

**New species and subspecies of the informal "Eucalyptus series
Calycogonae" Pryor & Johnson (Eucalyptus
series Aridae Blakely-Myrtaceae)**

M.I.H. Brooker

Division of Forest Research, Private Bag, P.O. Wembley, Western Australia 6014

Abstract

Brooker, M.I.H. New species and subspecies of the informal "Eucalyptus series *Calycogonae*" Pryor & Johnson (*Eucalyptus* series *Aridae* Blakely-Myrtaceae). *Nuytsia* 5(3): 357-371 (1986). An historical account is given of the species composing the informal "Eucalyptus ser. *Calycogonae*" Pryor & Johnson (*E. ser. Aridae* Blakely). This is followed by a key to all species and subspecies in the series, descriptions of two new taxa, viz. *Eucalyptus celastroides* subsp. *virella* and *E. brevipes*, and a description of *E. gracilis* var. *ylgarnensis* which is raised to species rank as *E. ylgarnensis*. The buds and fruit of each taxon are illustrated and distribution maps are given. Notes on variation and distribution follow, and the series is discussed in relation to the informal "E. ser. *Foecundae*" and ser. *Ovulares*.

Introduction

Turczaninow (1852) published two new species, viz. *E. calycogona* and *E. celastroides*, the protologues of which include "cupula ... tetragonis" for *E. calycogona* and "cupula .../ .../prope orificium constricta" for *E. celastroides*. These data and the types unambiguously establish these two taxa as we recognize them in the field today.

In 1855 Mueller published *E. gracilis* which Bentham included in "Flora Australiensis" twelve years later (1867). Despite Bentham's presumed access to Mueller's protologue in which there is no mention of angularity in the buds and fruits, a morphological feature of considerable taxonomic value in eucalypts, his digest for *E. gracilis* states that the "calyx tube" was "usually prominently 4-angled". Bentham cited eight specimens, the majority of which presumably had 4-angled "calyx tubes". It can only be assumed that Bentham was unaware that a duplicate of one of these cited specimens (Drummond 5th coll. no. 184) had been published in 1852 as *E. calycogona* by Turczaninow. Another of the specimens (Drummond 5th coll. no. 34) was a duplicate of that published by Turczaninow, as *E. celastroides*.

Bentham apparently did not recognise the various distinctions in what we now know as *E. calycogona*, *E. celastroides* and *E. gracilis* in the few specimens available to him and having based his description of *E. gracilis* on a specimen with 4-sided "calyx tubes" his observation of a further group of specimens with non-angled "calyx tubes" moved him to erect a variety based on this character. Thus *E. gracilis* var. *breviflora* was published at the end of his digest on *E. gracilis*. The holotype (K) consists of 4 separate pieces, 3 of which are clearly *E. gracilis* var. *gracilis* and the remaining piece is *E. calycogona*. The synonymy of *E. gracilis* var. *breviflora* with *E. gracilis* var. *gracilis* was later established by Maiden (1903). Subsequent to the publication of Bentham's classification, Mueller became aware of the names (if not specimens) of *E. calycogona* and *E. celastroides* but

he appears not to have known that they were published before *E. gracilis*, as he treated them as synonyms of *E. gracilis* in "Eucalyptographia" (1879-1884). His description in this work of the fruit of *E. gracilis*, "semiellipsoid or somewhat obconical or slightly urnshaped, faintly angular", could pass for forms of any of the three species.

Maiden, at first (1903), was not wholly convinced of the specific distinctions of the three species and established them as *E. calycogona* (thus recognising the priority of the name), *E. calycogona* var. *celastroides* and *E. calycogona* var. *gracilis*. He referred to the "slight angularity" in some specimens of *E. celastroides* and to the "insensible gradations" between *E. gracilis* and *E. calycogona*. He also regarded the recently collected Pritzel 332 (Figure 9) which Diels labelled "*E. yilgarnensis*" as "referable" to *E. calycogona* var. *gracilis*.

Later (1918) Maiden recognised the specific rank of *E. celastroides*, *E. gracilis* and *E. calycogona* but he suggested that all western *E. gracilis* were somewhat apart. He based his contention on "the longer and more slender peduncles and pedicels" among other features and he established this form as *E. gracilis* var. *yilgarnensis*.

The specific rank of the three species, *E. gracilis*, *E. calycogona* and *E. celastroides* was upheld in subsequent floras and handbooks (Black 1926, Ewart 1931, Blackall 1954, Willis 1973), in Gardner's census (1931) and in Blakely's Key (1934). In the latter work, *E. gracilis* var. *yilgarnensis* was relegated again to synonymy with *E. gracilis*. Blakely erected three new taxa, viz. *E. calycogona* var. *staffordii*¹, *E. gracilis* var. *erecta* and *E. gracilis* var. *viminea*.

Of the taxa so far referred to, Pryor and Johnson (1971) in their informal classification recognised *E. calycogona*, *E. celastroides* and *E. gracilis*. They anticipated subspecies status for *E. gracilis* var. *yilgarnensis*. All other varieties were considered to be only minor variants.

