Eucalyptus conglobata subsp. *perata* (Myrtaceae), a new taxon from southern Western Australia and notes on *E.* series *Rufispermae*

M.I.H. Brooker and A.V. Slee

CSIRO Plant Industry,
GPO Box 1600, Canberra, ACT 2601

Abstract

Brooker, M.I.H. and Slee, A.V. *Eucalyptus conglobata* subsp. *perata*, a new taxon from southern Western Australia and notes on *E* . series *Rufispermae*. *Nuytsia* (15(2): 157–162 (2004). A new taxon, *Eucalyptus conglobata* R. Br. ex Maiden subsp. *perata* Brooker & Slee, from southern Western Australia is described and illustrated. A distribution map for the typical and the new subspecies is provided. A brief discussion of the large *E.* series *Rufispermae* to which the species belongs is given.

Introduction

The *E.* series *Rufispermae* Maiden is one of the largest in the genus in terms of numbers of species. It was erected by Maiden (1925) and based on the single species *E. woodwardii* Maiden from east of Kalgoorlie. The species of the series are overwhelmingly southern in distribution with only *E. repullulans* Nicolle of the Pilbara occurring north of latitude 26°.

E. conglobata was originally published as a variety of *E. dumosa* in 1867 from specimens in South Australia. *E. dumosa* is now recognized to be an eastern endemic in New South Wales, Victoria, and South Australia possibly as far west as Eyre Peninsula. The var. *conglobata* was raised to specific status by Maiden in 1922 and its distribution recognised as extending to Western Australia. Field observations and herbarium specimens reveal that the far western form of *E. conglobata* is consistently smaller in adult leaf, flower bud and fruits, while recognizing that typical *E. conglobata* occurs east of Esperance in Western Australia.

Eucalyptus conglobata subsp. ***perata*** Brooker & Slee, *subsp. nov.*

A subspecie typica foliis adultis (ad 10 cm x 2 cm) alabastris (ad 0.8 x 0.4 cm) fructibusque (ad 0.5 x 0.7 cm) minoribus et distributione perata differt. (Figures 1, 2, 3).

Typus: 14 miles (23.5 km) west of Hopetoun towards Hamersley River (Fitzgerald River National Park), 7 November 1969, *M.I.H. Brooker* 2312 (*holo*: CANB; *iso*: PERTH).

Mallee to 5 m tall. Forming a lignotuber. Bark smooth throughout, shedding in short strips, pale

grey over creamy white; branchlets with oil glands in the pith. Cotyledons reniform; seedling stems rounded or squared in cross-section; seedling and juvenile leaves always petiolate, opposite for 3 or 4 nodes then alternate, ovate to broadly lanceolate, 4-8 x 2-3 cm, dull, green to grey-green. Adult leaves alternate, petioles 1-2 cm long, blade lanceolate to narrowly lanceolate, 6.2-10 x 0.8-1.5(2) cm, base tapering to petiole, concolorous, usually slightly glossy, green, penniveined reticulation very dense, veinlets erose, intramarginal vein close to margin, oil glands intersectional. Inflorescences axillary unbranched, peduncles stout, 0.3-0.8 cm long, 7-flowered; buds closely sessile, crowded, ovoid to obovoid, 0.7-0.8 x 0.3-0.4 cm, scar present, operculum usually conical, striate, stamens inflexed, anthers cuneate, versatile, dorsifixed, dehiscing by longitudinal slits (non-confluent), style long, stigma blunt, locules 4(5), the placentae each with 4 vertical ovule rows; flowers white. Fruit sessile, tightly clustered, cupular, 0.4-0.5 x 0.5-0.7 cm, disc usually descending, valves 4(5), at rim level. Seed reddish and lustrous, 1.1-2.2 mm long, flattened-ovoid and often slightly angular in outline, dorsal surface shallowly reticulate, occasionally lacunose, hilum ventral.

