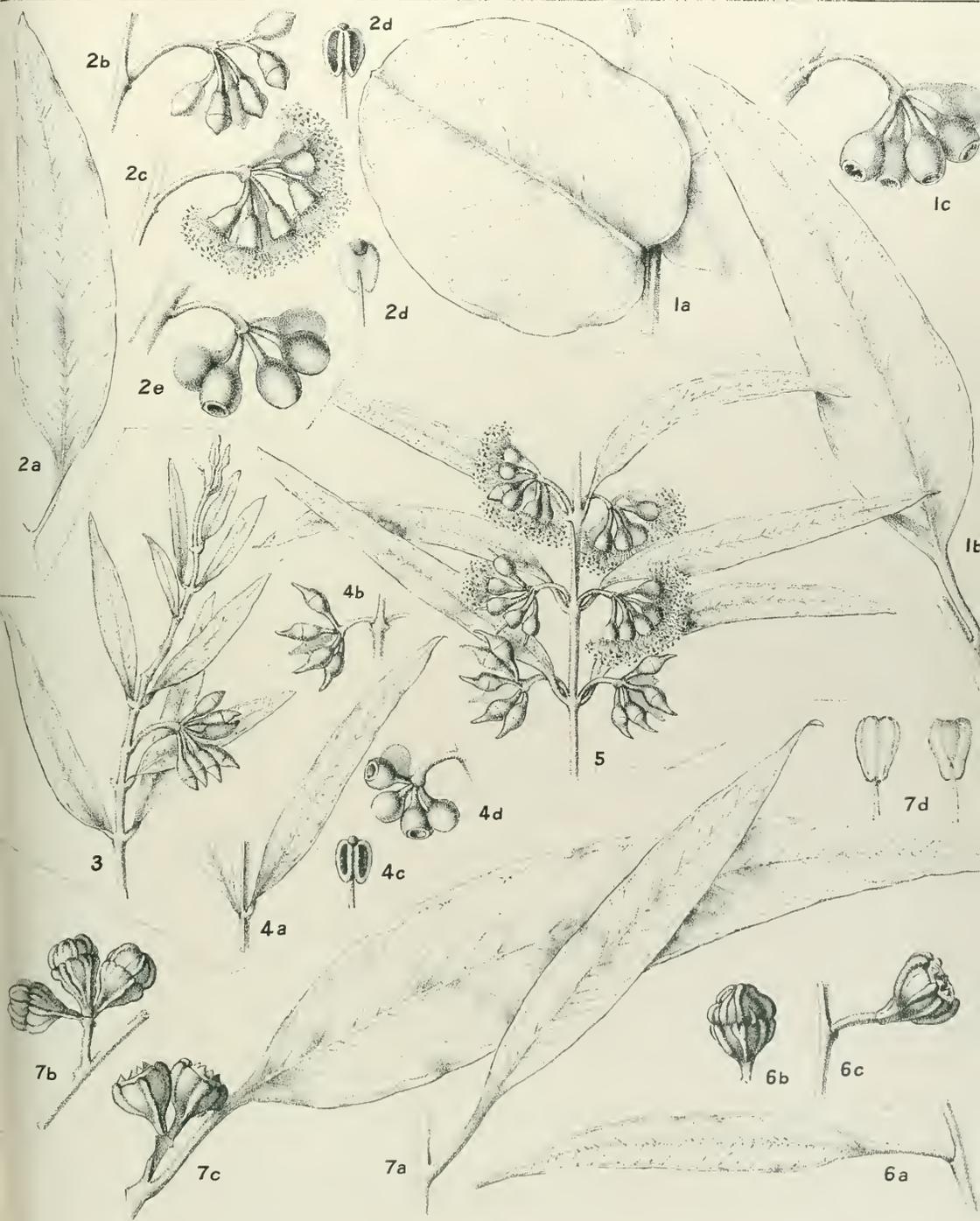




EUCALYPTUS OLEOSA, F.v.M. VAR. FLOCKTONI, MAIDEN (1-4)  
 E. LE SOUEFII, MAIDEN (5-7).

M. J. H. 2876





*E. DECURVA*, F.v.M. (1-2).  
*E. DORATOXYLON*, F.v.M. (3-5).  
*E. CORRUGATA*, LUEHMANN (6-7).

M. Flockton.



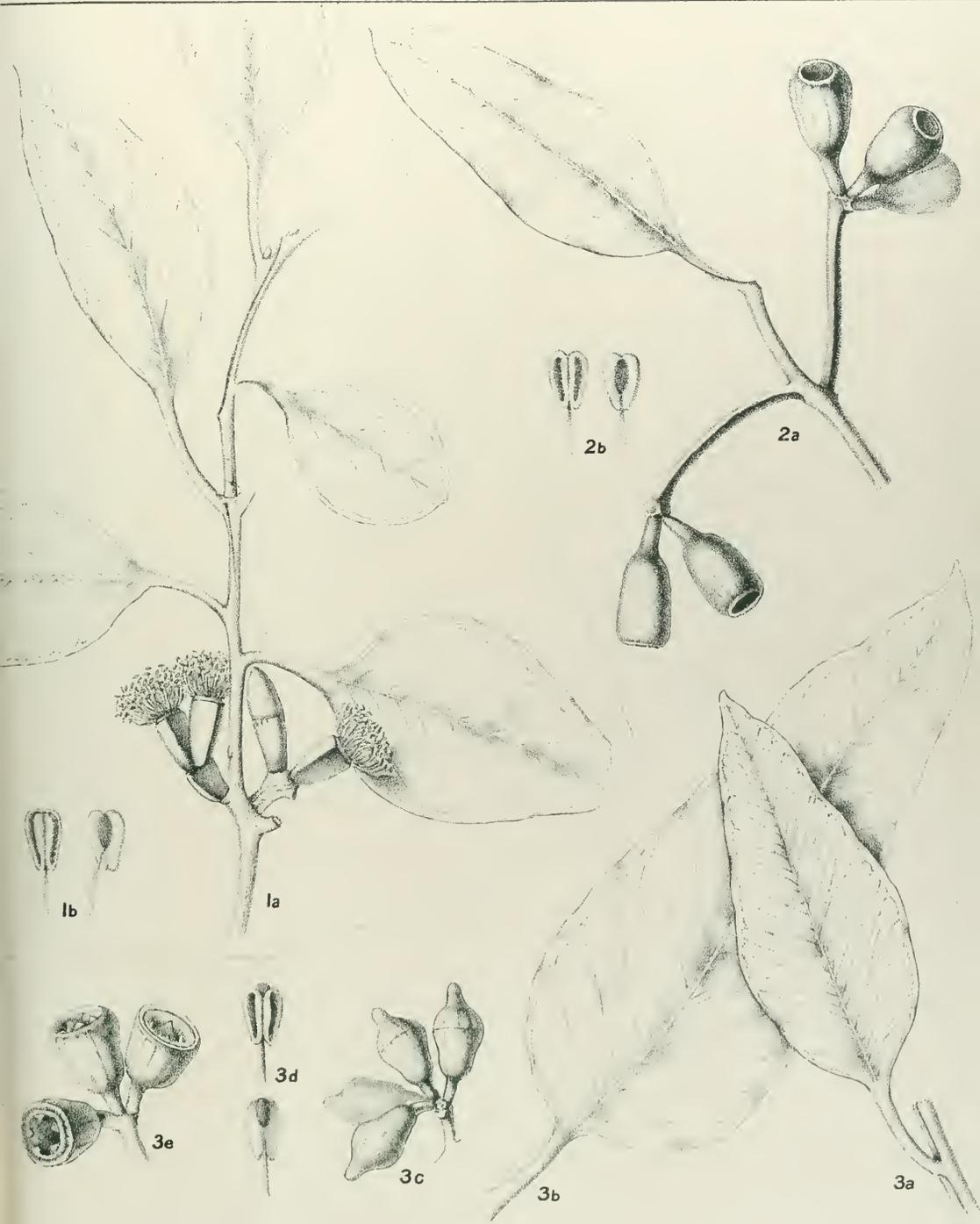


E. STRICKLANDI, MAIDEN (1). E. CAMPASPE, S. LE M. MOORE (2-4).

E. DIPTERA, ANDREWS (5).

E. GRIFFITHII, MAIDEN (6). E. GRIFFITHII, MAIDEN (7).





E. GROSSA, F.v.M. (1). [See also Fig. 2 of Plate 18].

E. PIMPINIANA, MAIDEN (2).

E. WOODWARDI, MAIDEN (3).



# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

(Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney)

---

VOL. II. PART 7.

Part XVII of the Complete Work.

(WITH FOUR PLATES.)

---

*"Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise."*

MACAULAY'S "ESSAY ON MILTON."

---

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## DESCRIPTION.

LXXXIX. *E. salmonophloia*, F.V.M.

In *Fragmenta*, xi, 11 (1878).

It was afterwards figured and described in the *Eucalyptographia*.

### Notes supplementary to the description.

A very uniform species, varying more in the operculum if at all, but not much in that. It is the largest tree on the Eastern Gold-fields of Western Australia.

The mature foliage is glossy on both sides and more or less yellowish-green as seen in the bush; the juvenile foliage is quite dull on both sides, petiolate, from nearly ovate to ovate-lanceolate, the intramarginal vein distinctly removed from the edge, the fine lateral veins parallel and feather-veined.

It has a broad white anther opening wide at the sides; filament at the base, and gland at the top.

It has a salmon-coloured smooth bark, which dries dull red and hard; sometimes there is a little rough-flaky bark at the butt.

The timber is of a reddish-brown colour, red with crimson in it. It is one of the most valuable Western Australian timbers, good for firewood, durable for posts, commonly used for railway-sleepers on the Eastern Gold-fields.

Speaking of the Goomalling (an agricultural) district, Mr. Percy Murphy informs me, "Difficult to get without gum-veins. It sometimes has hollow spaces from which you may obtain a couple of buckets of water." In this respect it resembles some New South Wales trees. It is, however, sound as a rule, and Goomalling is too far west for the species to attain its best development.

Mr. Vanzoolikum, of Katanning, gave me the native name in the South-eastern districts as "Wuruk."

---

## RANGE.

A Western Australian species. The type comes from "woods towards the mouth [head is doubtless meant] of the Swan River, F.M., from hence to the vicinity of the Victoria Spring (C. Giles)." In the *Eucalyptographia*, Mueller modifies the statement in the following words—"From the upper eastern part of Swan River and its affluents (F.V.M.) extending to Victoria Spring through the arid interior region, but not continuously" (C. Giles).

It is very widely diffused and is usually a sign of a region of low rainfall. It flourishes in the desert.

Following are some localities represented in the National Herbarium, Sydney.

Cowcowing (Max Koeh, No. 1,255); Carnamah, Victoria district (Dr. A. Morrison); Avon district (E. Pritzel, No. 320). Near York (L. Diels, No. 2,915); Goomalling, where it is a sign of good farming land (Percy Murphy). Indeed, it is an acceptable tree wherever it occurs. Narrogin (J.H.M.); 10–12 miles to the east of Broome Hill (J.H.M.); Cunderdin (W. V. Fitzgerald); Southern Cross (J.H.M.); 70 miles north of Kurrawang, also Goongarrie (J.H.M.); Hampton Plains, 5 miles east of Coolgardie (Ernest Lidgley); Kanowna, near Kalgoorlie (L. Diels, No. 1,702); “Giant Mallee,” 20–35 feet, bark glossy, light brown, Camp 63, Elder Exploring Expedition, 27th September, 1891 (R. Helms).

## AFFINITIES.

### 1. With *E. leptopoda*, Benth.

In the original description Mueller says that Drummond’s No. 188 certainly belongs to *E. salmonophloia*, and that perhaps No. 151 (of which he has not seen the fruit) does. Both these numbers are, however (B.Fl. iii, 238) placed by Bentham under his *E. leptopoda*.

Mueller (*Eucalyptographia* under *E. salmonophloia*), says :—

The nearest affinity of this species is to *E. leptopoda*; the leaves, however, are shorter, smoother, shining, and more visibly perforated by oil-dots, the flowers are fewer in the umbels, their stalklets shorter, and their lid blunter; the outer filaments are not all bent inward while in bud; the fruits are smaller and particularly less broad, while the valves are narrower and longer; besides, the flowers of *E. leptopoda* in an expanded state and its ripe seeds require yet to be compared.

Examination of Plate 73 shows that the two species can be readily separated by the fruits, while *E. salmonophloia* is a large tree and *E. leptopoda* a shrub.

### 2. With *E. oleosa*, F.v.M.

*E. salmonophloia* has also some characteristics in common with *E. oleosa*, but it is taller, the bark is very different, the leaves are thinner in consistence and darker in colour, the flowers are smaller, the lid is shorter and blunter, and the fruits are also of lesser size. (*Eucalyptographia*, under *E. salmonophloia*.)

I think I have dealt with the affinities of these species sufficiently fully under *E. oleosa*, ante Part XV, page 173.

### 3. With *E. dumosa*, A. Cunn., var. *rhodophloia*, Benth. (B.Fl. iii, 230).

In the original description of *E. salmonophloia*, Mueller remarks that it is said to have the same bark as the variety, but the variety has leaves almost opaque, and less oil-dotted, the flowers and fruit are larger, the operculum has an umbo and is plicate-striate, it has no pedicels, the anthers are longer, and it differs in having deltoid valves not exsert, and tends, further, to the series of the *Platypodæ* and not to that of the *Exsertæ*.

*E. dumosa*; var. *rhodophloia*, is figured at 1a and 1b Plate 21, and my readers can judge for themselves. I do not understand why it was necessary to compare this form with *E. salmonophloia*.

## DESCRIPTION.

*XG. E. leptopoda*, Bentham.

In B.Fl. iii, 238 (partim).

THE types are Drummond's Nos. 33 and 36 (5th Coll.), but not Nos. 151 and 188 of Drummond's specimens as quoted, which are *E. salmonophloia*, F.v.M.

It is further described in *Fragm.*, xi, 13. It is not figured in the "Eucalyptographia."

**Notes supplementary to the description.**

A thin, wiry, rather erect tall shrub or small spindly tree, with several stems together. Juvenile foliage narrow lanceolate, thick, equally green on both sides, no vein obvious other than the midrib.

The tazza-like fruits as depicted at *6b*, Plate 73, seem characteristic, and are the usual shape in this species.

So far as I know, it is a very uniform species.

---

SYNONYM.

*E. angustifolia*, Turcz.

I give the description, as it is contained in a work not readily accessible to Australians. It has several years' priority over Bentham's name, but the name *angustifolia* was applied to a species by Link, and indeed by at least one other botanist.

48. *Eucalyptus angustifolia* (Drum. 5, n. 33). *E.* glabra; ramis teretibus apice subangulatis; foliis alternis lineari-lanceolatis falcatis, in petiolum valde attenuatis, longe acuminatis: acumine saepius uncinato, pellucido-punctatis; umbellis in parte inferiore denudata ramorum ortis paucisque superioribus axillaribus 5-20-floris; pedunculis floriferis compressis, fructiferis teretiussculis, pedicellos duplo excedentibus; floribus (inapertis) parvis pedicello duplo brevioribus; operculo conico dupliciter cupulam aequante, exteriori membranaceo citius cadente, interiore coriaceo. Folia uninervia, marginata, avenia vel obscure venosa, 4-pollicaria, 3 lin. tantum lata. Pedunculi floriferi petiolo plus quam duplo longiores, cacterum longitudine valde variabiles, nam in uno eodemque specimine pedunculi fructiferi anni praecedentis, breviores sunt. Umbellae floriferae multiflorae (18-20), in stellam vel rotam dispositae, fructiferae inferne positae 5-10-florae. Fructus sphaericus, pisi magnitudine, 4-5-ocularis, vertice calyce emergente. Species memorabilis operculo duplici, exteriori saepe lacerato. Flores inter minimos. *E. micranthae* et affinium. (Turcz. in *Bull. Phys.-Math. Acad. Peters.*, 10, 1852, p. 337.)

## RANGE.

So far as we know, it is confined to Western Australia and to the Central Division of that State. Even yet Western Australia has been imperfectly explored as regards its Eucalypts, and hence some of our conclusions concerning them must still be of a provisional character.

“7 or 8 feet high, bark of trunk rough, of upper branches smooth and peeling off,” Watheroo Rabbit Fence (Max Koch).

Tammin, the furthest west recorded on the Perth-Kalgoorlie line (J.H.M.) “Grows on the sand-plains in clumps, 6 or 7 feet high, shrubby. Flowers small, white; colour of bark reddish-brown.” (Kellerberrin, F. Harvey Vachell.)

Boorabbin (Dr. A. Morrison); Coolgardie (Dr. L. G. Webster).

Then we have

Arbuscula circ. 3 m. alta *E. leptopoda* Bth. fructu accedens, sed foliis majoribus crassioribus glaucis, pedunculis brevioribus, fructibus majoribus notata hab. in dist. Austini meridionali pr. Menzies in fructicetis mixtis arenosis fruct. m. Oct. (D. 5,179). Quae forma a cl. Maiden (in litteris), *E. leptopodae* attributa sed probabiliter omnino nova ulterius observanda est. (Diels and Pritzel, *Engler's Jahrb.*, 1904, p. 442.)

Diels gives 25 km. (kilometres) south of Menzies for some specimens, which is not far from Comet Vale, where it is abundant (J.H.M.).

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## AFFINITIES.

### 1. With *E. oleosa*, F.v.M.

In buds, less in anthers, and occasionally in the narrow-leaved forms of *E. oleosa*, *E. leptopoda* may resemble that species, but as a rule *E. leptopoda* has narrow leaves, while the fruits of the two species are totally different.

### 2. With *E. angustissima*, F.v.M.

This species has depressed, domed fruits which certainly remind one of those of *E. leptopoda*, but they are almost sessile. The anthers appear to be more kidney-shaped in *E. angustissima*, but we imperfectly know them. *E. angustissima* is a narrow-leaved species, but its leaves are narrower than those of *E. leptopoda*.

### 3. With *E. macrorrhyncha*, F.v.M.

Certainly the fruits of *E. leptopoda* simulate those of *E. macrorrhyncha* (compare Plate 39), but those of the latter species have longer pedicels, while the rim is rarely if ever flat, as is *E. leptopoda* in fig. 8, Plate 73. *E. macrorrhyncha* is a large fibrous-barked tree of Eastern Australia.

### 4. With *E. haemastoma*, Sm., var. *micrantha*, Benth. (*E. micrantha*, DC.).

The fruits of this variety are smaller than those of *E. leptopoda*, but undoubtedly similar. See figures at top of Plate 47. Turczaninow noted this in his description of *E. angustifolia*, ante page 220. There is no close relation between the species.

## DESCRIPTION.

*XCI. E. squamosa*, Deane and Maiden.

In *Proc. Linn. Soc. N.S.W.*, xxii, 561 (1897), with a plate.

A medium-sized tree, that is to say, averaging 30 feet in height, and with a stem diameter of about 15 inches.

**Bark.**—Scaly, somewhat resembling that of *E. corymbosa*, but the scales thinner. The young stems are of a leaden colour, the outer bark thickens, turns bluish or ashy grey in colour, becomes fissured horizontally and longitudinally, thus taking on the scaly appearance. When the superficial scaly bark is removed, the bark is seen to be of a reddish-brown colour.

**Timber.**—Deep red.

**Juvenile leaves.**—Ovate, and finally ovate-lanceolate. So far as observed, always alternate and not opposite as in *E. viminialis*, *Stuartiana* and allies. Similar, as regards arrangement of leaves, to *E. punctata*, *piperita* and some other species.

**Mature leaves.**—Narrow to rather broad-lanceolate or ovate-lanceolate, slightly falcate,  $3\frac{1}{2}$  to nearly 6 inches long. In colour pale green to glaucous, the surface glandular-punctate. Veins reddish, the midrib conspicuous owing to its dark colour, the petioles reddish like the veins. The margin thickened outside the marginal vein and coloured like the midrib; marginal vein very near the margin. Transverse veins numerous and fine, making an angle with the midrib of about 50 degrees.

**Peduncles.**—Roundish, not flattened nor angular. Frequently or usually in pairs; the flowers generally from 8 to 12, usually 10 or 11.

**Calyx-tube.**—Subcylindrical, almost ovate, forming a continuous outline with the operculum. Somewhat urceolate in young fruit.

**Operculum.**—Ovate, but more or less pointed or beaked, and frequently showing a marked curve to one side. The length of the operculum about equal to that of the calyx, viz., about 3 lines.

**Fruits.**—Nearly hemispherical, with a slight tendency to constriction of the orifice; in extreme cases the fruits almost taking on an urceolate form. Size about 4 lines broad by 3 lines deep.

**Rim sunk.** Valves 3 or 4 and slightly exerted.

Its most obvious characteristic is its scaly bark, of which we take cognizance in giving the specific name to the tree.

## Notes supplementary to the description.

Anther white, round, dehiscence wide, has a gland at the top, and one gland at the back. So far as I know, this species is unique in having a gland in the latter position. Filament at the base.

## SYNONYM.

*E. tereticornis*, Sm., var. *squamosa*, Maiden, in Maiden's "Forest Flora of New South Wales," Part xi, p. 9.

*E. tereticornis*, Sm., var. *sphaerocalyx*, F.v.M.; and

*E. tereticornis*, Sm., var. *amblycorys*, F.v.M. (*partim*) in Deane's and Maiden's note in *Proc. Linn. Soc. N.S.W.*, xxiv, 629, and Maiden in *Bull. d'Herb. Boissier* (2nd series), 574, are not referable to *E. squamosa* as there stated, and will be dealt with when *E. tereticornis* is reached.

## RANGE.

On sterile sandstone ridges from the Hawkesbury River (Berowra, Peat's Road to Hawkesbury) and Como to Sutherland and National Park.

## AFFINITIES.

1. With *E. tereticornis* Sm., var., *sphaerocalyx*, F.v.M., and var. *amblycorys*, F.v.M.

The anthers are, however, very different, that of *E. tereticornis* opening in parallel slits, and being a narrow anther in comparison. I think it will be most convenient to deal with the affinities of *E. squamosa* to reputed varieties of *E. tereticornis* when dealing with the latter species.

2. With *E. salmonophloia*, F.v.M.

As regards anthers, *E. salmonophloia* and *E. squamosa* belong to the same class of round white anthers, opening widely, but the back-gland is not present in *E. salmonophloia*. The fruits of *E. squamosa* are larger, fewer-flowered and different in shape, the timber darker, the bark more flaky, and the tree more stunted.

3. With *E. incrassata*, Labill., var. *conglobata*, R.Br.

The fruits are much the same in shape (see Plate 17), but there is never any ribbing on those of *E. squamosa*; those of the latter are more or less stalked. The anthers are different.

4. With *E. Campaspe*, S. le M. Moore.

The fruit of this species (Plate 71) and of *E. squamosa* have a distant resemblance, but the latter is very glaucous, and the peduncle is strap-shaped.

5. With *E. punctata*, DC.

It possesses considerable superficial resemblance to *E. punctata*, from which it is at once distinguished by the anthers. Other differences are indicated by the domed rim of *E. punctata*. In *E. squamosa* the peduncles and pedicels are nearly round, not compressed as in *E. punctata*, while the bipedunculate arrangement has already been noted. *E. squamosa* has also very pale green leaves, narrower leaves, and more ruddy stalks than *E. punctata*.

6. With *E. corymbosa*, Sm.

Its resemblance to *E. corymbosa* is chiefly in the bark.

## DESCRIPTION.

XCII. *E. Oldfieldii*, F.v.M.

In Fragn. ii, 37 (1860).

It was described in English by Bentham in B.Fl. iii, 237, and figured and described by Mueller in "Eucalyptographia."

## Notes supplementary to the description.

It has an ovoid operculum usually more or less rostrate. In its varieties the rostrum may be absent. Its juvenile foliage is petiolate and ovate, not broad, with the intramarginal vein distinctly removed from the edge.

It is a stiff shrub of 8 or 10 feet, with many thin stems close together, forming an impenetrable scrub, but not a true Mallee. It is not a timber tree.

Variety *Drummondii*, new variety.

Syn. *E. Drummondii*, Benth., B.Fl. iii, 237.

Mueller ("Eucalyptographia," under *E. Oldfieldii*) uses the words, "If *E. Drummondii* should prove a mere variety (of *E. Oldfieldii*) as seems likely," . . .

Luehmann (*Proc. Aust. Assoc. Adv. Science*, vii, 532, 1898) writes: "*E. Drummondii* seems a variety of this (*E. Oldfieldii*), being smaller in all its parts."

Neither botanist took upon himself to say that *E. Drummondii* is a variety of *E. Oldfieldii*, and, after careful consideration of *Oldfieldii*, and its forms both in the field and in herbarium specimens, I am of opinion that *E. Drummondii*, Benth., is a variety of it, which I constitute under the name var. *Drummondii*.

The fruit was unknown to Bentham when he described *E. Drummondii* in B.Fl. iii, 237, and apparently Mueller only saw the young fruits.

Juvenile foliage petiolate, ovate, intramarginal vein close to edge (specimens of O. H. Sargent, near York, W.A.).

I constitute Drummond's No. 86 (see fig. 6, Plate 74) type of var. *Drummondii*, and would point out that O. H. Sargent's specimens, Cut Hill, York, are in every way similar to Drummond's No. 86, and fig. 7, Plate 74, may be taken as typical for the fruit.

## RANGE.

The species and all its forms are confined to Western Australia, so far as we know. The type came from the Murchison River (Augustus Oldfield). There is a specimen, labelled "Tree 30-40 feet. Bark smooth. Thicket near Colleullia,

Murchison River, W.A. (Oldfield),” in Herb. Barbey-Boissier, which will doubtless give a clue to the precise locality. The bud in this specimen (a little shrunk) is precisely as figured in “Eucalyptographia.”

Specimen 35 (Supplement to 5th Collection), Drummond, Herb. Cant., also Herb. Oxon., are both in early fruit. This number is quoted by Bentham as *E. Oldfieldii*.

Mueller (“Eucalyptographia”) gives its range from Champion Bay to the Murchison River.

Following are some specimens represented in the National Herbarium, Sydney:—

Between the rivers Moore and Murchison, practically a type locality (E. Pritzel, No. 353); Minginew (Dr. L. Diels, No. 3,075.—J.H.M.); Ebbano, east of Minginew (Dr. A. Morrison).

A litorali septentrionali (districtus Irwin) in interiora longius progreditur. Vidimus in distr. Coolgardie pr. Karalee una cum *Acaciis*, *Hakeis* que in solo arenoso (D. 5,576). (Diels and Pritzel, *Engler's Jahrb.*, 1904, p. 442.)

Mr. Max Koch (his 1,256) sent it to me from Cowcowing: “a small tree or shrub with a ragged bark.” The fruits are smaller than those of typical *Oldfieldii* and larger than those of typical var. *Drummondii*. See fig. 2, Plate 74.

### Variety *Drummondii*, Maiden.

Drummond’s No. 86. The inflorescence varies in size somewhat in various specimens. Figured at 3 and 6, Plate 74.

The following specimen matches the type absolutely:—

Small tree of about 20 feet. Trunk and branches smooth whitish buff, with a few brown semi-detached scales of dead bark. Leaves dull green. Growing in light humous soil mixed with ironstone gravel. Cut Hill York. (O. H. Sargent, No. 266.) (Figured at 5 and 7, Plate 74.)

The following specimen is similar:—

Darling Range, Kelmescott, near Perth. Fruits and pale-coloured foliage only (Dr. J. B. Cleland). (Figured at 9, Plate 74.)

I look upon all the above as var. *Drummondii*.

Now we come to what I look upon as anomalous forms of *E. Oldfieldii*, until we get complete material to indicate the amount of variation permissible in *E. Oldfieldii* and its variety *Drummondii*.

(1.) “Wandoo,” near Waroona (J. J. Fitzgerald). Lanceolate leaves and buds. The calyx-tube slightly angled, and the operculum hemispherical.

(2.) “White Gum,” sandy scrub land, Serpentine River (Collector of Baron von Mueller). Lanceolate leaves, flowers and early fruit. Operculum hemispherical. Calyx-tube scarcely angled, perhaps because it is in a more advanced stage than (1).

(3.) Lanceolate leaves, large fruits. "Very clean white Gum." Foot of Darling Range, Kelmscott, near Perth (Dr. J. B. Cleland). Figured at 4, Plate 74. It seems to be a large fruited form of Sargent's No. 266.

(4.) A form collected by Dr. A. Morrison, at Mt. Saddleback, Marradong, Williams District, is remarkable for its conical operculum.

It is figured at 10, Plate 74. It has dull coloured foliage, and, except for the length of the operculum, appears to be typical var. *Drummondii*.

(5.) The following interesting form was collected by me at 66 $\frac{1}{4}$  mile-post, Pindar, Murchison Line.

Many-stemmed, 10-15 or 20 feet. Tough wood. Peculiar bark, falling off in narrow longitudinal pieces, giving it a striped appearance. The indurated stems are 3 inches in diameter. Several clumps seen.

Very yellow buds with hemispherical operculum and absolutely no mucro. Operculum, which is distinctly smaller than the calyx, affording one of the best examples I remember of the "egg-in-egg-cup" bud. Leaves greenish-yellow, dull coloured. The material I have, is figured at 11, Plate 74.

Now, 1, 2, 3 are alike in leaf (lanceolate, bright green, and showing venation). 4 and 5 are broader and duller, the venation, except the midrib, scarcely discernible.

Nos. 1 and 2 are alike in buds (I have no buds of 3) and they strongly resemble those of No. 5.

Western Australians should examine *E. Oldfieldii* and its forms in the bush, and should particularly collect juvenile foliage while still in the opposite stage. Examination of these will probably settle the matter of the relation of *E. Oldfieldii* to its varieties and whether we have a second species.

---

## AFFINITIES.

Mueller ("Eucalyptographia") says:—

The leaves and anthers bring it into the vicinity of *E. oleosa* and *E. pachyphylla*, while the stamens, as regards their early position, indicate an affinity to *E. gomphoccephala* and *E. pachygloma*.

We will take the species referred to in detail.

### 1. *E. oleosa*, F.v.M.

While the anthers of *E. Oldfieldii* and *E. oleosa* resemble each other a good deal, comparison with Plates 65 and 66 shows that the similarities of the two species in most characters is not close.

### 2. *E. pachyphylla*, F.v.M. (*E. pyriformis*, Turcz., var. *minor*).

I have some notes on this variety at page 230 below. The fruits, &c., are figured at figs. 5-7, Plate 75 of the present Part. The fruits of *E. pyriformis*, var. *minor*, are sessile or stalked; so are those of *E. Oldfieldii*; the rim of var. *minor* is concave and not convex, while there are ribs in var. *minor*.

There is some similarity in the anthers. See under *E. pyriformis*, page 229

3. *E. gomphocephala*, DC.

I have not dealt with this species yet, but it is figured in the "Eucalyptographia" and meantime I will remark that the affinities of the two species are remote.

4. *E. pachyloma*, Benth.

Bentham placed it next to this species, from which it is decisively distinguished by longer leaf-stalks, by broader leaves with more divergent veins, shorter stamens, anthers of different structure, somewhat larger, more depressed fruits with prominent margin, longer valves, protruding pyramidally from a central groove of the vertex, and also narrower sterile seeds. (Mueller in "Eucalyptographia," under *E. Oldfieldii*.)

*E. pachyloma* is figured at Nos. 9 and 10 of Plate 36 under *E. diversifolia*, Bonpl. As my recent trip to Western Australia has given me an opportunity of studying *E. pachyloma* in its type locality, I will postpone further remarks concerning it until such time as I can publish my observations.

5. *E. incrassata*, Labill.

In the shape of its anthers *E. Oldfieldii* agrees almost with that variety of *E. incrassata*, in which they are shortened to a nearly roundish form; but still both these species are very different from the *Renanthera*, although they offer an approach to the *Micranthera*. (Mueller, "Eucalyptographia," under *E. Oldfieldii*.)

This is another species referred to by Mueller in speaking of *E. Oldfieldii*. He compares *E. Oldfieldii* with that variety of *E. Oldfieldii* "in which they (the anthers) are shortened to a nearly roundish form." Perhaps he is alluding to the same plant when in "Eucalyptographia," under *E. incrassata*, he says: "Some of the anthers occasionally verging to a globular-cordate form; the connective conspicuously glandular-turgid at the back." So far as I know, Mueller has not indicated the plant referred to, and we therefore cannot follow up the comparison.

As regards affinities of the two species, reference to the figures in Part IV of the present work shows that they are not close.

6. With *E. cosmophylla*, F.v.M.

This is another large fruited species, and there is some superficial resemblance in herbarium specimens. The buds may resemble each other a good deal, and the rim of the fruits of *E. cosmophylla* has a certain amount of sculpture, but it is not depressed as are those of *E. Oldfieldii*.

7. With *E. macrorrhyncha*, F.v.M.

This species and var. *Drummondii* have fruits which sometimes resemble each other a good deal. For example, compare fig. 7, Plate 74 of the present Part, with 11*b*, 3*c* and other figures of Plate 39 of Part VIII. But variety *Drummondii* has longer pedicels, the buds, anthers, and leaves are different. *E. macrorrhyncha* also is a large Stringybark.

8 and 9. With *E. resinifera*, Sm., and *E. punctata*, DC.

When these two species are figured, it will be seen that both have large fruited forms, which in herbarium specimens undoubtedly show resemblance to some forms of *E. Oldfieldii*. I am referring more particularly to figs. 4*b* and 7 of Plate 74. *E. resinifera* and *E. punctata* are large timber trees of Eastern Australia, which possess no close resemblance to *E. Oldfieldii*.

## DESCRIPTION.

XCIII. *E. orbifolia*, F.v.M.

Fragm. v, 50 (1865).

It was described in English by Bentham in B.Fl. iii, 238.

**Notes supplementary to the description.**

One of the objects of the present work is to elucidate all named forms of *Eucalyptus*. So far as I know, the specimen which I figure on Plate 74, and for the original figure of which I am indebted to the Director of Kew, is the only one in existence. No specimen of it has been known in the Melbourne Herbarium for many years. Western Australian botanists have now something to guide them in their search for the plant.

## RANGE.

Up to the present time it has only been found in one locality, and that is in Western Australia.

The locality given in the original description says: "At the foot of granite hills in Western Australia, latitude 30° 47', longitude 119° 25'. *C. Harper.*"

The description of the plant was made in 1865, and the Kew specimen is labelled "Dr. Mueller, received September, 1865." The locality given is believed to be 30 or 40 miles north of Southern Cross.

I had the pleasure of meeting Mr. Charles Harper in Perth, Western Australia, in 1909, and showed him the Kew drawing, which I carried thousands of miles in Western Australia in my pocket-book, hoping to trace the original. After some thought, Mr. Harper remembered the plant, but he could not give me specific directions as to the locality, and feared that, at his age, he might not revisit the spot.

Since the above was written, I regret to say that this fine old Western Australian pioneer died at his residence, Guildford, near Perth, April, 1912.

## AFFINITIES.

Mueller did not express any opinion as to its affinities. Luehmann wrote to me, "Described from too imperfect material to make recognition at all certain." I am, however, satisfied that it is a valid species.

1. With *E. Oldfieldii*, F.v.M., var. *Drummondii*.

Bentham's words are: "Although evidently allied to *E. Drummondii*, this appears to be specifically distinct both in the leaves and the parts of the flowers.") B.Fl iii, 238.)