In the following account I establish *E. gracilis* var. *yilgarnensis* as *E. yilgarnensis* and in addition I erect the western part of *E. celastroides* as a new taxon *E. celastroides* subsp. *virella* and describe a new species *E. brevipes*. In the notes following the taxonomic treatment of these taxa, I have used the names of Pryor and Johnson (1971) for the sections and series. The legitimate names where they exist are given in brackets following the informal names.

Key to the species and subspecies

1. Buds and fruit manifestly square in section; bark smooth *E. calycogona*
1. Buds and fruit round in section (upper part of pedicel and lower part of hypanthium may be angled); usually a stocking of rough bark present.
 2. Adult leaves greyish or bluish green; branchlets glaucous; buds and fruits often glaucous *E. celastroides* subsp. *celastroides*
 2. Adult leaves green; buds, fruit and branchlets not glaucous.
 3. Fruit urceolate or contracted at the rim; peduncles up to 0.8 cm long; juvenile leaves ovate *E. celastroides* subsp. *virella*
 3. Fruit cupular or barrel-shaped or slightly campanulate, if urceolate, peduncles up to 1.4 cm long, pedicels up to 0.8 cm long.
 4. Peduncles 0.3-0.5 cm long; opercula conical to slightly beaked *E. brevipes*
 4. Peduncles more than 0.5 cm long; opercula patelliform or conical.
 5. Buds up to 0.6 x 0.4 cm; pedicels slender or stout, 0.1-0.4 (0.5) cm long; fruit cupular or barrel-shaped, up to 0.7 x 0.5 cm *E. gracilis*
 5. Buds up to 0.4 x 0.3 cm; pedicels always slender, (0.2) 0.3-0.7 (0.8) cm long; fruit barrel-shaped to slightly urceolate, up to 0.5 x 0.4 cm *E. yilgarnensis*

¹ Blakely published this as var. *staffordii* but it was intended to honour W.J. Spafford (Black 1952).

Descriptions

***Eucalyptus celastroides* Turcz. subsp. *virella* Brooker, subsp. nov. (Figures 1-3)**

A subspecies typical of glaucedines, absent in peduncles, brevioribus et generaliter alabastris fructibusque minoribus distinguenda.

Typus: 13.2 km NE of Calingiri on Wongan Hills Road, Western Australia, 28 Aug. 1983, M.I.H. Brooker 8283 (holo: PERTH; iso: FRI, NSW, MEL, AD, BRI, K).

A *mallee* up to 4 m tall with smooth grey, greenish or bronze bark, or with a stocking of rough, grey flaky bark; lignotuberous. *Cotyledons* bisected. *Juvenile leaves* distinctly petiolate, alternating, ovate, up to 4 x 2.5 cm, greyish green, with perfect or imperfect suprabasal lateral primary veins. *Adult leaves* petiolate, alternating, narrowly lanceolate, up to 9 x 1 cm, bright glossy green, with conspicuous oil dots which are translucent when fresh, black when dry. *Immature adult leaves* may be duller, bluish green. *Inflorescences* axillary, umbel-like, 7-flowered. Peduncles slender, up to 0.8 cm. *Buds* shortly pedicellate, clavate, up to 0.7 x 0.3 cm, operculum conical or hemispherical-apiculate, shorter than hypanthium. *Flowers* white, November-December. *Fruit* shortly pedicellate, urceolate or contracted at the rim, up to 0.6 x 0.4 cm, rim thin. *Seed* compressed-ovoid, reddish brown to grey-brown, more or less smooth, with 1-3 shallow, longitudinal furrows; hilum ventral, central, not conspicuous.

Specimens examined. WESTERN AUSTRALIA: Harrismith, 6 March 1924, C.A. Gardner 2117 (PERTH); between Cleary and Beacon, 16 Jan. 1947, C.A. Gardner 8351 (PERTH); Manmanning, 4 Nov. 1956, J.W. Green 810 (PERTH); northwards from Beacon, Feb. 1957, C.A. Gardner (PERTH); 2 miles NW of Ongerup, 10 Nov. 1961, K. Newbey 117 (PERTH); Hyden-Norseman road, ± 50 miles W of Eyre Highway, A.S. George 4342 (PERTH); 212.6 mile peg (sic) on Morawa-Perth road, 5 March 1966, E.M. Scrymgeour 392, 394, 396, 397, 398 & S.G.M. Carr (PERTH); 0.4 miles E of Manmanning, 21 Oct. 1966, G.M. Chippendale 67 (PERTH, FRI); 11.8 miles S of Burakin, 21 Nov. 1966, G.M. Chippendale 66 (PERTH, FRI); 0.9 miles E of Korrelocking, 9 Aug. 1967, G.M. Chippendale 253 (PERTH, FRI); 260 mile peg E of Southern Cross, 16 April 1969, R.D. Royce 8588 (PERTH); 5 mile W of Wyalkatchem, April 1969, B. Rockel s.n. (PERTH); 1 mile W of Tammin, 3 June 1969, M.I.H. Brooker 1977 (PERTH, FRI); 8.2 miles SW of Three Springs, 7 Jan. 1970, M.I.H. Brooker 2369 (PERTH); Fitzgerald National Park, 12 July 1970, A.S. George 9928 (PERTH); 3.5 km SW of Yelbeni, Aug. 1973, M.D. Tindale 3721 (PERTH, NSW); reserve 14001, Kulin, 21 Oct. 1977, J.S. Beard 8151 (PERTH); Mason's Road, E of Gunyidi, 25 May 1982, M.I.H. Brooker 7529 (PERTH); 23 km NW of Strawberry on Burma Road, 26 Jan. 1983, M.I.H. Brooker 7948 (PERTH, FRI, NSW, MEL); 15.3 km NE of Calingiri towards Wongan Hills, 16 Feb. 1983, M.I.H. Brooker 7964 (PERTH, FRI, NSW, MEL); Chiddarcooping Nature Reserve, 17 Feb. 1983, M.I.H. Brooker 7978 (PERTH, FRI, NSW, MEL); 4.9 km E of Dudinin t/o on Kulin-Wickepin road, 5 May 1983, M.I.H. Brooker 8106 (PERTH, FRI, NSW, MEL); Wongan Hills, 29 May 1983, M.I.H. Brooker 8145, 8146 (PERTH, FRI, NSW, MEL); Rollands Road, NW of Esperance, 6 June 1983, M.I.H. Brooker 8169 (PERTH, FRI, NSW, MEL).