Specimens examined. WESTERN AUSTRALIA: Fitzgerald River National Park, Hamersley Drive 14.1 km. S. of Old Ongerup Road, 9 Oct. 1984, *Briggs, B.G.* 7688 *& Johnson, L.A.S.* (CAN, NSW, PERTH); 3 km S by track of the Ravensthorpe-Esperance road, c.35 km E of Ravensthorpe (track turnoff is 5.7 km W of rabbit proof fence on main road), 20 Sep. 1978, *Briggs, J.D.* 275 (CANB); 14 mls W of Hopetoun, Hamersley Inlet, 7 Nov. 1969, *Brooker, M.I.H.* 2312 (CANB, PERTH); on plain leading to Woolbernup Hill, 6 Apr. 1974, *Brooker, M.I.H.* 4456 (CANB); 1.4 km SW of rail crossing near Bokal, SW of Arthur River, 17 Aug. 1979, *Brooker, M.I.H.* 6369 (CANB, NSW, PERTH); Toolibin North turnoff at Narrogin-Harrismith road, 4 May 1983, *Brooker, M.I.H.* 8098 (CANB); 6.4 km W of Quiss Road between Jerramungup and Ravensthorpe, (33° 54'27"S, 119°02'42"E), 29 Aug. 1998, *Brooker M.I.H.* 12916 *& Slee, A.V.* (AD, CANB, PERTH); 2 mls S of Peringillup, 11 Sep. 1947, *Burbidge, N.T.* 2437 (CANB); Oldfield River, 40.8 mls E of Ravensthorpe, 15 Mar. 1967, *Chippendale, G.M.* 196 (AD, CANB, MEL, NSW, PERTH); Bremer Bay Road, 10 Feb. 1970, *Demarz, H.* 2176 (CANB, Kings Park); Wishbone Railway Reserve, 12 km E of Dumbleyung, 10 Mar. 1984, *Fell, D.G.* 188 (CANB); Fitzgerald River NP; 5 km ENE of point where Moir Rd crosses Phillips River, c. 7.6 km SSW of Ravensthorpe, 9 Feb. 1986, *Fox, J.M.* 86/216 (CANB, MEL, PERTH); Wagin, *Gardner, C.A. s.n.* (CANB); 1.5 mls (c. 2.4 km) SE of Ravensthorpe, 22 Feb. 1966, *George, A.S.* 7574 *& Carr, S.G.M.* (AD, BRI, CANB, DNA, HO, MEL, NE, NSW); Kwobrup, 28 Sep. 952, *Key, K.H.* 73689 *& Wallace* (CANB); 12 miles from Gnowangerup, towards Albany, 10 Oct. 1962, *Phillips, M.E. s.n.* (CANB); Stirling Ranges, Feb. 1963, *Rave, F.W. s.n.* (CBG 23071 in CANB); 15 mls W of Jerramungup, May 1969, *Rockel, B.A. s.n.* (CANB); 11 km E of Ravensthorpe on Highway 1, lower slopes of Ravensthorpe Range (33°35'26"S, 120°09'39"E), 14 Sep. 1999, *Slee, A.V.* 4247 (CANB).

CULTIVATED: seedlings of *Brooker* 2312 (the type) (CANB 443842); seedling, Glasshouse, Forest Research Institute, Yarralumla, ACT, FRI 18185, grown from seed of FRI 14524 (*Chippendale* 196), 27 Sep. 1967 (CANB); seedling, FRI glasshouse, Yarralumla, 13 Feb. 1970, *Eakin, R. s.n.* (CANB); seedling, FRI glasshouse, Yarralumla, ACT, 8 May 1969, *Heighway, K. s.n.* (CANB).

Distribution and habitat. WESTERN AUSTRALIA: southern wheatbelt, coastal and subcoastal from west of Arthur River and Kojonup (Bokal), to east of Ravensthorpe.

Conservation status. Widespread and abundant. Occurs in Stirling Range and Fitzgerald River National Parks.

Flowering period. Autumn.

Etymology. From the Latin *peratus*, western, alluding to its occurrence in relation to the typical subspecies.

Discussion

Eucalyptus conglobata belongs to the now large *E.* series *Rufispermae* Maiden (1925) which is overwhelmingly southern Western Australian in distribution, while a few species occur in South Australia, Victoria and New South Wales. On publication the series was monotypic although several other species, now clearly belonging to the series, had been published at the time. The series name is derived from the appearance of the seeds which are unique in the genus, being rather flat, lustrous and ruby-red and hence are easily recognisable.