It certainly has resemblance, in the buds and flowers, to 3*b*, Plate 74, a form of *E. Oldfieldii*, var. *Drummondii*, labelled *Drummondii* at Kew, and of which I have not seen a specimen. This is probably the specimen to which Bentham referred.

The leaves of *E. orbifolia* are much broader than of any form of *E. Oldfieldii* known.

2. With *E. pyriformis*, Turcz.

*E. orbifolia* certainly has some resemblance to *E. pyriformis*, because of the striæ of its comparatively large operculum, but the leaves are far too broad for that species. The anthers may turn out to be more closely alike than the drawing of *E. orbifolia*, made from imperfect material, would lead us to believe.

## DESCRIPTION.

CXIV. *E. pyriformis*, Turczaninow.

FOLLOWING is the original description :—

*Eucalyptus pyriformis*, Turczaninow, in *Bull. Soc. Nat. Mosc.*, xxii, Pt. 2, p. 22 (1849). Caule ramoso glabro, ramisque teretibus cortice fusco laevi obductis; ramulis compressis folisque alternis petiolatis oblongo-lanceolatis marginatis, acuminatis basiue attenuatis opacis glaucis; pedunculis recurvato reflexis tetragonis unifloris pedicellum obconico-tetragonum paulo superantibus; alabastris a basi ad operculi apicem bialatis, costis crassis basi interdum fere alaeformibus percursis; operculo conico acuto cupula aequali et fere conformi; staminibus numero is, longe exsertis. Alabastra  $1\frac{1}{2}$  pollicaria, operculo dejecto cum staminibus fere bi-pollicaria. Stamina fusco-aurantiaca. Drum. 4, n. 69.

This may be translated as follows :—

Stems and branches glabrous and terete, and covered with light brown bark. Branchlets compressed, leaves alternate and petiolate, oblong-lanceolate, marginate, acuminate and attenuate at the base, glaucous, opaque. Recurved-reflexed thick tetragonous one-flowered peduncles a little longer than the obconical-tetragonous pedicel; buds two-winged at the base and at the point of the operculum, with thick ribs, sometimes nearly winged at the base; operculum conical, acute, nearly equal to the calyx-tube. Stamens numerous, well exserted. Bud  $1\frac{1}{2}$  inches long, after the operculum has been thrown off, with stamens nearly 2 inches long. Stamens brownish orange-coloured.

It was later described by Bentham at B.Fl. iii, 226; figured and described by Mueller in his "Forest Resources of Western Australia" and again in his "Eucalyptographia"; figured (coloured) and described by J. E. Brown in Part 8 of his "Forest Flora of South Australia."

## Notes supplementary to the description.

I have not seen strictly juvenile leaves.

Diels and Pritzel say: "Folia glaucescentia ramorum juvenilium latiora late elliptica interdum suborbicularia."

I can find no two-winged buds, nor were fruits on the type specimen.

The colour of the filaments varies a good deal. Diels and Pritzel speak of them as crimson, rose-coloured and sulphur-coloured admixed on the same group of plants. I have seen them crimson and yellow, and there seems to be absolutely no botanical difference in the forms.

It is one of the handsomest of the genus, because of the large size and showiness of the flowers, and the large size and ornamental character or at least grotesqueness of the fruits.

### Varieties.

1. Var. *minor*, nov. var.
2. Var. *elongata*, nov. var.
3. Var. *Rameliana*, nov. var.

It is a very variable species, and it would appear that definition of the following varieties is justified.

1. Var. *minor*, nov. var. This is intended to include *E. pachyphylla*, F.v.M. For some notes on this species, see page 225. Figured at 5-7, Plate 75.

2. Var. *elongata*, nov. var., with the calyx-tube much attenuated and tapering gradually into the pedicel. The type is figured at 1, Plate 76. In typical *pyriformis* the pedicel is short, but the character is variable.

3. Var. *Rameliana*, nov. var., a small fruited form with an absence of ridges and furrows on the bud and flower. This is intended to include *E. Rameliana*, F.v.M., and is figured at 5, Plate 76.

## SYNONYMS.

1. *E. pruinosa*, Turcz.
2. *E. macrocalyx*, Turcz.
3. *E. erythrocalyx*, Oldfield and Mueller.
4. *E. Youngiana*, F.v.M.
5. *E. Rameliana*, F.v.M.
6. *E. pachyphylla*, F.v.M.

### 1. *E. pruinosa*, Turcz.

On the page following the description of *E. pyriformis* we have :—

*Eucalyptus pruinosa*. Glabra, ramis teretibus fuscis, novellis glaucescentibus; foliis alternis petiolatis ovatis acuminatis, basi rotundatis vel parum attenuatis, marginatis, opacis, obscure venosis, glaucis; pedunculis recurvato-reflexis crassis teretibus 1-2-floris; pedicellis brevibus obovato tetragonis, in cupulam turbinato-tetragonum, lateribus costatam pruinosa abeuntibus, costis in pedunculum decurrentibus; filamentis longe exsertis rufis; operculo. Stirps, propter specimina, jam operculo orbata, quo ad locum in genere incerta, etiamsi ab omnibus cognitis videtur bene distincta, accedit ad *E. pyriformem* cupularum magnitudine pedunculisque recurvatis saepe unifloris. Drum. 4, n. 70. (Turcz. in *Bull. Soc. Nat. Mosc.*, xxii, Pt. 2, p. 23 [1849].)

This may be translated as follows :—

Glabrous, with terete brown branches, the new ones glaucous; alternate petiolate ovate acuminate leaves, rounded at the base or a little attenuate, marginate, opaque, obscurely veined, glaucous; peduncles recurved-reflexed, terete, thick; 1-2-flowered, with short obovate tetragonous pedicels ending in a turbinato-tetragonous calyx tube with pruinose lateral ribs, the ribs decurrent into the peduncle, with long exserted rufous filaments; (operculum wanting in specimen examined).

As the specimen is devoid of an operculum, the position in the genus is uncertain, but it approaches nearest to *E. pyriformis* in the size of the calyx-tube, and the recurved, often one-flowered peduncles.

Mueller remarks:—

*E. pruinosa*, Turcz., exhibits a variety, having smaller flowers with obverse pyramidal sharply few-angled calyx-tube.

2. *E. macrocalyx*, Turcz.

It is simply a synonym of *E. pruinosa*, Turcz., according to the following passage:—

Nomen *E. pruinosa*, propter homonymum Schauerianum antiquius, in *E. macrocalycem* mutetur. (*Bull. Phys. Math. Acad. Petersb.*, x (1852), p. 339.)

3. *E. erythrocalyx*, Oldfield and Mueller, is described in *Fragm.* ii., 32 (1860), and following is a translation (with Mueller's italics):—

Shrubby, with alternate, coriaceous, ovate-lanceolate leaves, acute or acuminate, imperforate, with very fine spreading transverse veins, rather long petioles, the marginal vein close to the edge, *peduncles thick terete ultimately reflexed*, pedicels of nearly equal length or longer, about 3-flowered, *a very large light-reddish calyx*, with a nearly semi-ovate quadrangular tube gradually narrowed into the pedicel, little exceeding the nearly semi-ovate hemispherical shortly acuminate operculum. Anthers ovate-cordate. Fruits very large, hemispherical-turbinate, slightly 4-ribbed, the apex of the 4- to 6-celled capsule broadly encircled by a concave ascending margin or rim, the convex valves not exert. Seeds without wings.

In sandy places between Port Gregory and the Murchison River. *Oldfield*. Shrub 4 to 6 feet high. Branches terete. Branchlets compressed-tetragonous. Leaves shining, equal-coloured on both sides,  $1\frac{1}{2}$ –3 inches long,  $\frac{3}{4}$  to 1 inch broad, on a petiole  $\frac{1}{2}$  to 1 inch long. Peduncle at first about 1 inch long, ultimately up to 3 inches long. Pedicels 1 to  $1\frac{1}{2}$  inches long, very thick when old. The bud measured  $1\frac{1}{2}$  to  $1\frac{3}{4}$  inches in the only specimen seen, perfectly and strikingly red in the fresh state, slightly rugose after drying. Stamens not numerous. Anthers yellow. Fruit nearly 2 inches broad, and with acute margin round the apex. Valves bluish or lead-coloured, convex before expansion, forming the apex of the capsule. Sterile seeds sometimes  $2\frac{1}{2}$  to 4 lines long, clavate-filiform, angular, some broad or very broad, variable as to form. Fertile seeds not seen.

This fine species resembles *E. macrocarpa* in size as well as in the form of the calyx and capsule, but differs in the arrangement of the flowers, and in the nature of the leaves.

Mueller had not at this time seen an authentic specimen of *E. pyriformis*, as he himself states (“*Eucalyptographia*”).

4. *E. Youngiana*, F.v.M. (*Fragm.* x., 5 [1876].)

The description may be translated as follows:—

Arboreous with nearly terete branchlets, and falcate-lanceolate scattered leaves gradually acuminate, equal-coloured on both sides, imperforate, on rather long petioles. Veins copious, very fine, transverse, and with two longitudinal ones very near the margin. Solitary very thick peduncles, compressed and 2 or 3-flowered, with very thick pedicels conspicuously shorter than the flowers. Very large calyx with a depressed hemispherical tube, with numerous longitudinal ribs, hardly equal in size to the woody operculum, which is broad-conical and acuminate rostrate. Anthers cordate-ovate opening longitudinally, with a thick subulate style. Fruits depressed turbinate-hemispherical, with raised ribs. Has five deltoid valves and winged seeds.

At the desert water hole, Victoria Springs, *Young*. Fowler's Bay, *Richardson*.

The tree in question is, according to one of the discoverers, 50 feet high [is this a slip for 5?—J.H.M.] Leaves thick, coriaceous, pale green, not distinctly shining, mostly 4 to 5 inches long, and  $\frac{3}{4}$  to 1 inch broad, the veins oblique (angulo acuto excurrentes), not prominent. Peduncles deflexed, hardly 1 inch long. Calyx-tube 1  $1\frac{1}{2}$  inches broad, thick-woody, operculum nearly  $1\frac{1}{2}$  inches long, rugose. Stamens, as far as seen, all pollen-bearing. Filaments yellow, the longer ones nearly 1 inch long. Anthers  $\frac{1}{3}$  to  $\frac{1}{2}$  inch long. Style less than a line thick. Fruit in form much approaching that of *E. pachyphylla*, but much larger. Its folds are not dissimilar to the ribs of *E. macrocarpa* and *E. pyriformis*. Fertile seeds hardly exceeding a line, broad, angular, sterile ones at least partly thin-clavate.

The species greatly differs from the large-flowered species, *E. macrocarpa*, *E. meycaripa*, *E. Preisiana*, *E. calophylla*, *E. ficifolia*, *E. tetraptera*, *E. pyriformis*, *E. ptychocarpa*, and *E. erythrocorys*, by the immersed veins of the leaves, by the operculum neither depressed nor without beak, by the deeply folded fruits, which are not equally turgid from the margin to the valves.

“*E. Youngiana* represents the variety with flowers devoid of stalklets and with very strongly ridged and short-tubed calyces.” (Mueller)

I have not a specimen from Victoria Springs, but I have some from Fowler's Bay, by which may be meant Ooldea, 150 miles to the north. This is rather a widely diffused form, is figured at 1, Plate 75, and I have suggested that it is typical for *E. pyriformis*.

5. *E. Rameliana*, F.v.M., *Fragm.* x, 84 (1876).

The description may be translated as follows :—

Opaque, with nearly terete branchlets, nearly equal-sided ovate-lanceolate leaves, opposite and alternate, on rather long petioles, imperforate, of equal colour on both sides, and numerous very fine transverse veins and two longitudinal veins distinctly remote from the margin, 1-flowered terete peduncles, terete pedicels often thickened upwards, large calyces, not in the least angular, calyx-tube patella-hemispherical, the operculum exceeding the length of the tube, semi-globose, acuminate into a nearly conical beak. Stamens yellow, all fertile, with ovate-cordate anthers. Style rather long, not dilated at the stigma.

Beyond the Alfred-Marie Ranges. *E. Giles*.

Leaves of the very few specimens at hand 3 to 4 inches long, about 1½ inches broad, pale greenish, nearly glaucescent, gradually narrowed into a long point. Peduncle about ½ inch long, with a slender pedicel. Flower at first nodding. Pedicel nearly ¾ inch long.

Calyx an inch broad. Operculum, including its beak, little shorter than an inch. Stamens mostly ⅔ inch long. Anthers ⅓ line long. Style as long as the stamens. Fruit unknown.

I dedicate the new species to Prospero Ramel, who introduced Australian Eucalypts into Southern France and Algeria.

*E. pyriformis* is distinguished by the larger and angular calyx and the often more elongated peduncles and pedicels frequently in threes or more (the peduncles are 1-flowered in *E. Rameliana*), and by the calyx-tube gradually narrowing into the pedicel. The species is not easily confounded with *E. Youngiana*, though it is similar.

Only one bud, one flower, and a few fragmentary herbarium specimens seem to have been collected. These were lent me by Professor Ewart, and the figures 5, Plate 76, prepared therefrom.

6. *E. pachyphylla*, F.v.M.,\* in *Journ. Linn. Soc.*, iii., 98.

The description may be translated in the following words :—

Shrubby, with angular young branches and alternate leaves on moderately long petioles, thickly coriaceous, ovate or lanceolate-ovate, acuminate, hardly unequal-sided, not perforate, finely pinniveined, the peripheral vein remote from the margin; with axillary umbels irregularly 3-flowered, the peduncles and pedicels very short. Flowers not known. *The tube of the fruiting-calyx depressed-hemispherical, with 4 distinct ribs and more indistinct ones, with raised margins, the capsules 4- to 5-celled, convex at the top, with somewhat exerted valves, the fertile seeds with narrow wings, rather light-coloured.*

Hab. In a sandy desert at Hooker's Creek. Flowering time Autumn.

Shrub *argyalis* (sic) or slightly higher. Leaves mostly 1½ to 2½ inches long, opaque in dry specimens. Flowers not known. Fruits 6 to 8 lines in diameter, the margin just produced above the valves. Fertile seeds with the wings added 1½ lines long. Near to *E. alpina*.

It was then described by Bentham in B.Fl. iii., 237. *Inter alia*, the fruits are described as nearly sessile.

\* The Editor has a note, “Not *E. pachyphylla*, Cunn. MSS. from King George's Sound (No. 231 of 4th Voyage).

*E. pachyphylla* is then figured and described in the "Eucalyptographia," but Mueller does not figure a nearly sessile form, and therefore this is not strictly typical. It is, as regards the pedicels, very similar to the form depicted at 7*b*, Plate 75.

The specimens figured at 6, Plate 75, would appear to be strictly typical for *E. pachyphylla*, F.v.M.

*E. pachyphylla* approaches the variety *pruinosa* of *E. pyriformis* [such a variety has never been defined.—J.H.M.], but its flowers and fruits are much smaller, almost devoid of a general flower-stalk, and crowded to the number of about 7 together ("Eucalyptographia," under *E. pyriformis*).

I have already stated, I believe *E. pruinosa*, Turcz., to have fruits of the size of 3 and 4, Plate 75, which, while very much smaller than the typical form of *E. pyriformis* (figured at 1*b* of the same Plate), are very much larger than those of *E. pachyphylla*, F.v.M. (figured at, say, 7*b* of the same Plate).

## RANGE.

This species mainly occurs in Western Australia and western South Australia. If *E. pachyphylla* be properly referred to *E. pyriformis*, as I suggest, then the range of the species is extended to the Mulligan River, Western Queensland. The intervening country of Central Australia has been very imperfectly explored from the botanical point of view.

### WESTERN AUSTRALIA.

The type specimen of *E. pyriformis* is Drummond's 4th Collection No. 69. That of *E. pruinosa*, Turcz. (non Schauer), a synonym, is 4th Collection No. 70. Bentham (B.Fl. iii, 226) adds Drummond's No. 61, and also "Sandy plains between Port Gregory and the Murchison River, *Oldfield*," which is the locality quoted by Mueller for his *E. erythrocalyx*.

A specimen is before me, "In fructicetis arenosis inter flumina Moore et Murchison" (E. Pritzel, No. 440). In bud and flower (crimson filaments). Doubtless the calyces of these buds were "strikingly red" in a fresh state, and thus satisfy the requirements of *E. erythrocalyx*, F.v.M., but it would appear that the crimson calyx in the young state is common in the species.

Returning to Drummond's collections, I believe the following passages from Drummond's letters refer to *E. pyriformis*. Drummond's No. 49 is not in any collection to which I have access.

On the same hill (? near Moore River) I gathered the beautiful and curious Eucalyptus (No. 49), of which I sent you seed-vessels and flowers; the inflorescence is rose-coloured, and as large as that of *E. macrocarpa*; still it is readily distinguishable as a species, by its less glaucous and petiolated leaves, with the lengthened recurved footstalks of the blossoms and fruit; but I find that the winged seed-vessels and twin-growth of the flowers do not afford dependable characters.

(Letter dated September, 1842, in Hooker's *London Journal of Botany*, Vol. 3, p. 302.)

In the same district (? Wangan Hills) a noble Eucalyptus abounded, which eclipses even your *E. macrocarpus*; its flowers are crimson and golden-yellow, and freely produced on plants which have not attained half the full stature of 12-15 feet high. Sometimes these charming blossoms vary with pale red and white; they hang in profusion from the tips of the branches.

(Letter, undated, in Hooker's *Journal of Botany*, Vol. 5, p. 313 [1853].)

Mueller ("Eucalyptographia") quotes the additional localities of 'near the Victoria Spring (Tietkens), (is this the "Queen Victoria Springs in say 30° 50 South lat. and 123° 60 East longitude?); near Wilgerra Hill (Giles); and near the north side of Lake Gairdner (Mosley).

The following additional Western Australian localities are represented in the National Herbarium, Sydney:—

Received from W. Gill, Conservator of Forests, Adelaide, specimens with fruits smaller and less winged than the type. Filaments yellow. Locality not stated. It may not be Western Australian. (Figured at 2, Plate 75.)

Tammin (J.H.M.). Still smaller than the type. A little glaucous. Filaments crimson. Figured at 3, Plate 75. Tammin (J.H.M.). Same size as preceding. Very glaucous. Probably very near to *E. pruinosa*, Turcz. Filaments yellow. Figured at 4, Plate 75.

Coweewong (Max Koch, no number) is very glaucous and very similar to the preceding. Filaments crimson.

Coorow, Arrowsmith district. Bushy shrub, 1-2 metres high, leaves glaucous, purple calyx, filaments scarlet or golden yellow, anthers yellow. (L. Diels, No. 3,319.) Glaucous calyces. Coorow, filaments yellow. Calyces not glaucous. (L. Diels, No. 3,319b.)

#### SOUTH AUSTRALIA.

Mueller, in "Eucalyptographia," gives the following locality:—

Ooldea, north of Fowler's Bay, South Australia (Young); (this is a type-locality for his *E. Youngiana*; in the original description we have Victoria Springs, Young, and Fowler's Bay, Richardson; there may therefore be some confusion in regard to collectors' names).

A specimen from Ooldea, which is about 150 miles north of Fowler's Bay (Henry Deane) is perhaps as near as we shall get to the type of this variable species. It is figured at 1, Plate 75.

"Mr. Simon Mathieson, a squatter, obtained some specimens a while ago at Peela Well, near Wilgena Station.

"This station is situated not far from Tarcoola, which is right on the route of the Trans-continent Railway from Port Augusta to Kalgoorlie, W.A., and about 250 miles west from Port Augusta itself. Mr. Mathieson gave me some seed-vessels which I now have and said he found them in two patches, one having trees flowering with creamy white." (In a letter from W. Gill, dated 25th March, 1912.)

J. E. Brown, in his "Forest Flora of South Australia," gives the following localities for that State :—

The Everard Ranges, between Alice Springs and Burrow's Creek (J.W. Jones); in dense masses at Alice Well on Mount Burrell Station; at the "Old Depôt" of the Overland Telegraph Line on the Idracowra Station; in the vicinity of Chambers' Pillar (W. H. Wilshire); on the boundary between West and South Australia, north of Tomkinson's Range, at lat. 25° 35' S. and long. 129° E. (Berry).

Var. **minor**, var. nov.

"Interior of South Australia" (Herb. Melb.). (Figured at 5*b*, Plate 75) Quite sessile. Mueller has recorded "Glen of Palms, Macdonnell Range (E. Giles)."

"Western Queensland" (Mr. Cornish, Herb. Melb.). Figured at 6, Plate 75. Nearly sessile. This is doubtless the same specimen as that referred to in the list of "Plants collected in the vicinity of the Mulligan River by Mr. W. H. Cornish during his Survey Expedition in 1885," and referred to by Mueller, *Proc. Roy. Soc. S.A.*, ix, 214 (1887), in the following words :—"Eucalyptus pachyphylla, F.v.M. The anthers occur roundish, so that this species could be transferred to the series of *Strongylanthere*."

All three were referred by Mueller to *E. pachyphylla*, F.v.M.

"Mallee," Burracoppin, Western Australia, 182 miles east of Perth (Dr. J. B. Cleland), rather longer stalked than the preceding, but with shorter stalks than that of the figure of *E. pachyphylla*, F.v.M., in "Eucalyptographia."

So that this small-fruited form is very widely distributed.

Var. **elongata**, var. nov.

"Erect, 4-5 feet, in sandy plains between Lawler's and Doyle's Well. Filaments crimson" (Sergeant Donovan, comm. W. V. Fitzgerald). (Figured at 1, Plate 76.) Arrino (W. V. Fitzgerald).

Filaments yellow. A tall shrub growing on Sand plains, Cowcowing (Max Koch, No. 1,257). (Figured at 2, Plate 76.)

From Coolgardie (L. G. Webster) (Figured at 4, Plate 76) is a smallish form and seems to connect the type with var. *elongata* and with var. *minor*.

Var. **Rameliana**, var. nov.

This was collected by Ernest Giles north of the Alfred-Marie Ranges, Western Australia, say 25° South latitude, and 125° East longitude.

## AFFINITIES.

### 1. With *E. macrocarpa*, Hook.

*E. pyriformis* is closely akin to *E. macrocarpa*, but any whitish bloom on it is confined to the calyces and their stalks, the leaves are always narrower and gradually attenuated at the base, only exceptionally opposite and even then obviously stalked, the flowers stand seldom singly, and are never absolutely sessile, the calyx has not an even surface, the upper portion of the fruit from the edge of the calyx-tube to the rim of the disc is more elevated, and at the summit more contracted, reaching beyond the base of the valves. ("Eucalyptographia," under *E. pyriformis*.)

I will institute a comparison between the two species when I figure *E. macrocarpa* (in Part XVIII).

The anther of *E. pyriformis* is remarkable, and may be described as very irregular in shape and peculiarly curved. Further, they are not strictly uniform amongst themselves. There is a gland in front, near the top, and the dehiscence is extensive, being fully from top to bottom. The attachment of the filament is nearly at the base. The drawings of the anthers of *E. pyriformis* have been made from dry specimens, and the curvature is partly a matter of shrinkage.

The anthers of all the varieties of *E. pyriformis* are similar, and have flat, ribbon-like filaments in addition. The anthers of *E. macrocarpa* are similar. Those of *E. orbifolia* are closely allied, but the material available is too scanty to be satisfactory. The anthers of *E. Oldfieldii* are allied.

### 2. With *E. Preissiana*, Schauer.

This is a large-fruited species with yellow filaments, but the fruit is smaller and of quite a different shape to that of *E. pyriformis*. The leaves and anthers are both different. *E. Preissiana* will be dealt with in Part XVIII.

### 3. With *E. cosmophylla*, F.v.M.

Bentham, speaking of *E. pachyphylla*, F.v.M., says:—

The specimens are insufficient to determine the affinities of this species. In some respects they resemble *E. cosmophylla* and its allies; but the fruit, the seeds and, perhaps, the inflorescence are different. (B.Fl. iii, 237.)

It will be more convenient to deal with this matter when I figure *E. cosmophylla*.

### 4. With *E. Oldfieldii*, F.v.M.

I have a note on *E. pyriformis*, var. *minor* (*E. pachyphylla*, F.v.M.), and this species above, page 225.

## Explanation of Plates (73-76.)

## PLATE 73.

*E. salmonophloia*, F.v.M.

- 1a. Twig, bearing buds; 1b, twig, bearing fruits taken from Drummond's No. 188 of the year 1849. In B.Fl. iii, 239, Bentham placed it under his *E. leptopoda*.  
 2a. Leaf; 2b, anther, back and front view. 70 miles north of Kurrawang, W.A. (J.H.M.)  
 3. Buds with very round (hemispherical) opercula. Kellerberrin, W.A. (W. V. Fitzgerald.)  
 4. Fruits. Goomalling, W.A. (Percy Murphy.)

*E. leptopoda*, Benth.

5. Juvenile leaf. Comet Vale, 62 miles north of Kalgoorlie, W.A. (J.H.M.)  
 6a. Mature leaf, thickly dotted with oil glands; 6b, fruits, domed rims. Kellerberrin, W.A. (F. H. Vachell.)  
 7a. Mature leaf; 7b, buds; 7c, anther; 7d, fruits. Watheroo Rabbit Fence, W.A. (M. Koch.)  
 8. Fruits, with flat rim. Tammin, W.A. (J.H.M.)  
 9a. Leaf, with immature buds; 9b, fruits. From No. 33, J. E. Drummond, 1850, co-type of Bentham's *E. leptopoda*.

*E. squamosa*, Deane and Maiden.

- 10a. Juvenile leaf; 10b, mature leaf; 10c, buds; 10d, anthers; 10e, fruits, of type specimen. National Park, Sydney. (J.H.M.)

*E. Oldfieldii*, F.v.M.

- 11a. Juvenile leaf, apparently not typical; 11b, juvenile leaf, apparently typical; 11c, leaf in the intermediate stage; 11d, mature leaf; 11e, buds and flower; 11f, anther; 11g, immature fruit; 11h, fruits. Minginew, Midland Line, W.A. (J.H.M.)

## PLATE 74.

*E. Oldfieldii*, F.v.M. (continued).

- 1a. Buds, with operculum more pointed, and 1b, fruits in shape more spheroidal than 11h, Plate 73. Minginew, W.A. (Dr. L. Diels' No. 3,075.)  
 2a. Mature leaf (very thick, and venation almost invisible); 2b, buds; 2c, fruits. Cowcowing, W.A. (M. Koch.)  
 3a. Mature leaf; 3b, buds and flowers. From specimens in the Kew Herbarium labelled *E. Drummondii* by Bentham, and collected by Drummond (no number).  
 4a. Mature leaf; 4b, fruits. Foot of Darling Range, Kelmscott, near Perth, W.A. (Dr. J. Burton Cleland, No. 4.)  
 5a. Mature leaf; 5b, buds; 5c, anther. Cut Hill, York, W.A. (O. H. Sargent.)  
 6a. Mature leaf and immature fruit; 6b, buds; 6c, flowers; 6d, anther, of Drummond's No. 86 (1844), type of *E. Drummondii*, Benth., and of *E. Oldfieldii*, F.v.M., var. *Drummondii*.  
 7. Fruits. Cut Hill, York, W.A. (O. H. Sargent.) My specimens of Drummond's No. 86 are without fruits. Mr. Sargent's specimens match Drummond's No. 86 in leaves, buds, and flowers. These fruits from Mr. Sargent complete the series.  
 8a. Mature leaf; 8b, buds and flowers; 8c, immature fruits of "A White Gum, sandy scrub land, Serpentine River, W.A." (Unknown collector.)  
 9. Fruits. Darling Range, near Perth, W.A. (Dr. J. B. Cleland.)  
 10a. Buds, with pointed opercula; 10b, fruits. Mt. Saddleback, Darling Range. (Dr. A. Morrison.)  
 11a. Mature leaf; 11b, buds, with hemispherical operculum; 11c and 11d, fruits, from the same tree. Pindar, W.A. (J.H.M.)

*E. orbifolia*, F.v.M.

- 12a. Twig, bearing mature leaves, bud and flower of the only specimen known. This drawing is lithographed from one drawn by Miss M. Smith in the Kew Herbarium. It was collected by C. Harper in Lat. 30° 47', Long 119° 25'; 12b, anthers.

## PLATE 75.

*E. pyriformis*, Sm.

- 1*a*. Mature leaf; 1*b*, buds (note conical operculum); 1*c*, anthers; 1*d*, fruit. Ooldea, north of Fowler's Bay, South Australia. (H. Deane.) I believe this to be as near as possible to the type.
- 2*a*. Mature leaf; 2*b*, bud (note hemispherical operculum); 2*c*, fruit (smaller and less winged than 1*d*). From Western Australia, but not with specific locality. (W. Gill.)
- 3*a*. Bud (this is smaller than 2*b*, and operculum less pointed, otherwise the form is much the same); 3*b*, fruit (smaller and fewer wings than 2*c*). Filaments crimson. Near Tammin, W.A. (J.H.M.)
- 4*a* and 4*b*. Mature leaves; 4*c*, bud, with very marked wings; 4*d*, fruit. Filaments yellow. Near Tammin, W.A. (J.H.M.)

var. *minor*, var. nov.

- 5*a*. Mature leaf; 5*b*, flower. "Interior of South Australia."
- 6*a*. Bud; 6*b*, flowers; 6*c*, anthers; 6*d*, fruit. From Mr. W. H. Cornish, Mulligan River, West Queensland (Nos. 5 and 6 from National Herbarium, Melbourne, per late J. G. Luehmann).
- 7*a*. Mature leaf; 7*b*, fruit. Burracoppin, W.A. (Dr. J. B. Cleland.)

## PLATE 76.

*E. pyriformis*, Sm., var. *elongata*, var. nov.

- 1*a*. Intermediate leaf; 1*b* and 1*c*, mature leaves; 1*d*, buds; 1*e*, fruit. All between Lawler's and Doyle's Well. (W. V. Fitzgerald.)
- 2*a* and 2*b*. Mature leaves; 2*c*, flowers. Coweowing, W.A. (Max Koch.)
3. Fruit. W.A. (From National Herbarium, Melbourne; no further locality.)
- 4*a*. Mature leaf; 4*b*, flower with operculum. Coolgardie, W.A. (L. G. Webster.) This smaller form seems to connect the typical form and var. *elongata*.

var. *Rameliana*, var. nov.

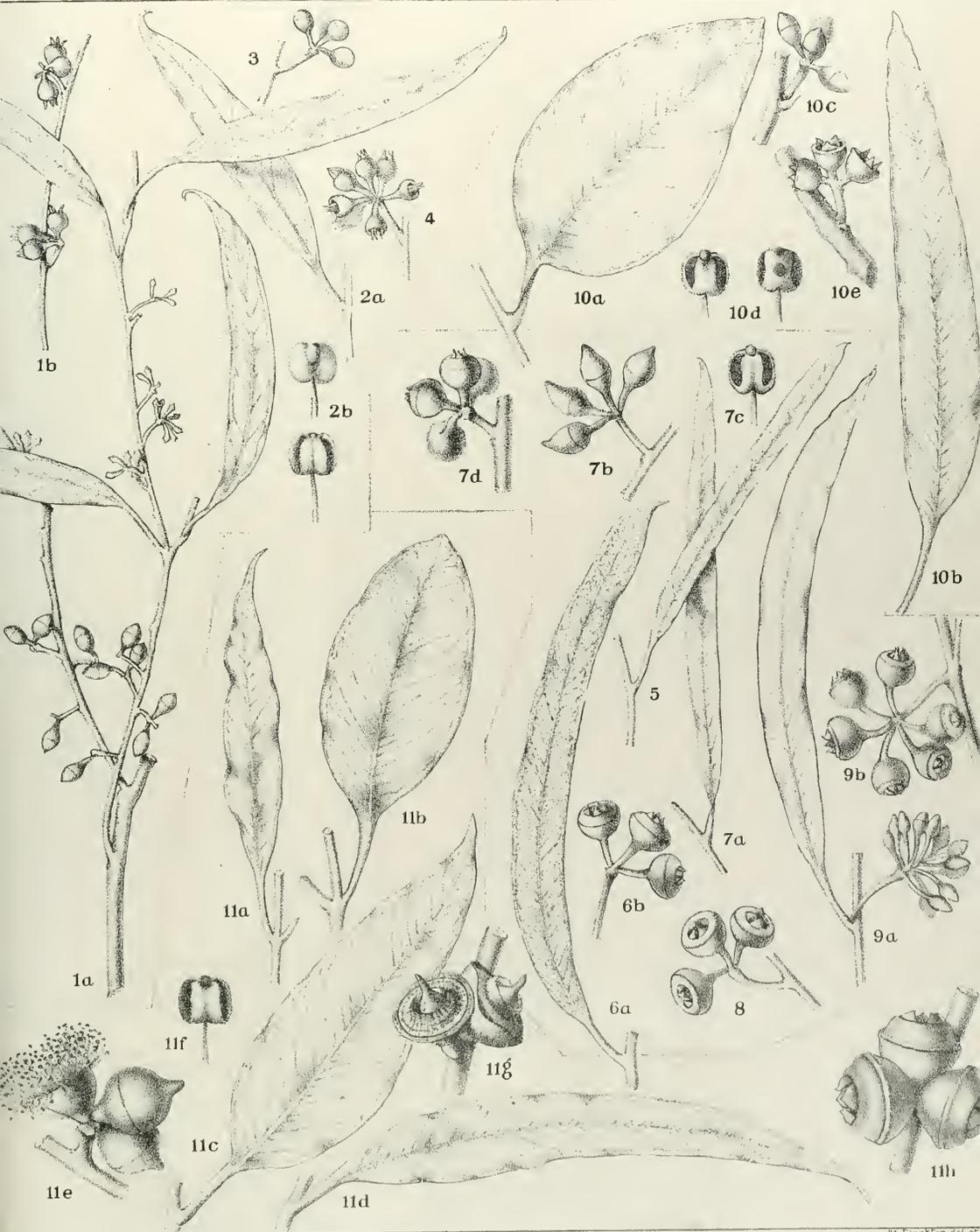
- 5*a*. Mature leaf; 5*b*, bud (note that it is quite smooth); 5*c*, anthers; 5*d*, flower (the rim is thin and there is one incipient ridge). Type of *E. Rameliana*, F.v.M. Beyond the Alfred and Marie Range, W.A. (A. Giles, circa 1874.) Drawn from specimen in National Herbarium, Melbourne, lent by Professor Ewart.