Distribution. Endemic to southern Western Australia, and bounded approximately by Walkaway in the north-west, Ongerup in the south-west, to east of Southern Cross and to Esperance in the south-east (Figure 4).

Discussion. The specimens now designated as *Eucalyptus celastroides* subsp. *virella* can be distinguished from *E. celastroides* subsp. *celastroides* by the non-glaucous branchlets, leaves, buds and fruit, the shorter peduncles, and the generally smaller buds and fruit. Its



WESTERN AUSTRALIAN HERBARIUM
PERTH, WA

Ex: CSIRO DIVISION OF FOREST RESEARCH, FOR
RESEARCH AND DEVELOPMENT
GPO BOX 348, STATION SQUARE

Eucalyptus celastroides Turrell, subsp. *virella*
Brooker

Coll. by: H. J. S. Brooker 4281 11/26/69

Determined: H. J. S. Brooker

Loc: R. 101/100 116° 12' E 40'

Dist: W.A. 10000 112 km NE of Kalbarri on
Kangaroo Hill road.

HOLOTYPE

Bulbs 6 m tall with smooth, greenish grey bark
with a grey hairy or yellowish sandy layer
with a rough surface, 10 m tall, 10
cm dbh, and 10 cm dbh, 10 cm dbh
in clay.

Figure 1. Holotype of *Eucalyptus celastroides* subsp. *virella* Brooker (PERTH, ex FRI).



Figure 2. Seedling of *Eucalyptus celastroides* subsp. *virella* (from Brooker 7948).

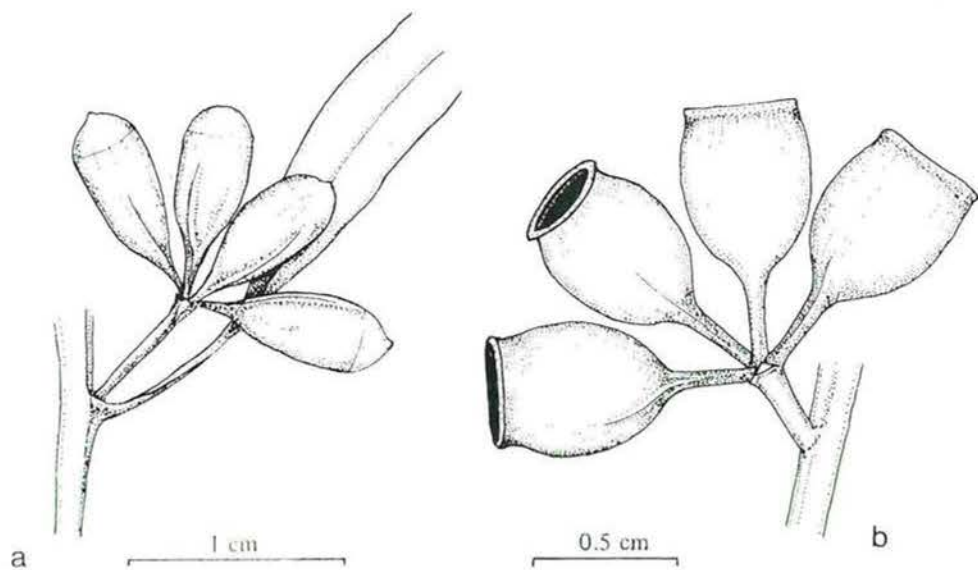


Figure 3. *Eucalyptus celastroides* subsp. *virella*. a Buds (from Wongan Hills). b Fruit (from Brooker 8146).

