http://dx.doi.org/10.7751/telopea19971011

New taxa in *Eucalyptus* (Myrtaceae) from New South Wales and Queensland

K.D. Hill

Abstract

Hill, K.D. (National Herbarium of New South Wales, Royal Botanic Gardens, Mrs Macquaries Road, Sydney, NSW 2000, Australia) 1997. New taxa in Eucalyptus *(Myrtaceae) from New South Wales and Queensland.* Telopea *7(3): 187–198.* Three new species of *Eucalyptus* (**E. farinosa, E. subcaerulea** and **E. scopulorum**) and one new subspecies (**E. pachycalyx** subsp. **banyabba**) from New South Wales and Queensland are described and illustrated. Distribution maps are provided, and conservation status is discussed. All taxa are regarded as rare or threatened.

Introduction

Three new species and one new subspecies of *Eucalyptus* from New South Wales and Queensland are described. All of the new species are classed as rare or threatened, and formal names are required in order to facilitate appropriate listing and action for conservation purposes.

1. Eucalyptus pachycalyx subsp. **banyabba** *K.D. Hill*, **subsp. nov.**

E. pachycalyci subsp. *waajensi* affinis sed foliis adultis juvenilibusque latioribus, foliis juvenilibus obtusatis differt.

Type: New South Wales: North Coast: Banyabba Nature Reserve, *M.I.H. Brooker 12396 & A.V. Slee*, 14 Oct 1995 (holo NSW; iso BRI, CANB, MEL).

Tree to 10 m tall, often several-stemmed. Bark smooth to base, shedding in scales, patchy light and dark grey, yellow and orange. Juvenile leaves grey-green, dull, opposite on early nodes, quickly becoming disjunct-opposite, ovate, apically rounded, 3–10 cm long, 2.2–5.5 cm wide; petioles to 2.3 cm long. Adult leaves grey-green, dull, disjunct-opposite, similifacial, broad-lanceolate, acute or apiculate, 5–13 cm long, 1.8–3.3 cm wide; petioles 1.2–2.3 cm long. Inflorescences axillary, frequently paired; umbellasters 7-flowered. Peduncles terete, 5–15 mm long. Pedicels terete, 1–3 mm long. Mature buds ovoid, 7–9 mm long, 5–6 mm diam. Outer calyptra shedding early. Inner persistent calyptra hemispherical, 1/2–2/3 as long as hypanthium. Stamens irregularly flexed, all fertile. Anthers adnate, basifixed, ovoid, opening by longitudinal slits. Fruits cup-shaped, 3–4-locular, 6–7 mm long, 7–8 mm diam. Calyptra scar and stemonophore flat, 0.2–0.5 mm wide. Disc level, 1.5–2 mm wide, with regular radial cracking. Valves narrowly triangular, acuminate with style remnants, basally enclosed, vertically raised and apically exserted. (Fig. 1).

Notes: *E. pachycalyx* Maiden & Blakely is a taxonomically isolated species most closely allied to *E. squamosa* Deane & Maiden, these two taxa representing eastern outliers in the large and otherwise primarily Western Australian section *Bisectaria* (Pryor & Johnson 1970). *E. pachycalyx* subsp. *banyabba* is readily distinguished from subspp. *pachycalyx* and *waajensis* by the lower length:breadth ratio in both adult and juvenile leaves, and the rounded juvenile leaves. Peduncles and pedicels tend also to be shorter (Table 1). The shared rounded buds and broad adult leaves suggest that subsp. *banyabba*