The following species of *Eucalyptus* are illustrated in my "Forest Flora of New South Wales"\* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

- |   |  |
|---|--|
| <i>acacioides</i> , A. Cunn. (xlviii).    | <i>melliodora</i> , A. Cunn. (ix).             |
| <i>acmeniolides</i> , Schauer (xxxii).    | <i>microcorys</i> , F.v.M. (xxxviii)           |
| <i>amygdalina</i> , Labill. (xvi).        | <i>numerosa</i> , Maiden (xvii).               |
| <i>Andrewsi</i> , Maiden (xxi).           | <i>obliqua</i> , L'Hérit. (xxii).              |
| <i>Baileyana</i> , F.v.M. (xxxv).         | <i>odorata</i> , Behr and Schlechtendal (xli). |
| <i>Behriana</i> , F.v.M. (xlv).           | <i>paniculata</i> , Sm. (viii).                |
| <i>bicolor</i> , A. Cunn. (xlv).          | <i>pilularis</i> , Sm. (xxxi).                 |
| <i>Boormavi</i> , Deane and Maiden (xlv). | <i>piperita</i> , Sm. (xxxiii).                |
| <i>Bosistoana</i> , F.v.M. (xliii).       | <i>Planchoniana</i> , F.v.M. (xxiv).           |
| <i>capitellata</i> , Sm. (xxviii).        | <i>populifolia</i> , Hook. (xlvii).            |
| <i>Consideniana</i> , Maiden (xxxvi).     | <i>punctata</i> , DC. (x).                     |
| <i>coriacea</i> , A. Cunn. (xv).          | <i>regnans</i> , F.v.M. (xviii).               |
| <i>corymbosa</i> , Sm. (xii).             | <i>resinifera</i> , Sm. (iii).                 |
| <i>dives</i> , Schauer (xix).             | <i>saligna</i> , Sm. (iv).                     |
| <i>fruticetorum</i> , F.v.M. (xlii).      | <i>siderophloia</i> , Benth. (xxxix).          |
| <i>goniocalyx</i> , F.v.M. (v).           | <i>sideroxylon</i> , A. Cunn. (xiii).          |
| <i>hæmastoma</i> , Sm. (xxxvii).          | <i>Sieberiana</i> , F.v.M. (xxxiv).            |
| <i>hemiphloia</i> , F.v.M. (vi).          | <i>stellulata</i> , Sieb. (xiv).               |
| <i>longifolia</i> , Link and Otto (ii).   | <i>tereticornis</i> , Sm. (xi).                |
| <i>Luehmanniana</i> , F.v.M. (xxvi).      | <i>virgata</i> , Sieb. (xxv).                  |
| <i>macrorrhyncha</i> , F.v.M. (xxvii).    | <i>vitrea</i> , R. T. Baker (xxiii).           |
| <i>maculata</i> , Hook. (vii).            |  |

\* Government Printer, Sydney. 4to. Price 1s. per part (10s. per 12 parts); each part containing 4 plates and other illustrations.





EUCALYPTUS SALMONOPHLOIA, F.v.M. (1-4).

E. LEPTOPODA, BENTH. (5-9).

E. SQUAMOSA, DRANE AND MAIREY (10)





*E. OLDFIELDII*, F.V.M., including VAR. *DRUMMONDII* (1-11).

*E. ORBIFOLIA*, F.V.M. (12).

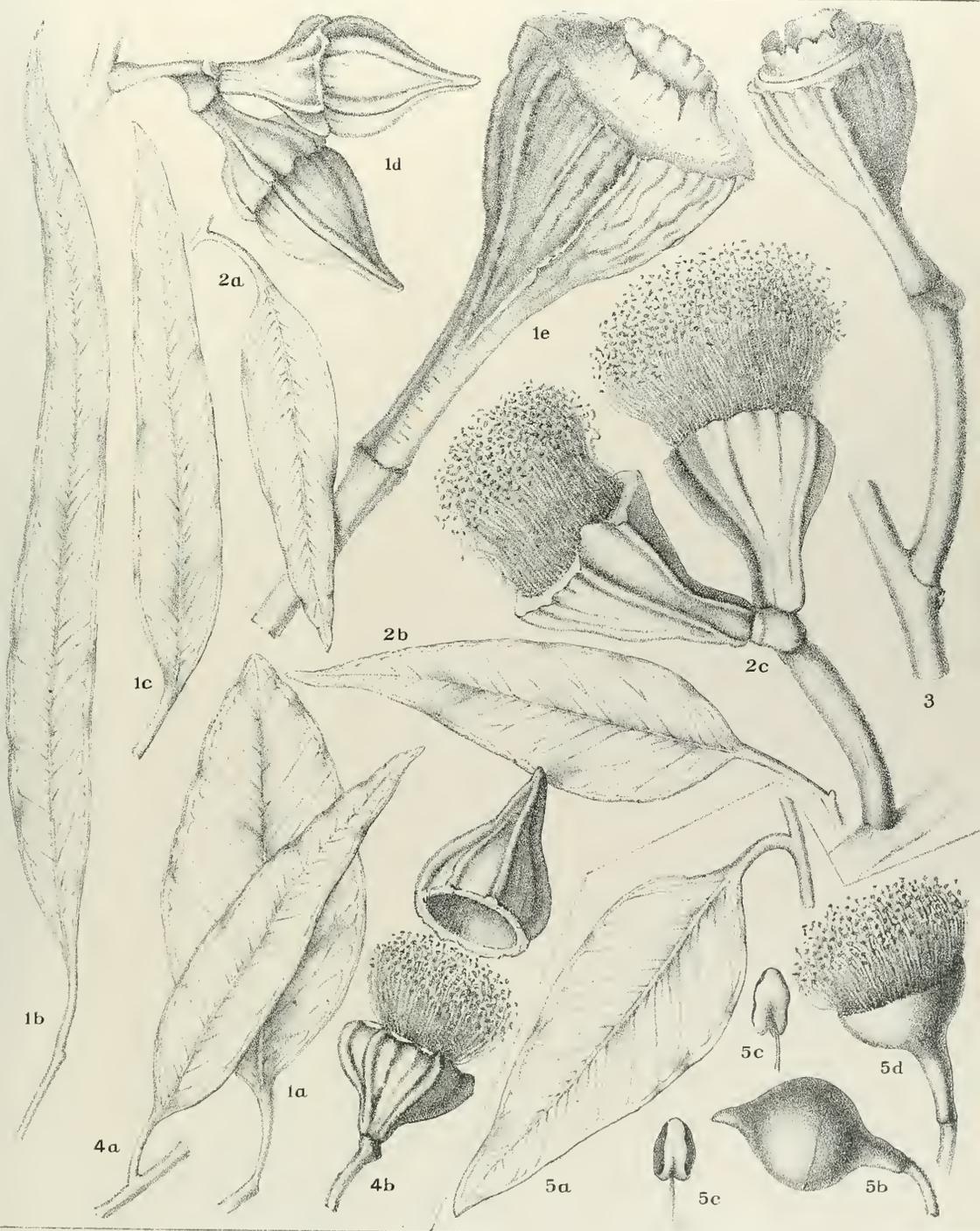




*E. PYRIFORMIS*, TURCZ. (1-4).

” ” VAR. *MINOR*, MAIDEN (5-7).





*E. PYRIFORMIS*, TURCZ., VAR. *ELONGATA*, MAIDEN (1-3).

[No. 4 is an intermediate form.]

VAR. *RAMELIANA*, MAIDEN (5).



# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

(Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

---

VOL. II. PART 8.

Part XVIII of the Complete Work.

(WITH FOUR PLATES.)

---

*“Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise.”*

MACAULAY'S "ESSAY ON MILTON."

---

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## DESCRIPTION.

XCV. *E. macrocarpa*, Hook.

In *Icones Plantarum*, tt. 405-7 (1842).

FOLLOWING is the original description:—

Arbor ubique farinaceo-glaucescens, foliis cordato-ellipticis brevi-acuminatis pedunculis axillaribus solitariis brevissimis unifloris, calycis magni crassissimi operculo conico-acuminato, capsula maxima breviter hemispherica marginata lignosa 4-5 valvi.

It was again figured and described in *Bot. Mag.* t. 4333, also by Paxton, *Mag. Bot.* xv, 29.

It is described by Bentham in B.Fl. iii, 224, and by Mueller in "Eucalyptographia."

### Notes supplementary to the Description.

I have never seen it grow higher than about 14 feet. It forms copses, which are very tough, and as it is usually very crooked in its growth, the wood is not used. The stems are seldom thicker than about 2½ inches. The flower has a superb appearance, usually about 3 inches across, and of a rich crimson colour. (W. D. Campbell, of Perth, in a letter.)

Mr. O. H. Sargent has sent me a small photograph of a seedling raised by him, in which a number of leaves are petiolate, and some of the lower ones quite narrow.

The thin bark is quite smooth, and varies from pale to dark grey, according to its age; the wood is pale-coloured, according to a specimen received from Mr. Sargent.

---

## RANGE.

It is confined to Western Australia.

Hab. Guangan, Swan River Colony, Australia. Mr. J. Drummond.

One of the finest of the many fine plants sent to me by Mr. J. Drummond from the Swan River Colony is the present new species of Eucalyptus. It is noticed in Mr. Drummond's letters, published in the second volume of our *Journal of Botany*, p. 313, and subsequent pages. Guangan is the native name for a country inland from the Swan River coast, constituting an open sandy desert, commencing about 80 miles E.S.E. [E.N.E. in the original passage as quoted in the *Journal of Botany*] of Fremantle and continuing for 200 miles. This barren, sandy desert is bordered by a considerable forest, composed principally of two species of Eucalyptus, called Urae and Morral by the aborigines. The present one is the Morral, conspicuous by its noble, glaucous, almost white leaves, its red flowers and its fruit, both of an unusually large size. The same species, however, Mr. Drummond has seen with white flowers. (Hooker, in original description.)

Drummond, writing from Hawthornden Farm, Toodyay Valley, 25th July, 1839, says :—

I have lately crossed the country from the sea-coast to the district called by the aborigines Guangan. I believe Guangan, in the native language, signifies *sand*; but I mean by it the open sandy desert which commences at about 80 miles E.N.E. from Fremantle, and is known to continue in the same direction for 200 miles. Hooker's *Journ. Bot.*\* ii, 356 (1840).

. . . the open sandy country is bordered by a considerable forest, composed principally of two kinds of Eucalyptus, called *Urac* and *Morral* by the aborigines. The *Urac* was in full bloom, but it seemed no easy matter to procure specimens, the trunk of the flowering trees being 60 feet high, very smooth, and of a yellow colour. . . . One of the most conspicuous plants on Guangan is a shrubby Eucalyptus with large glaucous coriaceous foliage, and conspicuous red flowers, succeeded by large seed-vessels. I have observed a white-flowered variety of the same. (Letter of James Drummond, 25th July, 1839, in Hooker's *Journ. Bot.* ii, 360, 1840.) This letter contains many references to Guangan.

The above is evidently the origin of Hooker's statement. I do not know what *Urac* is for a Eucalypt, but *Morral* or *Morrel* is a variety of *Eucalyptus oleosa*, dealt with in Part XV, page 166.

Through a slip of the pen, Hooker's statement would lead one to suppose that *Morral* is a name for *E. macrocarpa*, which is not what Drummond said. The last paragraph refers to *E. macrocarpa*.

As to Guangan, Lehmann (*Plantæ Preissianæ*, i, 132) refers to it as Quangan, province of Victoria. Bentham has the same spelling, "Forest bordering the Quangan Plains."

Mueller has it in the sentence, "From Dungin Peak eastward through the Guangan Desert (J. Drummond)." Guangan seems to be lost from modern maps but Dungin (Doongin) Peak is a remarkable conical hill, which I visited, a few miles from Tammam on the eastern railway. I suggest that Guangan survives in the modern name of "Wongan Hills." The Guangan district, as referred to by Drummond, is a somewhat irregular area, more or less to the N.E. and E.N.E. of Fremantle. It would probably, on its northern side, touch the old "province" of Victoria, and its most southerly boundary would include Dungin Peak. How far the "Guangan desert" goes eastward from Doongin Peak, as referred to in "Eucalyptographia," I do not know.

I submitted my identification of Guangan with Wongan, to Mr. Harry F. Johnston, the Surveyor-General of Western Australia, who concurs. He says: "It is the name now given to an isolated range of ironstone hills about 95 miles north-east from Perth."

He adds :—

With reference to the "open sandy desert commencing about 80 miles E.N.E. of Fremantle, and known to continue in the same direction for 200 miles," Mr. Drummond has been greatly misled, as though "sand plains" so called exist, and some of large extent, later surveys have long since dispelled erroneous ideas as to the size and sterility, and most of the land so designated is comprised in one of the best wheat districts of the State, and the balance is grazing country for sheep.

\* A word of caution in regard to the various series of Hooker's *Journal of Botany* may be useful. There are :—

1. The *Journal of Botany*, being a second series of the *Botanical Miscellany*, &c., by W. J. Hooker. Vols. i-iv (1831-1842). The above extract is from this series.
2. The *London Journal of Botany*, by W. J. Hooker. Vols. i-vi (1842-1847).
3. Hooker's *Journal of Botany* and Kew Garden Miscellany, by Sir W. J. Hooker. Vols. i-ix (1849-1857).

Mr. O. H. Sargent, of York, wrote to me in November, 1909 :—

The nearest *E. macrocarpa* I know of is about 10 miles distant ; but the shrubs are not flowering this year. I heard last week that the species is in full bloom near Greenhills, probably between 20 and 30 miles away. . . . It is called "Blue Bush" in the Quairading district, where it is plentiful.

Shrub of about 10 feet, flowers scarlet (*sic*). In sandy ironstone near Quellington (O. H. Sargent). Avon district (E. Pritzel, No. 907). "Est species insignis districtui Avon propria in glareoso-arenosis" (D. 3,957; E. Pritzel Pl. Austr. occ. 907) (Diels and Pritzel, *Engler's Jahrb.* xxv, p. 439).

It grows on the sand-plains 20 miles east of Beverley (W. D. Campbell).

Mr. Forest Ranger Gregory told me he knew the plant. He said it is found 70 miles east of Northam [this would be somewhere near Doodlakine.—J.I.M.], that it has a fruit like a "butter print" and that it is known as "Desert Gum or Mallee."

All the above are in what may be termed the Avon district.

Following is the only northerly locality represented in this herbarium, and it is in the modern Wongan Hills district.

"Plain north-east from New Norcia." With narrower leaves. (Dr. A. Morrison.)

Mueller gives the following additional localities for the species :—

In the scrub-country near the south-eastern sources of the Swan River (Oliver Jones); in the arid, somewhat elevated and undulating tracts between the Irwin and Greenough Rivers, in sandy as well as gravelly soil (Mueller); near the north-eastern sources of the Blackwood River (T. Muir).

Between the Irwin and Greenough Rivers would be the most northerly, and sources of the Blackwood River the most southerly records, and I would like to see more definite localities stated.

Bentham says: "A specimen of Labillardière's, without flower or fruit, from the Maria Island, on the same coast, appears to be the same species" (B.Fl. iii, 224). Maria Island is off the coast of Tasmania, and I suggest that Labillardière's specimen is *E. cordata*, Labill.

---

## AFFINITY.

With *E. pyriformis*, Turcz.

Mueller, in "Eucalyptographia," remarks that this is the only species in "near affinity" to *E. macrocarpa*, for, notwithstanding the great disresemblance arising from the not general glaucous hue, from the stalked as well as scattered and narrower leaves, and from the generally three-flowered umbels of *E. pyriformis*, it must be conceded that flowers and fruits are constructed upon the same type; indeed, in Drummond's collection occur specimens of *E. pyriformis* with opposite and already broader leaves, though stalked and green; the mealy whiteness, however, of *E. pyriformis* is confined to the young calyces chiefly or solely, the flower-stalks are never wanting, the tube of the calyx is often contracted into a

distinct stalklet, the disk of the fruit-summit is more elevated, ascends above the base of the valves, and may even overreach them, while the calycine portion of the fruit is usually distinctly marked with radiating narrow ridges, a characteristic in which the lid also mostly participates. But in the variety *Youngiana* of *E. pyriformis* the stalklets are almost wanting, though fruit-stalks are always developed.

Diels remarks :—

The only near relative of this species is *E. pyriformis*, Turcz., with mature leaves, which occurs in still drier regions. There are forms of this which differ from the typical *E. pyriformis* in several characters in the direction of *E. macrocarpa*. Some have opposite leaves, others have a white bloom, at least in the inflorescence, the pedicels (generally very distinct) are occasionally wanting; in short, one can see that *E. pyriformis* and *E. macrocarpa* are sisters, with heliomorphic distinctions in the vegetative sphere.

I think the chief differences and resemblances have been already stated. The chief practical resemblances lie in the fruit and leaves.

In the northern specimens the leaves of *E. macrocarpa* tend to be narrower than the normal, but the leaves of the two species can hardly be confused, those of *E. macrocarpa* being broad, sessile and glaucous.

## DESCRIPTION.

*XCVI. E. Preissiana*, Schauer.

In Lehmann's *Planta Preissiana*, i, 131 (1844).

FOLLOWING is the original description :—

Fruticosa, ramulis quadrangularibus, rigidis; foliis firmis, oppositis subalternisve, ellipticis oblongis vel subparabolicis, petiolatis, basi rotundatis, obtusissimis, viridibus nitidis; pedunculo axillari latissimo alato-ancipiti, petiolum aequante, trifloro; hypanthio brevissime pedicellato, obconico-cyathiformi (9 lin. alto), fauce amplissima diametro cras longitudinem totius hypanthii aequante, operculo. . . .

\* \* \* \* \*

Novembri a 1840 deflorata. Herb. Preiss. No. 239.

“Frutex 8-pedalis.” Folia supra lucida, subtus nitida, in sicco utrinque subflavescenti-viridia, pellucide punctata; lamina  $3\frac{1}{2}$  poll. longa,  $1\frac{1}{4}$ – $1\frac{1}{2}$  poll. lata; petiolus 9 lineas circiter longus, latus, complanatus, tortus. Hypanthium magnum ecostatum, ore estrorsum cicatrice duplici late marginato. “Stamina sulphurea.” Germen in fundo faucis hypanthii vertice depresso 5-radiato et 5-angulato breviter emersum, 5-loculare.—Species inter omnes tam habitu quam characteribus maxime insignis.

It was then figured (flowers and very young fruit, no buds) in *Bot. Mag.* t. 4266.

It is described at B.Fl. iii, 232, and he quoted Drummond's 3rd Coll. No. 63.

Mueller then described it in Latin in *Fragm.* ii, 38, and in English, with an illustration, in “Eucalyptographia.”

#### Notes supplementary to the Description.

It forms spindly shrubs up to 10 feet, so far as I saw, most of them smaller. Mueller says it attains a height of 15 feet.

The young leaves are decussate, or nearly so.

It has *dots on the leaves*, as has *E. pallidifolia*, and they are very noticeable. These depressions or pits are caused by larvæ of insects of the genus *Aleurodes* (family Aleuroideæ), according to Mr. W. W. Froggatt.

The thick edges of the mature leaves are sometimes tinted brown.

The opercula are rather flat, as seen by me; double opercula are common.

The filaments are bright yellow in colour, very few species having them so bright.

The numerous valves of the fruits are worthy of mention.

## SYNONYM.

*E. plurilocularis*, F.v.M.

The reference is a very brief one, there being no formal description.

In *Fragm.* ii, 70, Mueller says:—

“Huic ultimae speciei (*E. megacarpa*) paulo ad *E. Preissianam* accedenti, significatio *E. plurilocularis* idonea crit.”

It is cited by Mueller in “Eucalyptographia.”

The type is figured at 3, Plate 78, and exhibits no less than 12 protuberances on the depressed rim, *i.e.*, twice as many as there are valves.

## RANGE.

The original description says the type was obtained “In lateribus rupestribus collium Konkoberup promontorii Cape Riche.”

Drummond, writing from Cape Riche in 1848, says:—

But the most striking example of the effects of the soil on the plants which grow upon it is seen at Mount Melville, a low ironstone hill about half a mile from Mr. Cheyne's residence. This hill is the “Collis Konkoberup” of the *Plante Preissiana*. (Hooker's Journ. Bot. i, 251, 1849).

Mueller (“Eucalyptographia”) says it occurs at Stokes' Inlet (Maxwell), which is, roughly, midway between Hopetoun and Esperance.

Bentham gives the localities as “From the Kalgan River to Cape Riche,” evidently collected by *Oldfield*, at least as regards the Kalgan River.

Also I have seen in Herb. Barbey-Boissier a specimen labelled “Shrub 3 feet, anthers straw-coloured. Minanup, Kalgan, W.A.” (*Oldfield*), which gives a more precise locality for *Oldfield*'s specimen.

As I emerged (5 miles) from forest on to plain land on the Takalarup Road, coming from the eastern end of the Porongorups, I saw the first patch of this species; but not till I reached  $6\frac{1}{2}$  miles did I see it in abundance. I found it again 2 miles from the Stirling Range, on the Kalgan Plains. It occurs in patches on these plains.

Diels and Pritzel speak of the same district:—

Observavimus plantam insignem in montibus lapidosis Stirling Range. Quorum montium summos colles occidentales una cum *Lambertia ericifolia* habitat. Est frutex humilis ramis divaricatis foliis pererassis glaucis insignis (D. 2991). Prope promontorium C. Riche viget forma foliis acuminatis floribus minoribus notabilis (leg. A. Moir in hb. Berol !) (Engler's *Jahrb.* xxxv, 441).

## AFFINITIES.

1. With *E. megacarpa*, F.v.M.

See that species, which appears to be its closest affinity, below, page 247.

2. With *E. cosmophylla*, F.v.M.

Leaves of this species more scattered, generally narrower and more acute, the flower-stalks shorter and not much dilated, the flowers not so large, the filaments of paler colour, the fruits smaller, with less descending rim and never top-shaped, but always devoid of any prominences encircling the valves, while the sterile fruits are much more slender. ("Eucalyptographia," under *E. Preissiana*.)

## DESCRIPTION.

XCVII. *E. megacarpa*, F.v.M.

In *Fragm.* ii, 70 (1860-61).

It was originally described by Mueller from a specimen cultivated at Sydney under the name "Blue Gum," together with non-cultivated specimens from South-Western Australia.

Bentham then described it in B.Fl. iii., 232.

It is figured and described in the "Eucalyptographia," and there is a note on it at p. 14 of the "Forest Resources of Western Australia."

**Notes supplementary to the Description.**

A medium-sized tree known as "Blue Gum." Mueller saw trees 3 feet in diameter near the Gordon River.

Bark like a White Gum, or perhaps like a Grey Gum (*E. punctata* of eastern New South Wales) to some extent, that is to say, white and smooth, with patches of bark of sand-paper like texture, which peel off and present a smooth surface, which, in its turn, roughens and exfoliates. Bark rather thick, wood not hard, with large gum veins (brown kino), and brownish towards the heart. A gouty, useless timber tree.

Juvenile foliage (now described for the first time) elliptical ovate, commonly 4 inches long by half that width, apex blunt, very shortly stalked, texture not thick, intra-marginal vein very distantly removed from the edge, lateral veins roughly parallel and at about an angle of 30° to the midrib.

Anthers long, opening in parallel cells, with a large circular gland at the back, showing a little at the top. Filaments glandular.

The fruits attain a size of over  $1\frac{1}{4}$  inch in diameter. The tips of the valves form blunt cusps.

## RANGE.

It is confined to Western Australia.

Following are localities quoted by Mueller in the original description:—Wilson's Inlet, Franklin (Frankland) River, Deep River, all localities close to each other a few miles west of King George's Sound.

Bentham gives the following localities :—

King George's Sound and to the eastward, *R. Brown, Drummond*, 3rd Coll. Suppl. n. 18; margin of Wilson's Inlet, *Maxwell*; near Augusta, *Gilbert*, No. 257 (I have seen a specimen of this in the Vienna Herbarium).

Mueller, in "Forest Resources of Western Australia," says: "Sparsely occurring from the vicinity of King George's Sound to Cape Leeuwin, occasionally ascending the tops of mountains." He collected it on the Gordon River, which is a tributary of the Frankland.

Mueller ("Eucalyptographia") gives the following additional localities :—

Mount Elphinstone (Maxwell); on the granitic summit of Mount Burrabunup and on the crest and declivities of the Stirling Range (Mueller).

There is a Mount Elphinstone in about lat. 20°40' S. and long. 128° 30' E., just south of the Musgrave Range and near the South Australian border, but I do not think this is Maxwell's locality. Mount Burrabunup I cannot trace.

I have it also from north-west gorge of Mount Toolbrunup, Stirling Range, with rather small leaves and fruits. (Dr. A. Morrison.)

Mr. Percy Murphy called the tree "Flooded Gum." He got it at Karridale, near Cape Leeuwin, and describes it as 2 feet 6 inches in diameter, a stunted tree not used locally; grows on top of hills. Close to sea.

The trees I found between Princess Royal Harbour (King George's Sound) and the granite rocks on the ocean side, known locally as "The Caves," were growing in damp, low-lying sandy land.

I have received it also from "King George's Sound" (B. T. Goadby, No. 238), and Mount Clarence, Albany, 20 feet high, 1 foot in diameter (J. Staer).

## AFFINITIES.

### 1. With *E. Preissiana*, Schauer.

Mueller ("Eucalyptographia") says :—

*E. Preissiana* is only of shrubby growth, the branchlets are stouter, the leaves are mostly opposite, often approaching to an oval form, of very thick texture and paler hue, with thicker veins, the flowers are not rarely provided with short stalklets, the lid separates from the tube of the calyx by a less regular or even imperfect dehiscence, and is often more blunt, the filaments are yellow, the fruits are semi-ovate, with descending rim and short, almost deltoid, enclosed valves.

The juvenile foliage of *E. megacarpa* is not glandular-hairy, the filaments are glandular; the calyx-tube of the fruit is hemispherical in *E. megacarpa*, and conoid, almost top-shaped, in *E. Preissiana*, the rim convex or domed in *E. megacarpa*, and concave in *E. Preissiana*, the filaments white or cream-coloured in the former species, and bright yellow in the latter.

2. With *E. globulus*, Labill.

Mueller ("Euealyptographia," under *E. megacarpa*) has already compared them, and their resemblances and differences may be stated as follows :—

The juvenile foliage is much more glaucous in *E. globulus*, and sessile, the mature foliage longer and more aromatic. The buds and fruits are usually warty, and much more variable than has hitherto been ascertained in *E. megacarpa*.

*E. megacarpa* is a snappy, gouty White Gum with inferior timber; *E. globulus* is an erect tree with more or less ribbony bark at the butt, and with hard durable timber.

*E. megacarpa* and *E. globulus* resemble each other in their anthers (the filaments are, however, not glandular), and in the convexity of the rim of the fruit. *E. megacarpa* has no very close relation, and hence, because we do not yet know its near relations, is what we know as a "strong" species; *E. globulus* is perhaps as near to it as any other.

## DESCRIPTION.

XCVIII. *E. globulus*, Labillardière.

IN "Relation du Voyage à la Recherche de la Pérouse," &c., i, 153 (1799), with Plate 13 of the Atlas (1811).

There is an English translation of this work, entitled "Voyage in Search of La Pérouse," &c., with the illustrations of the original reduced. At page 111 is Labillardière's account of the tree, which I reproduce herewith:—

I had not as yet been able to procure any of the flowers of a new species of the *Eucalyptus*, remarkable by its fruit, which very much resembles a coat button in shape.

This tree, which is one of the tallest in nature, as it grows sometimes to the height of 150 feet, blossoms only near its summit. Its trunk exactly resembles that of the *Eucalyptus resinifera*, when its spongy bark has been peeled off. In other respects these two species are nearly of the same dimensions. The trunk, which is very straight, at least to one-half of its height, might be usefully employed in ship-building, and especially for masts, although it is neither so light nor so elastic as that of the Fir. Possibly it might be of advantage to construct masts of different pieces of timber, and even to perforate the large trunks of trees throughout their whole length, so as to render them lighter, and give them equal strength by binding them at equal distances with hoops of iron. By this means I should think they might be rendered as strong as one could wish, since persons versed in mechanics know that a cylinder, though hollow, still retains a great degree of strength. We were obliged to cut down one of these trees in order to obtain its blossoms. Being already in a slanting position, it was easily felled. As the sun shone very bright, the sap was mounting in abundance, and as soon as the tree was cut down it flowed very copiously from the lower part of the trunk. This beautiful tree, which belongs to the tribe of the Myrtles, has a very smooth bark; its branches are somewhat crooked, and have toward their extremity alternate leaves, slightly bent, and about 6 inches in length, and one-half in breadth. The flowers are solitary, and grow from the base of the stalk of the leaf.

The calyx is shaped like an inverted urn, and consists, like that of the genera of the same tribe, of a single leaf, which falls off as soon as the stamina are completely formed. It has no corolla. The stamina are numerous and attached to the sides of the receptacle. The style is simple and divided at its base into four partitions. It has only one stigma. The capsule is open at the top, and generally divided into four partitions, which contain a number of angular seeds; at the base it has four angles, two of which project from the rest. It is shaped like a button, on which account I have denominated this tree *Eucalyptus globulus*.

## EXPLANATION OF THE FIGURES IN PLATE XIII.

- Fig. 1. Branch of *Eucalyptus globulus*.
- Fig. 2. Flower.
- Fig. 3. Fruit.
- Fig. 4. Calyx.

The bark, leaves and fruit of this tree are of an aromatic nature, and might be employed for economical uses in the place of those aromatics with which we have hitherto been furnished exclusively by the Molucca Islands.

Then we have it more formally described by Labillardière in his "Novæ Hollandiæ Plantarum Specimen," ii, 121 (1806), in the following words:—

*Eucalyptus operculo conico, medio constricto, calycis tetragoni latitudine; foliis subfalcatis, axillis unifloris.* Habitat in capite Van Diemen (it not having been ascertained at that time that Tasmania is an island).

It was more fully described by Bentham in B.Fl. iii, 225, and figured and described in "Eucalyptographia."

No species has been written more about than *E. globulus*; a small library has been devoted to it alone.

#### Notes supplementary to the Description.

It was at one time thought that it displayed no variation, but extended knowledge of it has shown that it varies considerably in size of fruit, and in the amount of rugosity, which may be even absent altogether. Instead of being glaucous, the fruit may be glabrous and even shining, while, as may be observed from examination of the figures on Plate 79, there is not a little variation in the shape.

While driving in the Beechworth district some years ago, Mr. C. French, the Victorian Government Entomologist, had his attention drawn to some leaves growing on a Blue Gum tree by the road. They measured 28 inches in length, with a corresponding width and solidity.

#### VARIETY.

Var. *coronifera*, F.v.M. (*Fl. Tas.* i, 133).

"Mueller sends specimens from Gippsland with very small smooth flowers and capsules; it is his var. *coronifera*." (Hb. Hook.). (*Loc. cit.*)

Professor Ewart has favoured me with a specimen of a bud which is precisely similar in roughness and general appearance to figure 3 of Plate 79, only very much smaller—as small as those figured at 7a, but sessile. The flower from a bud like this could scarcely be "smooth." I doubt whether it is a useful variety.

---

## SYNONYMS.

1. *E. cordata*, Miq. non Labill. in *Ned. Kruidk. Archief.* iv.
2. *E. diversifolia*, Miq. non Bonpl., *loc. cit.*
3. *E. gigantea*, Dehnh., *Cat. Pl. Hort. Camald.* Ed. ii, 20.

I have seen a complete series of specimens in Hort. Vindob.

4. *E. glauca*, DC.

Through the courtesy of M. Casimir De Caudolle I have examined the type and agree that it is *E. globulus*, Labill.

The original label reads:—

*Eucalyptus glauca*, h. Noisette 18 Aout 1821. Toutes les branches sont congruées au meme arbre. Les jeunes branches de l'arbre adulte ont peu a peu les feuilles plus petiolées et moins glauques. Il n'a pas encore fleuri.

5. *E. perfoliata*, Desf. (*Cat. Hort. Par.*, ed. iii, 408), "very doubtful" (Bentham), is probably *E. globulus*, Labill.
6. *E. perfoliata*, Noisette. Is described in Steudel's *Nomenclator botanicus* ed. i, 1821, but is nomen nudum.

The reference is "*perfoliata*" Nois. = *glauca*. It is quoted as a synonym of *E. glauca*, DC. in DC. *Prod.* iii, 221.

7. *E. pulverulenta* Link's *Enum.* p. 31 is also quoted as a synonym of *E. glauca*, DC., in the same place.

The seed of *E. globulus* has been exported to Europe for very many years, and the above species arose through the practice of the early botanists, who named Eucalypts from plants in the seedling stage.

## RANGE.

Originally discovered in Tasmania, it has been found to occur pretty extensively in Victoria, and it is by no means rare in New South Wales, chiefly in southern alpine regions. A favourite tree for planting, it now often occurs even in South and Western Australia and Southern Queensland, but it is not indigenous there. As regards Tasmania, Victoria and New South Wales, it is important for observers to carefully distinguish between localities in which it is planted and those in which it is spontaneous.

### TASMANIA.

It is fairly well diffused over many parts of the island, except in the west. It is more common in the south than in the north.

The following Tasmanian specimens in the National Herbarium, Sydney, have historical associations :—

Adventure Bay, the locality visited in January, 1777, on Cook's Third Voyage, by David Nelson and Mr. Anderson, Surgeon of H.M.S. "Resolution," who here collected the first Eucalyptus. (J.H.M.)

R. Brown, *Iter Australiense*, 1802-5 (probably Hobart).

Port Arthur, visited by Backhouse and other botanists. (J.H.M.)

Hobart (Gunn's No. 1070).

Flinders' Island (Gunn's No. 1070 and J. Milligan's No. 658).

### VICTORIA.

This tree grows plentifully in parts of Gippsland, for instance, from Neerim southwards through Poowong to Jumbunna and westwards to Currajong. It is found on the north-eastern shores of Lake King, at Lake Tyers in the Cunningham State Forest, at Apollo Bay and many other places, but I cannot now recall any State Forest where it is found, exempting that at Cunninghame. It is found also in the

high mountains of the Great Dividing Range, on the sources of the Goulburn, Ovens, Mitta Mitta, and even in the higher Alps, as at Mount Livingstone, where it is known as "Ribbeny Gum." (The late A. W. Howitt, in an unpublished report.)

It is somewhat widely distributed in Gippsland. It is found at various places along the littoral forests on the Great Southern Railway from Korumburra to Forster and Toora. It occurs also at Neerim, around Cunningham, in the Lakes District, and in various other places on the Baw Baw, or Great Dividing Range. It is also found at the head of the Mitta and Ovens, and may also extend to the head waters of the Goulburn. The chief State Forests which contain this timber are, Blackwood Reservation, near Forster, Cape Otway. Other State Forests containing Blue Gum include Apollo Bay; here, however, the difficulties of an exposed port has been an insuperable barrier to the getting out of this timber by water carriage. As regards the Mount Cole State Forest, Beaufort, the Blue Gum forest at Mount Cole contains fine timber.

At Stanley State Forest, near Beechworth, a small "bed" of Blue Gum is found. (The late G. S. Perrin, in an unpublished report.)

Mueller briefly gives its Victorian range as "From the vicinity of Cape Otway to Wilson's Promontory, northward to the Hume (Murray) River" ("Eucalyptographia").

In the National Herbarium, Sydney, we have the normal form from the following Victorian localities:—

Upper Fern-tree Gully (E. Cheel); Darlimurla, South Gippsland (H. Deane); Metung (A. W. Howitt); Beechworth and Sandy Creek (H. Melb.); Long Gully, Cassilis Township, scattered along the gullies in the locality (H. Hopkins). Some of the fruits from this locality a little smaller than the type, and thus like some New South Wales specimens.

#### NEW SOUTH WALES.

Mueller in "Eucalyptographia" gives the Hume (Murray) and Tumut Rivers for the occurrence of this species in New South Wales. He also quotes the Rev. Robert Collie for the locality Braidwood to Araluen, but this is founded on a mistake, the species afterwards named *E. Maidenii* being Mr. Collie's tree. I will refer to this when I come to the latter species, page 259.

In the south it has been recorded from the Counties of Selwyn, Wynyard, Buccleuch and Cowley.

Further north we have it from Burrinjuck, Yass district (County of Harden), and still further north (west from Sydney) it occurs at the Jenolan Caves (County of Westmoreland), also Nulla Mountain, 25 miles east of Rylstone, Mudgee district, and at about 13 miles from Mudgee (Parish of Derale, County of Phillip).

In New England, we have it from the Nundle and Waleha districts.