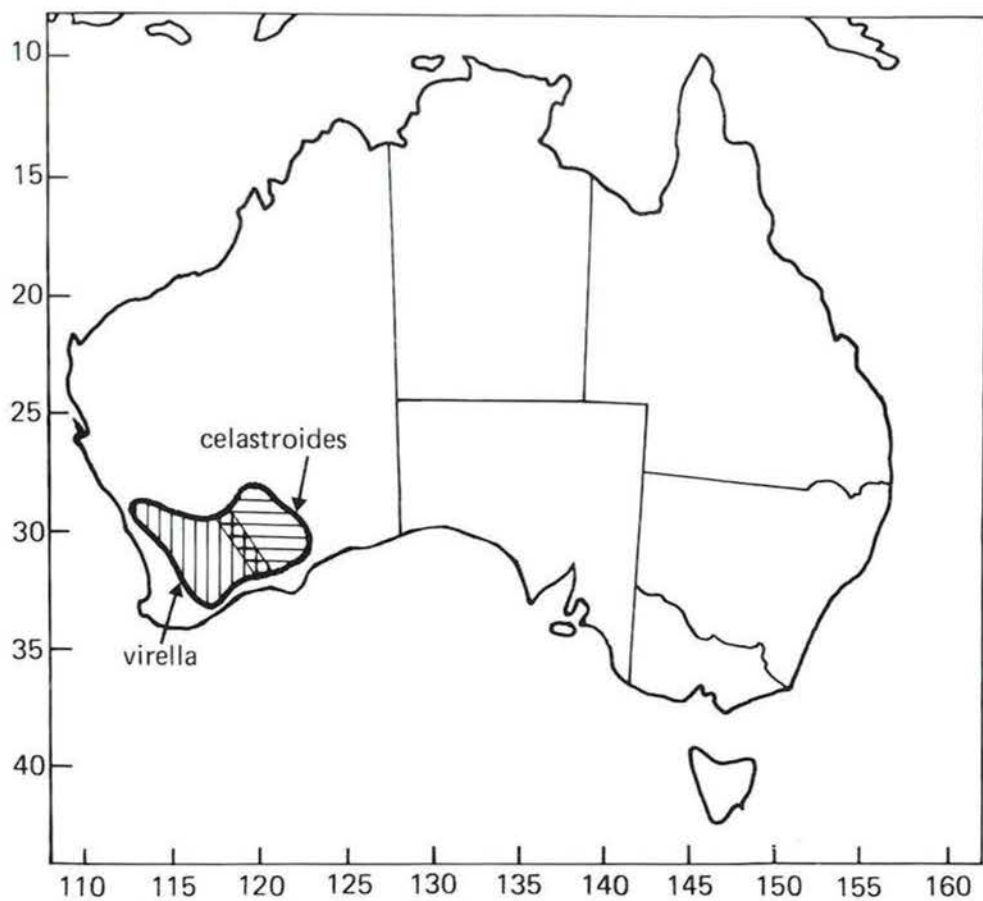


Figure 4. Distribution of *Eucalyptus celastroides* subsp. *celastroides* and *virella*.



Figure 5. Holotype of *Eucalyptus brevipes* Brooker.



Figure 6. Seedling of *Eucalyptus brevipes* (from Brooker 1970).

distribution is west of that for *E. celastroides* subsp. *celastroides* but specimens of intermediate character are found in the intervening zone.

Eucalyptus brevipes Brooker, sp. nov. (Figures 5-7)

Eucalypto gracilis F. Muell. affinis sed foliis adultis angustioribus, rigide erectis, pedunculis brevioribus, operculis conicis vel rostratis, et foliis plantularum longioribus et dispersioribus distinguenda.

Typus: c. 200 metres south of Cunderin Hill (30°38'S, 118°29'E), Western Australia, 20 July 1983, M.I.H. Brooker 8242 (holo: PERTH; iso: FRI, NSW, AD, MEL, K).

A mallee up to 5 m tall with a stocking of hard rough bark to about 1 m, becoming softer and lighter in colour with age, bark smooth grey over bronze or salmon pink above; lignotuberous. *Cotyledons* bisected. *Juvenile leaves* shortly obscurely petiolate, alternating, linear to narrowly lanceolate, up to 8 x 1.5 cm, dull green, venation prominent only in broader leaves. *Adult leaves* petiolate, alternating, linear to narrowly lanceolate, stiff, held erect, up to 10 x 0.8 cm, green, slightly glossy (depending on maturity) with conspicuous black (seen with reflected light) oil dots. *Inflorescences* axillary, umbel-like, 7-flowered. Peduncles short, broadening at the summit, up to 0.5 cm long. *Buds* on distinct tapering pedicels, becoming angled on drying, clavate, with black oil dots, up to 0.7 x 0.5 cm, operculum conical to slightly beaked, often reddish when mature (Figure 7). *Flowers* white. *Fruit* pedicellate, barrel-shaped to cupular, up to 0.7 x 0.6 cm, disc obliquely descending, whitish. *Seed* compressed-ovoid, reddish brown to grey-brown, more or less smooth, usually with 1-3 shallow longitudinal furrows; hilum ventral, central, not conspicuous.