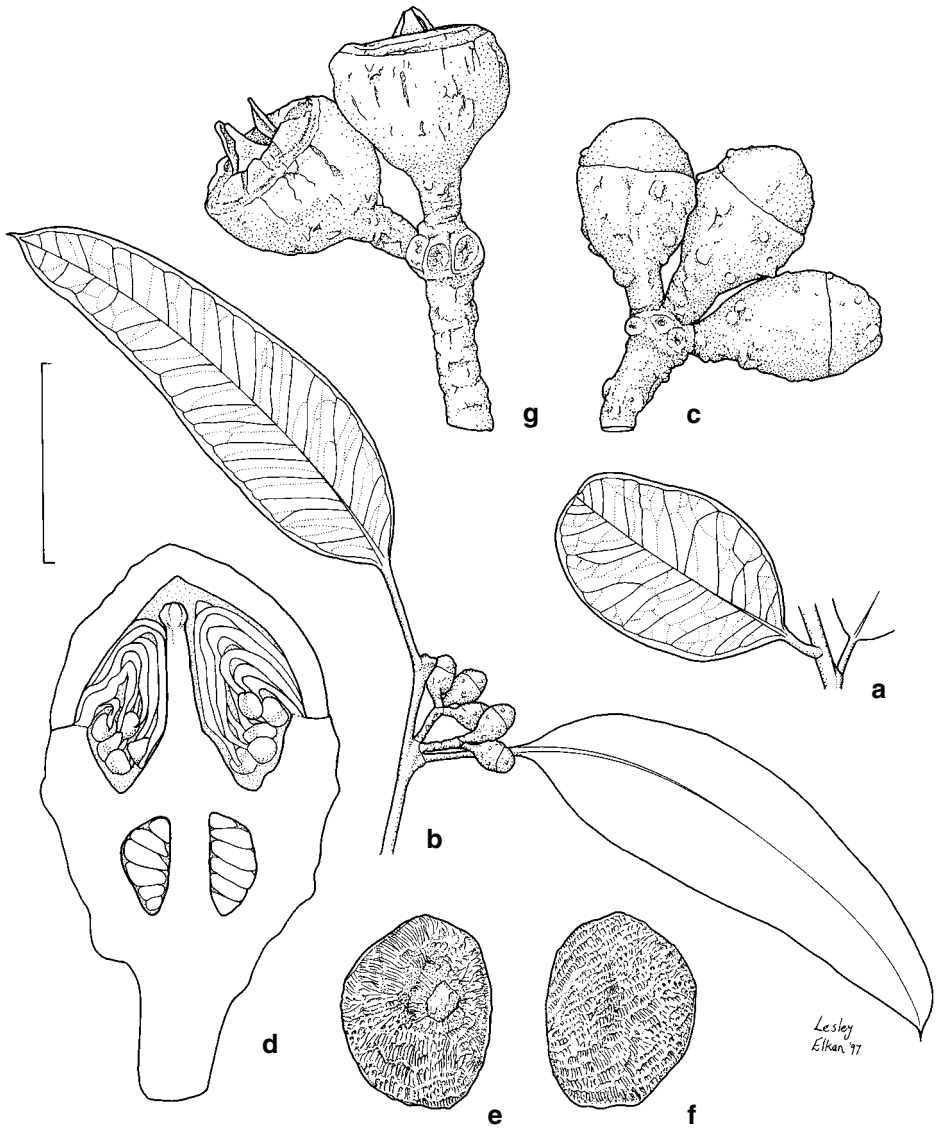

Fig. 1. *E. pachycalyx* subsp. *banyabba*. **a,** juvenile leaf. **b,** adult leaf and inflorescence. **c,** buds. **d,** transverse section of bud. **e, f,** seed. **g,** fruit. (a from *Hill 4898 & Richards*, b–f from *Thomas s.n.*). Scale bar: a, d = 4 cm, b, c = 1 cm, e = 2 mm, f = 4 mm.

Table 1. Comparison of the subspecies of *E. pachycalyx*.

Subspecies	***pachycalyx***	***waajensis***	***banyabba***
Juvenile leaves	broad-lanceolate	broad-lanceolate	ovate
	obtuse to rounded	acute	rounded
cm	6–15 × 1.5–6	5–16 × 2.2–6	3–10 × 2.2–5.5
Adult leaves	narrow-lanceolate	lanceolate	broad-lanceolate
cm	10–15 × 1.3–2	5–12 × 1–2.2	5–13 × 1.8–3.3
Petioles cm	1.3–2	1–2.5	1.2–2.3
Peduncles cm	0.6–1.4	1.2–1.6	0.5–1.5
Pedicels mm	2–4	4–5	1–3
Buds mm	7–10 × 4–5	6–7 × 4–5	7–9 × 5–6
Calyptra	conical	rounded	rounded
	longer than hypanthium	as long as than hypanthium	shorter than hypanthium
Fruits mm	5–6 × 7–8	5–6 × 6–7	6–7 × 7–8

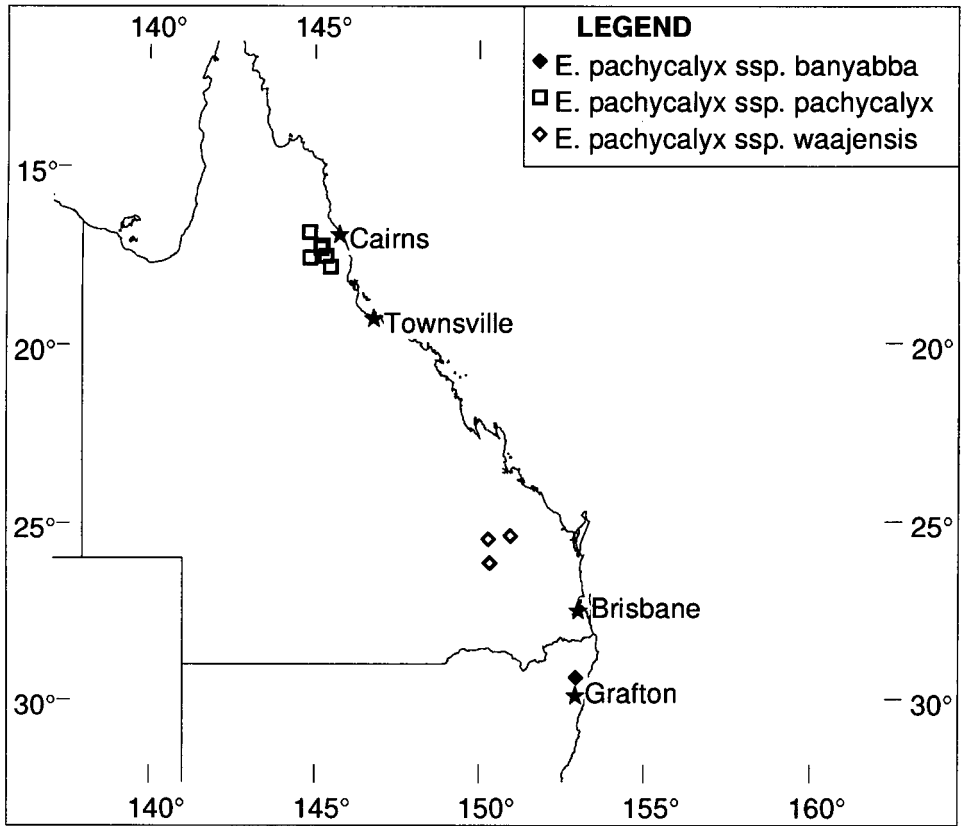

Fig. 2. Distribution of *E. pachycalyx* subspp. *pachycalyx, waajensis* and *banyabba.*