Staff-Surveyor A. Chesterman, then of Tumut, made the following memo. a few years ago, as to the localities in which Eurabbie (*E. globulus*) is found.

(1.) Found only in mountainous districts where there is a certain rainfall. It grows in rich soil along the lower edge of the snowbelt, for although the best trees grow in places where snow occasionally falls and even lies on the ground for some weeks, the timber disappears as the higher levels are reached.

(2.) Through the County of Selwyn, along the slopes of the huge spurs falling westerly from the Main Dividing Range, this timber is to be found, and hence it can be traced in belts and patches northerly through the County of Buccleuch and into the County of Cowley, on to the Goodradigbee River.

Inviting attention to County maps, I would name the following parishes as places where *Eurabbie* is to be found, starting from near the head of the Murray River (Indi) and proceeding northerly:—Geelhi, Youngal, Khancoban, Jagumba, Welumba, Cowra, Maragle, Burra, Beaumont, King, Buddong, and Yellowin in County of Selwyn; Bago, Selwyn and Batlow in County of Wynyard; Talbingo, Bogong, Baloo, Jibeem, Nimbo, Garnet and Cooleman in County of Buccleuch; Napier, Weejasper, and on to the Goodradigbee River in County of Cowley.

It will not, of course, be understood that this timber is confined to these parishes; but by following them on the County maps an idea will be obtained of the belt of country in which this timber grows. Along this belt it is scarce in places, perhaps more particularly through the Buccleuch parishes, and into County Cowley. It is thickest in Parishes of Burra, Beaumont, King, and the edge of Selwyn, and some of the best specimens I have seen were trees growing on the Burra Forest Reserve, a few miles east of Tumbarumba. North of this again, through part of the Bago Forest Reserve, the trees grow to a good size.

The following New South Wales localities are represented in the National Herbarium, Sydney:—

(In New South Wales specimens the fruits are sometimes rather smaller than the type, and less warted, but not always so.)

*Southern Localities.*—Snowy Mountains (J. V. de Coque); between Germanton and Tumbarumba (W. Forsyth); “*Eurabbie*,” Burra, Tumbarumba (J. S. Taylor); Cumberland Range, *via* Talbingo (A. W. Howitt); in deep gullies facing south-east, north of Burrinjuck (R. H. Cambage, J. L. Boorman, Rev. J. W. Dwyer).

*Western Localities.*—Fruits rather smoother than the type, and smaller, Jenolan Caves (John Duff, W. F. Blakely).

On Nullo Mountain, about 25 miles east of Rylstone, it is growing in a fair proportion with other timbers such as a large gum, locally called “Mountain Ash,” Ribbon Gums, Manna Gums, &c. (G. R. Brown, formerly Forest Ranger.)

*Eucalyptus globulus* obtained on the Nullo Mountain, Parishes of Simpson and Nullo. The trees measured girthed up to 13 feet at 4 feet from the ground, but length of barrel on the bigger trees will not exceed more than 20 feet; smaller girth, 9 feet or less, have fair length, 30 feet being quite common.

The timber is scarce, although a fair number of seedlings are making an appearance. Some saplings give promise of growing into very long trunks.

The timber is not used in the locality where it is growing, being very hard to work, besides a considerable quantity of easier worked timber is available.

I am informed that this tree is a very quick grower, and, judging by the spread that seedlings are making, that eventually most of this reserve will be taken up with Blue Gum (*globulus*). (Mr. James B. Yeo, Forest Guard, reporting in 1912.)

It grows in limited quantities in the gullies of a mountain, 13 miles from Mudgee, *viz.*, upon Settlement Leases 387 and 383; in the Parish of Derale, County of Phillip. I was informed that a number of the gullies carried this timber, which I had not time to visit. (R. Sim, junr., Forester.)

*Northern Localities.*—Past Lindsay’s Gap (County of Parry), 5 miles on Wallabadah Road from Nundle, there is a little *E. globulus* var., and for some miles further on.

Mr. J. F. Campbell, L.S., formerly of Walcha, but who has now left the district, writes to me concerning *E. globulus*:—

I have no locality map nor notes by me, and must depend entirely upon memory in the following brief description.

The most northerly limit of the species, as far as I know, is the Carrai Tableland, a small portion of the main tableland on its eastern side, cut off by the canyons of the Macleay River and Kunderang Brook.

The Reserve embracing the timber is shown on the parish map of Kunderang, I think, and on the county map of Vernon, near its north-east corner. It adjoins, on the south, selections held by Mowle and others.

The Carrai is elevated between 2,000 and 3,000 feet above the bed of the river, and is difficult of approach owing to the steepness of the ascent. A bridle track from about the junction of George's River is probably the easiest route to the top.

The patch of *globulus* is confined to about 100 acres near the edge of the falls to Kunderang Brook, with a southerly aspect. It grows on or near to the west contact of the slate with the granite, the geological features of the Carrai. The granite occurs in the form of a dyke about 2 miles in width, extending northerly across the Macleay, where it is well defined, and southerly towards Mt. Maiden, which you know.

The timber is of marketable value, but small in comparison with that of its southern limit (about Hobart), which I have seen. The wood is yellowish, close-grained, and apparently healthy.

As to its distribution, I have seen no other patches on the Tableland, but as much of the country south of the Carrai is still unexplored botanically, other patches may yet be found. Mr. A. R. Crawford, of Moona Plains, the discoverer of the Carrai patch, informed me that he has also seen the tree on the eastern top of the Winterbourne Spur, some 20 miles westerly from the Carrai at a similar elevation.

Mr. A. R. Crawford, of Moona Plains, Walcha, wrote to me in January, 1896:—

A small-fruited form of *Eucalyptus globulus* has been sent by Mr. Forester Siddons, of Armidale, from Stony Creek, Parish of Coaldrane, County of Vernon. The species was discovered there by me about 1889, and a specimen sent to Baron von Mueller. I know another locality where both tree and fruits are much smaller than at Stony Creek. It is but a small patch, 39 or 40 acres in extent; it is about 10 miles in a crow line from Stony Creek. As I write it is visible from the door, and about 3 miles distant, but the Falls are between us—3 miles down and 3 miles up the opposite side. I think that the arid stony nature of the place will account for the smaller tree and fruit. At Stony Creek the ridge is moist and shaded. I think that the smaller patch was one of much greater extent, as I met with young plants more than  $\frac{1}{4}$  mile distant from the patch.

Mr. Crawford wrote to me again as follows, 27th May, 1907:—

Once I went from here on to part of the adjoining run, Winterbourne, north-east about 7 miles in a crow line, having been told of a rare species of Gum-tree, which from description I knew must be *E. globulus*. I had previously discovered it on the Carrai Tableland where the reserve has been made. To reach the nearest place, that on Winterbourne, I went down the hill to the river and camped at the yard a mile below. At daylight next morning, as the range was very steep, I left my horse in the yard, and after a climb of 2 miles gained the tableland, a small piece called "The Narrow Neck," and found the *E. globulus* half a mile in. That was the variety with small fruits mentioned in the *Agricultural Gazette*. I think it is not a variety, but merely the poverty of the place it grows in,—very hard and dry,—ground formation is, I think, clay slate. As long as I can remember, the place has every five or six years suffered severely from bush-fires,—every leaf on the trees apparently killed. Looking across the gulf as you go down to Kunderang, you are a mile distant in a crow line.

I wrote to him asking him to favour me with the latest report on the occurrence of *E. globulus* in New England, and he promised to do so, but I sorrowfully record that this careful student of our vegetation was thrown from his horse and died from the effects of it early in 1912.

Mr. District-forester T. H. Wilshire reported as follows in August, 1912, to the Director of Forests:—

"Forest Reserve 22,699, Parish of Kunderang, County of Vernon. The only local information I could obtain about this timber was from Mr. William Mowles, the lessee of the Reserve, who stated that the only thing he had used it for was a pick-handle, and it answered admirably, being used both for fencing and grubbing, and was in use two years when he lost it.

Another peculiarity pointed out by Mr. Mowles was that the blue gum only grows on the top and southern fall of a low ridge running east and west, no specimens being seen on the northern slope, but he showed me a seedling transplanted two miles to the north, making good growth.

F. R. 22,699 was proclaimed for the protection of this timber which was, I believe, submitted for identification by Mr. Crawford of Moona Plains, and is situated on a high tableland about 3,800 feet above sea-level.

This plateau is surrounded by deep gulfs and at present can only be reached on horseback, it contains approximately 60,000 acres.

There is approximately about 800 acres containing this blue gum, which is intermixed with stringybark, blackbutt, white gum, oak and honeysuckle."

## AFFINITIES.

Mueller, in "Eucalyptographia," says:—

It is at once distinguished from its numerous congeners, except *E. alpina*, by the warty-glandular calyces, covered by a crown-shaped lid; besides the shape of its almost or quite sessile fruit is exclusively peculiar and bears resemblance only to *E. megacarpa* and *E. Preissiana*.

### 1. With *E. alpina*, Lindl.

*E. alpina* is of very slow growth, remains always a shrub, has thicker, more shining, almost oval or even roundish leaves, smaller flowers, nearly heart-shaped anthers, less angular fruits with more depressed rim. ("Eucalyptographia," under *E. globulus*.)

The two are certainly warted-budded species for the most part, and warted-fruited sometimes. Reference may be made to Plate 41. The fruits of *E. alpina*, however, have their valves exsert, and are more hemispherical in shape than those of *E. globulus*.

### 2. With *E. megacarpa*, F.v.M.

This and *E. globulus* have something in common, particularly as regards the fruits. I have already referred to the matter at page 248.

### 3. With *E. Preissiana*, Schauer.

Except that both have somewhat large fruits, it would not occur to one to compare the two species. Reference to Plate 78 shows that the buds and fruits have nothing in common; it remains only to add that *E. Preissiana* is a small shrub with bright yellow filaments to the stamens.

### 4. With *E. Cambagei*, Deane and Maiden.

This is another species which sometimes has warted buds. I will refer to the affinities when I come to *E. Cambagei*.

### 5. With *E. Maidenii*, F.v.M.

This species has the closest affinity of all to *E. globulus*, and I will deal with the matter when I come to *E. Maidenii*.

## HYBRIDISM.

I have specimens of Tasmanian (?), Algerian, and Californian origin that appear to be hybrids of this species. They will be described when they are figured.

## DESCRIPTION.

*XCIX. E. Maideni*, F.v.M.

In *Proc. Linn. Soc. N.S.W.*, xiv (or 2nd series, iv), 1020, with two plates (1890).

FOLLOWING is the original description:—

Finally tall; branchlets slender, quadrangular at the end; leaves scattered, of rather thick consistence, copiously dotted, narrow-elongate or sometimes broad-lanceolar, distinctly or somewhat sickle-shaped; the petioles from  $\frac{1}{2}$  to 1 inch in length, the lateral veins spreading and slightly prominent underneath, the circumferential vein distinct and rather remote from the edge of the leaf; young shoots quadrangular, their leaves broadly cordate with a small pointed apex, opposite and of a whitish hue underneath, petioles almost absent; umbels axillary on angular stalks about  $\frac{1}{2}$  inch long, dilated towards the top, bearing two to nine flowers of rather large size, stalklets none, or exceedingly short; calyx-tube obconical, angular, warty-glandular, especially at the base; lid depressed hemispherical, suddenly raised in the centre to a thick point, like the calyx-tube warty glandular; stamens all fertile, indexed before expansion; anthers oblong kidney-shaped; stigma slightly broader than the style, depressed; ovulary 3 to 5-celled; fruit  $\frac{1}{2}$  inch in thickness, nearly hemispherical, its rim broad, convex, at the edge separated from the calyx-tube by an ample furrow; seeds all without any appendage, the sterile narrower and longer than the fertile seeds.

## SYNONYMS.

*E. Mortoniana*, Kinney. Described in "Eucalyptus," p. 193 (1895), by Abbott Kinney, Los Angeles, Cal., U.S.A.

FOLLOWING is the original description:—

Leaves long-stalked, scattered, lanceolar or sickle-shaped, long and rather broad; equally dull green; stalk compressed; about length of calyx-tube; stalklet distinct; calyx-tube rough, often slightly ridged, top-shaped or truncate-ovate; border of a tube has the appearance of a pot of some thick fluid boiling over; lid hemispheric-acuminate, the point or beak of the lid is thick and long; buds flattened and angular; valves exerted, generally four, or rarely three; bark sheds in long strips. General appearance suggests *Eucalyptus globulus*; anthers oblong, opening by parallel slits, dorsal gland prominent, style spotted, somewhat dilated toward top, stigma not dilated.

Grown at Los Angeles, California, U.S.A. - It is No. 237,908 in the United States National Herbarium.

I have figured leaf, bud and fruits at fig. 8, Plate 80. It is one of the larger fruited forms of *E. Maideni*.

## RANGE.

*E. Maideni* is at present only known from south-easterly New South Wales and Eastern Victoria. Additional localities are required to more definitely establish its range.

## NEW SOUTH WALES.

It is found in the southern part of the County of Camden, the most northerly locality recorded being Box Point to Tallong, and additional search will prove it to be somewhat farther north than that.

Going south it occurs in the Counties of St. Vincent, Dampier, and Auckland, and so into Gippsland. It has not been recorded west of the counties named.

In the Counties of Wellesley and Wallace I fully expect to hear of this species, or *E. globulus*, or both of them, being found.

The localities given by Mueller in the original description are: "In rich soil only on steep mountain slopes from the southern boundary (of New South Wales) as far north as the Braidwood and Nelligen districts" (W. Baeuerlen).

Following are the localities of some specimens collected by Mr. Baeuerlen at the time:—

Tantawanglo Mountain, Cathcart; Colombo, Candelo; between Nelligen and Currawang Creek, and at Araluen and Monga, near Braidwood.

Following is a letter from Mr. Baeuerlen to me, dated September, 1890:—

This Blue Gum, *E. Maideni*, I found a few days ago very plentiful on the Bolaro Mountain, near Nelligen (County of St. Vincent.—J.H.M.), ascending to an elevation of fully 3,000 feet, growing amongst bare rocks, but yet attaining a height of 150 feet and a diameter of 2 feet, with remarkably straight and long trunks.

For practical purposes the situation is inaccessible. On this mountain I saw it for the first time associated with the Spotted Gum (*Eucalyptus maculata*), both species having, no doubt owing to their situation, their fruit remarkably small, but in *Eucalyptus Maideni* I noticed the peduncles broader and flatter than I have seen them before.

The trees were on the eastern slope of the mountain, almost right up to the top of it, accompanied by the Spotted Gum and Burrawang (*Macrozamia spiralis*). As soon as I got over the top and on to the western slope Spotted Gum and Burrawang had disappeared, and the Blue Gum appeared to be left with Messmate, for there were trees, and plenty of them apparently, quite the same as on the eastern slope,—the same in colour of bark, appearance of head, &c., the same in height and diameter; in fact, they would be taken to be exactly the same kind of tree as those on the eastern slope, but when I examined the windfalls they all proved to be of *Eucalyptus gonicalyx*, the Mountain Gum, and young seedlings and suckers bore testimony to the same.

It has been collected by others, as follows:—

Araluen Mountain (H. Deane, J. S. Allan, J.H.M.). I was told it occurs at Nerrigal, but I did not see specimens.

This timber is known locally by the name of Blue Gum or Grey Gum, and is only to be found on the Araluen Mountain from the Irish Corner Mountain to Bell's and Deep Creeks. There appears to be a considerable number of fine trees growing in this locality, but the country is very rough and hilly. (J. V. de Coque.)

Wyndham, near Eden, plentiful, and thence up to the foot of the tableland (A. W. Howitt, J.H.M.).

Spring Hill, Wingello (J. L. Boorman); Box Point to Barber's Creek, now Tallong (J.H.M.).

The following report of Mr. Forest Ranger Taylor, dated 21st September, 1892, confuses *E. globulus* with *E. Maidenii*, but with the notes I have placed in brackets the confusion will disappear:—

*Eucalyptus globulus* is known in this district [he refers to the high lands about Tumbarumba] as Eurabbie. It has been known to me since 1862, and was pointed out by my father as Blue Gum; we cut the timber that year for dray-shafts on the Old Man Mountain, overlooking the Araluen Valley, County of St. Vincent. The price of Blue Gum [this is *E. Maidenii*] shafts was then 21s. per pair, Woolly Butt 18s., and Apple Tree 13s., which will give some idea of the relative value of these timbers.

*E. globulus* [*E. Maidenii*] was brought under the notice of the Government in 1882 by Rev. Mr. Collie, as growing near Araluen; again in 1883 by myself, as growing near Tumbarumba [*E. globulus*]; and in 1884 by Mr. Duff, as growing at the Jenolan Caves [*E. globulus*].

When I reported it in 1883 [*i.e.*, from Tumbarumba] I forwarded seeds, which were pronounced by Baron von Mueller as identical with Tasmanian Blue Gum.

To my own knowledge it is distributed over a wide area in this Colony, but only in limited clumps or patches, and not in any defined or continuous belts, but in every instance the elevation above sea-level is about the same, from 2,500 to 3,000 feet, confining itself to the same line of ranges, and, if I mistake not, the same formation, and certainly the most inaccessible spots, places where until the last forty or fifty years the foot of the white man had never trodden, and but seldom at present.

I am under the impression that it can be traced from the Blue Mountains, Abercrombie Ranges, Araluen Mountains, along the western slopes of the Australian Alps, through Gippsland, southward, confining itself to the dividing line of ranges.

I cannot say that it is plentiful, for it seldom covers an area of more than 1,000 acres, in clumps of 20 to 30 miles apart.

#### VICTORIA.

In this State it is confined to Gippsland, and we require further collecting to absolutely determine its range.

Following are some localities represented in the National Herbarium, Sydney:—

Long Gully, Cassilis township, Gippsland (H. Hopkins); 7 miles north-west of Bacchus Marsh, in the bed of the Lederberg River (P. R. H. St. John). See fig. 10, Plate 79. These two specimens are similar, and exhibit a transit form between *E. globulus* and *E. Maidenii*, which I am inclined to think is nearer to the latter.

Cann River, Gippsland (H. Hopkins). Figured at 7, Plate 79. This is another transit form, and I make the same remarks as I have done in regard to the preceding. More or less warted buds are common in *E. Maidenii*. Mr. Hopkins says the same form occurs at Toongabbie, about 100 feet above sea-level, at Sardine Creek (Cann River), Rising Sun Creek, near Bonang, at about 1,500 or 2,000 feet above sea-level.

I have a larger fruit than that depicted (see 7b, Plate 79), also from the Cann River. The fruit is as large and as smooth as 11 and 12 (Plate 79), from Metung and Sealers' Cove respectively (A. W. Howitt and J. L. King). Specimens like these seem true transit forms between *E. globulus* and *E. Maidenii*, and there will probably always be a difference of opinion as to which species they are more closely allied.

I have a most interesting series of *E. Maidenii* from Metung, some collected by the late Dr. A. W. Howitt, and others by Mr. J. L. King and myself. Some (*e.g.*, fig. 12, Plate 80, in particular) may be thought to afford instances of hybridism.

## AFFINITIES.

### 1. With *E. globulus*, Labill.

The following account of the confusion between these two species, and the history of the elucidation of *E. Maidenii*, is from the pen of Mr. William Bauerlen, the well-known botanical collector, and is taken from a letter addressed to me by him on 21st February, 1891.

*Re Eucalyptus globulus* occurring as stated by Mr. Duff in the County of St. Vincent (this refers to a statement in the press), I beg to state that the species does not occur there. The tree called "Blue Gum" in that district is *E. Maidenii*, and the nearest locality to Moruya, where it occurs, so far as I know, is the Bolaro Mountain.

The history connected with the species is, as far as I can make out, about the following:—

The tree is rather plentiful on the mountains about Araluen, and is commonly called "Blue Gum" there. Some years ago the Rev. Robert Collie visited the locality, saw the tree, and judging no doubt superficially from the chalky leaves and angular twigs, took it to be *E. globulus*, and had it reported in several publications that he found *E. globulus* as far north as Araluen. This report has been copied and reiterated by almost everyone who had anything to write on Eucalypts. To my surprise, it is even in the "Eucalyptographia," and I am sure the Baron must have accepted Mr. Collie's report merely on trust, and cannot have seen, at the time, actual specimens of the tree.

In December, 1884, I was in the same locality when I found the tree in flower, and also saw the fruit. It struck me at once that it is not *E. globulus*, wherefore I sent a complete set of specimens to Baron von Mueller, who at the time did not diagnose it further than to say that it might be a variety of *E. botryoides*, and there the matter rested for some time. About two years afterwards I found the species again at Colombo, locally known as "Blue Gum," "White Gum," or "Spotted Gum," from where I sent fruiting specimens again to Baron von Mueller, who then said that he required flowering specimens for its determination, in consequence of which I asked my friend, Mr. David Allan, of Colombo, to watch the trees and collect flowering specimens. Unfortunately, the following season the trees hardly flowered at all so that only a few flowers could be obtained. These, however, with more fruiting specimens, were forwarded to Baron von Mueller. Meanwhile, under the impression that the tree is a hybrid, I paid particular attention to it in order to trace out its parents, especially in the south on the Tantawangolo Mountains, near Candelo. At that time also the Baron threw out the hint that the tree might be a hybrid between *E. globulus* and *E. goniocalyx*, and stated expressly that if that would be the case, both parents should be found in those mountains. This at first appeared much like solving the problem most satisfactorily, but pursuing the matter further I found that though *E. goniocalyx* is very plentiful, *E. globulus* is not found in those mountains, and in some respects the species is widely different from *E. goniocalyx* to allow that species to have had anything to do with the species in question. From former correspondence you know how eventually the Baron found again the flowering specimens sent to him years ago and how he determined it to a new species, and named it *E. Maidenii*. The chief point in question, is, however, that it is not *E. globulus*, and it is worthy of remark that never in one instance when the Baron received specimens from me did he say that the species is *E. globulus*, which makes me believe that he received no specimens from Mr. Collie, but accepted the report merely on trust.

If there is a species I have expressly looked for from the Shoalhaven to the boundary of Victoria, and have not found, it is *E. globulus*.

The two species are doubtless more closely allied than any other species.

The young branchlets in both species are quadrangular and sometimes a little winged, while the juvenile leaves are very glaucous, and reek with oil. The juvenile leaves appear to be the same in both species, except that those of *E. Maidenii* appear to be the smaller.

Both are large trees, known as "Blue Gum."

The buds of *E. Maideni* are smooth, or only slightly warted; those of *E. globulus* are usually much warted. *E. Maideni* has long peduncles, often strap-shaped; in *E. globulus* the peduncle is absent or very short.

The fruits of *E. Maideni* are small, conoid, slightly angled, usually smooth or little warted, little constricted at the rim, and with the valves distinctly exerted. Those of *E. globulus* are large, less conoid, usually very much warted and angled, much constricted at the rim, and with the valves rarely exert.

2. With *E. goniocalyx*, F.v.M.

The affinity to this species has already been referred to, and some observers may look upon *E. Maideni* as intermediate between *E. globulus* and *E. goniocalyx*. I will deal with the matter when I come to *E. goniocalyx*. Mr. Baeuerlen has already referred to it (p. 259).

3. With *E. pilularis*, Sm.

The buds and fruits of the two species may resemble each other (compare Plate 4), but in *E. pilularis* the first is usually less conoid and less angled, while the buds have never been known to be tuberculate. The bark of *E. pilularis* is more fibrous; the timber of both trees is pale-coloured. The anthers of the two species are different.

4. With *E. punctata*, DC.

The buds and fruits of these two species undoubtedly resemble each other somewhat, but *E. punctata* is a "Grey Gum," without rough or ribbony bark at the butt; it also has deep red timber, while *E. Maideni*, although sometimes called "Grey Gum," is not a Grey Gum of the *E. punctata* type, *i.e.*, the true Grey Gum of the oldest settlers of Australia.

## DESCRIPTION.

*C. E. urnigera*, Hook. f.

In *Lond. Journ. Bot.* vi, 477 (1847).

FOLIIS ovatis v. lineari ovatis rectis v. curvatis utrinque angustatis plerisque in petiolum sublongum attenuatis, pedunculis sublongatis trifloris, alabastris cylindraceo-urceolatis pedicellatis cupula depresso hemispherica latiuscula umbonata v. mamillata fructu lignoso urceolato laevi infra orem crassum valde constricto.

Hab. Mount Wellington and Lake Echo; Gunn:—v.v.n. Arbor statura variabilis, ad cacumina montium arbuseula, in convallibus montosis arbor 20-pedalis v. procerior evadit. Ramuli exempl. alpestribus rugosi, nudi, rufescentes, procerioribus laeves, glauci. Folia  $1\frac{1}{2}$ –4 unc. longa, bis ad quater longiora quam lata, coriacea, plerumque nitida. Alabastra  $\frac{1}{3}$  ad  $\frac{3}{4}$  unc. longa, plerumque plus minusve urceolata. Fructus  $\frac{1}{3}$ –1 unc. longus, elongatus v. rarius globosus, semper infra orem dilatatum contractus.

Then it was figured and described by Hooker in *Bot. Antarc. Voyage, Fl. Tas.* i, 134 (Plate xxvi).

Besides the Latin description (practically a copy of the original), the author described it in English, as follows:—

A small tree, 15–20 feet high, with spreading branches and drooping, red-brown branchlets. *Leaves* extremely variable in size and shape, 1–4 inches long, generally shining, from ovate or elliptic and straight to narrow, linear-lanceolate and falcate; apex with a short, hooked, deciduous mucro; petioles almost an inch long. *Flowers*  $\frac{1}{3}$ – $\frac{3}{4}$  inch long, in threes, with long pedicels at the apex of a long peduncle. *Calyx* extremely variable in breadth (rarely globose), swollen below, then contracted and expanding again at the mouth, which is thick, and not plane. *Operculum* short, broad, often with a mamilla, but sometimes sunk in the middle. *Fruit* sometimes an inch long; valves sunk far below the mouth, placed at the contraction. Upon this species a species of *Coccus* abounds, which yields a bright-red colouring matter, which may be of use in the arts: the fact was first noticed by Mr. Lawrence, who had commenced experiments upon the subject, that were frustrated by his lamented death.

Then it was described by Bentham in *B.Fl.* iii, 227. It is not figured by Mueller in the “*Eucalyptographia*.”

### Notes supplementary to the Description.

The juvenile foliage is large, orbicular, sometimes very glaucous, though not always so, and has crenulated edges, the crenulation being sometimes not very obvious.

It will be observed, on reference to fig. 1c, Plate 80, that the shape of the fruit is sometimes scarcely urceolate.

The timber is pale-coloured.

### Variety *elongata*, Rodway.

A tall, spreading tree. Bark smooth, white. Leaves linear-lanceolate, 4–8 inches long. Peduncle not very long. Operculum conical, umbonate, half as long as the capsule. Fruit pyriform-globose, slightly constricted,  $\frac{1}{3}$  inch long. Capsule much sunk. (*The Tasmanian Flora*, p. 58.)

Mr. Rodway (in a letter to me) points out the close resemblance of the juvenile foliage of this form to that of *E. viminalis*. He has suggested the possibility of this form being a hybrid between *E. urnigera* and *E. viminalis*, and says that wherever he has seen the variety growing, he has always seen the two species associated.

---

## SYNONYM.

*Eucalyptus Whittinghamiensis*, Hort. (I have also seen the spelling *Whittinghami*.)

Raised from seed gathered on Mount Wellington, Tasmania, in Whittingham Gardens, Haddingtonshire, Scotland.

Mr. Rodway has a specimen in fruit and early bud, which, he says, is apparently a form of *E. urnigera*, in which opinion I concur. I hope fuller material will be available.

I may say that *E. urnigera* grows at Whittingham (see *Gardeners' Chronicle*, 14th January, 1899, p. 19).

---

## RANGE.

It is confined to Tasmania.

In the original description and *Fl. Tas.*, Hooker quotes the localities known to him as "Alpine districts, not uncommon on the summit of Mt. Wellington, Lake Echo, &c."

Bentham says Robert Brown found it on Table Mountain. Table Mountain is the original name for Mt. Wellington. It occurs on that mountain at an elevation of about 3,000 feet. He named it, and it is presumed described it, as seems to have been his practice when he attached a name, but his name was never published. Indeed, few of Brown's observations on this interesting genus were ever published, through some unfortunate misunderstanding.

In the National Herbarium, Sydney, we have the following specimens:—

Mt. Wellington (Ronald Gunn's 1,074); Riverside, Risdon (Gunn's 1,073); Marlborough (J. D. Hooker, Gunn's 1,075); Mt. Falkiner (L. Rodway); Mount Field East, at an elevation of 3,000–4,000 feet (J.H.M.).

## AFFINITIES.

1. With *E. cordata*, Labill.

The juvenile foliage is sometimes only maintained for one or two feet of growth. In other localities it is maintained until the plant is 6 to 8 feet, and is always exactly like that of *E. cordata*.

I will deal with the affinities of the two species when I come to *E. cordata*.

2. With *E. Stuartiana*, F.v.M.

This species is like *E. urnigera*, one in which the juvenile foliage is nearly orbicular, usually glaucous, and with crenulate margins. The buds and fruits are very different.

3. With *E. corymbosa*, Sm.

This species possesses an obvious resemblance to *E. urnigera* in the shape of its fruit; the individual flowers are somewhat similar, but the inflorescence is less corymbose. In other respects the resemblance appears to be less close.

4. With *E. cladocalyx*, F.v.M.

*E. urnigera* is a species whose operculum is very much shorter than the calyx-tube. This is accompanied by a peculiar curved shape, and also the diameter may be larger than the calyx-tube at the junction (see fig. 14b, Plate 80). Certain members of the Corymbosæ group, viz., *E. maculata* and *eximia*, have opercula shorter than the calyx-tube, but the species are very different in other respects.

In *E. cladocalyx*, however, the size of the bud and the proportionate size of operculum and calyx-tube are so similar to those of *E. urnigera* as to merit mention.

---

**Explanation of Plates.**

## PLATE 77.

*Eucalyptus macrocarpa*, Hook.

- 1a Twig with leaf and fruit. 20 miles east of Beverley, W.A. (W. D. Campbell). The flower is 3 inches in diameter in a dry state. The figure in the "Eucalyptographia" perhaps hardly shows sufficiently the crowded foliage. It certainly does not show the undulations of individual leaves. 1b, front and back views of anther. The anther has a somewhat remarkable shape.
2. Bud received from Miss Moore, of Perth, W.A. Locality not stated. This bud shows neither angle nor wing.
3. Fruit. Plain north-east from New Norcia, W.A. (Dr. A. Morrison.) The fruit is larger and riper than depicted in the "Eucalyptographia."

*Eucalyptus Preissiana*, Schauer.

- 4a and 4b. Two pairs of juvenile leaves; 4c, double opercula (rather shrivelled). 4a shows the insect markings (see p. 243), which are fairly characteristic. Takalarup Road from Porongorup, W.A. (J.H.M.)

## PLATE 78.

*Eucalyptus Preissiana*, Schauer.

- 1a. Mature leaf, showing insect markings; 1b, front and back views of anther; 1c, fruit. Takalarup Road. (J.H.M.)
2. Buds from cultivated specimen in Botanic Garden, Hobart (coll. J.H.M.). The opercula are rather blunt.
3. Views of a fruit of type of *E. plurilocularis*, F.v.M. (*E. Preissiana*, var. *plurilocularis*, F.v.M.)

*Eucalyptus megacarpa*, F.v.M.

4. Juvenile leaves. Near Albany, W.A. (B. T. Goadby.)
5. Intermediate leaf. Tops of hills, close to the sea, Karridale, near Cape Læwinn, W.A. (Percy Murphy.)
- 6a. Mature leaf; 6b, front and back view of anthers, showing also transparent glands on the filaments 6c, fruits (larger than those depicted in "Eucalyptographia"). The other side of Princess Royal Harbour from Albany. (J.H.M.)
7. Bud. "Western Australia." (C. Walter.)
8. Buds. Cultivated in Botanic Garden, Melbourne. (W. R. Guilfoyle.)

## PLATE 79.

*Eucalyptus globulus*, Labill.

1. Juvenile leaf. (Coll. Labillardière in Herb. Kew.) (Tasmania.)
- 2a. Juvenile leaf; 2b, mature leaf. Adventure Bay, Tasmania. (J.H.M.) Captain Cook visited Adventure Bay, and here the first *Eucalyptus* described (*obliqua*, L'Hérit.; see p. 51, vol. 1, part 2) was collected.
3. Bud. Hobart, Tasmania. (L. Rodway.)
- 4a. Front and back views of anther; 4b, typical form of ripe fruits. Port Arthur, Tasmania. (J.H.M.)
- 5a. Bud; 5b, fruit. The top of the fruit is flat, and in bud and fruit there is a slight indication of pedicel. (R. Gunn, Flinders Island, 1842, No. 1,970.)
6. Fruits, no flattened pedicel, quite sessile. Long Gully, Cassilis township, Victoria. (H. Hopkins.)
- 7a. Buds; 7b, small fruits, nearly smooth. Cann River, Gippsland, Victoria. (H. Hopkins.)
8. Fruit of medium size. No flattened pedicel. Fruit sessile in axis of leaf. Burriajuck, N.S.W. (R. H. Cambage.)
- 9a. Fruit of medium size and slightly warty; 9b, smaller and nearly smooth; 9c, small, smooth, and with a sharp rim. All from Jenolan Caves, N.S.W., and within a few yards of each other. 9a and 9b (John Duff); 9c (W. F. Blakely). These three specimens alone illustrate the great variation in the fruits of this species.
10. Fruit. Long Gully, Cassilis township, Gippsland (H. Hopkins); also 7 miles north-west of Bacchus Marsh, in the bed of the Lederberg River, Victoria (P. R. H. St. John). This is a transit form to *E. Maidenii*.
11. Fruits of medium size, smooth, domed. Metung, Victoria. (A. W. Howitt.)
12. Fruits of medium size, flat topped. Sealers' Cove, Victoria. (A. W. Howitt.)

*Eucalyptus Maidenii*, F.v.M.

3. Juvenile leaf. Colombo, Candelo, N.S.W. (Type). (W. Bauerlen.)
4. Juvenile leaf. Spring Hill, Wingello, N.S.W. (J. L. Boorman.)

## PLATE 80.

*Eucalyptus Maidenii*, F.v.M.

- 1a. Buds; 1b, buds; 1c, anthers; 1d, mature leaf and fruit. Colombo, Candelero, N.S.W. (Type). (W. Baeuerlen.)
2. Buds. Spring Hill, Wingello, N.S.W. (J. L. Boorman.)
3. Small, slightly domed fruits. Monga, Braidwood, N.S.W. (W. Baeuerlen.)
4. Slightly larger, slightly domed fruits. Box Point to Barber's Creek, N.S.W. (J.H.M.)
- 5a, 5b, 5c. Three sizes of fruits from the same tree. Araluen Mountain, N.S.W. (J.H.M.)
6. Bud and flower. Poole's Inlet, Metung, Victoria. (A. W. Howitt.)
7. Fruits. Long Gully, Cassilis township, Victoria. (H. Hopkins.) Compare the fruits of forms of *E. globulus*, e.g., fig. 10, Plate 79.
- 8a. Mature leaf; 8b, bud; 8c, fruits of No. 237,908, U.S. Nat. Herb. Cult. at Los Angeles, Cal., U.S.A. (Type of *E. Mortoniana*, Kinney.)
- 9a. Buds; 9b, fruits of a form between *E. globulus* and *E. Maidenii*, but nearer to the latter. Metung, Victoria. (John L. King.)
- 10a. Buds; 10b, fruits, smooth buds, slightly angled.
11. Fruits. Both 10 and 11 are from the same locality and by the same collector as 9, and they are likewise intermediate or transition forms, showing nearness to *E. Maidenii*.
- 12a. Buds; and 12b, fruits, with rather long pedicels and peduncles, referable to *E. Maidenii*. Same locality and collector as No. 9.