Specimens examined. WESTERN AUSTRALIA: Cunderin Hill, 1979, P. de Rebeira s.n. (PERTH); Echo Valley road, south of Yanneymooning Hill, 16 Feb. 1983, M.I.H. Brooker 7970 (FRI, PERTH, NSW, MEL); type locality, 20 July 1983, M.I.H. Brooker 8243 (FRI, PERTH, MEL, NSW, AD).

Distribution. Endemic to Western Australia and restricted to a small area north-east of Mukinbudin (Figure 8).

Discussion. *E. brevipes* is the most geographically restricted species in the series and occurs wholly within the distribution of *E. yilgarnensis*. Its natural affinity, however, is with the widely distributed *E. gracilis* which occurs to the south. Any connections between the two which presumably once occurred in the form of an ancestral type or may currently exist as intergrades are not evident in the available collected material.

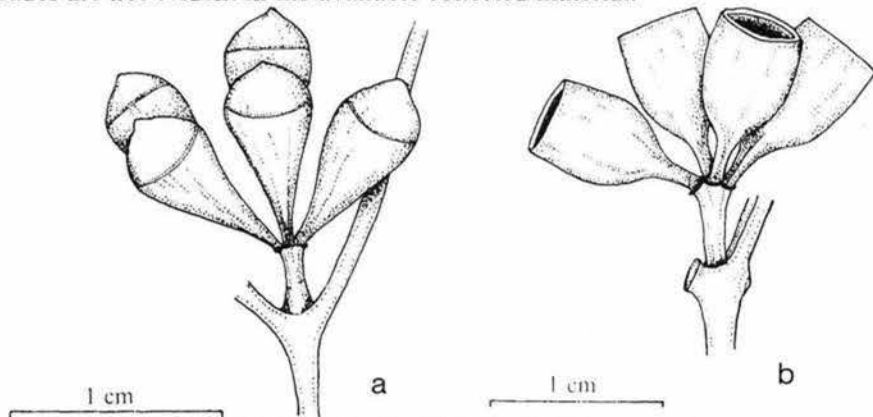


Figure 7. *Eucalyptus brevipes*. a — Buds (from Brooker 8142). b — Fruit (from Brooker 8142).

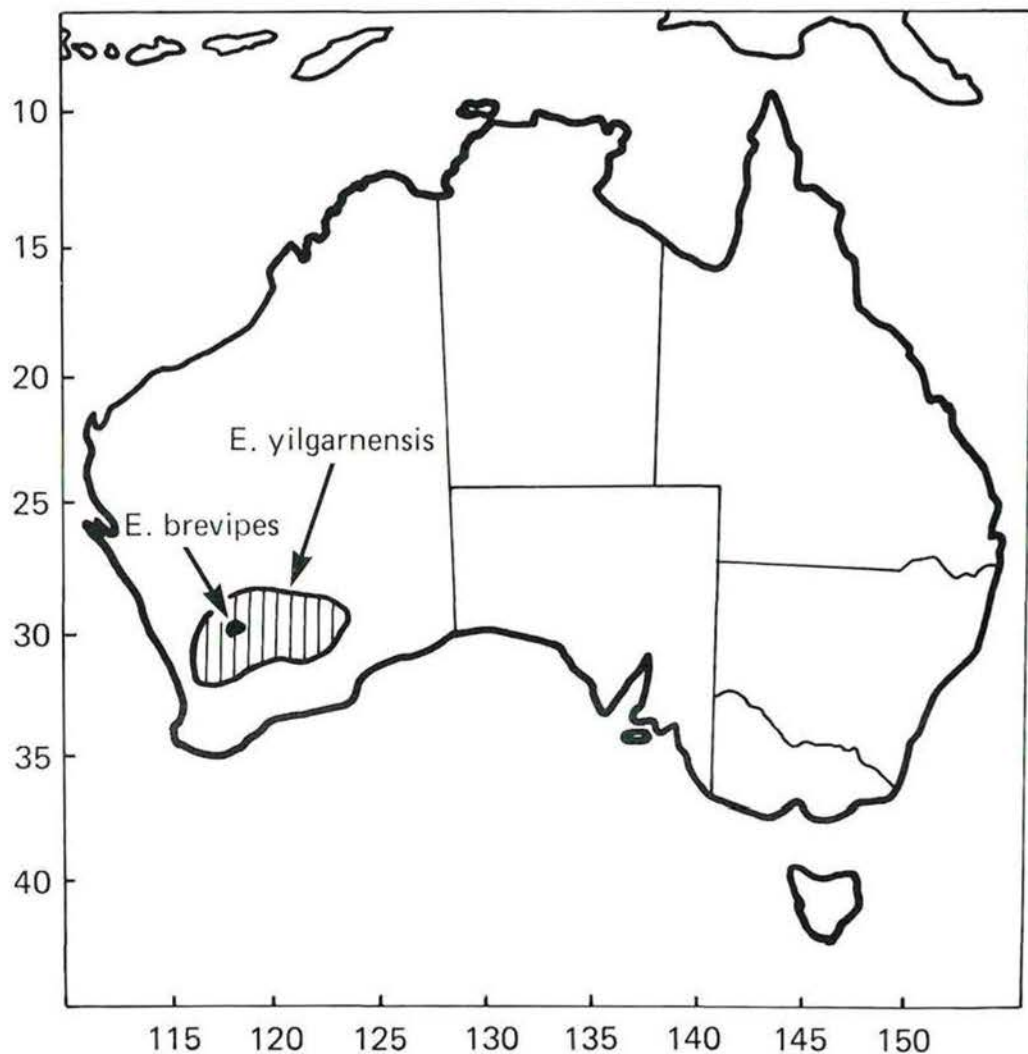


Figure 8. Distribution of *Eucalyptus yilgarnensis* and *E. brevipes*.