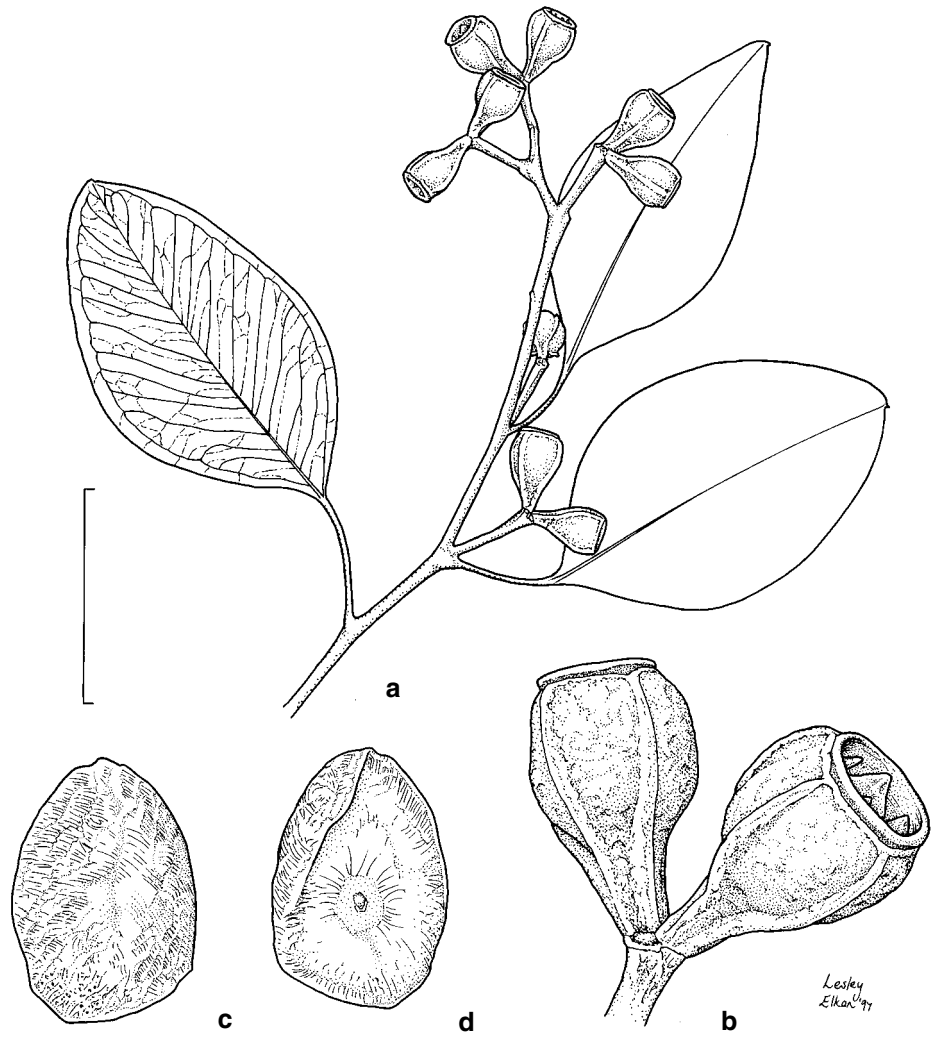

Fig. 3. *E. farinosa*. **a,** adult leaves, inflorescence and fruits. **b,** fruits. **c, d,** seed (from *Hill 4823*). Scale bar: a = 4 cm, b = 2 mm, c = 1 cm.

may be nearer to subsp. *waajensis*, although the rounded juvenile leaves shared with subsp. *pachycalyx* do not support this.

Distribution: known only from a few small stands in the Banyabba Nature Reserve in north-eastern New South Wales (Fig. 2).

Ecology: locally dominant in small patches on skeletal sandy soils over sandstone on slight rises. Individual plants are frequently many-stemmed as a result of successive regeneration from the lignotuber after fire, and the exact population sizes are consequently unclear, although likely to be alarmingly small.

Conservation status: 2RC.

The epithet is taken from the occurrence of this subspecies in the Banyabba Nature Reserve.

Selected specimens (from 4 examined): New South Wales: North Coast: Banyabba Nature Reserve, *Thomas s.n.*, 1994 (NSW 206468); Banyabba fire trail, *Hill 4898 & Richards*, 29 Oct 1996 (NSW).

2. Eucalyptus farinosa *K.D. Hill*, **sp. nov.**

E. quadricostatae affinis sed ramulis, foliis fructibusque glaucis, foliis minoribus latioribusque differt.

Type: Queensland: track to top of Mt Stewart, W of Charters Towers, *K.D. Hill 4823*, 11 Oct 1996 (holo NSW; iso BRI, CANB).