*Eucalyptus urnigera*, Hook. f.

13. Juvenile leaves. Near the summit of Mount Field East, Tasmania. (J.H.M.)
- 14a. Mature leaf; 14b, buds; 14c, anthers; 14d, fruits of a co-type. R. Gunn's No. 1,074. Mount Wellington, Tasmania.
15. Mature leaf, margin slightly undulate. Mount Wellington, Tasmania. (L. Rodway.)
16. Fruit, scarcely urceolate. Mt. Wellington, Tasmania. (A. H. S. Lucas.)

The following species of Eucalyptus are illustrated in my "Forest Flora of New South Wales"\* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

<i>acacioides</i> , A. Cunn. (xlviiii).	<i>microcorys</i> , F.v.M. (xxxviii).
<i>acmenioides</i> , Schauer (xxxii).	<i>numerosa</i> , Maiden (xvii).
<i>amygdalina</i> , Labill. (xvi).	<i>obliqua</i> , L'Hérit. (xxii).
<i>Andrewsi</i> , Maiden (xxi).	<i>ochrophloia</i> , F.v.M. (1).
<i>Baileyana</i> , F.v.M. (xxxv).	<i>odorata</i> , Behr and Schlechtendal (xli).
<i>Behriana</i> , F.v.M. (xlvi).	<i>paniculata</i> , Sm. (viii).
<i>bicolor</i> , A. Cunn. (xliv).	<i>pilularis</i> , Sm. (xxx).
<i>Boormani</i> , Deane and Maiden (xlv).	<i>piperita</i> , Sm. (xxxiii).
<i>Bosistoana</i> , F.v.M. (xliii).	<i>Planchoniana</i> , F.v.M. (xxiv).
<i>capitellata</i> , Sm. (xxviii).	<i>populifolia</i> , Hook. (xlvii).
<i>Consideriana</i> , Maiden (xxxvi).	<i>punctata</i> , DC. (x).
<i>coriacea</i> , A. Cunn. (xv).	<i>regnans</i> , F.v.M. (xviii).
<i>corymbosa</i> , Sm. (xii).	<i>resinifera</i> , Sm. (iii).
<i>dives</i> , Schauer (xix).	<i>saligna</i> , Sm. (iv).
<i>fruticetorum</i> , F.v.M. (xlii).	<i>siderophloia</i> , Benth. (xxxix).
<i>goniocalyx</i> , F.v.M. (v).	<i>sideroxyylon</i> , A. Cunn. (xiii).
<i>hæmastoma</i> , Sm. (xxxvii).	<i>Siberiana</i> , F.v.M. (xxxiv).
<i>hemiphloia</i> , F.v.M. (vi).	<i>stellulata</i> , Sieb. (xiv).
<i>longifolia</i> , Link and Otto (ii).	<i>tereticornis</i> , Sm. (xi).
<i>Luehmanniana</i> , F.v.M. (xxvi).	<i>Thozetiana</i> , F.v.M. (xlix).
<i>macrorrhyncha</i> , F.v.M. (xxvii).	<i>virgata</i> , Sieb. (xxv).
<i>maculata</i> , Hook. (vii).	<i>vitrea</i> , R. T. Baker (xxiii).
<i>melliodora</i> , A. Cunn. (ix).	

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# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

(Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

---

VOL. II. PART 9.

Part XIX of the Complete Work.

(WITH FOUR PLATES.)

---

*"Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise."*

MACAULAY'S "ESSAY ON MILTON."

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*CI. Eucalyptus goniocalyx*, F.v.M.

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## DESCRIPTION.

### *CI. E. goniocalyx*, F.v.M.

In Miquel's *Stirp. Nov. Holl. in Ned. Kruidk. Arch.* iv, 134 (1856).

THE original description is in Latin, and a copy will be found in my *Forest Flora of New South Wales*, vol. i, 116.

The type specimens came from the Buffalo Range in north-eastern Victoria.

Following are the earliest specimens seen by me, labelled *E. goniocalyx* by Mueller himself :—

(a) Buffalo Range, March, 1853; (b) Mitchell River, April, 1854.

It was again described in Latin in the *Fragmenta* ii, 48, in May, 1860.

The localities quoted in the *Fragmenta* are the original one, and to this was added Mount Buller, Loutitt Bay (between Cape Otway and Port Phillip), the sources of the Rivers Yarra and Barwon and the River Mitchell (all in Victoria). The localities are inland mountain and also coastal.

The tree, "small or tall," was called "Spotted Gum," its bark rough and peeling off (rugosus, secedens).

Then Mueller (*Fragm.* iv, 52) in February, 1864, described *E. elæophora* from grassy mountains near the McAlister River (north-eastern Victoria), particularly in the neighbourhood of Mt. Ligar.

The tree was small, and with bark persistent, rough, and of a dirty ashy grey (persistente rugoso sordide cinerascente).

Then in B.Fl. iii, 229, in describing *E. goniocalyx* in English, Bentham speaks of the "bark rough and persistent on the trunk, at least when the tree is large, deciduous in the upper part (Oldfield), usually deciduous, but sometimes persistent (F. Mueller.) Leaves ovate-lanceolate to lanceolate" . . . and he makes *E. elæophora*, F.v.M., a synonym.

Mueller, in *Eucalyptographia*, accepts Bentham's conclusion, and figures the species, which he terms "The Spotted Gum of Victoria," although he does not confine his description to that tree.

He says: "As regards the nature of the bark, it fluctuates between Hemiphloïæ and Leiophloïæ; in the latter case the tree passes among the woodmen as Blue and White Gum-tree; in the other case as Grey or Bastard Box."

The facts seem to be as follows, and I will deal with some of them at greater length when treating of *E. elaeophora*:—

(1) The original *E. goniocalyx*, F.v.M., is what was known as *E. elaeophora*, F.v.M., or *E. Cambagei*, Deane and Maiden.

(2) Mueller, in *Fragm.* ii, 48, redescribed his original *E. goniocalyx* as *E. elaeophora*.

(3) In the *Eucalyptographia* he included, under the name of *E. goniocalyx*, two trees—a smooth-barked gum and a rough-barked species, the former being what is now generally known as *E. goniocalyx*, F.v.M., and the latter as *E. elaeophora*, F.v.M.

(4) I think it would cause endless confusion to attempt to suppress *E. goniocalyx*, F.v.M., now, redescribing the smooth-barked Gum (which is the tree universally accepted now as *E. goniocalyx*) under another name.

*E. goniocalyx* (*sensu strictu*) may be briefly described as follows:—

A tall tree, bark smoothish, but with ribbons and more or less roughish and even flaky bark at butt. Found in gullies or damp bottoms.

**Timber** pale-coloured, fissile.

**Juvenile foliage** thin, broad to narrower, pale underside or equally green on both sides.

**Seedlings** narrowish, with pale undersides to the leaves.

**Buds** pointed but sometimes blunter; operculum of lesser diameter, shorter than calyx tube; filaments drying dark.

**Fruits** pear-shaped and angled, sometimes with a rim, stalked or sessile, valves sunk, flush with orifice or exsert. In parts of New South Wales orifice quite open and not slightly contracted.

#### Recorded Varieties.

##### 1. Var. *acuminata*, Benth.

Flowers more distinctly pedicellate, the bud narrow, the operculum longer and more acuminate. Gippsland, F. Mueller. (B.Fl. iii, 230.)

I have a drawing of a type specimen of this plant, and have seen the original, which I think can hardly be maintained as a variety.

##### 2. "Var. *pallens*. Specimens glaucous white, as in *E. dealbata*. Mountains on Snowy River, F. Mueller." (B.Fl. iii, 230.) See below, p. 276.

## RANGE.

*E. goniocalyx* is found in the States of South Australia, Victoria, and New South Wales, favouring valleys with moisture and fairly good soil.

#### VICTORIA.

"*E. goniocalyx* has a wide range in Gippsland, especially in the western parts.

It grows well in the deep shady gullies of the southern slopes of the mountains, where it reaches some 200 feet to 250 feet in height, with a tall massive bole. In its typical form it occurs in the valley of the Thompson River, on the Upper Wellington, near Grant, on the southern slopes of Fainting Range at

Gelantipy, and elsewhere, up to 4,000 feet above sea level in favourable localities. It is very commonly termed "Blue Gum," and as such has, to my knowledge, been cut by saw-millers. At Walhalla it is used in preference to *E. Sieberiana* or *E. capitellata*, as being the best procurable in the district for props in the mines, and, so far as my experience goes, may be placed after *E. globulus* as a useful timber tree for work that is not placed in or on the ground—as framing or planking.

The typical form of *E. goniocalyx* seems not to be able to cross from the cool southern slopes to the warmer and drier northern sides. . . . On the south side of Fainting Range *E. goniocalyx* ascends to the summit at about 2,000 feet." . . . (A. W. Howitt in *Trans. Roy. Soc. Vict.* ii, 103, 1890.)

Following are some localities represented in the National Herbarium, Sydney:—

Grey Box, Lilydale (A. W. Howitt); Dandenong Mountain (J.H.M.); large Gum-tree with smooth slate-coloured bark, Fern Tree Gully (R. H. Cambage); smooth-bark variety, Warrandyte (C. Walter); Healesville district (C. Walter); "Dividing Ranges" (C. Walter).

Upper Barwon, also near Bunyip River (Herb. Melb. No collectors stated); Blacks' Spur (H. Deane).

Grey Gum, Darlimurla, South Gippsland (H. Deane); Bairnsdale (A. W. Howitt).

Large Gum-tree with a little rough bark, in moist flats, Mississippi Creek, near Metung (J.H.M.).

Walhalla (A. W. Howitt; Fainting Range (A. W. Howitt); Gooram, North-east Victoria (H. B. Williamson); Strathbogie (A. W. R. Vroland).

#### SOUTH AUSTRALIA.

Glen Ewin, Houghton (Mr. McEwin).

The species should be further sought for in South Australia in the ranges around Adelaide; localities to connect the Victorian ones should also be ascertained.

#### NEW SOUTH WALES.

It will be seen that the species is particularly abundant in south-eastern New South Wales, connecting with the Victorian localities for a considerable distance. Westerly it does not appear to leave the Blue Mountains, while it becomes rare in the north, where its range is unascertained.

*South.*—Grey Gum, Twofold Bay. A specimen in bud with longer pedicels (L. Morton); Eden (A. W. Howitt); Bell-bird Creek, Eden-Pambula (A. W. Howitt); "Yellow Gum," the bark often presenting a more or less yellow cast. Candelo district (A. Rudder). It has the extraordinary name of "Monkey Gum" in the Bermagui district. Mr. Oliver Smith, Forest Guard, who gives me this information, says that the "Native Bears," or "Koalas" (*Phascolarctos cinereus*) are especially fond of the foliage of this tree, as many as fifty being seen on one

at one time. The Native Bear is, on the South coast, often vulgarly known as "Monkey." Cathcart (H. Deane); near Montgomery's saw-mill, Tantawanglo Mountain (H. Deane and J.H.M.); Grey Gum, Buckley's Springs, 15 miles east of Bombala (A. W. Howitt); Tumberumba (T. H. Williams).

"Mountain Gum," smooth bark, Reidsdale, near Braidwood (H. Deane); "Mountain Gum," height 150 feet, diameter 3 feet, Sugar Loaf Mountain, Monga, near Braidwood (J. S. Allan, W. Baeuerlen); "Mountain Gum," Major's Creek (W. Bound); "Grey Gum," Benandra (J. S. Allan).

"Yellow Gum," the largest trees of the district, 40-80 feet high, the bark of a ribbony nature, the yellow patches are prominent, whence the bark peels off; the older bark is of a greyish colour, and reminds one of that of *E. punctata*. Prominent midrib of a yellow colour, tips of branches yellow. Wood yellowish when fresh, and with age turns to the colour of Tallow-wood (*E. microcorys*). Sides of gullies on good, rich land, Nye's Hill, Wingello (J. L. Boorman).

West Dapto (R. H. Cambage).

*West.*—Tall trees with a green glaucous bark, except at the foot. Locally known as Mountain Ash. Valves exsert. Head of the Valley of Waters, Wentworth Falls (W. Forsyth).

Kanimbla Valley, Hartley to Lowther, also old road to Hartley Valley from Mount Victoria (J.H.M.). With very quadrangular-stemmed suckers, Hartley to Hassan's Walls (J.H.M.).

Jenolan Caves (W. F. Blakeley; J.H.M.). Mount Wilson. A Gum, with fruits smaller than the type, almost spreading orifice, with valves well exsert and long pedicel (Jesse Gregson and J.H.M.).

*North.*—Black soil, Upper Meroo, Mudgee district (A. Murphy).

Bark ribbony. Valves of fruits exsert, hardly to be distinguished from certain Blue Mountains trees. Nundle, Hanging Rock (J. L. Boorman). Material somewhat incomplete in both these northern specimens.

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## AFFINITIES.

1. With *E. incrassata*, Labill., var. *dumosa*.

"Very near in flowers to some forms of *E. dumosa*, but with a very different foliage." (*B. Fl.* iii, 230). I only note this because it is a suggestion of Bentham. If Plate 16, Part IV, of this work be turned to, it will be seen that the affinity is not close. *E. goniocalyx* has not corrugated opercula. *E. goniocalyx* is a large tree found in the coast and mountain districts, in localities where var. *dumosa*, which is a shrub, or very small tree, is never found.

2. With *E. eleophora*, F.v.M.

This is the species undoubtedly closest to *E. goniocalyx*, and I will deal with their affinities when I come to *E. eleophora*.

3. With *E. Stuartiana*, F.v.M.

*E. eleophora* is in some respects intermediate in characters between *E. goniocalyx* and *E. Stuartiana*, and I will deal with their affinities when I come to *E. Stuartiana*.

4. With *E. quadrangulata*, Deane and Maiden.

There is no doubt that these two species have much in common. Some obvious affinities are :—

(1) Quadrangular sucker stems and shape of sucker foliage.

(2) Timber of a similar class, although that of *E. quadrangulata* is apparently more interlocked.

Their most obvious dissimilarities are :—

(1) *E. quadrangulata* has a Box-bark.

(2) The fruits of *E. quadrangulata* are smaller, and the valves more exerted.

5. With *E. globulus*, Labill.

In its young state *E. goniocalyx* is often taken for Blue Gum, *E. globulus*, by reason of the bluish-grey tint of the young foliage, hence its bush name, "Bastard Blue Gum."

The timber of the two trees have much in common, but the buds and fruits readily separate the two species. (See Plate 79, Part XVIII, of the present work.)

6. With *E. Maideni*, F.v.M.

Both are large trees yielding pale-coloured, durable timbers, which resemble each other a good deal. They more closely resemble each other than do *E. goniocalyx* and *E. globulus*, *E. Maideni* being in a measure intermediate between these two species. The three trees resemble one another a good deal in the bush; examination of Plate 80, Part XVIII, of the present work will show that *E. Maideni* and *E. goniocalyx* are sufficiently distinct.

## DESCRIPTION.

CII. *E. nitens*, n. sp.

I SUGGEST that the tree hitherto known as *E. goniocalyx*, F.v.M., var. *nitens*, Deane and Maiden, is worthy of specific rank, and describe it in the following terms:—

Arbor major, "Giant Gum," "Silver Top," diverse nominata.

Cortex basi rugosus, deciduus, in stratis tenuibus secedens, parte superiore laeve

Lignum fissile, pallidum. Ramuli quadrangulares et aliquando alati. Folia juvenia obtuse lanceolata, basi cordata, amplexicaulia. Folia matura nitidula, crassa, petiolata, falcata, lanceolata. Venae patentēs. Vena peripherica a margine remota.

Folia aliqua undulata et margines irregulariter dentatae videntur propter tubercula insectis facta.

Fructus nitidi ad 7 in capite, circiter 5 mm. longi, ovoidi, valvularum apices leniter angulares sub orificio depressi.

A very large tree, growing to a height of 200-300 feet, and with a diameter (measured by Mr. W. Baeuerlen) of 2-17 feet.

Known as "Giant Gum" or "White Gum," in the Bombala district of N.S.W., but perhaps more distinctively "Silver-top" or "Silver-top Gum" in reference to the smooth and shining bark of the upper part of the trunk.

**Bark.**—Deciduous, hanging in strips, and more or less rough at the butt; the upper portion, which usually includes nearly the whole of the trunk, smooth, and even shining.

**Timber.**—Almost flesh-coloured when fresh; dries very white. Straight in the grain, not very easy to work to a smooth surface, being slightly teary and shrinking in the grain on exposure to the atmosphere.

**Juvenile Foliage.**—Branchlets quadrangular and even-winged. Leaves equally green on both sides, somewhat glaucous. Bluntly lanceolate in shape, the bases cordate and stem-clasping. Rather thin in texture, covered with minute oil-dots, mid-rib prominent, lateral veins spreading, the intramarginal vein scarcely obvious, the margin slightly thickened.

**Mature Leaves.**—Equally green on both sides, somewhat shining, thickish, petiolate, falcate, lanceolate, nearly symmetrical, venation spreading, intramarginal vein distant from the edge. The mature leaves may attain a length of over 1 foot, and a width of 3 inches, but usually they are very much smaller.

A character which I have not seen in any other species has been described as follows at my request by Mr. E. Mackinnon. He has also made illustrative drawings, which have not been reproduced.

Small tubercles appear irregularly distributed along both margins of the leaves. The base is approximately 1 mm. in diameter, and the centre of the tubercle is generally depressed and black.

Microscopic examination of the tissue in this area and in the ordinary margin of the leaf shows that the abnormality is probably due to injury by some insect, as the leaf has been stimulated to produce cork-tissue to surround and close off the injured part from the rest of the leaf.

Mr. Froggatt, Government Entomologist, is of the opinion that the insects responsible belong to the family Coreidae (Gum Tree Bugs) or the family Cercopidae (Frog Hoppers).

The phenomenon has been noticed both in the longest leaves and also in the small mature leaves, and gives the leaf an undulate appearance, while the margin becomes irregularly toothed, as shown on 9b and 9c, Plate 81).

**Buds.**—Not seen fully developed, shining, usually pale brown, curved, angled, both calyx-tube and operculum curved; operculum pointed, the operculum shorter than the calyx-tube.

**Flowers** not seen.

**Fruits.**—Shining up to seven in the head as seen, sessile, on a common peduncle of about half an inch; about 5 mm. long, ovoid, slightly angled, slightly contracted at the orifice thin-rimmed, points of the valves sunk beneath the orifice or scarcely protruding.

The type is Delegate River, N.S.W., W. Baeuerlen, May, 1889, National Herbarium and Technological Museum, Sydney. It is figured *E. goniocalyx*, F.v.M., var. *nitens*, Deane and Maiden, on Plate 81.

---

## SYNONYM.

*E. goniocalyx*, F.v.M., var. *nitens*, Deane and Maiden. *Proc. Linn. Soc. N.S.W.*, xxiv, 463 (1899).

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## RANGE.

So far as we know at present, it is confined to north-eastern Victoria (part of Gippsland), and to south-eastern New South Wales—its furthest north, so far as we know, being near Bodalla.

It is represented by the following specimens in the National Herbarium, Sydney:—

### VICTORIA.

Mount Mueller, near Mount Baw Baw, Victoria (James Melvin)—received from the late J. G. Luehmann, National Herbarium, Melbourne.

### NEW SOUTH WALES.

Haydon's Bog, Delegate (W. Baeuerlen); "Giant Gum," Delegate River (W. Baeuerlen); "Silver-top Gum," Glenbog, Dividing Range, near Candelo (J. Duff).

"Silver-top," 80–120 feet, diameter 2–4 feet, occurring chiefly in damp and swampy places. Mountain Top, Nimitybelle (W. Baeuerlen).

"Mountain Gum," smooth grey bark, with few long flakes, near Nimbo Station, head of Queanbeyan River (H. Deane).

Very long leaves. Turlinjah, Tuross Lake (J.H.M.).

## AFFINITIES.

1. With *E. goniocalyx* (F.v.M.).

Its closest affinity is undoubtedly with this species, of which it has long since been looked upon as a variety. The differences which separate the two species appear to be as follows:—

(1) *E. nitens* attains a magnitude apparently never attained by *E. goniocalyx*.

(2) The timber of the two species appears to be different, but an adequate technical investigation of the timber of *E. nitens* has not yet been made. It would appear to be freer in the grain, less interlocked, and less durable than that of *E. goniocalyx*.

(3) The young branchlets of *E. goniocalyx* do not appear to be winged at any time.

(4) The peculiar margins of the leaves, owing to insect action, appear to be peculiar to *E. nitens*.

(5) The fruits of *E. nitens* are much smaller and shinier than those of *E. goniocalyx*.

2. With *E. quadrangulata*, Deane and Maiden.

The affinities of these two species will be indicated when I reach *E. quadrangulata*.

## DESCRIPTION.

CIII. *E. elæophora*, F.v.M.

THE attention of my readers is invited to what I have already said in regard to this species under *E. goniocalyx*, F.v.M., *ante* p. 267.

Following is a translation of Mueller's formal description of *E. elæophora* in *Fragm.* iv, 52, with italics as in the original:—

Arborescent, with angular branchlets, at length nearly terete, with falcate-lanceolate leaves, closely covered with pellucid dots, alternate, thinly coriaceous, equally coloured on both sides, rather shining, on petioles long or moderately long, with thin primary veins diverging in an acute angle, the peripheral one remote from the margin, with solitary two-edged axillary peduncles and *capitate, four to seven flowered umbels*, with the calyx-tube nearly doubly exceeding the length of the semi-ovate double operculum, with truncate-ovate fruits, slightly or hardly angular, three, rarely four-celled, the vertex of the capsule convex, enclosed, the acute valves reaching to the orifice, with wingless seeds, the fertile ones conspicuously larger than the sterile ones.

In grassy mountains at the McAlister River, especially in the vicinity of Mt. Ligar.

A middle-sized tree with a persistent rugose bark, dirty ash-grey. Leaves 3-7 inches long,  $\frac{3}{4}$  to  $1\frac{1}{2}$  inches broad, with a long acute apex, the base often oblique. Peduncles hardly  $\frac{1}{2}$  to 1 inch long,  $1\frac{1}{2}$  to 2 lines broad. Bracts of the umbel in the early state enveloping the calyptra, membranous, deciduous. Outer operculum membranous, very deciduous. Fully developed flowers not seen. Fruits nearly 4 lines long, slightly contracted at the mouth. Fertile seeds black, obliquely or almost round-ovate, nearly 1 line in diameter, sterile ones brown, clavate, or sub-rhomboid.

The species was described by Deane and Maiden, under the name of *E. Cambagei*, with two plates, in *Proc. Linn. Soc. N.S.W.* xxv, 106 (1900).

The description may be supplemented as follows:—

A "Box," the rough bark occasionally strongly resembling that of an Ironbark in old trees. It grows on the well-drained sides or tops of hills.

**Juvenile foliage.**—Thickish, as a rule, but sometimes thin (e.g., Bendigo, Victoria), of equal colour on both sides or rarely pale on the underside (e.g., Bendigo). Orbicular, orbicular-acuminate to ovate or oblong.

**Buds.**—Operculum pointed or blunt, shorter than the calyx-tube, which is flattened or almost winged sometimes.

**Filaments** dry red.

**Fruits.**—Valves scarcely exsert to very exsert, and with wide orifice; fruit sometimes very angular, and very large. Stalked or sessile.

## SYNONYMS.

1. *E. goniocalyx*, F.v.M., var. *pallens*, Benth.
2. *E. Cambagei*, Deane and Maiden.

1. *E. goniocalyx*, F.v.M., var. *pallens*, Benth. "Specimens glaucous white, as in *E. dealbata*. Mountains on Snowy River, F.v. Mueller." (B.Fl. iii, 230.)

The following four specimens belong to this variety (*pallens*, Benth.), and are, indeed, the type:—

I do not find it a useful variety-name either of *E. goniocalyx* or of *E. elæophora*, since the glaucousness is merely a matter of locality, and I find no permanent morphological differences between it and *E. goniocalyx* or *E. elæophora*.

(A) “*Eucalypti goniocalycis videtur varietas pallens*.”

“*Arbor mediocris divisionis E. dealbata, cue valde humilis?* In montibus ad. fl. Snowy, 10/2 '54. Dr. M.” (Mueller).

The above is a copy of a label in Mueller's handwriting in Herb. Melb.

(B), “*Euc. goniocalyx*, Ferd. Mueller, var., Snowy River.” Copy of a label in Mueller's handwriting in Herb. Melb.

The fruits of (B) are smaller, have the valves more exserted, and are less glaucous than those of (A). The leaves are precisely the same, and no doubt the fruits pass into each other.

(C), “*Eucalyptus pallens*, DC. Snowy River, Mueller.” Copy of an old label (not on printed form) from Herb. Melb. in Herb. Calcutta.

(D), “*Eucalyptus albens*, DC. Snowy River, Victoria, Dr. F. v. Mueller.” Copy of a label (on printed form) from Herb. Melb. in Herb. Calcutta.

For some further references to the confusion between *E. albens* and *E. pallens* see Part XI, p. 20, of this work.

In this connection it is useful to consider the following specimens, which are glaucous and have the valves obvious, but not much exsert.

#### VICTORIA.

“A scraggy tree, 60-80 feet high, 3 feet diameter at the base, rough scaly bark, persistent on stem and branches.” Fruit more hemispherical than usual. Long Gully, Cassilis Township (by side of Omeo road), N.E. Victoria (H. Hopkins).

“Common in northern Victoria” (J. Blackburne); Buffalo Mountain (C. Walter); Beechworth (C. Falck).

#### NEW SOUTH WALES.

Burrinjuck (J. L. Boorman); hills near Gooradigbee and Burrinjuck (Rev. J. W. Dwyer); “Mountain Apple,” Queanbeyan District (H. Deane); Tharwa, on Murrumbidgee, 16 miles south-west of Murrumbidgee (R. H. Cambage); “Mountain Apple,” rough-barked, Rob Roy (H. Deane); Adelong Range (A. W. Howitt); summit of Mt. Naughton, near Tumut (J.H.M. and J. L. Boorman); Tumut (W. Campbell); Bago Forest Reserve, Tumut District (W. U. Nowland); Merambego (W. Forsyth).

(The above are all in the southern district; the following are from considerable elevations in the western district. It would appear that the glaucous appearance is the result of environment.)

On Devonian rock, Cargo road, 17 miles from Orange (R. H. Cambage); top of Mt. Moppra (4,000 feet), Warrumbungle Ranges (W. Forsyth).

## RANGE.

It occurs in the following States:—South Australia, Victoria and New South Wales.

It extends over a considerable range in New England, New South Wales, and I think it is most likely that it will be found in that portion of New England which extends into Queensland.

The localities of the glaucous specimens already enumerated should be borne in mind and added to those about to be given.

### SOUTH AUSTRALIA.

“Bastard Box,” Adelaide and Barossa Ranges (W. Gill).

Some from the same general locality, but from near Murray’s, Mount Crawford (W. Gill), are conoid, valves well exsert and a remarkable form. See fig. 13, Plate 82. Wirrabara (J.H.M.)

Some of the fruits hardly exsert, like fig. 3c, others large and well exsert, like figs. 12 Laura (W. Gill).

### VICTORIA.

The typical form of *E. goniocalyx* seems not to be able to cross from the cool southern slopes to the warmer and drier northern sides, but there is found in such places a peculiar divergent form.

On the south side of Fainting Range *E. goniocalyx* ascends to the summit at about 2,000 feet, while on the northern face of the mountain, and at about 2,500 feet above sea level, there is a *peculiar variety of this type*. (The italics are mine, and refer to *E. eleophora*.—J.H.M.) The seedlings and young plants have opposed, ovate, sessile leaves of a rather light tint of green, not shining, and without the peculiar and characteristic rank odour of the leaves of the young plant of the common form.

The tree is usually under 50 feet in height, often with a short bowl, and scanty limbs and tops. The bark is distinctly wrinkled, and the branches only are smooth. The leaves are finally scattered, long lanceolar or falcate lanceolar, and more attenuate at the stalk than is usually the case in the typical form. The marginal veins are somewhat removed, and the lateral ones slightly spreading. The umbels, flowers, and fruit accord well with the general character of this Eucalypt. (Howitt in *Trans. Roy. Soc. Vict.* v, 2, p. 103 (1891) ).

In an unpublished report of 1895 Mr. Howitt again refers to two trees placed under *E. goniocalyx*.

The variety *b*) (of *goniocalyx*, but which is *elaëphora*, J.H.M.) grows in two localities in the Gippsland mountains and very generally throughout the other parts of the Colony.

It is not necessary to refer to it further than to say that it is used in places for "round posts" for fencing where better timber is not to be obtained. Otherwise it is a worthless timber.

Buffalo Range, collected and labelled "*Eucalyptus goniocalyx*" by Mueller.

Specimen from herb. Melb. from the late J. G. Luehmann, labelled "*Eucalyptus elaëphora*, F.v.M., Macalister Ranges, Gippsland. Mueller. Original specimen."

"Bastard Box," Croydon (A. W. Howitt); East of Balmoral (A. W. Howitt); Ringwood (R. H. Cambage); Dandenong Range — Boyle); Mt. Macedon (J.H.M.; E. Cheel); called "Bastard Box" at Macedon (W. S. Brownscombe); Mandwang and Water Reserve near Bendigo (J. Blackburne); Heathcote (A. W. Howitt); "Apple Box," "Apple Jack," "Stinking Box," "Cabbage Box," a very variable species, stunted in growth, bark roughish, persistent up to the smaller branchlets. Leaves up to 10 inches and over in length, from broad to narrow lanceolar, Heathcote, &c. (W. S. Brownscombe); Ararat (A. W. Howitt); Pyrenees (Collector of Baron von Mueller, September, 1871. Glauces).

#### NEW SOUTH WALES.

Mr. R. H. Cambage has given the following general account of its range in New South Wales:—

"In the Mudgee and Bathurst to Goulburn districts it is seldom found below an altitude of 2,000 feet above sea-level, though near Cootamundra it is growing at about 1,200 feet, and at about 550 near Albury. It is known under the names of Apple, Mountain Apple, Bastard Box and Bundy, the last being the local name south of Bathurst, around Rockley and Burruga, where it is in considerable request as a fuel in the copper smelting furnaces. South of the Macquarie River it is seldom found west of a line joining Wellington, Molong, Cargo, Mt. McDonald, Gundagai and Albury. There are, however, a few patches of it to be found west of this line, one being near Bumberry, between Molong and Parkes, and near Cootamundra, while there are probably other small areas of it in isolated spots. In these extreme western localities it is usually found occupying the tops of hills, and is undoubtedly more in its regular home on the higher lands to the eastward. In the Bathurst and Orange districts it may generally be found growing on ridges of Silurian slate; and although it evidently prefers a sedimentary formation, it is occasionally to be found on hills of igneous origin. In no case does it appear to grow on an alluvial flat." (*Proc. Linn. Soc. N.S.W.* xxvii, 199).

The following specimens in the National Herbarium, Sydney, are arranged:

*South*.—Wyangle, near Tumut, very large fruits, No. 880 (R. H. Cambage).

Practically identical specimens. Queanbeyan (J. L. Boorman); Top of Burrinjuck Mountain (E. Cheel); Hills near Burrinjuck and Gooradigbee, Yass district (Rev. J. W. Dwyer); Gundaroo (Rev. J. W. Dwyer).

“Bastard Apple” “Bastard Box,” Cootamundra to Stockinbingal (R. H. Cabbage).

Binalong (R. H. Cabbage).

Hill  $1\frac{1}{2}$  miles north Yass Junction (R. H. Cabbage, W. M. Carne); Yass (Rev. J. W. Dwyer).

Bowning (A. Murphy); Goondah, near Bowning, No. 1908, also Kangiara, 14 miles north of Bowning, on hills of quartz-porphry. Large fruits. No. 2201 (R. H. Cabbage),

“Box.” Follows tops of mountains and sides of hills. Box bark right up butt and limbs. Smooth only on smaller branches. Up to 3 feet 6 inches in diameter. Towrang, on Cookbundoon Mountains (A. Murphy).

Marulan (J. L. Boorman); Bungonia (W. Baeuerlen).

*West.*—Hartley to Hassan’s Walls (J.H.M.); Tarana,—on Allan Cunningham’s track to Sidmouth Valley (R. H. Cabbage and J.H.M.); three miles south of Locksley (R. H. Cabbage); Bathurst (L. Stephenson); Bathurst to Sofala—on Allan Cunningham’s track (R. H. Cabbage and J.H.M.); Perth, near Bathurst (J. L. Boorman); Hill End (R. H. Cabbage); “Broad-leaved Peppermint,” Mudgee (Rev. Dr. Woolls); Carwill Creek, Rylstone, No. 2723 (R. H. Cabbage); Hargraves (A. Murphy).

A thick stemmed, thick limbed, small crooked branched tree. The bole and limbs have a bark between peppermint and box in character. The branches smooth up to a foot of top. Mt. Macquarie, Carcoar (A. W. Howitt).

Mt. McDonald, near Cowra, on granite (R. H. Cabbage, J. L. Boorman, J.H.M.); Canoblas, Orange. Glauous (R. H. Cabbage).

Low trees, the branches with a somewhat pendulous habit, bark light grey, not very rough. Height, 30–40 feet. Girth, 2–3 feet. On the ranges, Mt. Esk. Bowan Park, near Cudal (W. F. Blakeley); Ironstone Hill, Cadia, Orange (R. H. Cabbage); Borenore,  $9\frac{1}{2}$  miles west of Orange. Glauous (R. H. Cabbage); Ophir, Orange (R. H. Cabbage); Bumberry, Molong (J. L. Boorman); Toogong, Forbes District (District Forester Wilshire); Stuart Town (A. Murphy). “Woolly Butt.” Plentiful in moist lands! Euchareena (J. L. Boorman); Harvey Ranges, near Peak Hill (J. L. Boorman); top of Mt. Bulaway, 3,450 feet (W. Forsyth); “Woolly Butt” sides of Damnation Creek, Warrumbungle Ranges (W. Forsyth).

*North.*—On basalt, Kar’s Gap, about 2 miles from Liverpool Range, 22 miles north-west of Scone (R. H. Cabbage). Murrurundi. Fruits smaller than normal (W. F. Blakeley). Also (J. L. Boorman and J.H.M.), glauous twigs, larger angled, valve-exserted fruits.

Small pendulous trees growing at the highest (?) elevations around Nundle. Bark resembling that of *E. Stuartiana*, not plentiful. Also about one mile on the ascent from Nundle (right hand) to Hanging Rock. Scattered on the hills at lower levels. With leaves, when dried, as large as 20 inches long and 4 inches wide (J. H. M. and J. L. Boorman).

Eastern end of Mt. Terrible, Currabubula, at 2,900 feet. No. 3,578. Glau-  
cous. Valves exsert (R. H. Cambage). Three miles north of Currabubula, at  
2,500 feet. Fruits large, prominently angled. Valves exsert. No. 3,558 (R. H.  
Cambage). Side of Tia River, near Walela, below falls (W. Forsyth); Mt. Lindsay  
(at 4,860 feet), Nandewar Mountains. No. 2,393 (R. H. Cambage). The most  
northern record, and at the greatest elevation known to the collector. Also at the  
foot of Mt. Lindsay (3,600 feet).