***Eucalyptus yilgarnensis* (Maiden) Brooker, comb. et stat. nov. (Figures 9-10)**

E. gracilis F. Muell. var. *yilgarnensis* Maiden, Proc. Roy. Soc. New South Wales 52: 489 (1918).

Type: Yilgarn and Coolgardie Goldfields in silvis valde apertis, May 1901, *E. Pritzl* 332 (holo: NSW; iso: BM, G, K, L, P, PERTH, W).

A tree or mallee up to 6 m tall with a persistent stocking of short-fibred, flaky, dark grey bark, smooth bronze or grey above, rarely completely smooth-barked; lignotuberous. *Cotyledons* bisected. *Juvenile leaves* petiolate, alternating, broadly lanceolate (up to 8 x 1.5 cm) or ovate (up to 6 x 3 cm), dull grey-green to bluish green, commonly with perfect or imperfect suprabasal lateral primary veins. *Adult leaves* petiolate, alternating, narrowly lanceolate, up to 8 x 1.3 cm, glossy green with conspicuous oil dots which are translucent



Figure 9. Isotype of *Eucalyptus yilgarnensis* (Maiden) Brooker.



Figure 10. Seedling of *Eucalyptus yilgarnensis* (from Brooker 1816).

when fresh, black when dry; venation sometimes almost parallel. *Inflorescences* axillary, umbel-like, 7- or 9-flowered. *Peduncles* slender, up to 1 (1.4) cm long. *Pedicels* usually long and slender, (0.2) 0.3-0.7 (0.8) x 0.05-0.1 cm. *Buds* ovoid, pyriform or clavate, up to 0.4 x 0.3 cm, operculum shallowly conical to hemispherical-apiculate, much shorter than hypanthium, patelliform, equal to or less than maximum diameter of hypanthium. *Flowers* white, March to September. *Fruit* with slender pedicels, barrel-shaped to slightly urceolate, up to 0.5 x 0.4 cm, often smooth and shiny, rim thin. *Seed* compressed-ovoid, reddish brown to grey-brown, more or less smooth, usually with 1-3 shallow, longitudinal furrows; hilum ventral, central, not conspicuous.

Specimens examined. WESTERN AUSTRALIA: Coolgardie, April and July 1899, R. Helms s.n. (PERTH); Southern Cross, 19 May 1901, L. Diels s.n. (NSW); Cowcowing, June, October 1904, M. Koch 986, 989 (PERTH); 70 miles N of Kurrawang, Sept. 1909, J.H. Maiden s.n. (NSW); Korrelocking, 22 August 1920, C.A. Gardner 182 (PERTH); Kumarl, May 1938, L.A. Horbury 40 (PERTH); North Bungulla, 2 May 1945, C.A. Gardner s.n. (PERTH); Bullabulling, 31 May 1949, C.A. Gardner 9276 (PERTH); 12 miles W of Zanthus, 26 Jan. 1956, R.D. Royce 5257 (PERTH); bank of Goddard Creek, 28 Jan. 1956, R.D. Royce 5361 (PERTH); Jumnanina Rocks, W of Coonana, 29 Jan. 1956, R.D. Royce 5373 (PERTH); 18 miles N of Norseman, 24 March 1962, K. Newbey 162 (PERTH); 18 miles E of Norseman, 29 May 1963, F.G. Smith 1646 (PERTH); 40 km S of Coolgardie, 11 April 1966, P.G. Wilson 4092 (PERTH); 9 miles W of Karalee, 19 Sept. 1966, R. Filson 8940 (PERTH, MEL); 26.3 miles N of Kalgoorlie, 9 March 1967, G.M. Chippendale 120 (FRI, PERTH); 9.2 miles SE of Coolgardie, 11 March 1967, G.M. Chippendale 139 (FRI, PERTH); 1 mile S of Sandford Rock, 15 Jan. 1970, M.I.H. Brooker 2431 (PERTH); 10 miles N of Lake Varley, 4 Dec. 1970, K. Newbey 3332 (PERTH); 92 km E of Hyden, 3 Oct. 1975, D.F. Blaxell W75/31 (NSW, CANB, K, PERTH, FRI); 21 km E of Karonie, 9 Nov. 1976, H. Demarz 6244 (PERTH); 44 km W of Coolgardie, 13 May 1978, G.J. Keighery 1740 (PERTH); 7 miles E of Yellowdine, 13 June 1978, J.W. Green 4696 (PERTH); c. 105 km SSW of Coolgardie, 19 Sept. 1979, M.D. Crisp 5932 (CBG, PERTH); 32 km SSW of Norseman, 13 March 1980, K. Newbey 6737 (PERTH); 25.7 km S of Koorda towards Wyalkatchem, 14 Sept. 1982, M.I.H. Brooker 7615 (PERTH, FRI, NSW); 29.6 km S of Mollerin towards Koorda, 10 Jan. 1983, M.I.H. Brooker 7912 (PERTH, FRI, MEL, NSW).