Tree to 8 m tall. Bark hard dark grey ironbark throughout. Small branchlets strongly glaucous. Juvenile leaves not seen. Adult leaves grey-green with a white glaucous wax bloom, dull, disjunct-opposite, similifacial, ovate to orbicular, acute to rounded, 6–10 cm long, 3–6 cm wide; petioles 2.0–3.0 cm long. Inflorescences compound, often axillary; umbellasters 7-flowered. Peduncles terete or weakly angular, 7–15 mm long. Pedicels quadrangular, gradually expanded apically and merging into hypathium, 3–5 mm long. Mature buds not seen. Fruits strongly glaucous, quadrangular, cup-shaped, 4–5-locular, 9–12 mm long, 8–10 mm diam. Calyptra scar and stemonophore flat, c. 0.5 mm wide. Disc vertically depressed, 1–1.5 mm wide. Valves broadly triangular, acute, steeply raised, tips level to almost level with stemonophore or sometimes slightly exserted. (Fig. 3).

Notes: *E. farinosa* is nearest to *E. quadricostata* Brooker, from which it can be distinguished by the strongly glaucous twigs, leaves and fruits, the broader and more rounded leaves, and the shorter peduncles and pedicels (Table 2). Only a single collection of this species was examined (the type), although the population of over 1000 individuals across a range of more than 10 km was examined in the field.

Both *E. farinosa* and *E quadricostata* belong to Section *Adnataria* (Pryor & Johnson 1970), a large and predominantly eastern Australian group that includes the boxes and ironbarks. Within that section, these two species are placed in a series defined by possession of hard ironbark, an outer calyptra that sheds early, anthers that dehisce through lateral slits, and absence of staminodes. This series includes the widespread species *E. crebra* and *E. siderophloia*. Pryor & Johnson (op. cit.) had named this group Series *Pruinosae* on the (mistaken) assumption that *E. pruinosa* from northern Australia also belonged here. This was corrected by Brooker (1985), who suggested that a series name *Crebrae* would be appropriate. Chippendale (1988) used the series name *Siderophloiae* for the same group, revising the circumscription from that used by Blakely (1934), who first erected the name at series rank. Within the series, the two species discussed are readily distinguished by the quadrangular fruits.

Distribution: known only from Mt Stewart, west of Charters Towers (Fig. 4).

Ecology: locally frequent but restricted to shallow gritty soils on the slopes of a steep granite range. This species is the dominant tree on steep dry slopes.

Conservation status: 2R-.

The epithet is from the Latin *farinosus*, floury or mealy, in reference to the thick white coating on the leaves, buds and fruits.

3. Eucalyptus scopulorum *K.D. Hill*, **sp. nov.**

E. caleyi affinis sed foliis adultis juvenilibusque angustioribus, ramulis alabastrisque non glaucis differt.

Type: New South Wales: Northern Tablelands: Peregrine Point, Gibraltar Range State Forest (29°36'54"S 152°12'04"E), *K.D. Hill 4887 & P.G. Richards*, 28 Oct 1996 (holo NSW; iso BRI, CANB, K, MEL).

Table 2. Comparison of *E. quadricostata* and *E. farinosa*.

	E. quadricostata	***E. farinosa***
Adult leaves	lanceolate	ovate to orbicular
cm	11–15 x 1.5–2.2	6–10 × 3–6
Petioles cm	1.3–2.7	2.0–3.0
Peduncles mm	12–20	7–15
Pedicels mm	5–7	3–5
Fruits mm	10–14 × 8–10	9–12 × 8–10