## AFFINITIES.

### 1. With *E. goniocalyx*, F.v.M.

The most obvious differences between the two species are seen in the forest, when *E. goniocalyx* is seen to be a tall, straight-growing tree, loving damp flats and creek sides, with a smooth bark, having ribbons, and fissile timber, while *E. elaeophora* prefers the tops of dry hills, and is a straggly tree, with rough bark, often to the small branches, with timber interlocked, and with juvenile foliage more orbicular. The young leaves of *E. goniocalyx* have pale undersides, and quadrangular branchlets.

There are, however, transition stages between the two species, which sometimes causes one to hesitate, whether in the herbarium or in the bush. As a rule, however, it is not easy for an intelligent person to confuse the species.

The fruits of *E. elaeophora* sometimes attain a larger size than those of *E. goniocalyx*.

### 2. With *E. Stuartiana*, F.v.M.

*E. elaeophora*, in the southern tablelands, goes under the local names of Mountain or Highland Apple, and Bastard Box.

It is one of the most useless timbers in the bush; it is also very difficult to destroy, whereas the Lowland Apple (*E. Stuartiana*) is easily destroyed and frequently dies of its own accord. Both trees are, however, very much alike in the region mentioned. The two trees are often confused in the bush, but the leaves of *E. elaeophora* are usually much longer than those of *E. Stuartiana*.

I will further compare the two species when I deal with *E. Stuartiana*.

3. With *E. Gunnii*, Hook. f.

A glaucous form of *E. Gunnii* (a smooth-barked species) resembles, so far as herbarium specimens are concerned, certain glaucous specimens of *E. elaeophora* a good deal.

I will again refer to the subject when I come to *E. Gunnii*.

4 and 5. With *E. globulus*, Labill., and *E. Maidenii*, F.v.M.

These are erect trees with smooth or ribbony bark, but both species sometimes form a scrubby growth, and in that state resemble a good deal a form of *E. elaeophora* found around Nundle, for example. The leaves also are not dissimilar, while the large fruits (e.g. fig. 15, Plate 82, and 2b, Plate 83) have some resemblance to fig. 12, Plate 79 (*E. globulus*), and fig. 11, Plate 80 (*E. Maidenii*). The fruits of the latter species are, however, usually more domed and fewer in the head than in *E. elaeophora*, but the general resemblance of the three species undoubtedly exists, and will be referred to later.

## DESCRIPTION.

CIV. *E. cordata*, Labill.

Nov. Holl. Pl. ii, 13, t. 152 (1806) (the toothing of the leaves being rather too accentuated) in the following words:—

*Eucalyptus* operculo hemispharico, mucronato, foliis oppositis, sessilibus, cordatis, crenatis.

Arbor procera, ramulis teretiuseulis, sæpius glaucis ut folia ovato-cordata, vix acuminata, decussatim opposita, patentia. Capituli ut plurimum triflori, pedunculo communi semitereti, florum longitudine, operculo brevi. Calyx turbinatus. Stylus brevior staminibus; stigma obtusum. Capsula obovata, immersa, tri ad quadrilocularis. Ceterum ut in precedentibus. Habitat in capite Van-Diemen.

It was then described in Hook. f., *Fl. Tas.* i, 132; also in *B.Fl.* iii, 224 and *Eucalyptographia*, the leaves perhaps being figured a little too erenate in the latter work.

It is figured in *Bot. Mag.* t. 7835, and also in the *Gardeners' Chronicle* for 12th March, 1910.

## Notes Supplementary to the Description.

It is a tree up to 50 feet in height. The bark is not described in the *Flora Australiensis*.

“Bark of stem comparatively thin, solid, outside but very slightly wrinkled, dark coloured and marked with whitish blotches.” (*Eucalyptographia*).

Rodway (*Tasmanian Flora*) says the tree rarely exceeds 20 feet, and that its bark is smooth.

## RANGE.

It is confined to Tasmania.

It was originally found in Reeherehe Bay by Labillardière, whence the type specimens were obtained and described by the finder. This locality is in the extreme south of Tasmania, and although Mueller (*Eucalyptographia*) says Robert Brown, Hooker, Gunn, Stephens and Abbott all found it in the same locality, I have not seen the evidence to that effect.

After Labillardière, Gunn found it. I have a specimen labelled by him, “Huon Mountain, North-west River, collected 27th October, 1839.” This was before Dr. (afterwards Sir Joseph) Hooker arrived in Hobart, and Gunn probably showed growing plants to him.

Then it was lost for about forty years, when it was found by Mr. Richard Hill, in 1880, on the Huon Road, probably on the same spot where it had been found by Gunn. Then, shortly after it was found by Mr. T. Stephens and Mr. F. Abbott on the foot-hills of Mt. Wellington, on the Huon Road, within five miles of Hobart. See *Proc. Roy. Soc. Tas.*, April, 1881, p. iv. Mr. Stephens raised a tree from seeds he then collected. This was blown down by a gale in 1903, its height being 40 feet.

It was sent to the Royal Society of Tasmania by the Rev. C. J. Brammall from Nelson's Tier, where he found it growing abundantly over a range of from 6 to 10 miles from Sorell

This is certainly a new locality, and he adds that he obtained a specimen at Recherche Bay, and another from near Leslie in 1881, and, in the same year, he and Mr. Abbott found it growing abundantly near the Huon Road, about 4 miles from Hobart. (*Papers and Proc. Roy. Soc. Tas.*, 1888, xxxiii.) Leslie is a small township, sometimes called Huon Track, North West Bay River, about 12 miles from Hobart.

Mr. L. Rodway collected it on Mount Wellington, near Ferntree, probably near the above locality, and pointed it out to Mr. R. H. Cambage and myself. Mr. Rodway also found it at Longley, several miles further from Hobart. In Mr. Rodway's *Tasmanian Flora* he quotes the following localities:—"Huon Road, Recherche, Brown Mountain, Campania, Tasman Peninsula." His statement that it is also found in the southern districts of New South Wales is probably based on an erroneous statement by me.

Mr. T. Stephens informed me that *E. cordata* grows in decomposed volcanic rock (greenstone, diabase), not in recent volcanic rock (basalt).

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## AFFINITIES.

### 1. With *E. pulviger*, A. Cunn.

Bentham (B.Fl. iii, 193) makes the following contrast:—

Leaves erenate. Calyx obtuse at the base ... *E. cordata*.

Leaves quite entire. Calyx tapering at the base... *E. pulverulenta*.

By *E. pulverulenta*, Sims, *E. pulviger*, A. Cunn., is meant, and I will refer to the matter in Part XXI, when I deal with *E. pulviger*.

### 2. With *E. cinerea*, F.v.M.

At this place, see a paper by R. T. Baker, "On *Eucalyptus cordata*, Labill., and its cognate species" (*Proc. Aust. Assocn. Adv. Science*, ix, 344), and I will refer to the affinities with *E. cinerea*, when I figure that species in Part XXI.

3. With *E. Risdoni*, Hook., f.

"The Chief Justice remarked that one thing he found with regard to the foliage of *Eucalyptus cordata* was that while in its young state it closely resembled *E. Risdoni*; the latter in its more advanced state was more lanceolated, and not glaucous as in *E. cordata*. (*Proc. Roy. Soc. Tas.*, 1888, xxxiii).

A specimen labelled "*Eucalyptus cordata*" in Fraser's handwriting in herb., Oxon is *E. Risdoni*.

There is no doubt that the two species present some similarity, and it will be convenient to turn to Part VI, where *E. Risdoni* is figured.

Obvious differences between the two species are the more usual bluntness of the leaves of *E. cordata*; the fruits of *E. cordata* are usually in threes, and are larger than those of *E. Risdoni*, and not sessile; the anthers of the latter are reniform; the leaves of *E. cordata* are more crenulate.

4. With *E. cosmophylla*, F.v.M.

"Like *E. pulcerulenta* (*pulviger*, A. Cunn., J.H.M.) it appears to be much more nearly allied to *E. cosmophylla*." (*B.Fl.* iii, 224). I will deal with this when I come to *E. cosmophylla* in Part XXI.

5. With *E. Stuartiana*, F.v.M., var. *cordata*, Baker and Smith. See *Proc. Aust. Assoc. Adv. Sci.* ix, 348.

I will deal with this when I come to *E. cinerea*, Part XXI.

6. With *E. Gunnii*, Hook., f.

Mueller (*Eucalyptographia*) quotes Mr. F. Abbott as having stated that the sap is sweet. In this respect it resembles *E. Gunnii*.

7. With *E. obliqua*, L'Hérit.

"Oldfield expressed an opinion that this might be the young tree of *E. obliqua*; the flowers, however, as well as the fruit, and especially the anthers, are far too dissimilar to admit of the approximation of the two species without more conclusive evidence." (*Bentham*, in *B.Fl.* iii, 224). I have not seen Oldfield's remarks; they are probably attached to a label, and I would suggest that they were made before it was known what *E. obliqua* really is. (See p. 51, Part II). Of course, *E. cordata* and *E. obliqua* have no close affinity.

## DESCRIPTION.

*CV. E. angustissima*, F.v.M.

In *Fragm. Phyt. Aust.* iv, 25 (Sept., 1863).

FOLLOWING is a translation of the original description : —

Shrubby, with branches soon terete, with *broad-linear leaves densely dotted* (italics in the original. J.H.M.), with transparent dots, alternate, finely pointed, shortly petiolate or almost sessile, equally coloured on both sides, shining, inconspicuously veined, with solitary, axillary, shortly pedunculate umbels of 2 to 4 flowers on very short pedicels, with a semi-ovate or sub-conical operculum nearly half as long again as the hemispherical non-ribbed calyx tube, with minute sub-cordate anthers, *nearly hemispherical fruits*, slightly contracted at the orifice, 3 or rarely 4-celled, with short deltoid valves, and fertile unwinged seeds conspicuously larger than the sterile ones.

Between Point Malcolm and Point Dover. Maxwell. (Places about 150 miles apart, at the western side of the Great Australian Bight).

Leaves coriaceous, mostly 2 to 3 inches long and 1½ lines broad, with a curved or hooked point. Peduncles nearly terete. Bud about 2 lines long. Filaments white. Fruits 1½ to 2 lines long.

The species leans towards *E. gracilis* and *E. oleosa*. It should also be compared with *E. uncinata*.

Then it was described by Bentham in B.Fl. iii, 238, who supplements the description, partly from Maxwell's notes, as follows :—

A bushy shrub of 5 feet, flowers only seen in bud, fruit depressed-globular, about 3 lines diameter, contracted at the orifice, the rim convex, the capsule on a level with it, the valves worn away in the specimens seen.

In his *Forest Resources of Western Australia* (1882) Mueller describes it in English, with a plate (No. 15).

It is not figured in the *Eucalyptographia*.

The material extant of this species is imperfect, ripe buds, flowers, and juvenile foliage not being available, while a series of ripe fruits would be very desirable.

A final pronouncement as to its affinities cannot yet be uttered.

I believe the anthers drawn in the plate in Mueller's *Forest Resources of Western Australia* to be immature, while those I have figured at 8a, Plate 84, certainly are, having been taken from an undeveloped bud.

Mueller draws attention to its possible value as an oil-yielding plant.

## RANGE.

We know it at present from a limited distance along the coast-line of the Great Australian Bight, in Western Australian territory.

Mueller, in his description, gives between Point Malcolm and Point Dover. Bentham, quoting a label of Maxwell's, gives "Point Malcolm and eighty miles

away to the eastward." Then we have "The precise geographic limit of this Eucalypt remains as yet unknown; it belongs probably to the tertiary limestone formation, and may thus have a very extensive range" (Mueller, *Forest Resources of Western Australia*).

I have seen the following specimens:—

- (1) "Point Malcolm" (Maxwell). In immature bud. Evidently the type.
- (2) "West Australia" (T. Drummond). The bud scarcely formed, and assumed to be *E. angustissima* because of its narrow leaves.
- (3) "Israelite Bay" (no collector). In fruit only.
- (4) "Towards the Tone River" (Th. Muir, 1880). This has immature buds, very much like that of the type, but with much broader leaves. The fruits are conoid, different to those of the Israelite Bay specimen.

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## AFFINITIES.

I remind my readers that *E. angustissima*, F.v.M. is still too imperfectly known to render dogmatic statements as to its affinities possible.

### 1. With *E. salubris*, F.v.M.

"It is allied in many respects to *E. salubris*, but the flower-stalks are not dilated, while the leaves are narrower than in any other Eucalypt." (Mueller, *Forest Resources of Western Australia*.)

We, of course, know but little about *E. angustissima* in the bush, but the two species can hardly be confused from herbarium specimens. Both *E. salubris* and *E. angustissima* have what I have termed "egg-in-egg-cup" buds, but I do not know the similarity "in many respects." The leaves and fruits sharply divide them.

### 2. With *E. oleosa*, F.v.M.

The affinity is suggested by Mueller. Attention is invited to Plates 65 and 66, Part XV of the present work. The only resemblance seems to lie in the buds, which, although as a rule are very different to those of *E. oleosa*, occasionally present some resemblance (e.g., Plate 65, fig. 6a). *E. oleosa* is exceptionally very narrow leaved (e.g., Plate 66, fig. 2a).

### 3. With *E. calycogona*, Turcz., var. *gracilis* (*E. gracilis*, F.v.M.).

This affinity is suggested by Mueller. The variety *gracilis* is figured at Plate 12, Part III of the present work, but the resemblance is not close, even if allowance is made for the fact that in exceptional shrubs the leaves of var. *gracilis* are even narrower than depicted. The buds of the latter are sub-angular and the fruits quite different.

4. With *E. uncinata*, Turcz.

This species is only brought under review because it sometimes bears very narrow leaves, and because Mueller suggested the comparison. Individual shrubs with very narrow leaves are more common than would be surmised from casual perusal of Plate 62, Part XIV of this work, which simply enumerates the various forms without reference to the relative frequency of individuals. On the evidence of buds, anthers, filaments and fruits the affinities of the two species are not close, but we must ever bear in mind the paucity of material of *E. angustissima*.

5. With *E. leptopoda*, Benth.

Bentham places *E. angustissima* next to *E. leptopoda*, Benth., which, however, includes *E. salmonophloia*, F.v.M., a species carved out of it later. (See Part XVII, p. 217).

There is certainly some resemblance in the fruits of *E. angustissima* and *E. leptopoda* (compare, e.g., fig. 6b, Plate 73, Part XVII of this work), but the fruits of *E. angustissima* are nearly sessile, while the leaves of *E. leptopoda*, though narrow, are by no means as narrow as those of *E. angustissima*.

6 and 7. With *E. linearis*, Dehnh., and *E. amygdalina*, Labill.

The typical forms of both species have linear leaves, and hence remind one of *E. angustissima*. For *E. linearis*, see fig. 5, Plate 30, Part VI of this work, and for *E. amygdalina* see fig. 1, Plate 29. But the leaves of both species are usually thinner and more aromatic, while the buds, anthers and fruits are different. *E. linearis* is a smooth-barked tree; the bark of *E. amygdalina* is more or less fibrous; both are much larger species than *E. angustissima*. At the same time we must bear in mind that we are ignorant of the size to which *E. angustissima* may attain.

8. With *E. apiculata*, Baker and Smith.

This is another narrow-leaved species. It is figured at 3, Plate 44, Part IX of the present work. It differs in all essential characters from *E. angustissima*.

9. With *E. cneorifolia*, DC.

On the label of a specimen "Towards the Tone River, Th. Muir," Mueller has the note "Near *E. cneorifolia* of Kangaroo Island."

This suggested resemblance or affinity occurred to me independently, but cannot be fully discussed until we know more about *E. angustissima*.

*E. cneorifolia* is figured on Plate 60, Part XIII of the present work, and sometimes has leaves nearly as narrow as those of *E. angustissima*, while the ventral seaming of the leaf is common to both species. The fruits of the two species are dissimilar, and the buds appear to be permanently different.

Mueller suggests *E. angustissima* as an oil-yielding species; *E. cneorifolia* is one of proved value in this respect.

## Explanation of Plates.

## PLATE 81.

*E. goniocalyx*, F.v.M.

1. Seedling leaf, Walhalla, Victoria (A. W. Howitt).
- 2*a*, 2*b*, 2*c*. Juvenile leaves, in the opposite and sessile stage; 2*d*, in the opposite and sub-petiolate stage; 2*d'*, mature leaf (some of the leaves are 15 inches long); 2*e*, young buds, which are angled. Note that the operculum is much shorter than the calyx-tube; 2*f*, fruits, slightly angled, pedicel long, smallish orifice, valves sunk; 2*g*, anthers, Mississippi Creek, near Metung, Victoria (J.H.M.) These specimens very closely resemble those of the type. The actual type specimens have either not been preserved, or their identity has not been preserved.
3. Buds with small pointed opercula. Major's Creek, N.S.W. (W. Bound.)
4. Small fruits, Bellbird Creek, Eden-Pambula. (A. W. Howitt.)
5. Still smaller fruits. Tantawango Mountain, near Cathcart. (J.H.M.)
6. Sessile fruits, Dandenong Mountain, Victoria. (J.H.M.)
7. Buds with longer opercula than those of the type. Mt. Victoria, N.S.W. (J.H.M.)
- 8*a*. Immature buds, 8*b*, 8*c*, fruits more hemispherical than those of the type, and with exerted valves, a character not found in the type. Mt. Wilson, N.S.W. (Jesse Gregson and J.H.M.)

*E. nitens* n. sp.(var. *nitens* Deane and Maiden on the Plate.)

- 9*a*. Juvenile leaf; 9*b*, 9*c*, mature leaves; 9*d*, 9*e*, young buds; 9*f*, fruits with slightly exerted valves; 9*g*, fruits. Haydon's Bog, Delegate district, N.S.W. (W. Baeuerlen.)  
The toothed appearance of the leaves is referred to at p. 272. 9*h*, fruits, Delegate River. (W. Baeuerlen.)
10. Buds throwing off the "umbel-" or "double-operculum," Dividing Range, Glenbog, Candelo, N.S.W. (J. Duff.)

## PLATE 82.

*E. eleophora*, F.v.M.

- 1*a*. Mature leaf; 1*b*, immature buds; 1*c*, angled fruits. Macalister Range, Gippsland (Mueller). Drawn from type specimen, herb., Melb.
2. Further developed buds. Note the comparatively small operculum and the angled calyx-tube (compare *E. goniocalyx* in regard to both characters).
- 3*a*. Juvenile leaves; 3*b*, 3*c*, 3*d*, fruits varying in size; 3*e*, buds and flower; 3*f*, anthers. Heathcote, Macedon, Victoria (W. S. Brownscombe). These specimens are practically identical with those of the type.
4. Fruits. Burrinjuck, N.S.W. (J. L. Boorman.)
5. Fruits, slightly immature; stalked. Mt. Lindsay, Nandewar Mountains, N.S.W. (R. H. Cabbage, No. 2393.)
- 6*a*. Blunt buds, the short opercula with diameter exceeding that of the calyx-tube; 6*b*, buds with pointed opercula; 6*c*, fruits, conoid in shape, and valves slightly exert. Mt. Macdonald, near Cowra, N.S.W. (R. H. Cabbage.)
7. Fruits, slightly stalked, nearly hemispherical, and valves slightly exert. Side of Tia River, below Falls, New England, N.S.W. (W. Forsyth.)
- 8*a*. Juvenile leaves; 8*b*, buds; 8*c*, fruit. Bathurst, N.S.W. (L. Stephenson.)
9. Elliptical juvenile leaf. Pambula to top of Big Jack, N.S.W. (A. W. Howitt.)
10. Buds, with the angles of the calyx-tube extended into short wings. Ringwood, Victoria (R. H. Cabbage.)
11. Fruits angled, slightly domed, and with valves well exerted. Maryborough, Victoria (J. Blackburne.)
12. Fruits, valves well exerted. Very similar to 11. Murrurundi, N.S.W. (J. L. Boorman and J.H.M.)
13. Fruits almost conoid and valves very exert. Adelaide and Barossa Hills, South Australia (W. Gill.)
- 14*a*. Buds, with almost pointed operculum; 14*b*, nearly hemispherical, thin-rimmed fruits, valves exert. Long Gully (Cassilis township), Victoria (Harry Hopkins.)

- 15a. Buds, with strap shaped peduncle, calyx-tube angled, operculum conoid; 15b, and 15c, coarse, angled (bi-angled) fruits. Nundle, N.S.W. (J. L. Boorman and J.H.M.). See No. 1, Plate 83.
16. Pair of leaves of seedling raised from seed collected at Perth, N.S.W. (J. L. Boorman). Note the narrowness of the leaves. This figure is inserted as a reminder that we may have narrow seedling leaves in a species in which the "sucker" leaves are uniformly broad. Comparison of a seedling with a sucker must be made with the eyes of experience, and, as a general rule, it may be said that it is safer to compare seedlings with seedlings and suckers with suckers.

### PLATE 83.

*E. elvophora*, F.v.M.—(continued).

- 1a. Juvenile leaf, stem-clasping and bluntly acuminate; 1b, buds, winged, and with warted opercula; 1c, fruit winged and with valves exsert. Nundle, N.S.W. (J. L. Boorman and J.H.M.). See also No. 15, Plate 82.
- 2a. Coarse buds; 2b, fruits, the largest in this species seen by me so far. Wyangle, 12 miles N.E. of Tumut, N.S.W. (R. H. Cambage, No. 880).
3. Small sessile fruits, slightly angled. Fainting Range, Victoria. (A. W. Howitt).
- 4a. Buds; 4b, smallish fruits, sunk rim, exserted valves. Bago Forest Reserve, Parish of Hindmarsh, near Tumut, N.S.W. (W. U. Nowland).
5. Small fruits. Valves slightly exsert. "Yellow Gum," Wingello, N.S.W. (A. Murphy).
6. Fruits larger than 5. Marulan (J. L. Boorman). Nos. 5 and 6 are from practically identical trees in the same district.
- I look upon 3-6 as showing affinities to *E. gonicalyx*, var. *nitens*.
- 7a. Buds and flower; 7b, small fruits of the type of *E. gonicalyx*: F.v.M., var. *pallens*, Deane and Maiden, Snowy River (Victoria and New South Wales) (Collector?) which I now look upon as a small fruited form of *E. elvophora*, F.v.M.
- 8a. Small fruits; 8b, fruits slightly domed. Mandurang, near Bendigo, Victoria. (J. Blackburne).
- 9a. Juvenile leaves; 9b, small fruits with flat rim. Mt. Moppra (4,000 feet), Warrumbungle Ranges, N.S.W. (W. Forsyth).
- Nos. 7-9 are, like Nos. 3-6, small fruited forms of this very variable species.

*E. cordata*, Labill.

- 10a, 10b. Juvenile leaves, Mt. Wellington, Tasmania (R. H. Cambage and J.H.M.).
11. Perfoliate leaf. Mt. Wellington (R. D. Fitzgerald, in Woollian herbarium, National Herbarium, Sydney).

### PLATE 84.

*E. cordata*, Labill.

- 1a. Twig with buds; 1b, twig with fruits. Facsimile of a portion of tab. 152, Labill. *Pl. Nov. Holl.* (the type). The crenulation of the margin is somewhat exaggerated in Labillardière's figure.
- 2a and 2b. Juvenile leaves; 2c, twig and buds; 2d, fruits. All fragments of Labillardière's type, received from Herb. Mus., Paris.
3. Twig with buds. Mt. Wellington. (R. D. Fitzgerald).
4. Stalked leaf and fruits. Note the slightly crenulate margin of the leaf (Gunn's No. 1071).
5. Anthers. Mt. Wellington (L. Rodway).
6. Oblong leaf taken from an upper branch of a tall tree. Mt. Wellington (T. Stephens).

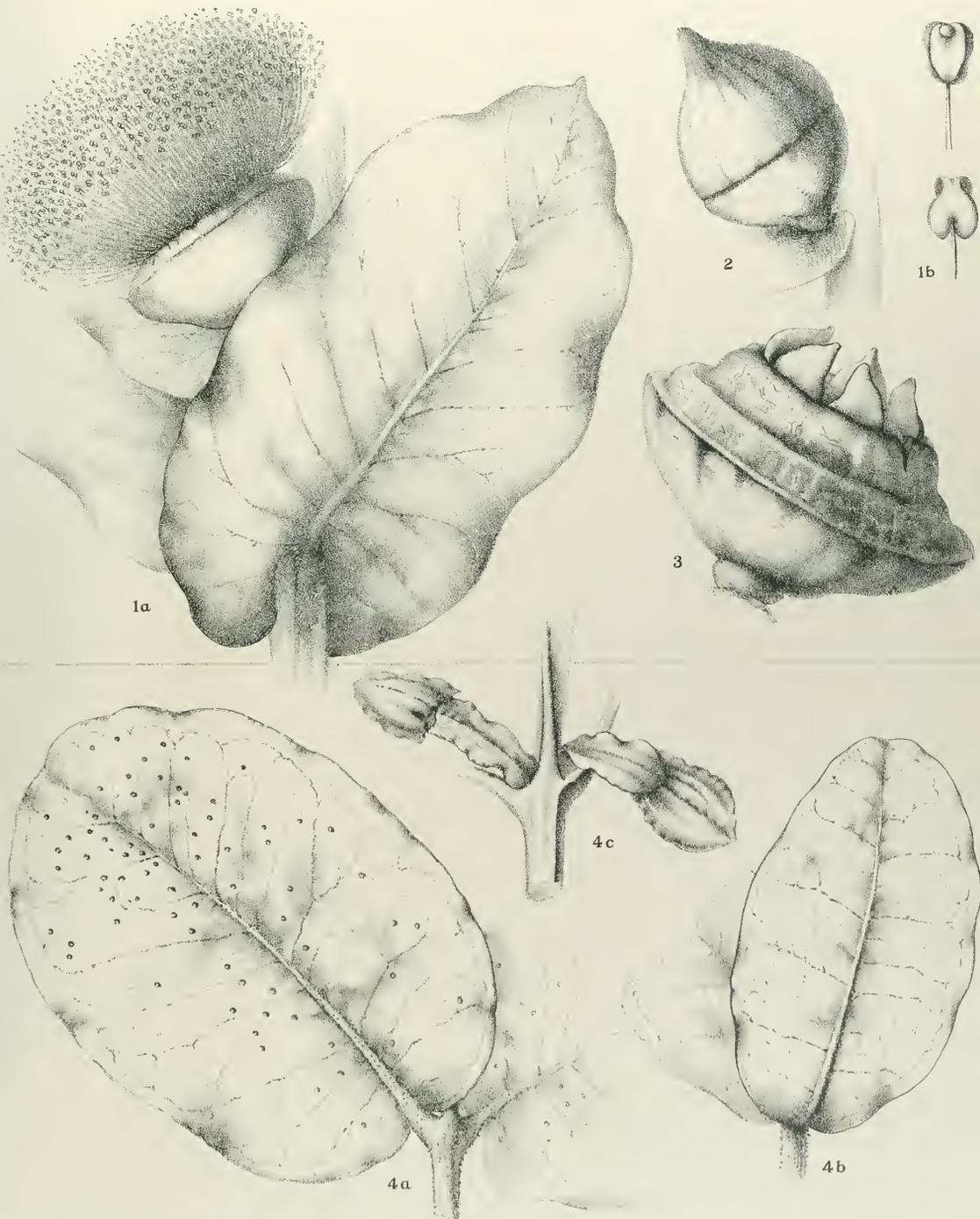
*E. angustissima*, F.v.M.

- 7a. Twig with buds (from specimen of co-type at Kew); 7b, leaf with fruits; 7c, anthers.  
7b and 7c reproduced from Fig. 16, (Mueller's "Forest Resources of Western Australia")  
Point Malcolm and to the eastward, W.A. (Maxwell). (Type.)
- 8a. Anthers (immature); 8b, fruits with leaf narrower than the type; 8c, end on view of fruit. Israelite Bay, W.A. (Collector?) Herb. Melb.).
- 9a. Twig with buds. Opercula conoid. 9b, fruits conoid and domed. Towards the Tone River, W.A. (T. Muir). Referred by Mueller to *E. angustissima*.

The following species of *Eucalyptus* are illustrated in my "Forest Flora of New South Wales" \* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

- |  |  |
|--|--|
| <i>acacioides</i> , A. Cunn. (xlviii)      | <i>melliodora</i> , A. Cunn. (ix).             |
| <i>acmenioides</i> , Schauer (xxxii).      | <i>microcorys</i> , F.v.M. (xxxviii).          |
| <i>amygdalina</i> , Labill. (xvi).         | <i>numerosa</i> , Maiden (xvii).               |
| <i>Andrewsi</i> , Maiden (xxi).            | <i>obliqua</i> , L'Hérit. (xxii).              |
| <i>Baileyana</i> , F.v.M. (xxxv).          | <i>ochrophloia</i> , F.v.M. (1).               |
| <i>Behriana</i> , F.v.M. (xli).            | <i>odorata</i> , Behr and Schlechtendal (xli). |
| <i>bicolor</i> , A. Cunn. (xlv).           | <i>paniculata</i> , Sm. (viii).                |
| <i>Boormanii</i> , Deane and Maiden (xlv). | <i>pilularis</i> , Sm. (xxxix).                |
| <i>Bosistoana</i> , F.v.M. (xlili).        | <i>piperita</i> , Sm. (xxxiii).                |
| <i>capitellata</i> , Sm. (xxviii).         | <i>Planchoniana</i> , F.v.M. (xxiv).           |
| <i>Consideniana</i> , Maiden (xxxvi).      | <i>populifolia</i> , Hook. (xlvii).            |
| <i>coriacea</i> , A. Cunn. (xv).           | <i>punctata</i> , DC. (x).                     |
| <i>corymbosa</i> , Sm. (xii).              | <i>regnans</i> , F.v.M. (xviii).               |
| <i>dives</i> , Schauer (xix).              | <i>resinifera</i> , Sm. (iii).                 |
| <i>fruticetorum</i> , F.v.M. (xlii).       | <i>saligna</i> , Sm. (iv).                     |
| <i>gigantea</i> , Hook. f. (li).           | <i>siderophloia</i> , Benth. (xxxix).          |
| <i>goniocalyx</i> , F.v.M. (v).            | <i>sideroxyton</i> , A. Cunn. (xliii).         |
| <i>hæmastoma</i> , Sm. (xxxvii).           | <i>Sieberiana</i> , F.v.M. (xxxiv).            |
| <i>hemiphloia</i> , F.v.M. (vi).           | <i>stellulata</i> , Sieb. (xiv).               |
| <i>longifolia</i> , Link and Otto (ii).    | <i>tereticornis</i> , Sm. (xi).                |
| <i>Luehmanniana</i> , F.v.M. (xxvi).       | <i>virgata</i> , Sieb. (xxv).                  |
| <i>macrorrhyncha</i> , F.v.M. (xxvii).     | <i>vitrea</i> , R. T. Baker (xxliii).          |
| <i>maculata</i> , Hook. (vii).             |  |

\* Government Printer, Sydney. 4to. Price 1s. per part (10s. per 12 parts); each part containing 4 plates and other illustrations.



EUCALYPTUS MACROCARPA, Hook. (1-3).

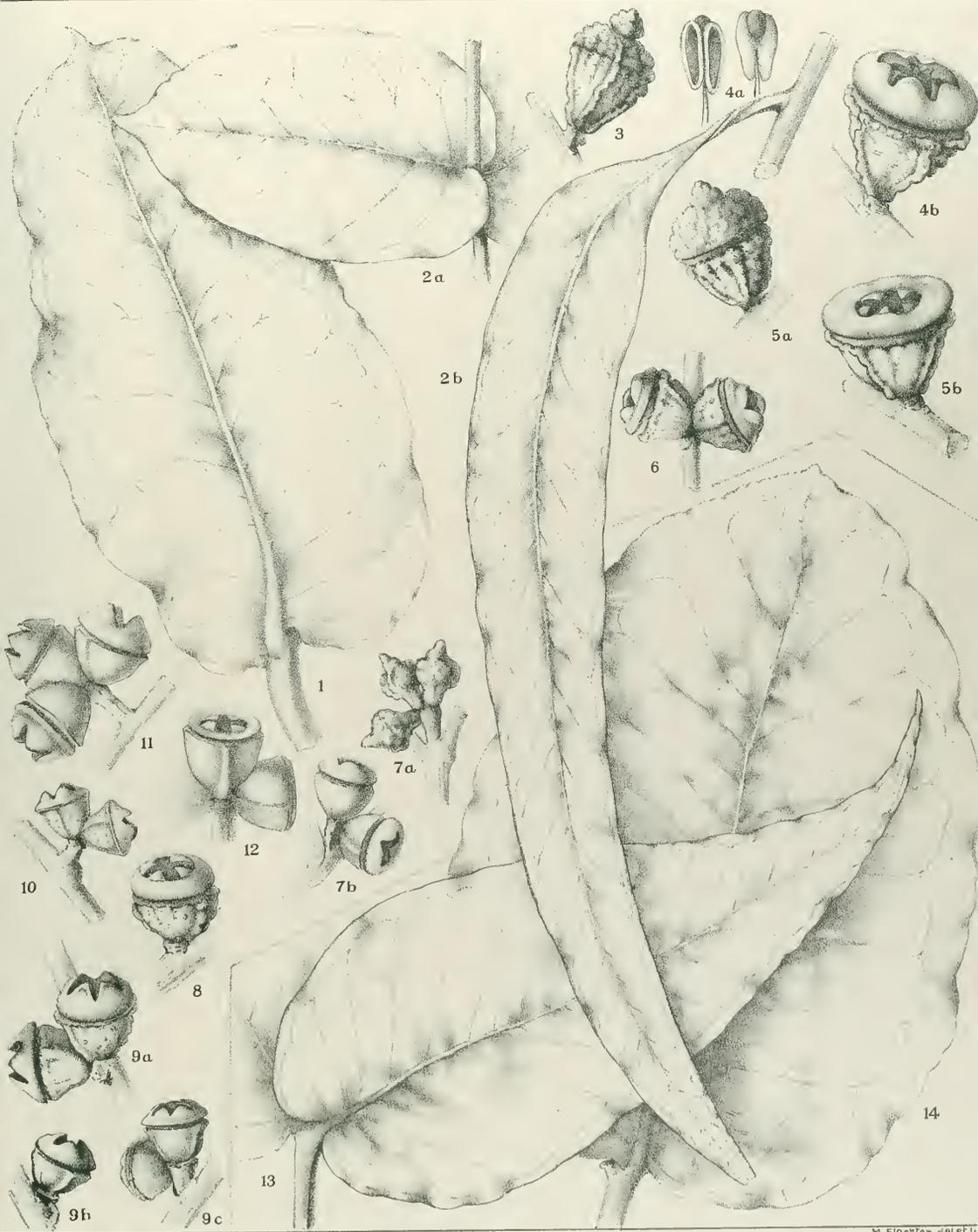




EUCALYPTUS PREISSIANA, SCHAUER (1-3). [See also Plate 77.]

E. MEGACARPA, F.v.M. (4-8).





EUCALYPTUS GLOBULUS, LABILL. (1-12).