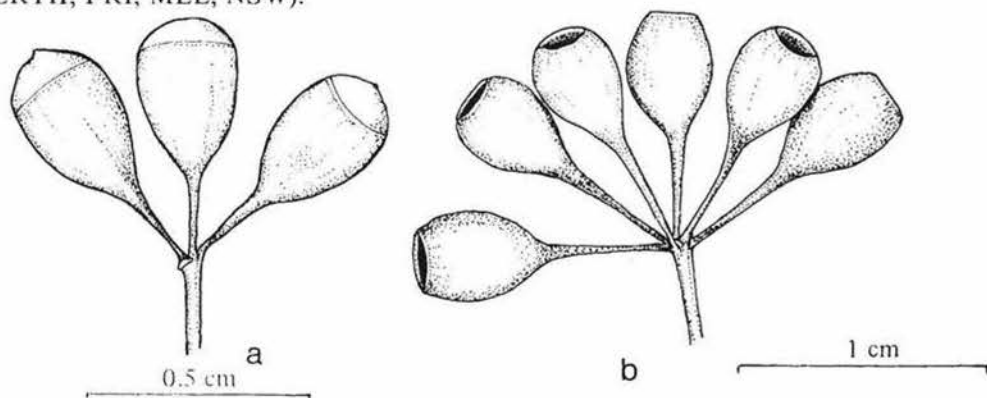


Figure 11. *Eucalyptus yilgarnensis*. a — Buds (from Kennecott s.n.). b — Fruit (from Kennecott s.n.).

Distribution. Endemic to Western Australia in the northern wheatlands and Goldfields area (Figure 8).

Discussion. *Eucalyptus yilgarnensis* is distinguished by the small, delicate pedicels, buds and fruit. The buds sometimes resemble those of *E. myriadena* Brooker. The fruits are

always barrel-shaped to slightly urceolate. The juvenile leaves are broad-lanceolate to ovate and contrast with the narrower leaves of *E. gracilis*. Maiden (1918) had earlier recognised the distinction in the juvenile leaves.

Notes on the informal "*Eucalyptus* series *Calycogonae*"

The "*Eucalyptus* ser. *Calycogonae*" is one of the eight mallee series with representatives in both western and eastern Australia (east of Spencer Gulf). With 6 taxa it is one of the smallest series. It is distinctive, its members being instantly recognisable among those of the informal "*Eucalyptus* sect. *Bisectaria*" Pryor & Johnson (1971) by the possession of staminodes. In flower these outer, long, barren filaments spread and become characteristically twisted while the inner short stamens merely become erect in flower or remain inflexed.

The series is further distinguished in "*E.* sect. *Bisectaria*" by the strongly glandular disc of the buds and by the constriction at the base of the style. A similar constriction is also seen in the unrelated *E. loxophleba* Benth. (Brooker 1972).

The series maintains the typical distribution pattern of the mallees, i.e. a concentration of species in the west with some in the east. In this case six taxa occur in the west where four are endemic and the remaining two, *E. gracilis* and *E. calycogona* occur in both east and west although in Western Australia, *E. gracilis* occurs only in the eastern part of the State.

The absence of *E. calycogona* from most of New South Wales is surprising when it is considered that there are habitats available which support several species in common with the adjacent areas in Victoria, e.g. *E. gracilis*, *E. socialis* F. Muell. ex Miq., *E. oleosa* F. Muell. ex Miq., *E. dumosa* A. Cunn. ex Schau., *E. leptophylla* F. Muell. and *E. incrassata* Labill. Site studies for *E. gracilis* and *E. calycogona* have not been made for their whole range of distribution, but Parsons and Rowan (1968) found that in parts of eastern South Australia and north western Victoria, *E. calycogona* occurs on heavier soils than *E. gracilis*.

It appears that *E. gracilis* was not known on Kangaroo Island until collected by M.D. Crisp in 1971. I recently visited his collection site which is on the peninsula on the north side of Pelican Lagoon at the eastern end of the island. There the species occupies the top of a coastal dune with much limestone rubble in the soil surface. The mallees are tall, up to 10 m, and the crown is distinctly terminal (it occurs in dense *Melaleuca lanceolata* shrubbery) with prominently erect leaves. In this character and its coastal occurrence, it is similar to *E. gracilis* var. *erecta* from Boston Island but I have not been able to discern other characteristics that should result in the variety being accorded formal status.