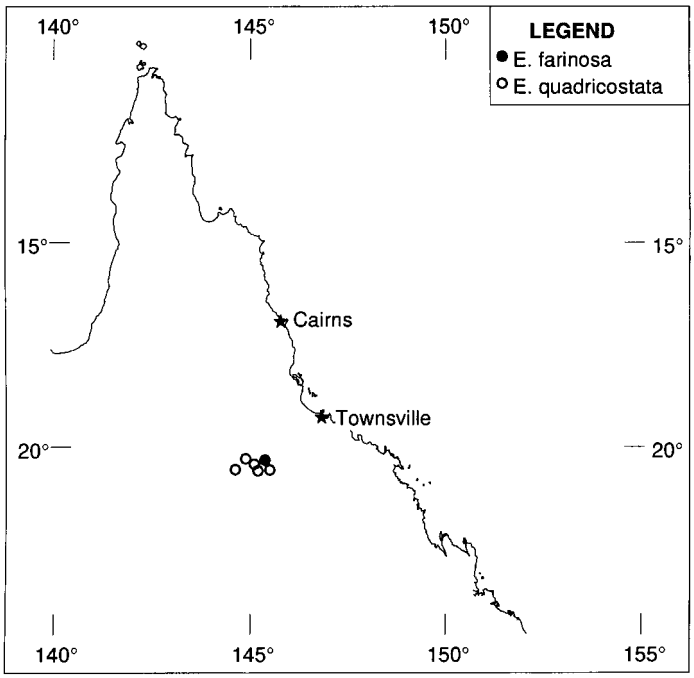

Fig. 4. Distribution of *E. farinosa* and *E. quadricostata.*

Tree to 8 m tall. Bark pale grey corky ironbark throughout. Juvenile leaves grey-green, dull, disjunct-opposite, narrow-elliptical to elliptical, 3.5–9 cm long, 1.8–3.0 cm wide, apically rounded or obtuse; petioles 1–5 mm long. Adult leaves grey-green, dull, disjunct-opposite, similifacial, broad-lanceolate, acuminate, 6–11 cm long, 1.3–3.4 cm wide; petioles 0.8–2.5 cm long. Inflorescences simple or compound, terminal or axillary; umbellasters 7-flowered. Peduncles terete or weakly angular, 6–18 mm long. Pedicels terete or weakly angular, apically expanding and merging into hypanthium, 3–8 mm long. Mature buds fusiform, 7–9 mm long, 3.5–4.5 mm diam. Outer calyptra shed long before anthesis. Inner persistent calyptra conical, acute, about half as long as hypanthium, distinctly narrower than hypanthium. Stamens regularly inflexed, outer rows infertile. Anthers adnate, obliquely basifixed, cuboid, opening by terminal pores. Fruits obconical to barrel-shaped, 3–4-locular, 6–9 mm long, 5–7 mm diam. Calyptra scar and stemonophore flat, c. 0.5 mm wide. Disc vertically depressed, 1–1.5 mm wide. Valves broadly triangular, obtuse, steeply raised, deeply enclosed. (Fig. 5).

Notes: the corky ironbark, the early shedding outer calyptra, the anthers that open by terminal pores and the presence of staminodes place *E. scopulorum* in the *E. paniculata* Sm. group (series *Paniculatae*, Pryor & Johnson 1970). The thick, broad, dull, similifacial adult and juvenile leaves and the rounded to obtuse juvenile leaves suggest that it is nearest to *E. caleyi* Maiden, from which it differs in the lower length:breadth ratio in both adult and juvenile leaves and the lack of any glaucousness. In particular, juvenile leaves of *E. scopulorum* range between about 0.3 and 0.5 in length: breadth ratio, whereas the range in *E. caleyi* is between 0.6 and 1.0. *E. fusiformis* Boland & Kleinig could also be confused with *E. scopulorum*, but can be distinguished by the narrower and thinner adult and juvenile leaves, and the more slender fruits (Table 3).

Distribution: known only from a few small stands in the Gibraltar Range State Forest in the New England region of north-eastern New South Wales (Fig. 6).

Ecology: locally dominant but extremely restricted, occurring only in crevices on steep acid porphyry cliffs. *E. notabilis* Maiden and *Brachychiton populneus* (Schott & Endl.) R.Br. occur in association.

Table 3. Comparison of *E. caleyi*, *E. fusiformis* and *E. scopulorum*.

	E. caleyi	***E. fusiformis***	***E. scopulorum***
Juvenile leaves	orbicular	lanceolate	narrow-elliptical to elliptical
cm	4–10 × 3–7	15–20 × 2.5–3.2	3.5–9 × 1.8–3.0
Adult leaves	lanceolate to broad-lanceolate	lanceolate	broad-lanceolate
cm	5–10 × 1.5–4	9–15 × 1.1–2.5	6–11 × 1.3–3.4
Petioles cm	1.4–2.3	1.2–2.0	0.8–2.5
Peduncles mm	12–25	3–20	6–18
Pedicels mm	5–10	2–6	3–8
Buds mm	6–8 × 4–5	5–8 × 3–4	7–9 × 3.5–4.5
Fruits mm	6–10 × 5–8	5–9 × 4–5	6–9 × 5–7