E. MAIDENI, F.v.M. (13,14). [See also Plate 80.]

M. Flochon del. et lit.



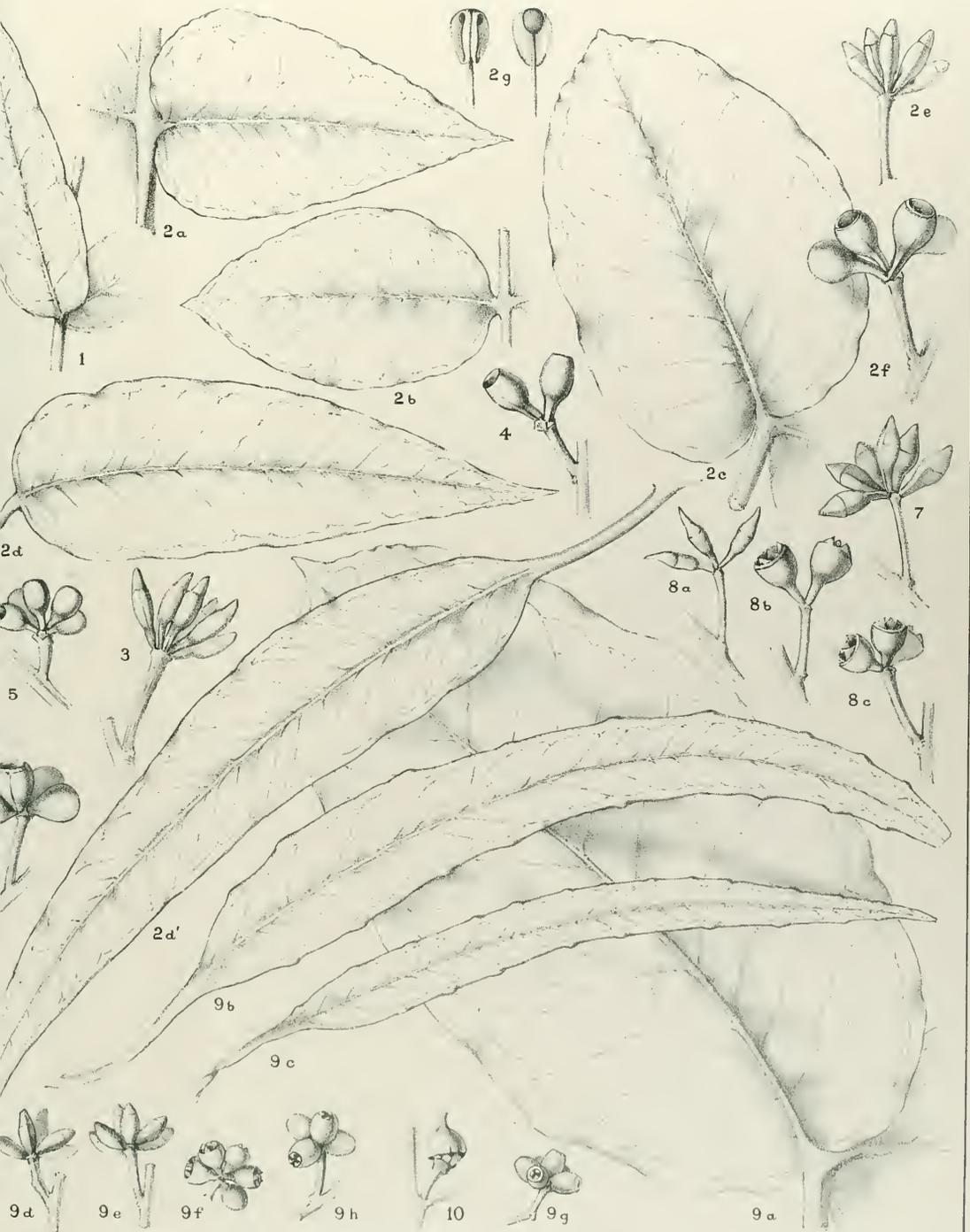


EUCALYPTUS MAIDENII, F.v.M. (1-12). [See Plate 79.]

E. URNIGERA, HOOK. F. (13-15).

M. Flockton del. et lith.



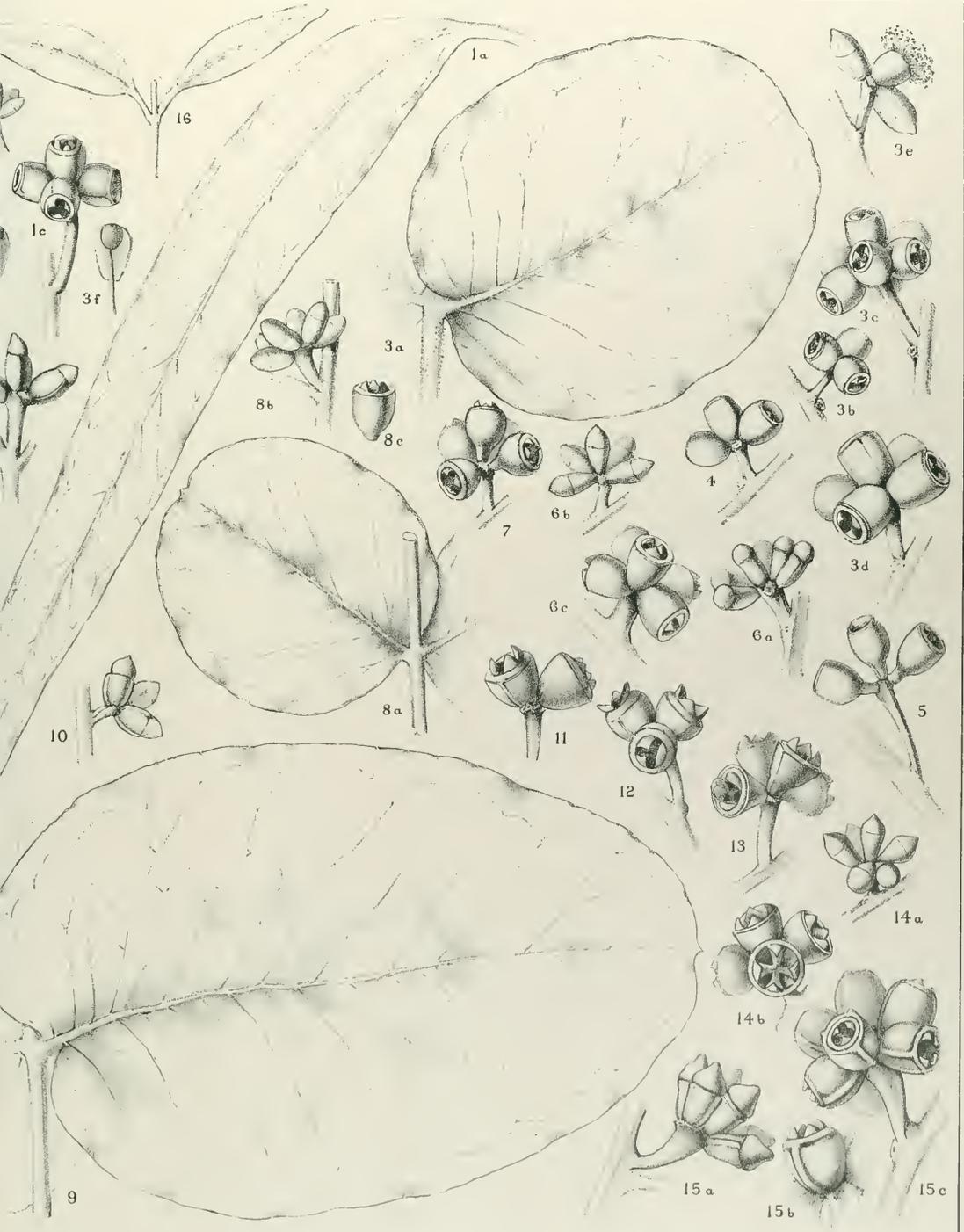


EUCALYPTUS GONIOCALYX, F.v.M. (1-8).

Var. *nitens*, DEANE AND MAIDEN (9-10).

M. Flochton del. et lith.

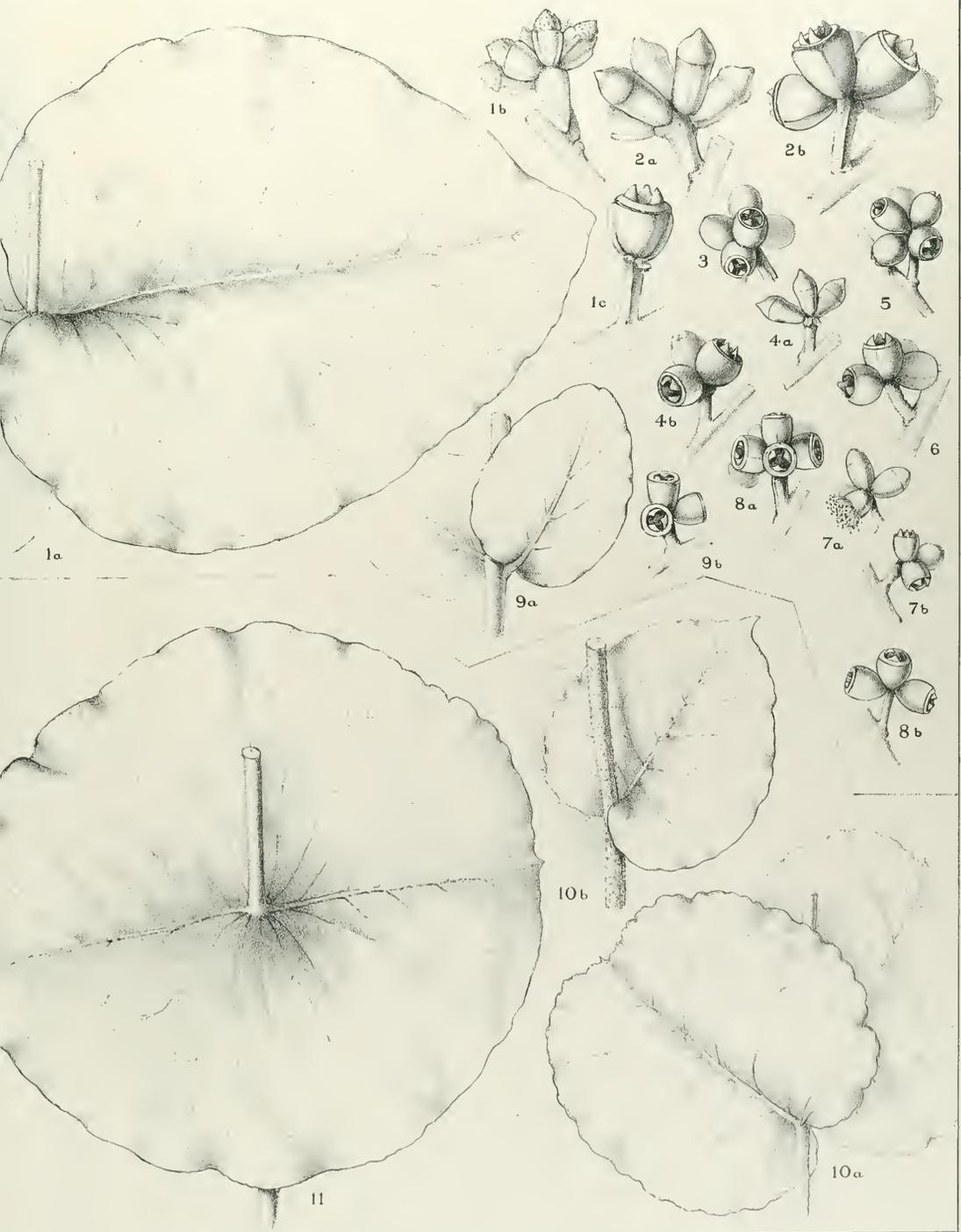




EUCALYPTUS ELÆOPHORA, F.v.M. [See also Plate 83.]

M. Floeckh del. G. F. IIIh





M. Flocken del. et lith.

EUCALYPTUS ELÆOPHORA, F.v.M. (1-9). [See also Plate 82.]

E. CORDATA, LABILL. (10-11). [See also Plate 84.]





EUCALYPTUS CORDATA, LABILL. (1-6). [See also Plate 83.]

E. ANGUSTISSIMA, F.v.M. (7-9).

PI. FLOREON. coll. of lith.



# A CRITICAL REVISION OF THE GENUS EUCALYPTUS

BY

J. H. MAIDEN

(Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney).

---

VOL. II. PART 10.

Part XX of the Complete Work.

(WITH FOUR PLATES.)

---

*"Ages are spent in collecting materials, ages more in separating and combining them. Even when a system has been formed, there is still something to add, to alter, or to reject. Every generation enjoys the use of a vast hoard bequeathed to it by antiquity, and transmits that hoard, augmented by fresh acquisitions, to future ages. In these pursuits, therefore, the first speculators lie under great disadvantages, and, even when they fail, are entitled to praise."*

MACAULAY'S "ESSAY ON MILTON."

---

PRICE TWO SHILLINGS AND SIXPENCE.

---

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THE GOVERNMENT OF THE STATE OF NEW SOUTH WALES.

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1914.



*CVI. Eucalyptus gigantea* Hook. f.

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# DESCRIPTION.

## CVI. *E. gigantea* Hook. f.

In *London Journal of Botany* vi, 479 (1847).

SEE also "The Botany of the Antarctic Voyage," Part iii, "Flora Tasmaniae," i, 136 (*partim*), with a plate (1860).

I have copied out the original description, and also the amplified description and the full text of Hooker's remarks at pp. 58-9, Part II of this work, so they need not be reproduced here. Attention may also be invited to my remarks on *E. gigantea* at p. 177, Part VI of this work.

In Part li of my "Forest Flora of New South Wales," I have given translations of the original description, and of that redescription which Hooker gave in *Fl. Tae.* i, 136.

The Plate 191 of Part li, has been reproduced in its essential details from Plate xxviii of *Fl. Tas.* *Op. cit.*, I state that Hooker mixed two closely allied trees, and it is better to disentangle the confusion, making it clear what refers to *E. gigantea* and what to *E. obliqua* (the species confused with it), than to perpetuate the confusion by permitting botanists to continue to assume that one is a synonym of the other, and to ignore Fitch's beautiful plate in Hooker's work.

There is nothing new in rectifying a description; the process is well known to European and American botanists. Coming to instances amongst Eucalypts, let us take the case of *E. resinifera* Sm. The type does not exist, and the plate quoted in White's "Voyage" shows a smooth bark. The name *resinifera* was used most loosely in the early days, as any student of early botanical literature knows. It was imagined to be the only "resin" (kino) producing species. Bentham, however, compiled the description so as to apply to the tree known in Eastern Australia as "Red Mahogany," and this became the *E. resinifera* Sm. accordingly of all modern botanists. See my "Forest Flora of New South Wales," vol. i, pp. 64 and 65, for some references.

Then *E. piperita* Sm. was looked upon as the species yielding Eucalyptus oil. As a matter of fact, it is a rather unsatisfactory species for oil. Smith's description of his species is not satisfactory (see vol. i, Part X, of the present work), and so were his specimens; but Bentham first properly defined the species.

In *Proc. Linn. Soc. N.S.W.*, xxvi, 556 (1901), I have partly dealt with the very great confusion that had gathered around *E. Stuartiana* F.v.M., which originally was the so-called Red Gum of Tasmania. In vol. ii, p. 14, I have shown that quite a different tree to that now accepted as *E. hemiphloia* F.v.M., was originally described by Mueller under that name.

In Part XIX of the present work, I have tried to clear up the confusion, chiefly and quite pardonably, caused by Mueller in regard to his own species *E. elatophora* and *E. goniocalyx*. I could give other instances of amended descriptions, both in Eucalypts and in other Australian plants, an important object being not to multiply names unnecessarily.

Neither Hooker's original description nor his amended one in *Flora Tasmaniae* applies exclusively to *E. obliqua* or *E. gigantea*. There is more to go upon in the *Flora Tasmaniae*.

First we have Gunn's specimens Nos. 1,095, 1,104, 1,106, 1,965, 1,966, which are as follows:—

1,905 is *E. obliqua*. Some of the material under this number may be *E. gigantea*.

1,104 is *E. obliqua*.

1,104 (second specimen) is *E. gigantea*.

1,106 is *E. obliqua*.

1,965 is *E. gigantea*.

1,966 is *E. gigantea*.

I have re-examined the above specimens, with some additional material; I had previously examined them for the present work (I, 178).

Glaucousness is by far the commoner in *E. gigantea*, but it occurs also in *E. obliqua*.

Then as to the use of the terms "Stringybark" and "Stringybark Gum," as applied by Hooker. *E. gigantea* is often known as Stringybark, although it is more frequently applied to *E. obliqua*. Indeed, perhaps the commonest name for the former is "Gum-topped Stringybark," the branches being more or less smooth. The two trees often carry the same vernaculars, especially when not fully grown.

Undoubtedly the two species are closely allied. Some years ago I made *E. gigantea* *E. obliqua* var. *alpina*, and there is much to be said in favour of that view. According to the opinions of various people as to what amount of difference constitutes a species as distinct from a variety, so one may look upon it as a variety of *E. obliqua*, and another as a distinct species. I think it is better to look upon this tree as a distinct species, but I came to that conclusion very gradually. I have specimens which most closely connect the two species, whose affinities are not so obvious from typical forms.

*E. gigantea* generally succeeds *E. obliqua* in alpine situations; its bark is whiter, more matted (Box-like)—that is to say, less fibrous—while the branches are smoother and more glaucous, the opercula less pointed, the fruits more pear-shaped, and the foliage more succulent and more pleasantly aromatic.

*E. gigantea* was subsequently described by Mueller in *Fragm.* ii, 44, and at p. 45 its supposed differences from *E. obliqua* L'Hérit. were stated. *E. obliqua* was then not known to him, and he followed Hooker in confusing the two species.

Mr. Harry Hopkins has favoured me with the following notes in regard to the bark:—

*E. gigantea* has tall clean tapering trunks, the bark on the lower half of stem very thick and woolly, like stringybark. This ceases abruptly at about half the height of the stem or barrel, no matter what height the tree or length of stem may be. Above this the bark is quite clean, very thin, only about half an inch thick, of a pale bluish grey or whitish colour, the old bark peeling off in long thin strips, which do not generally hang loosely about the stem and branches, as is the case with *E. regnans*.

---

## SYNONYMS.

It has long been confused with *E. obliqua* L'Hérit., as already explained, and also to a less extent with *E. hæmastoma* Sm.

*E. delegatensis* R. T. Baker, and *E. obliqua* L'Hérit. var. *alpina* Maiden, are also synonyms.

---

## RANGE.

It is a species of cold localities, having only been found in the higher elevations of Tasmania, Victoria, and southern New South Wales.

Following are some of the localities represented in the National Herbarium, Sydney.

### TASMANIA.

“Gum-topped Stringybark,” Lake Sorell (T. Stephens).

Mount Wellington (Gunn, Nos. 1,965, 1,966). I have another 1,965 Gunn which is from Arthur's Lakes, and the original of Hooker's figure in *Fl. Tas.* Arthur's Lakes (Gunn, No. 1,10), *partim*).

Marlborough (in Gunn's Herbarium, but collected by J. D. Hooker). Marlborough is Upper Derwent, near Lake St. Clair.

“Gum-topped Stringybark,” East Mount Field.

Guildford Junction, 2,000 feet, basalt formation. Locally known as “Stringybark.” Bark fibrous, not a true Stringybark; branches usually smooth. Trees up to 150 feet. (R. H. Cambage.)

Parattah and Russell Falls River (T. Stephens).

## VICTORIA.

Great Divide (western side), Dargo High Plains, Snowy Plains, Twelve Mile Creek (A. W. Howitt); "Messmate," Mount Mueller, near Mount Baw Baw (James Melvin); Mount St. Bernard (J.H.M.).

Tops of Mounts Arnold and Strickland, at an elevation of from 3,400 to 4,000 feet. The smallest branches very tough. (W. Inglis, through J. Blackburne.)

"Woolly-butt." On the mountain slopes of the Main Dividing Range from Dargo to Mt. Delegate, between 3,000 and 4,500 feet above sea level. Appears to be strictly confined to that zone. A medium-sized, sometimes large tree, 200-300 feet high, up to 6 feet in diameter. Tall, clean, straight, slightly tapering stem. Bark on *lower half* of stem very thick and woolly, like stringybark. This ceases abruptly at about half the height of the stem or barrel, no matter what height the tree or length of stem may be, and above this the bark is quite clean, very thin, only about half an inch thick, of a pale bluish grey colour, or whitish, the old bark peeling off in long, thin strips, which do not generally hang loosely about the stem and branches, as is the case with the Gippsland Blackbutt (*E. regnans* var. *fastigata*). The trees are remarkably sound at heart, even the largest trees rarely showing any sign of pipe or heart decay. The wood is remarkably light, easy to work, and very suitable for joiners' work." (H. Hopkins.)

## NEW SOUTH WALES.

Delegate Mountain and Snowy Mountains, 4,000-5,000 feet, on dry ridges (W. Baeuerlen); Eucumbene, near Kiandra, Yarrangobilly Caves (A. W. Howitt); Laurel Hill, Tumberumba (R. H. Cambage); Mount Kosciusko (J.H.M.); Tumberumba (A. Murphy).

---

 AFFINITIES.
1. With *E. obliqua* L'Hérit.

This is the species that *E. gigantea* will be confused with by most people in the future as it has been in the past, but as I have already dealt with the matter pretty fully, it seems not necessary to go over the ground again at this place.

## DESCRIPTION.

CVII. *Eucalyptus longifolia* Link and Otto.

It was originally described in Enum. Hort. Berol. ii, 29 (1822).

This short description is in Latin, and will be found in my "Forest Flora of New South Wales," vol. i, p. 33. An excellent plate was published by Link and Otto in *Icones Pl. Sel.* 97, t. 45 (1846).

Then Bentham (B.Fl. iii, 226) published a description in English, and Mueller described and figured it in his "Eucalyptographia." A plate and a full account of this tree will be found in my work quoted above.

## SYNONYM.

*E. Woollsii* F.v.M. (Fragm. ii, 50).

## RANGE.

The type probably came from Port Jackson, and the species has not hitherto been recorded much north of it, the Hunter River district (Raymond Terrace) being the furthest recorded in that direction. Going west we have it from the foot of the Blue Mountains, while southerly it keeps to the coastal strip and occurs in Eastern Victoria. Following are some specific localities.

## VICTORIA.

Sealers' Cove (A. W. Howitt and J. L. King); East Gippsland, without more definite locality (C. Walter).

## NEW SOUTH WALES.

Eden (A. W. Howitt, J.H.M.). S. Mossman (after whom Mosman's Bay Sydney, was named), No. 269, collected at Twofold Bay for the Paris Exhibition of 1855, is this species; Merimbula (A. W. Howitt); Wolumla (E. Francis); Bateman's Bay (H. Deane, J. V. de Coque); "Woolly Butt," "Redwood," "Peppermint," Ulladulla (J. S. Allan); Narrawallie Creek, Milton, scarce (R. H. Cambage); Nowra (J.H.M.); Appin (H. Deane, J.H.M.).

Wyce (A. Murphy); near Raymond Terrace (A. Rudder), which is the most northerly locality known to me.

Mt. Pleasant, Penrith (J. L. Boorman). The most westerly locality known to me.

*Hybridism.* In vol. ii, p. 186, of my "Forest Flora of New South Wales," I have drawn attention to a probable hybrid between this species and *E. robusta* Sm., from Erina Creek, near Gosford. I will figure this interesting form when I deal with hybridism in the genus.

---

## AFFINITIES.

Bentham (B.Fl. iii, 194) associates it most closely with *E. pyriformis* Turcz., *E. conoidea* Benth. (*E. erythronema* Turcz.), *E. urnigera* Hook., *E. cæsia* Benth. on an anthereal basis as usual. Mueller mentions the following four species:—*E. leucozyllon*, F.v.M., *E. cæsia* Benth., *E. erythronema* Turcz., and *E. cosmophylla*, F.v.M.

In its anthers it is very close to *E. urnigera* Hook. f., *E. cordata* Labill., *E. globulus* Labill., and *E. megacarpa* F.v.M., some of which have been dealt with in Part XVIII.

### 1. With *E. globulus* Labill.

It certainly has a strong affinity with the *E. globulus* group, but the timber of *E. globulus* is pale coloured. Like some other species, it may not be possible to place it next to one species without qualification, and in the grouping and "genealogical" tree I shall submit later, it will probably be found that the intensity of the affinity of some species to others can only be assessed on points based on examination of all known characters.

### 2. With *E. Planchoniana* F.v.M.

*E. longifolia* can readily be determined from its fruit, which is usually in threes. It has the largest fruit of any of the Eastern Australian species, except *E. Planchonina* F.v.M., whose fruits are not only large, but they are ribbed. The shape of the fruit in *E. longifolia* is characteristic; the size and the sculpture of the rim vary somewhat.

The two timbers are different, that of *E. longifolia* being red, and *E. Planchoniana* pale coloured.

3. With *E. robusta* Sm.

These two species have undoubted affinities; they have both red timbers, the anthers are not very dissimilar, and the fruits have somewhat the same shape, but the rim is very different, as is the texture and venation of the leaves.

4. With *E. leucoxylon* F.v.M.

This is also a large fruited species, and fig. 12e, Plate 56, of this work may be referred to. The anthers are different, and the trees are not closely allied.

5. With *E. urnigera* Hook. f.

Its anther resembles that of *E. urnigera* very closely, but the affinities of the two species would not appear to be great (see Plate 80).

## DESCRIPTION.

CVIII. *E. diversicolor* F.v.M.

In Fragm. iii, 131 (1863).

It was then described in English in B.Fl. iii, 251, and again described and figured in the "Eucalyptographia." Mueller reproduced his own figure, and redescribed the species more briefly in his "Forest Resources of Western Australia" (1882). The fruits are depicted too conoid.

After seeing much growing Karri, I have elsewhere suggested that it corresponds in habitat, in general appearance, both of tree and timber, to the Blue Gum (*E. saligna* Sm.) of Eastern Australia.

The outline of the juvenile leaf is shown in the "Eucalyptographia" Plate, while the venation is shown on fig. 7a of Plate 86 of the present work. The young foliage is very thin in texture, with pale undersides. Mucller ("Eucalyptographia") speaks of this tree in superlative terms. He says:

One of the grandest trees of the globe and one of the greatest works in the whole creation of plants. Astounding records of the height of this giant tree have been given. Messrs. Muir saw trees with stems about 300 feet long up to the first branch, and I myself noticed many trees which approached to 400 feet in their total height.

One is reminded of the quoted heights of the Victorian Mountain Ash, *E. regnans*, only a few miles from Melbourne, which shrank from 525 to 326 feet on investigation. See p. 183, vol. i, of the present work, and p. 161, vol. ii, of my "Forest Flora of New South Wales," where the general question of the heights of Australian and American trees is reviewed. The fact is that the estimated height of a very high tree is valueless as a specific record. No estimates are worth anything unless they are backed by the observations of a surveyor or other competent person. In many forests it is exceedingly difficult to take observations, and a perfectly honest man may be very easily mistaken.

But this can be certainly stated, that the Karri does attain a huge size. I have wandered in Karri forests and individual trees are stupendous, but I would not like to quote their size in figures, since I had no means of measurement or comparison with me.

In my review of the heights of Australia's tallest trees, already referred to, the following passage occurs:—

Turning to Western Australia, Mucler, in "Seemann's Journal of Botany," states that Mr. Pemberton Walcott measured a Karri (*Eucalyptus diversicolor*) in one of the delightful glens of the Warren River, "where it rises to approximately 400 feet."

On another occasion "Messrs. Muir saw trees with stems 300 feet long up to the first branch, and I myself noticed many trees which approached to 440 feet in their total height. When closely growing the young trees may have a comparatively slender trunk, so much so that a tree 180 feet high may show a stem hardly over a foot in diameter."

These figures require verification.

The Karri tree has a red timber, and undoubtedly resembles Jarrah (*E. marginata*) a good deal. All people agree as to their external similarity, and many people have their own methods of distinguishing them. In the forest or in the log, the differences of habitat and appearance are obvious enough, but they closely resemble each other as sawn stuff. A good test is by burning, when Karri burns to a white ash, while Jarrah leaves a black charcoal.

It is not within the scope of this work to offer a pronouncement in regard to the Karri-Jarrah question. An official Western Australian statement is—

"Karri" (*Eucalyptus diversicolor*).—Height of average tree about 150 feet, running to 6 feet in diameter at breast high. The timber is heavy, dense, tough, elastic, and closely resembles Jarrah in appearance, weighing about 63 lb. per cubic foot when seasoned. Economic uses—Railway car and waggon frames and bodies, bridge timbers, flooring, p'anking, telegraph pole arms, felloes, shafts, woodblocking.

"Jarrah" (*Eucalyptus marginata*).—A tree averaging 90 to 100 feet in height, and from 2 to 3 feet in diameter at the base. The wood is very hard and dense, weighing about 60 lb. per cubic foot when seasoned. Economic uses—Railway sleepers, jetties, bridges, marine and engineering works of all kinds, building construction, flooring, woodblocking, boat-building, fencing, furniture, &c.

The consensus of Western Australian opinion seems to be that the use of Karri in engineering works is for superstructure only. Undoubtedly it is a valuable timber in the directions indicated in the statement just quoted.

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## SYNONYM.

*E. colossea* F.v.M.

In Fragm. vii, 42, the seedlings are described, but I cannot find that a formal description of the species was published.

In "Eucalyptographia," under *E. diversicolor*, occurs the passage—

" . . . . led to the belief that the gigantic Karri was specifically different, and hence it became temporarily distinguished as *E. colossea*, under which very impressive designation it chiefly still passes in the countries around the Mediterranean Sea."

Under this name *E. diversicolor* F.v.M. has been distributed to various herbaria.

## RANGE.

It is confined to south Western Australia, and it has been stated to cover 2,300 square miles of country. In the original description Mueller (quoting Augustus Oldfield) speaks of it occurring in low-lying places, where it is known as "Blue Gum." This term is not inappropriate, as generally applied in Australia, but at least another species goes by this name in south West Australia, and in course of time the native name "Karri" (now exclusively used) became applied to it. Mueller, in the "Eucalyptographia," states its range in the following words:—

In the moist hilly or mountainous country at and near the Frankland and Walpole Rivers, the Shannon, Warren and Dunolly Rivers, more particularly towards the coast, extending about 30 miles or less inland, reaching the country near the entrance of the Blackwood River (J. Forrest), constituting the Karri-forests, occurring sparingly also at the Porongurup and Torbay (F.v.M.), and around Mount Manypeak (Maxwell).

Bentham records that it was collected by Robert Brown (I have seen a specimen labelled 4,769, King George's Sound), and Mueller says that it is Drummond's Nos. 39 and 59.

I found it abundant in the Margaret River district.

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## AFFINITIES.

### 1. With *E. Guilfoylei* Maiden.

Its closest affinity appears to be with *E. Guilfoylei* Maiden, and I will refer to the matter when dealing with that species.

### 2. With *E. drepanophylla* F.v.M.

The silky sheen of the leaves sometimes seen in this species is also observable in those of *E. diversicolor*, and a fine venation is common to both. Sometimes both species have clavate buds; but the two species have no close affinity, *E. drepanophylla* being an Ironbark.

## DESCRIPTION.

CIX. *E. Guilfoylei* Maiden.

IN Journal of the *Western Australian Natural History Society*, vol. iii (January, 1911).

Following is the original description :—

Arbor altus, cortice fibrosa, ligno pallido et fissile.

Foliis juvenibus tenuis, glabris, pallidioribus inferiore latere, petiolatis, venis, lateralibus tere parallelis et tenuissimis.

Foliis maturis coriaceis, lato lanceolatis venis lateralibus tenuibus.

Pedunculis angularibus gemmis operculis fere hemisphericis Flores non vidi.

Fruetibus truncatis similibus piro formatis, aperte angularibus, vix 1 cm longis et aliquanto minis maximo diametro. Margine depresso, apicibus valvularum omnino in orificio.

A tall tree, with fibrous or stringy bark to within a few feet of the branches; timber pale-coloured and fissile.

**Seedlings.**—Hypocotyl tapering very gradually into the root, crimson, like the petioles of the cotyledonary leaves, and of the young axis and petioles, the cotyledonary leaves nearly reniform in shape and crimson underneath. The young leaves petiolate from their earliest stages, elliptical, tapering slightly into the petiole and into a terminal point, venation looped.

**Juvenile Leaves.**—Thin, glabrous, paler on the lower side, petiolate, ovate-acuminate, about twice as long as broad (say, 4 by 2 inches), midrib prominent, distinctly raised on the lower surface and exhibiting a slight channelling on the upper; lateral veins nearly parallel, making an angle of about 130 degrees with the midrib, very fine, intramarginal vein not conspicuous and not far removed from the leaf-margin.

**Mature Leaves.**—Coriaceous, equally green on both sides, drying pale, nearly symmetrical, broadly lanceolate, up to 6 inches long, and more commonly a quarter of that wide in the widest part, with a distinct midrib and abundant fine lateral parallel veins, making about an angle of 30 degrees with the midrib, scarcely visible in mature leaves, circumferential vein marginal or very close to it, oil-dots fine, the leaves not rich in oil.

**Buds and Flowers.**—A profuse flowerer. Inflorescence a compound panicle, peduncles very angular. Buds in umbels up to 7 in., the head on a long flat peduncle, the buds nearly sessile, the angular calyces tapering into the very short pedicels. Operculum nearly hemispherical and less than half the length of the calyx.

**Fruits.**—Truncate pear-shaped, with a marked angle and frequently a second one diametrically opposite to it. Barely 1 cm. long, and slightly less in greatest diameter. Rim sunk, three to four valved, with the points of the valves completely sunk within the orifice or approaching the same; not seen protruding.

In honour of William Robert Guilfoyle, late Director of the Botanic Gardens, Melbourne, who, when in office, actively promoted the cultivation of the especially beautiful flora of Western Australia.

The following information has become available since publication of the original description :—

**Anthers.**—*E. Guilfoylei*: Anthers kidney-shaped. The two cells diverging widely from each other, opening in horizontal wavy *slits along the base of each cell*. Filament at base, small gland at the top, a little in front, not versatile. The anther seems unique, so far as I know at present.

*E. diversicolor*: Anther opening in vertical parallel slits, and separating a little at the tips, an immense gland covering the top and seen on both sides of the anther; versatile.

Anther affinities — *E. megacarpa*, *globulus*, and *goniantha*, with rather smaller slits.

This is known as the "Yellow Tingle Tingle."

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## AFFINITIES.

### 1. With *E. diversicolor* F.V.M.

The affinities of the two species, as far as herbarium specimens are concerned, are very close. The bark of *E. diversicolor* is smooth and the timber red; these two characters sharply differentiate the two trees in the bush.

The seedlings of the two species are very similar.

The juvenile foliage (suckers) of *E. diversicolor* appears to be more orbicular.

The mature foliage of the two species is very similar.

The buds of *E. diversicolor* are less angular, and the operculum is usually more conical. The comparison of anthers has just been given.

The fruits of *E. diversicolor* are less pear-shaped, there being a sharp accentuation between the fruit proper and the distinct pedicel. When unripe, there is a distinct rim and a tendency to be urceolate, which I have not noticed in *E. Guilfoylei*.

### 2. With *E. patens* Benth.

The affinities of these two species are close, so far as herbarium specimens are concerned.

The juvenile foliage of *E. patens* has the marginal rim further removed from the edge and the lateral veins more prominent and looped. The juvenile leaves of *E. patens* are sessile and even stem-clasping. Those of *E. Guilfoylei* have a fairly long petiole, and the lamina tapers towards the petiole.