In *Eucalyptus*, morphological distinctions between species of a series, compared with the distinctions between series, between sections, and between subgenera, are frequently blurred and may be attributable to their incomplete divergence. This is no less the case with all six taxa of the "*E.* ser. *Calycogonae*" than with the "*E.* ser. *Foecundae*" (*E.* ser. *Fruticosae* Blakely), and *E.* ser. *Ovulares* (Brooker 1979, 1981). When such groups of related species are subjected to conventional taxonomic treatment, the morphological boundaries between taxa will always be somewhat subjective and may or may not be found realistic when the group is reassessed with more material available. This became the case with *E. gracilis* and *E. yilgarnensis*, where recent collections, field observations and seedling trials have shown that these taxa are as distinct as many other species pairs among the mallees.

The problems of specific delimitation are greatest with the widely distributed species such as *E. leptophylla* and *E. gracilis* which have undergone adaptive or gratuitous morphological and presumably physiological changes. No doubt incipient speciation can be observed in such forms as the *E. leptophylla* around Kumarl and perhaps recent speciation in *E. fruticosa* Brooker (1979). Some coastal forms of *E. gracilis*, e.g. near Port Lincoln and on the south coast of Western Australia, which are slightly coarser in the buds and fruit, and *E. gracilis* var. *erecta* (see above) may presage the selection of coastal taxa derived from typical *E. gracilis* stock.

It is possible that gene exchange is constantly taking place between most of the contiguous or sympatric taxa within the "*E. ser. Calycogonae*" and "*E. ser. Foecundae*", thus hindering the emergence of more distinctive forms under the existing selection regimes. On the other hand, I know of no evidence that inter-series crossing is possible between species of these series nor between species of the *E. ser. Ovulares* and species of any other series in the informal "*E. sect. Dumaria*" Pryor and Johnson (*E. ser. Dumosae* Blakely), yet I have recently seen evidence (segregation in the F1 progeny) of a hybrid between *E. redunca* ("*sect. Bisectaria*") x *E. incrassata* ("*sect. Dumaria*") showing that inter-sectional crossing, though apparently extremely rare, does occur under natural conditions.

Acknowledgements

I am grateful to Barry Rockel for growing the seedlings, Gillian Crook for the drawings, Maurie Woodward for the maps, Steve Hopper for comments on an early draft and to Directors of many herbaria for access to the specimens.

References

- Bentham, G. (1867). "Flora Australiensis" Vol. 3. (L. Reeve & Co.: London.)
- Black, J.M. (1926). "Flora of South Australia" Part 3 (Govt. Printer: Adelaide.)
- Black, J.M. (1952). "Flora of South Australia" Part 3, 2nd edn. (Govt. Printer: Adelaide.)
- Blackall, W.E. (1954). "How to Know Western Australian Wild Flowers" Part 1 (ed. B.J. Grieve). (Univ. W. Aust. Press: Perth.)
- Blakely, W.F. (1934). "A Key to the Eucalypts." (The Worker Trustees: Sydney.)
- Brooker, M.I.H. (1972). Four new taxa of *Eucalyptus* from Western Australia. *Nuytsia* 1: 242-253.
- Brooker, M.I.H. (1979). A revision of the informal series *Foecundae* Pryor & Johnson of the genus *Eucalyptus* L'Herit. and notes on the variation in the genus. *Brunonia* 2: 125-170.
- Brooker, M.I.H. (1981). A new series *Ovulares* of the genus *Eucalyptus* based on the subseries *Ovularinae* Pryor and Johnson. *Brunonia* 4: 1-26.
- Ewart, A.J. (1931). "Flora of Victoria." (Govt. Printer: Melbourne.)
- Gardner, C.A. (1931). "Enumeratio Plantarum Australiae Occidentalis" Part 3. (Govt. Printer: Perth.)
- Maiden, J.H. (1903). "A Critical Revision of the Genus *Eucalyptus*" Vol. 1. (Govt. Printer: Sydney.)
- Maiden, J.H. (1918). Notes on *Eucalyptus*, No. VI. *Proc. Roy. Soc. New South Wales* 52: 489.
- Maiden, J.H. (1917-1920). "A Critical Revision of the Genus *Eucalyptus*" Vol. 4. (Govt. Printer: Sydney.)
- Mueller, F. (1879-1884). "Eucalyptographia." (Govt. Printer: Melbourne.)
- Parsons, R.F. and Rowan, J.N. (1968). Edaphic range and cohabitation of some mallee eucalypts in south eastern Australia. *Aust. J. Bot.* 16: 109-116.
- Pryor, L.D. and Johnson, L.A.S. (1971). "A Classification of the Eucalypts." (Aust. Natl. Univ.: Canberra.)
- Turczaninow, N. (1852). Myrtaceae xerocarpicae, in Nova Hollandia A cl. Drumond (sic!) lectae et plerumque in collectione ejus quinta distributae, determinatae et descriptae. *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg* 10: 338.
- Willis, J.H. (1967). Typification of eight Victorian species names in *Eucalyptus*. *Muelleria* 1: 165-68.
- Willis, J.H. (1973). "A Handbook to Plants in Victoria" Vol. 2. (Melb. Univ. Press: Melbourne.)