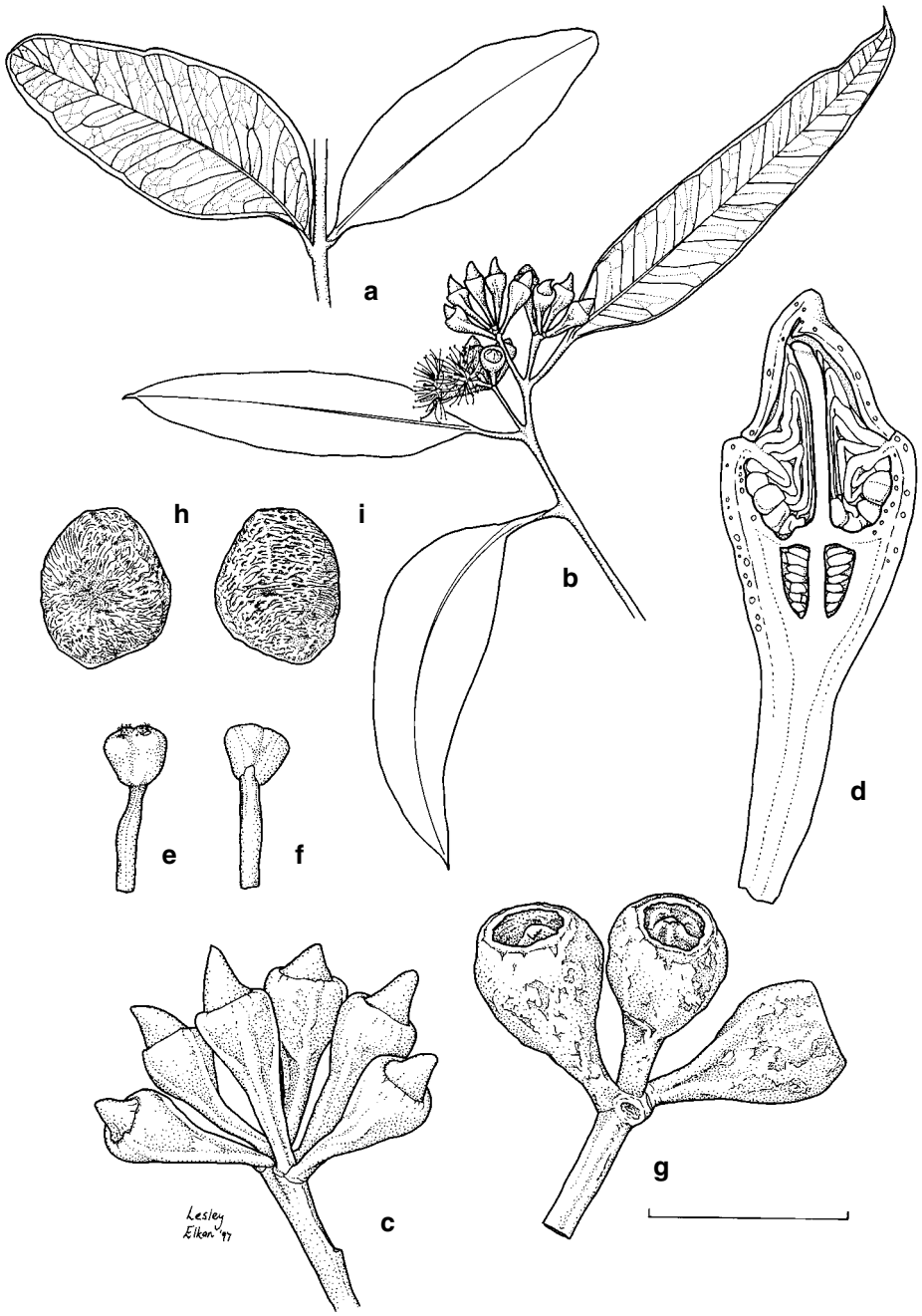

Fig. 5. *E. scopulorum*. **a,** juvenile leaves. **b**, adult leaves and inflorescences. **c,** inflorescence and buds. **d,** transverse section of bud. **e, f,** anther. **g,** fruit. **h, i,** seed (a from *Hill 4888*, b–g from *K.D. Hill 4887*). Scale bar: a, b = 4 cm, c = 4 mm, d, e = 1 cm, f, g = 2 mm.

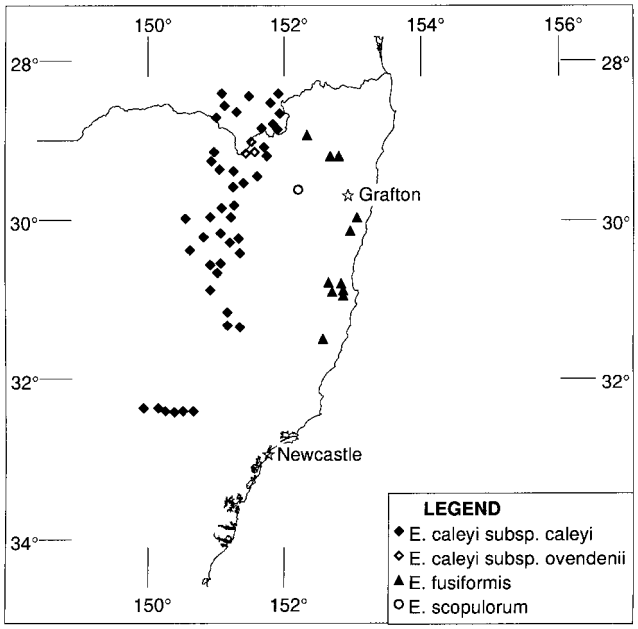

Fig. 6. Distribution of *E. scopulorum, E. caleyi* and *E. fusiformis.*

Conservation status: 2RC.

The epithet is from the Latin *scopulus*, a cliff, from the occurrence on precipitous sites.

Specimens examined: New South Wales: Northern Tablelands: Peregrine Point, Gibraltar Range State Forest, *Hill 4888 & Richards*, 28 Oct 1996 (NSW, BRI , CANB, K, MEL), *Hill 4892 & Richards*, 28 Oct 1996 (NSW).

4. Eucalyptus subcaerulea *K.D. Hill*, **sp. nov.**

E. agglomeratae affinis sed foliis adultis juvenilibusque minoribus angustioribusque, alabastris minoribus, fructibus minoribus differt.

Type: New South Wales: Northern Tablelands: Cooraldooral trig., Gibraltar Range State Forest, *K.D. Hill 4889 & P.G. Richards*, 28 Oct 1996 (holo NSW; iso AD, BRI, CANB, HO, K, L, MEL, MO).

Tree to 15 m tall. Bark persistent, stringy, branches from ca. 2 cm diam. smooth, pale grey. Juvenile leaves mid-green, dull, hispid with simple hairs arising from raised oil glands, opposite on early nodes, becoming disjunct-opposite, broad-lanceolate to ovate, 3.0–6 cm long, 12–26 mm wide, petioles 1–4 mm long. Intermediate leaves broad-lanceolate, glabrous, 6–10 cm long, 1.7–3.0 cm wide. Adult leaves glossy green with a bluish sheen, glabrous, disjunct-opposite, similifacial, lanceolate, acute or apiculate, 4.5–11 cm long, 1.2–2.6 cm wide; petioles 0.9–1.5 cm long. Inflorescences axillary; umbellasters many-flowered (more than 11). Peduncles slightly flattened or angular, 5–10 mm long. Pedicels absent, or terete and to 1 mm long if present. Mature buds fusiform, 5–6 mm long, 1.5–2.5 mm diam. Calyptra conical, acute, about as long as or slightly longer than hypanthium. Stamens irregularly flexed, all fertile. Anthers versatile, dorsifixed, reniform, opening by confluent oblique slits. Fruits tightly clustered, globular, apically strongly constricted, 3–4-locular, 4–5 mm long, 5–7 mm diam.