The mature foliage is not very dissimilar at first sight. The venation of *E. patens* is more spreading (?), the buds less angular, the opercula more pointed, and the fruits larger, more spheroidal, not angled, and sharply accentuated from the short pedicels.

The bark of *E. patens* is softer and less fibrous, and the timber appears to be paler, softer, less fissile, and heavier. The bark of Blackbutt (*E. patens*) may be described as follows:—

Rough bark all over stem and branches, soft, thick, greyish black, much resembling that known as Woolly-butt in the Eastern States.

## RANGE.

*E. Guilfoylei* is locally called "Yellow Tingle Tingle." It occurs on the edges of Karri (*E. diversicolor*) forests, between the Denmark River and the Leeuwin, in deep gullies. The local timber-getters look upon it as a hybrid ("bastard" in ordinary Australian timber parlance).

Type—Denmark, Western Australia. A. Murphy, March, 1905.

*E. Guilfoylei* has been described as resembling the Jarrah in general appearance, but the bark of the Jarrah is less rough.

This tree (Yellow Tingle Tingle) is in appearance very like the White Mahogany (*E. acmenioides* Schauer.—J.H.M.) of New South Wales. The tree is sometimes about 4 feet in diameter, the average is 2 to 3 feet, the height over 100 feet. The timber is good and durable, splits well, is used for palings and fencing, is sawn up for house-building purposes, and should make good railway sleepers. It grows in rich red loamy soil in the Karri hills, where it is fairly plentiful, at Denmark, Western Australia. It is entirely a different tree from the Karri. (Andrew Murphy and Louis Dillon.)

Mr. Andrew Murphy, of Woy Woy, New South Wales, first drew my attention to this tree in 1905, he having received seed from Western Australia.

When recently in Western Australia, I found the tree not in flower, and appealed to the Surveyor-General (Mr. Harry F. Johnston) for information. He gave me a copy of the following report by Mr. H. S. Brockman, Inspecting Ranger, to the Inspector-General of Forests:—

There is another tree growing in the vicinity of Denmark, which is locally known by the same name, and in general appearance is identical to the Frankland River timber, but on examination I found the colour and texture of the wood quite different, the Denmark timber being quite a yellow or "Boxwood" colour.

## DESCRIPTION.

### *CX. E. patens* Bentham.

In *Flora Australiensis* iii, 247 (1866).

It was subsequently described and figured in "Eucalyptographia." It is a large tree, grows in damp land, and has rough bark all over the trunk and branches. Said bark is soft rather than hard, thick, greyish black. In Western Australia such a bark is called "Blackbutt." In the Eastern States it would be called "Woolly-butt." The tree reminded me somewhat of Jarrah in general appearance, but Jarrah bark is less rough.

The juvenile leaves opposite or ternate from broad to narrow-ovate, large, strictly sessile, cordate, and the broader ones auriculate, mostly abruptly drawn at the top into a narrow point, often  $\frac{1}{4}$  of an inch long, the thickened margins indistinctly and irregularly erenulate. They have not been previously described, and were sent by Mr. Max Koch from the Preston Valley. (Maiden in *Journ. W.A. Nat. Hist. Soc.* iii, 1911.)

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## RANGE.

It is a common species in south Western Australia. Bentham originally quoted Harvey River, *Oldfield*, Tone River and granite rocks near Cape Arid, *Maxwell* (apparently the most eastern locality so far), and also quoted *Drummond's* 4th Collection No. 72.

Mueller ("Eucalyptographia") adds "in damp valleys of the Upper Swan River and on slopes of fertile ridges on the Blackwood River." It is not referred to in his "Forest Resources of Western Australia" (1882).

It is the common "Blackbutt" of south Western Australia. In my trip it first appeared at about 5 miles out from Yallingup, going to the Margaret River. On the eastern (W.A.) gold-fields, however, the term "Blackbutt" is applied to several other species.

It is represented by the following specimens in the National Herbarium, Sydney.

Drummond's No. 72. Wooroloo (Max Koch, No. 1,419). Tree 15-20 metres high, bark ashy grey. Swan River, Darling Range (L. Diels' No. 1,439). Tree 40 feet or more, rough grey bark on trunk. Swamp, Talbot district, 12 miles south-west of York (L. O. & O. H. Sargent, Nos. 736 and 736a). Jarrahwood (Forest Ranger Wm. Donovan), Blackwood district (Diels' No. 2,535) 6 miles from Busselton (Percy Murphy). Preston Valley (M. Koch). Up to 30 feet, glaucous foliage. With *E. cornuta*, Kent River, near Lake Muir (L. Diels' No. 2,632). Shrub 2 metres high. King George's Sound (L. Diels' No. 2,271).

*Preiss'* No. 252. See *Plantæ Preissianæ* i, 130, under *E. rudis*, Endl. Specimens in immature fruit in Herb. Barbey Boissier are labelled "*E. rudis* Endl. (Preiss No. 252)."

It is probable that these specimens are referred to in the following passage in B.Fl. iii, 247, under *E. rudis*, "and in Preiss's collection in fruit distributed with the flowering specimens of *E. rudis* but apparently not seen by Schauer."

Under *E. rudis* Bentham (B.Fl. iii, 245) quotes Preiss' No. 252 and adds "I have not seen Huegel's specimens, but quote them on Schauer's authority, who has compared them. The fruiting specimens distributed by Preiss (not described by Schauer) belong to *E. patens*, which has much resemblance with *E. rudis* in foliage, but differs in inflorescence, flowers, and fruit."

I believe these to be likewise *E. patens*. In other words, immature fruiting specimens of *E. patens* were mixed up and distributed with *E. rudis* (Preiss' No. 252).

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## AFFINITIES.

### 1. With *E. diversicolor* F.v.M.

This has already been dealt with, ante, p. 302.

### 2. With *E. Todtiana* F.v.M.

Its closest affinity appears to be with this species, and I will deal with it when I come to *E. Todtiana*.

## DESCRIPTION.

CXI. *E. Todtiana* F.v.M.

In Wing's *Southern Science Record*, Melbourne, for August, 1882, Vol. ii, p. 171.

As this work is now scarce, I give the text of the original description:—

Arborescent, but not tall; *leaves* rather small, rigid, narrow-lanceolar, slightly curved, almost equilateral, shining on both sides, scarcely paler beneath; *veins* pinnately spreading, much immersed, the circumferential vein only slightly removed from the edge; oil-pores concealed; *flower stalks* axillary, rather long not much compressed, bearing from four to seven flowers; *stalklets* none or exceedingly short; *calyces* longitudinally streaked; their tube semiovate, attenuated at the base, somewhat longer than the hemispheric lid; *stamens* all fertile, with exception of some of the outermost inflexed before expansion; *anthers* nearly heart shaped, anteriorly dehiscent with longitudinal upward confluent flits; *stigma* not dilated; *fruits* rather large, nearly globular or truncate-ovate, their margin thin; valves three, enclosed, very short; *sterile seeds* mostly broad; *fertile seeds* expanding laterally into a transparent membrane. Near the Greenough and Arrowsmith Rivers on sandy ridges, F.v.M., near the Moore River, J. Forrest. Allied as well to *E. buprestium* as to *E. patens*. Named in honour of Mr. Emil Todt, through whose artistic talent numerous species became illustrated for the "Atlas of Eucalypts." [Generally known as "Eucalyptographia."—J.H.M.]

Mueller subsequently figured it and gave additional notes, in his "Eucalyptographia."

Mueller spoke of it as a small tree, but in the districts north of Perth it evidently does not attain its full development. It is, however, a species with a trunk 3 feet in diameter at South Perth. It has narrow juvenile leaves. The branches are very brittle. It is not a commercially valuable timber tree, having a short trunk, with rather brittle, non-durable timber.

## RANGE.

It is confined to Western Australia. Mueller gives the localities "Near the Greenough and Arrowsmith Rivers, on sandy ridges (Mueller); in the vicinity of the Moore River (J. Forrest)." The Greenough flows into the ocean near Geraldton, while the Arrowsmith is a few miles further south. The Moore River is about 50 miles north of Perth. It was not known to Mueller that it grows in the vicinity of Perth, where it attains a much larger size than he was aware of.

Following are some specimens in the National Herbarium, Sydney:—South Perth (J.H.M.); North Perth (Dr. J. B. Cleland); Bayswater, Lower Swan River (A. Morrison); Guildford (R. Helms); Swan River, Diels' No. 2,720; 10 metres (33 feet) high, with rough bark and pendulous foliage, Swan River, near Cullala (Dr. L. Diels' No. 2,423). Cullala is between the Swan and Moore Rivers. Diels and Pritzel also saw it between the Moore River and Dandaragan; Arborescent, 40–50 feet, bark and appearance of *E. patens*, Moore River, near Gumber (W. V. Fitzgerald).

# AFFINITIES.

Mueller, in the original description, and later on in "Eucalyptographia," points to *E. luprestium* F.v.M., and *E. patens* Benth.

## 1. With *E. luprestium* F.v.M.

From which it chiefly differs in thicker and smaller leaves, with the peripheric vein nearer to the margin, in thicker flower-stalks, in fewer flowers together but of larger size, and not placed on thin stalklets, in proportionately longer lid, in anthers not broader than long, with more extended but far less divergent slits, in the ampler orifice of the fruit, with thinner edge and higher inserted as also broader valves, and in the fertile seeds expanding into a broader and paler membrane. ("Eucalyptographia," under *E. Todtiana*.)

The fruits of the two species are usually so different that it is impossible to confuse them, but with the large spherical fruits (1-1½ inch in diameter) there are occasionally a few hypertrophied ones, which display considerable resemblance to those of *E. Todtiana* F.v.M.

*E. luprestium* is a slender, tall, Mallee-like shrub, with smooth stems; *E. Todtiana* is a gnarled tree, with rough bark.

## 2. With *E. patens* Benth.

The differences of *E. patens* consist in that species having thinner leaves, shorter flower stalks, narrower anthers, and smaller fruits; besides, it attains as a tree to much greater dimensions. ("Eucalyptographia.")

They both have pale timbers, and their fibrous barks are a good deal similar; *E. Todtiana* is more spreading in habit, while *E. patens* has a long trunk. *E. Todtiana* may have a trunk diameter of 2 feet and more, which is much larger than Mueller was aware of; at the same time, there is no record that *E. Todtiana* attains the size that *E. patens* does. Further investigations in the field are required as regards *E. Todtiana*.

## 2. With *E. marginata* Sm.

The similarity of these two species as regards herbarium material, has been overlooked, and it is considerable. The juvenile leaves appear to be uniformly narrower in *E. Todtiana*. The opercula are longer and narrower in *E. marginata*, and the anthers are renantheroid. The affinity of *E. marginata* and *E. Todtiana* is obvious on other grounds.

The fruits of *E. marginata* are usually smaller and more ovoid, but exceptionally they may be almost as spherical as those of *E. Todtiana*, and even larger than I have ever seen those of *E. Todtiana* (e.g., my var. *Staerii* of *E. marginata*, Proc. Roy. Soc. N.S.W., vol. xlvii, 1913).

The leaves of *E. marginata* and *E. Todtiana* are often strikingly alike, both in texture and venation. The timber of *E. marginata* (Jarrah) is, of course, red, while that of *E. Todtiana* is pale coloured.

## DESCRIPTION.

CXII. *E. micranthera* F.V.M.

In Bentham's *Flora Australiensis* iii, 218 (1866).

ONLY one indubitable specimen being known, and that only in bud and flower (see Plate 88), I take the unusual course of recopying a *Flora Australiensis* description, as I desire to give every facility to my readers to be on the lookout for additional material.

A shrub of 6 to 10 feet, with a smooth bark (Maxwell). *Leaves* oblong-lanceolate, acuminate or almost obtuse, 2 to nearly 4 inches long, very thick and smooth so as wholly to conceal the veins. *Peduncles* very short, often flattened, with three to six flowers like those of *E. uncinata* or *E. oleosa*, but larger. *Calyx-tube* turbinate, 2 to nearly 3 lines long, tapering into a very short thick pedicel or almost sessile. *Operculum* very obtuse and shorter than the calyx-tube. *Stamens* inflected sometimes almost as acutely so as in *E. corynocalyx* and *E. uncinata*, but the filaments not so fine and the anthers very minute, with parallel contiguous cells. *Ovary* flat-topped. *Fruit* globose-truncate 4 to 5 lines diameter, somewhat contracted at the orifice, the rim broad, flat or slightly concave, the capsule very slightly sunk. (B.Fl. iii, 218.)

The remarkable and apparently unique anther may be described as follows:— Small anther, globular in shape, opening in lateral pores, gland on the top. Filament broad and angular, slightly ribbed transversely, half as wide as the anther.

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 RANGE.

It is confined, so far as is known at present, to Western Australia. Bentham quotes Sandy hummocks, from Israelite Bay to Eyres' Relief, *Maxwell*, these being localities on the south coast towards South Australia.

Following is a copy of the label in Maxwell's handwriting "White sand patch, 25 (miles *sic*) from the cliffs. Shrubs, bark smooth."

There is a specimen of "a white Gum, sandy scrub land, Serpentine River, W.A.," in the Melbourne Herbarium, which was referred to this species by Mueller himself, but I think it differs from the south coast specimens. The Serpentine River is a few miles south of Perth.

## AFFINITIES.

1. With *E. uncinata* Turcz.

Bentham says :

"Possibly a form of *E. uncinata*, but both the operculum and *stamens* appear different" (B.Fl. iii, 218).

Mueller subsequently writes :—

The differences of *E. micranthera* (from *E. uncinata*) are less obvious (than *E. corynocalyx* F.v.M., and *E. decurva* F.v.M.—J.H.M.), consisting in somewhat larger undotted leaves, with the circumferential vein distant from the edge, lid shorter than the tube of the calyx, which latter is also proportionately broader, in thicker filaments, the openings of the anthers extending further downward, stout style and somewhat larger fruit (the size of the fruit can only be guessed at by analogy; it has never been collected nor described.—J.H.M.); the filaments are in a similar way very straight except the single curvature about their middle. ("Eucalyptographia," under *E. uncinata*.)

The superficial resemblance to normal *E. uncinata* is not close, since the latter is a slenderer plant, but probably Bentham had in his mind such a form as is depicted at fig. 15, Plate 62, a form supposed to be his var. *major*. The resemblance is certainly strong, but the anthers are different and the serrulate filament of *E. micranthera* is not present.

2. With *E. decipiens*.

Bentham (B.Fl. iii, 193) contrasts these two species thus :—

Operculum obtuse, shorter than the calyx-tube. . . . *E. micranthera*.

Operculum acuminate, longer than the calyx-tube. . . . *E. decipiens*.

Then Mueller says :—

"*E. micranthera*, which is closely connected with the arboreous and soft-barked *E. decipiens*" . . . ("Eucalyptographia" under *E. incrassata*.)

It would not have occurred to me to make the comparison. A good many figures of *E. decipiens* will be found on Plate 63. *E. decipiens* may attain a considerable size. One must defer further consideration of the supposed affinity until we get complete material of *E. micranthera*.

3. With *E. incrassata* Labill.

*E. micranthera* . . . . differs from the genuine *E. incrassata*, particularly in its very short and almost heart-shaped anthers, but in other respects comes near to the variety so long separated as *E. dumosa* ("Eucalyptographia" under *E. incrassata*).

In Part IV of this work (Plate 13, &c.) will be seen figures of *E. incrassata*, and in Plate 16 figures of *E. incrassata* var. *dumosa*. The general resemblance is undoubtedly present, but the corrugated opercula of var. *dumosa* is absent and the general shape of the buds of *E. incrassata* is different; the anthers and filaments are very different.

4. With *E. Oldfieldii* F.v.M.

There is an imperfect specimen in the Melbourne Herbarium labelled "A white Gum, sandy scrub land, Serpentine River, W.A." Herb. Melbourne (*Euc. micranthera* F.v.M.)."

This specimen seems to me probably a narrow-leaved form of *E. Oldfieldii*. The affinity of *E. Oldfieldii* to *E. micranthera* is not close. See Plates 73 and 74.

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Explanation of Plates (85-88).

## PLATE 85.

*E. gigantea* Hook. f.

1. Twig in bud and flower; 2, twig in fruit, being portions of the figure of the type as depicted in Plate 28, Vol. i of Hooker's *Flora Tasmaniae*.
3. Anthers from a Tasmanian specimen. (W. H. Archer.)
4. Fruits. Parattah, Tasmania. (T. Stephens.)
5. Vertical half of a juvenile leaf. Mt. St. Bernard, Victoria. (J.H.M.)

## PLATE 86.

*E. longifolia* Link & Otto.

- 1a. Leaf (the broadest in the original); 1b, portion of twig, showing leaf, flowers in threes, with very long operculum. Reproduced from the figure of the type, Tab. 45 of Link & Otto's *Icones Plantarum Selectarum*. (1820-8.)
- 2a. Small buds; 2b, larger buds and flower of the type of *E. Woollii* F.v.M., which is a synonym of *E. longifolia* Link & Otto. Note that the buds are much smaller than those of the type. Parramatta, N.S.W. (Rev. Dr. Woolls.)
3. Anthers. Homebush, near Sydney. (J.H.M.)
4. Fruits larger than those of the type, and with flat rims. Wolumla, N.S.W. (E. Francis.)
5. Small fruits, domed, and with exerted valves. Appin, N.S.W. (J.H.M.)
6. Fruits in twos and with angled calyx-tubes. East Gippsland, Victoria. (P. R. H. St. John, through C. Walter.)

*E. diversicolor* F.v.M.

- 7a, 7b, Juvenile leaves in the opposite stage, Margaret River, W.A. (J.H.M.)
8. Buds, with rounded opercula. King George's Sound, W.A. (Robert Brown, 1802-5. No. 4,769 of the British Museum distribution of 1876.)
- 9a. Mature leaf; 9b, buds, with umbonate opercula. King George's Sound. (L. Diels, No. 2,692.)
10. Buds, with conoid opercula. (Drummond's No. 59.)
11. Fruits. Blackwood River, W.A. (John Forrest.)
12. Fruits. Torbay Junction, near Albany, W.A. (Correspondent of Andrew Murphy.)
13. Immature fruits. Western Australia (Correspondent of C. Walter.)
14. Anthers. Margaret River. (J.H.M.)

## PLATE 87.

*E. Guilfoylei* Maiden.

- 1*a*, 1*b*, Juvenile leaves, still in the opposite stage; 1*c*, intermediate leaf. Torbay Junction, near Albany, W.A. (Louis Dillon.)
- 2*a*, Mature leaf; 2*b*, buds, angular and with small opercula (the most advanced I was able to procure at the time the plate was drawn; 2*c*, anthers of unique shape; 2*d*, mature fruits. Denmark, W.A. (Andrew Murphy.)
- 3*a*, Immature fruits; 3*b*, small ripe fruits. Torbay Junction. (Percy Murphy.)
4. Fruits of "Red Tingle Tingle," Frankland River, W.A. (Acting Inspector-General of Forests.) Since ascertained to be a distinct species (*E. Jacksoni* Maiden). *Proc. Roy. Soc. N.S.W.*, vol. vlvii, 1913.

*E. patens* Benth.

5. Juvenile leaf. Preston Valley, W.A. (Max Koch.)
- 6*a*, Mature leaf; 6*b*, buds; 6*c*, small fruits, slightly urceolate. Darling Range (Swan), W.A. (L. Diels' No. 1,439.)
7. Immature fruits. Blackwood district. (L. Diels' No. 2,535.)
- 8*a*, Anthers; 8*b*, fruits. Woorlooloo, Darling Range. (Max Koch.)

## PLATE 88.

*E. patens* Benth. (*continued*).

1. Juvenile foliage in a whorl of three. This is of very rare occurrence in Eucalyptus. Preston Valley, W.A. (Max Koch.)
2. Fragment of Drummond's No. 72, 4th Coll., which is the type of the species.

*E. Toltiana* F.v.M.

- 3*a*, Juvenile foliage; 3*b*, anthers. South Perth, W.A. (J.H.M.)
4. Immature fruits. Bayswater, Lower Swan River, Perth, W.A. (Dr. A. Morrison.)
- 5*a*, Buds; 5*b*, ripe fruits, with sunk rim. South Perth. (Dr. J. Burton Cleland.)
6. Mature fruit, flat rim. Bayswater, Perth. (W. V. Fitzgerald.)
7. Twig with buds and flowers. Perth district. (Collector.)
8. Two immature fruits from a specimen labelled No. 252 Preiss, mixed with *E. rudis* Endl., which is, of course, a very different species. See p. 305.

*E. micranthera* F.v.M.

- 9*a*, Twig in bud and flower; 9*b*, anther, very small, and with serrulated filament, a rare and perhaps unique character. Drawing from a unique specimen in the Melbourne Herbarium, from Western Australia, without more definite locality stated. (Maxwell.) For locality see p. 308.

The following species of *Eucalyptus* are illustrated in my "Forest Flora of New South Wales"\* with larger twigs than is possible in the present work; photographs of the trees are also introduced wherever possible. Details in regard to their economic value, &c., are given at length in that work, which is a popular one. The number of the Part of the Forest Flora is given in brackets:—

<i>acacioides</i> , A. Cunn. (xlviii)	<i>meliadora</i> , A. Cunn. (ix).
<i>acmenioides</i> , Schauer (xxxii).	<i>microsorys</i> , F.v.M. (xxxviii).
<i>amygdalina</i> , Labill. (xvi).	<i>numerosa</i> , Maiden (xvii).
<i>Andrewsi</i> , Maiden (xxi).	<i>obliqua</i> , L'Hérit. (xxii).
<i>Baileyana</i> , F.v.M. (xxxv).	<i>ochrophloia</i> , F.v.M. (1).
<i>Behriana</i> , F.v.M. (xlv).	<i>odorata</i> , Behr and Schlechtendal (xli).
<i>bicolor</i> , A. Cunn. (xlv).	<i>paniculata</i> , Sm. (viii).
<i>Boormanii</i> , Deane and Maiden (xlv).	<i>pilularis</i> , Sm. (xxxi).
<i>Bosistoana</i> , F.v.M. (xliii).	<i>piperita</i> , Sm. (xxxiii).
<i>capitellata</i> , Sm. (xxviii).	<i>Planchoniana</i> , F.v.M. (xxiv).
<i>Consideniana</i> , Maiden (xxxvi).	<i>populifolia</i> , Hook. (xlvii).
<i>coriacea</i> , A. Cunn. (xv).	<i>punctata</i> , DC. (x).
<i>corymbosa</i> , Sm. (xii).	<i>regnans</i> , F.v.M. (xviii).
<i>dives</i> , Schauer (xix).	<i>resinifera</i> , Sm. (iii).
<i>fruticetorum</i> , F.v.M. (xli).	<i>saligna</i> , Sm. (iv).
<i>gigantea</i> , Hook. f. (li).	<i>siderophloia</i> , Benth. (xxxix).
<i>goniocalyx</i> , F.v.M. (v).	<i>sideroxylon</i> , A. Cunn. (xiii).
<i>hæmastoma</i> , Sm. (xxxvii).	<i>Sieberiana</i> , F.v.M. (xxxiv).
<i>hemiphloia</i> , F.v.M. (vi).	<i>stellulata</i> , Sieb. (xiv).
<i>longifolia</i> , Link and Otto (ii).	<i>tereticornis</i> , Sm. (xi).
<i>Luehmanniana</i> , F.v.M. (xxvi).	<i>virgata</i> , Sieb. (xxv).
<i>macrorrhyncha</i> , F.v.M. (xxvii).	<i>vitrea</i> , R. T. Baker (xxiii).
<i>maculata</i> , Hook. (vii).	

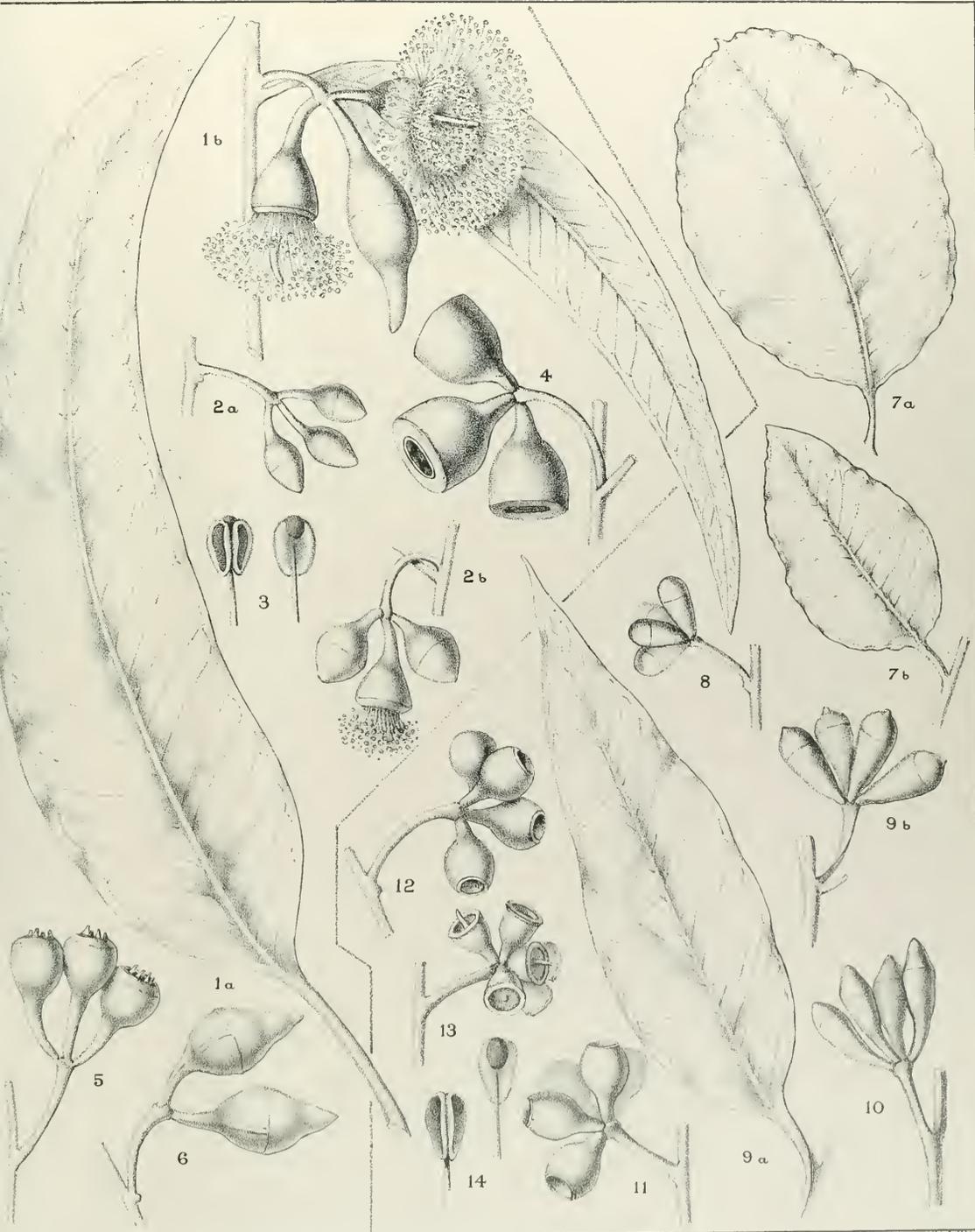
\* Government Printer, Sydney. 4to. Price 1s. per part (10s. per 12 parts); each part containing 4 plates and other illustrations.



EUCALYPTUS GIGANTEA, Hook. F.

M. Fleckton del. et lith.



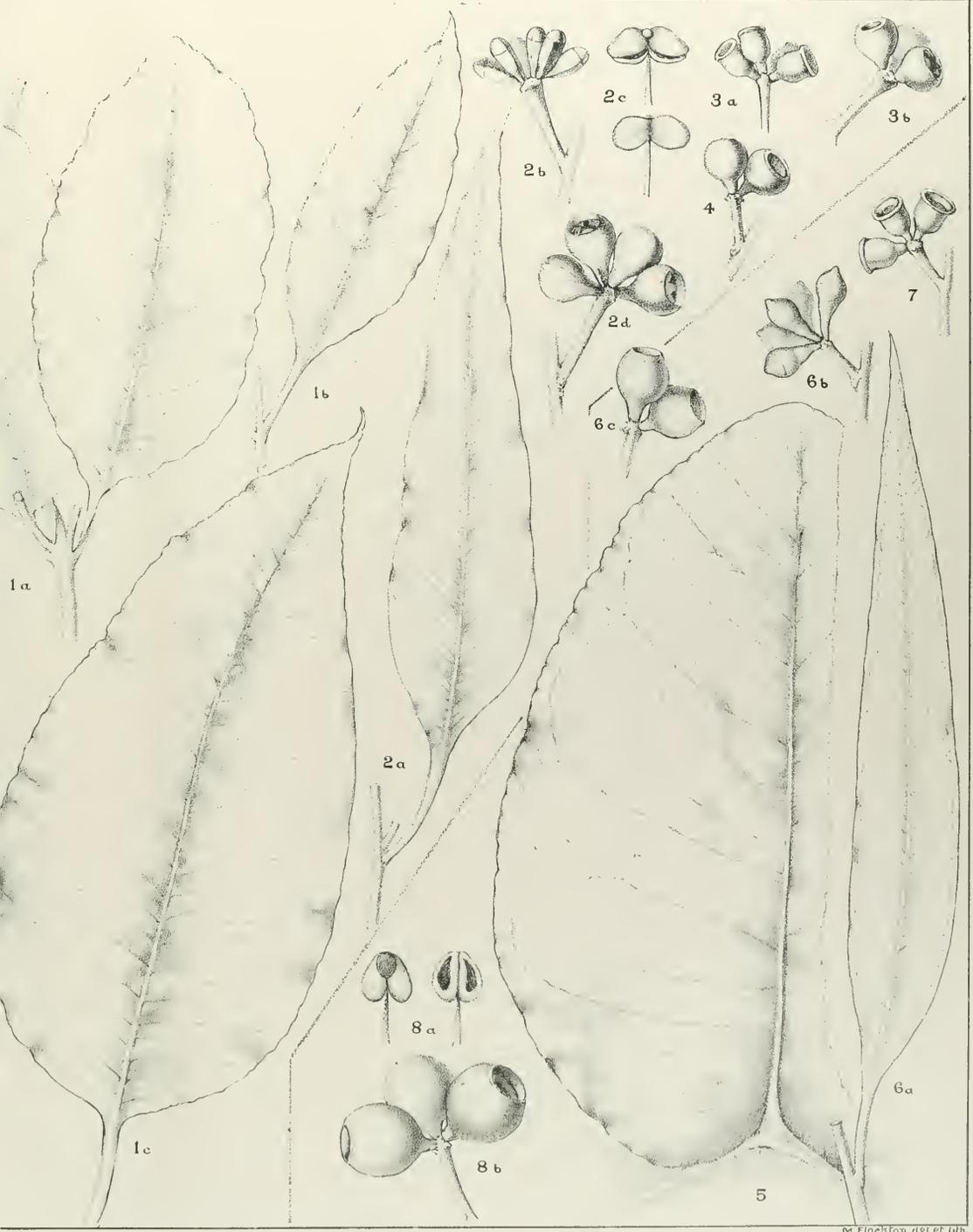


M. Flockton del. et lith.

EUCALYPTUS LONGIFOLIA, LINK AND OTTO (1-6).

E. DIVERSICOLOR, F.v.M. (7-14).



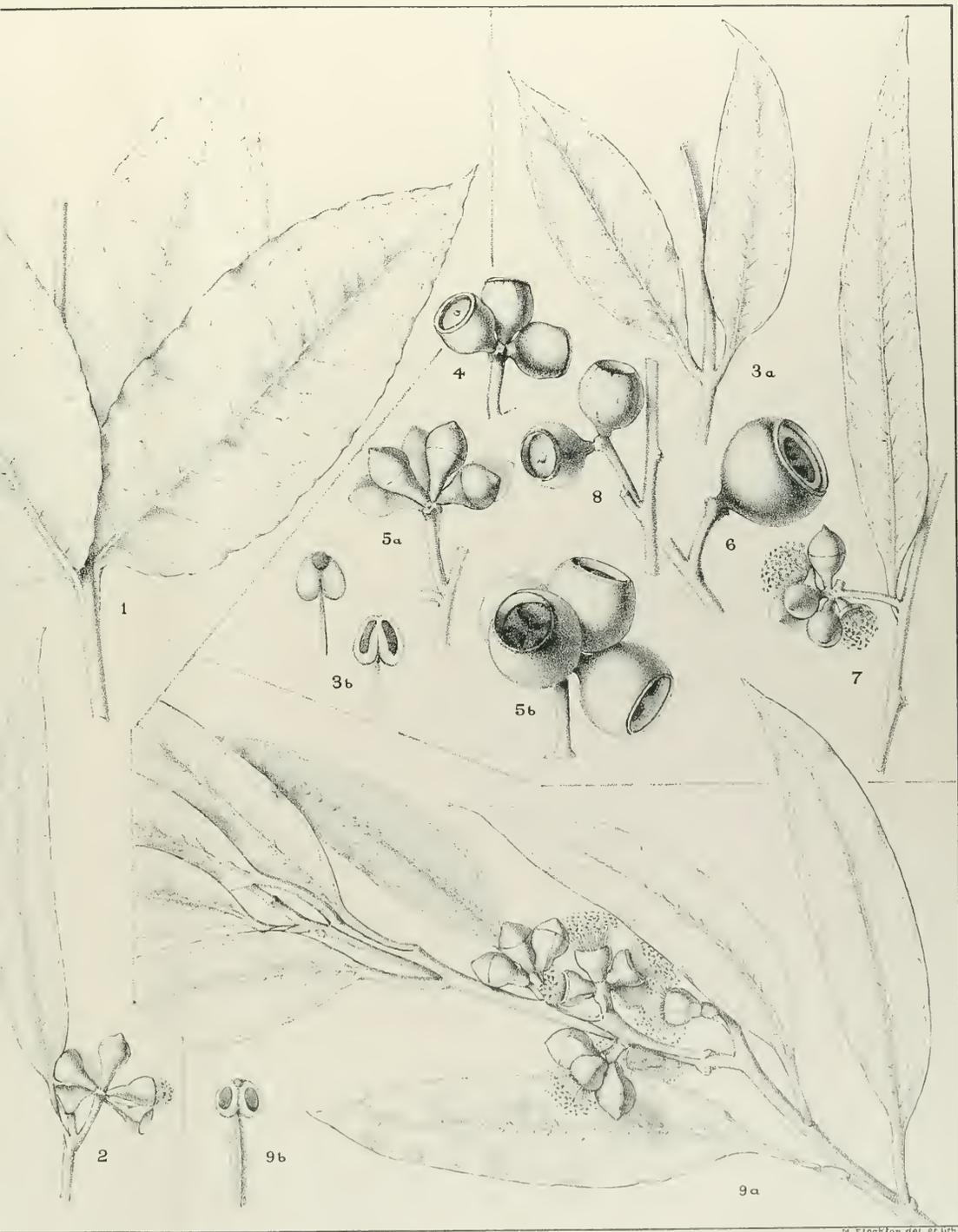


EUCALYPTUS GUILFOYLEI, MAIDEN (7-4).

E. PATENS, BENTH. (5-8). [See also Plate 88.]

M. FLOCHTON del. et lith.





EUCALYPTUS PATENS, BENTH. (1-2). [See also Plate 87.]

E. TODTIANA, F.V.M. (3-8).

E. MICRANTHERA, F.V.M. (9).

in Floekton del et lith







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