The type for the series, *E. woodwardii* Maiden (1910), is a rare species occurring east of Kalgoorlie. It is an extreme form for the series, having the largest buds and fruit and attractive yellow flowers. The other species are white-flowered. Overall, the species of the *E.* series *Rufispermae* are variable in habit and comprise tree, mallet and mallee taxa. Bark is smooth in most species although a few taxa are blackbutts. Decorticating bark is shed by long ribbons, which characteristically remain hanging from the branches.

Although Blakely (1934) referred to seed morphology in some taxonomic groups, e.g. bloodwoods and ghost gums, which he seems to have grouped haphazardly together with *E.* series *Corymbosae*, he apparently did not know or recognise the coherent nature of the *Rufispermae* seed type in assessing natural affinities between species. This assumption could be negated by the fact that his work was explicitly a key and not a classification. Nevertheless, from the majority of his species' groupings, the 'Key' can be interpreted as a classification, deriving primarily from assessment of anthers and secondarily on habit, bark, phyllotaxis, and inflorescence characters, but not on seeds. This is despite the fact that his mentor and colleague, Maiden (1929), had earlier made a significant study of the seeds of many eucalypts and placed species into groups based on the similarity of their seeds. Blakely, however, in his preface, acknowledges that Maiden preferred the idea of a key based on cotyledons and 'primary leaves', which would clearly have had little applicability outside of the glasshouse.

Blakely (1934) appears to have ignored Maiden's series *Rufispermae* altogether and placed *E. woodwardii* with six other species in a new series *Obliquae* which was not typified. This series is now recognized to be heterogeneous. Based on characters other than the seeds, in accordance with his methodology (habit, bark, phyllotaxis, leaf shape, and inflorescences), Blakely erected the *E.* series *Dumosae*, based on *E. dumosa* A. Cunn. ex Oxley, an eastern taxon, and one of the few species of the series that he would have been familiar with, apart from herbarium or cultivated specimens. *E.* series *Dumosae* Blakely is also a heterogeneous grouping, although most of the species are recognized to belong to the higher taxon *E.* section *Dumaria* Pryor & Johnson ex Brooker (2000).

In 1988, Chippendale restored Maiden's series *Rufispermae* in the Flora of Australia Volume 19. He placed the series in contiguity with four other series, *Torquatae*, *Merrickianae*, *Tetrapterae* and *Ovulares* (if we exclude *E.* series *Dundasianae* which belongs in *E.* section *Bisectae*). Brooker (2000) grouped all the constituent species of these series, apart from *E. dundasii*, plus several published after 1988, into *E.* section *Dumaria*, comprising eleven taxonomic series.

E. conglobata subsp. *conglobata* occurs from lower Eyre Peninsula in South Australia west to about Esperance in Western Australia. It is usually a mallee, rarely a tree (Boston Island off Port Lincoln, D. Nicolle 1997). According to Chippendale (1988), syntypes for *E. conglobata* were collected at Port Lincoln (by C. Wilhelmi) and 'south coast' [S.A] (by R. Brown). The mallees of this species (or trees) have more or less smooth bark, slightly glossy, green adult leaves (to 13 x 4 cm), and tightly clustered, sessile buds (to 1 x 0.7 cm) and fruits (to 0.8 x 1.2 cm) in 7s.

The typical subspecies has a much wider distribution than was known at the time of its publication and certainly extends to south-eastern, coastal Western Australia. The new subspecies occurs to the west of this distribution although there is a narrow zone in which the two taxa intergrade. It differs from the typical subspecies in the smaller adult leaves (to 10 x 2 cm), buds (to 0.8 x 0.4 cm), and fruits (to 0.5 x 0.7 cm), while its natural affinity is unmistakably with the typical subspecies. A comparison of the subspecies of *E. conglobata* and closely related taxa and also some that may be confused with it is given in Table 1.

Table 1. Comparison of mallee species closely related to *E. conglobata*.