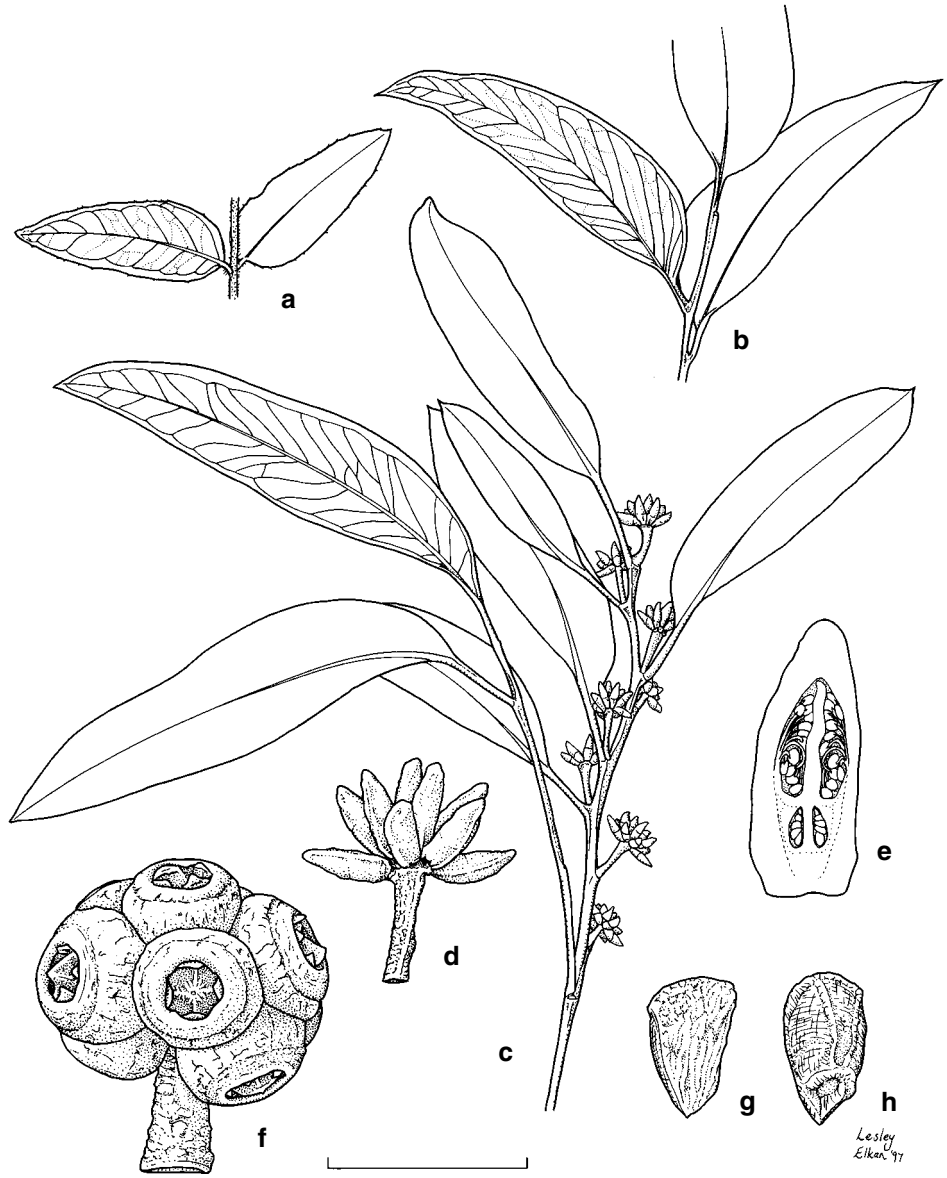

Fig. 7. *E. subcaerulea.* **a,** juvenile leaves. **b,** intermediate leaves. **c,** adult leaves and inflorescences. **d,** inflorescence and buds. **e,** transverse section of bud. **f,** fruit. **g,** h, seed. (a,b from *Hill 4890,* b from *Hill 4891*, c-j from *Hill 4889*). Scale bar: a, b, c = 4 cm, d = 4 mm, e = 2 mm, f, g = 1 cm.

Table 4. Comparison of *E. agglomerata* and *E. subcaerulea*.

	E. agglomerata	***E. subcaerulea***
Juvenile leaves	ovate	broad-lanceolate to ovate
cm	4–7 × 2.0–4.5	3.0–6 × 1.2–2.6
Petioles cm	0.5–1.0	0.1–0.4
Intermediate leaves	broad-lanceolate	broad-lanceolate
cm	8–15 × 3.0–5.0	6–10 × 1.7–3.0
Adult leaves	lanceolate	lanceolate
cm	10–14 × 1.8–3.0	4.5–11 × 1.2–2.6
Petioles cm	1.0–1.5	0.9–1.5
Peduncles mm	6–13	5–10
Pedicels mm	0	0–1
Buds mm	5–8 × 2–3	5–6 × 1.5–2.5
Fruits mm	5–7 × 7–10	4–5 × 5–7

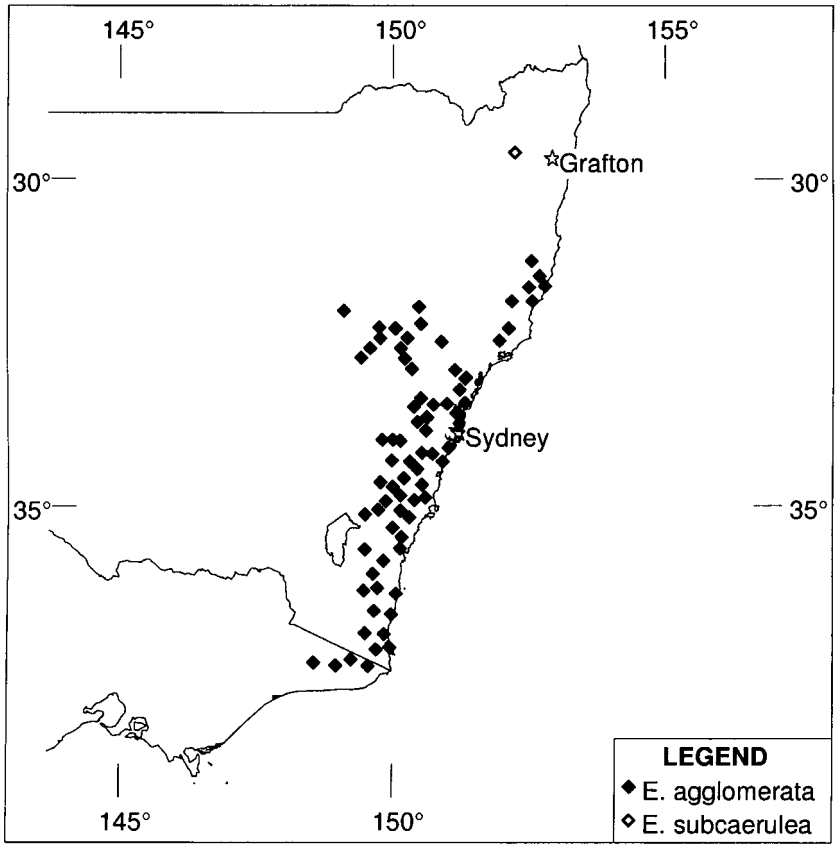

Fig. 8. Distribution of *E. subcaerulea* and *E. agglomerata.*

Calyptra scar and stemonophore flat, c. 0.2–0.4 mm wide. Disc raised, glossy reddish brown, 1–1.5 mm wide. Valves broadly triangular, obtuse, slightly raised, tips level with disc. (Fig. 7).

Notes: *E. subcaerulea* is nearest to *E. agglomerata* Maiden, from which it is readily distinguished by the smaller, narrower adult and juvenile leaves with lower length:breadth ratios in both, and smaller buds and fruits (Table 4).

E. subcaerulea and *E. agglomerata* are placed in Section *Renantherae* of subgenus *Monocalyptus* (Pryor & Johnson 1970) by the renantherous anthers. Within the section, they are placed in Series *Capitellatae* (the stringybarks) by the stringy bark and the hispid juvenile leaves. Both taxa are distinguished within that group by the broad juvenile leaves that become glabrous at an early stage, the closely clustered and more or less sessile fruits and the bluish sheen of the adult leaves.

Distribution: known only from a few small stands in the Gibraltar Range State Forest in the New England region of north-eastern New South Wales (Fig. 8).

Ecology: locally dominant in a band around the upper slopes of a steep ridge, on gritty sandy soils over granite and among outcropping boulders. *E. campanulata* R. Baker occurs in adjacent woodland, with some individuals among the *E. subcaerulea* population. The understorey is mainly grassy, dominated by *Poa* sp.

Conservation status: 2RC.

The epithet is from the Latin *caerulea*, blue, and the Latin prefix *sub-*, somewhat, in reference to the blue sheen of the adult foliage that, while always present, is not always obvious.

Specimens examined: New South Wales: Northern Tablelands: Cooraldooral trig., Gibraltar Range State Forest, *Hill 4890, 4891 & Richards*, 28 Oct 1996 (NSW, BRI, CANB).

Acknowledgments

Peter Richards is gratefully acknowledged for drawing attention to *E. scopulorum* and *E. subcaerulea*, and for valuable assistance in the field. Jeff Thomas drew attention to the new subspecies of *E. pachycalyx*. Peter Wilson is thanked for assistance with Latin diagnoses. Thanks are due to Leonie Stanberg for continued valuable assistance in the field and the herbarium, and Lesley Elkan for the illustrations.

References

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

Brooker, M.I.H. (1985) The ironbarks allied to *Eucalyptus crebra* F. Muell, and the description of a new species, *E. quadricostata*, in the group. *Austrobaileya* 2: 148–152.

Chippendale, G.M. (1988) *Eucalyptus, Angophora*. In George, A.S. (ed.), *Flora of Australia*, vol. 19 (Australian Government Publishing Service: Canberra).

Hill, K.D. (1991) *Eucalyptus.* Pp. 76–142 in Harden, G.J. (ed.), *Flora of New South Wales*, vol. 2 (New South Wales Press University: Kensington).

Pryor, L.D. & L.A.S. Johnson (1971) *A Classification of the Eucalypts* (ANU Press: Canberra).

Manuscript received 18 March 1997
Manuscript accepted 26 June 1997