Character	*E. conglobata* subsp. *conglobata*	*E. conglobata* subsp. *perata*	*E. phenax* subsp. *phenax*	*E. phenax* subsp. *compressa*	*E. dumosa*	*E. pileata*
Peduncle length cm	0–0.7	0.3–0.8	0.3–0.8	0.8–1.4	0.5–2	0.5–1.5
Pedicel	sessile	sessile	sessile to shortly pedicellate	sessile	sessile or pedicellate	pedicellate
Bud shape	ovoid to obovoid	ovoid to obovoid	cylindrical to ovoid	cylindrical to ovoid	cylindrical	cylindrical to ovoid or ±pyriform
Operculum shape	conical (rarely beaked or rounded)	conical (rarely beaked)	conical to rounded	conical to turban-shaped	conical to slightly beaked or turban-shaped	conical to rounded or turban-shaped
Fruit shape	cupular to hemispherical, compressed	cupular	cylindrical to cupular	cupular to cylindrical or barrel-shaped	cupular to cylindrical or barrel-shaped	cupular to obconical or shortly barrel-shaped
width	0.7–1.1	0.5–0.7	0.5–0.8	0.6–1	0.5–0.7	0.6–0.9
Adult leaf length cm	7–13	6.2–10	5–12	6–11	4.8–12	6.5–14
Adult leaf width cm	1.5–4	0.8–1.5(2)	0.8–2.8	1.5–3.5	0.8–2.5	0.7–2.5
Bark	smooth	smooth	smooth	smooth	may be rough on lower trunk	smooth

Chippendale (1973) commented on the "smaller budded, smaller-fruited mallee" from near Wagin east to Israelite Bay, although he made no formal taxonomic distinction in his 'Eucalypts of the Western Australian Goldfields'. We consider that the distribution of this small-budded form does not extend as far east as Chippendale stated and that the typical form occurs from east of Esperance. Subspecies status is appropriate for the new taxon because of its relatively discrete geographic range and consistent, smaller bud and fruit dimensions. The typical subspecies is more variable in dimensions, particularly

in the Port Lincoln region, although the great majority of the mallees there have conspicuously larger leaves, buds and fruits than the new taxon.

It is instructive to compare closely two similar taxa shown above, which we believe to be convergent and widely disjunct. These are *E. conglobata* subsp. *perata* which can be distinguished most readily from the other, *E. phenax* subsp. *compressa*, by the stout peduncles 0.3 – 0.8 cm long (peduncles 0.8 – 1.4 cm in *E. phenax* subsp. *compressa*). *E. conglobata* subsp. *perata* also generally has narrower adult leaves (0.8 - 2 cm wide) and smaller fruit (0.5 – 0.7 cm wide) than *E. phenax* subsp. *compressa* (leaves 1.5 – 3.5 cm wide; fruit 0.6 – 1 cm wide). *E. conglobata* subsp. *perata* is a Western Australian endemic while *E. phenax* subsp. *compressa* is restricted to Kangaroo Island and the adjacent mainland of Fleurieu Peninsula in South Australia.

It is difficult to glean from herbarium data the site characteristics that the new taxon appears to prefer. Clays, loamy sand, sandy loan, sandy clay over granite, limestone and lateritic gravel are all given as substrate on labels. Associated eucalypts are *E. occidentalis* Endl., *E. redunca* Schau., *E. pleurocarpa* Schau., *E. oleosa* F. Muell. ex Miq. subsp. *corvina* L. Johnson & K. Hill, *E. lehmannii* Schau., *E. platypus* Hook., *E. uncinata* Turcz., and *E. leptocalyx* Blakely. These are known to occur on a range of sites from wet depressions, to clay and lateritic sands.

The *E.* series *Rufispermae* comprises over thirty species, many of which have been divided into subspecies. The series is one of the largest in the genus in terms of number of taxa and in distribution, which is probably why no comprehensive taxonomic revision has been undertaken. As well, it is likely that new taxa in the series will be found, e.g. on Eyre Pensinsula and southern Western Australia.

A complicating feature of the series is that it is difficult to recognize infra-series taxa. Brooker (2000) lists the species only with affinities merely suggested, with no division into subseries, unlike the treatment of a similarly large series, viz. the *E.* series *Subulatae* (Brooker 2000).

In a recent publication, Hill, Johnson and Blaxell (2001) stated of the *E.* series *Rufispermae* (which they treated as *E.* series *Obtusiflorae*), "Further division into subseries is problematical", and we are certainly in agreement with this assertion. However, to accommodate the species treated in their publication, Hill *et al.* tentatively recognized three complexes, viz. those based on *E. pileata*, *E. obtusiflora* and *E. kondininensis*. The complexes were not comprehensively described, emphasizing the difficulty of diagnosis in this area of *Eucalyptus* taxonomy. We suggest that *E. conglobata* would belong to the *E. pileata* complex of Hill *et al.*, but as stated earlier, the series requires a detailed revisionary treatment.

References

Blakely, W.F. (1934). "A Key to the Eucalypts." (The Worker Trustees: Sydney).

Brooker, M.I.H. (2000). A new classification of the genus *Eucalyptus*. Australian Systematic Botany 13, 79-148.

Chippendale, G.M. (1973). "Eucalypts of the Western Australian Goldfields and the adjacent wheatbelt." Australian Government Publishing Service": Canberra.

Chippendale, G.M. (1988). *Eucalyptus* in "Flora of Australia" Volume 19. Australian Government Publishing Service: Canberra.

Hill, K.D., Johnson, L.A.S. and Blaxell, D.F. (2001). Systematic Studies in the eucalypts. 11- New taxa and combinations in *Eucalyptus* Section *Dumaria* (Myrtaceae). Telopea 9: 259-318.

Maiden, J.H. (1925). "A Critical Revision of the genus *Eucalyptus*." 7, 152 Government Printer: Sydney

Nicolle, Dean (1997). "Eucalypts of South Australia." D.Nicolle: Adelaide.

Figure 1. Intact inflorescences showing flower buds of *E.conglobata* subsp. *conglobata* (top, Slee 4058) and *E.conglobata* subsp. *perata* (bottom, Brooker 12916).

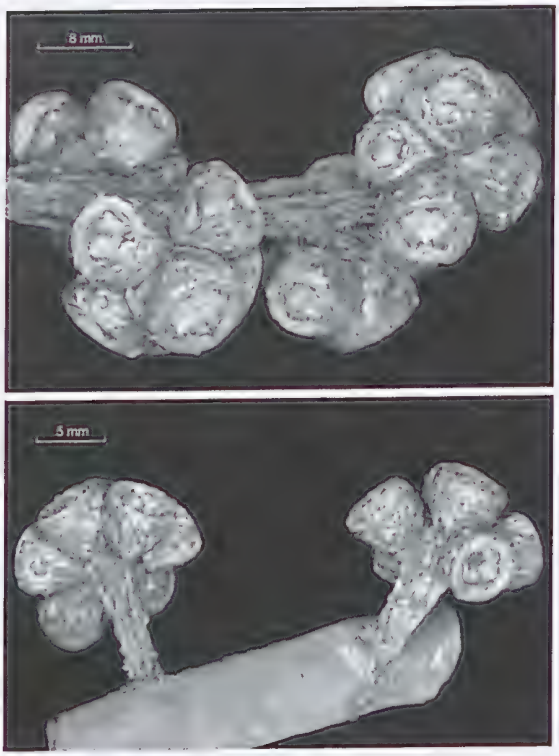

Figure 2. Intact inflorescences showing fruits of *E. conglobata* subsp. *conglobata* (top, Slee 4058) and *E. conglobata* subp. *perata* (bottom, Brooker 12916).

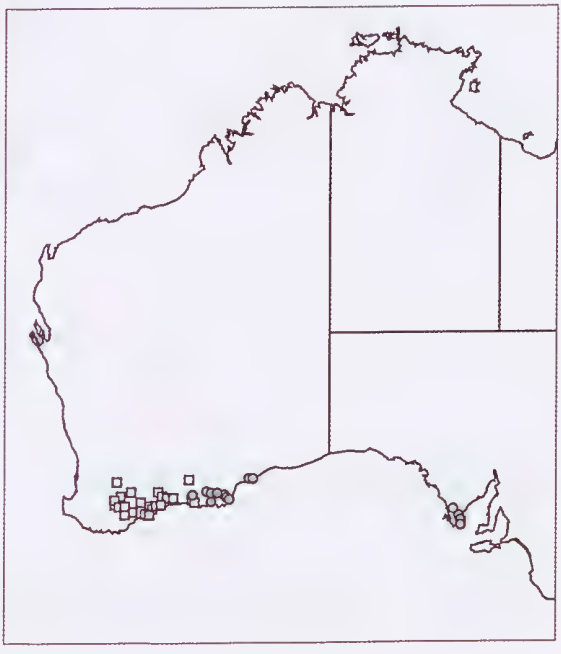

Figure 3. Distribution of *E. conglobata* subsp. *perata* □ and *E. conglobata* subsp. *conglobata* ○.