

## Systematic studies in the eucalypts – 4 New taxa in *Eucalyptus* (Myrtaceae)

K.D. Hill & L.A.S. Johnson

### Abstract

Hill K.D. & Johnson L.A.S. (National Herbarium of New South Wales, Royal Botanic Gardens, Sydney, NSW, Australia 2000) 1991. Systematic studies in the eucalypts – 4. New taxa in *Eucalyptus* (Myrtaceae). *Telopea* 4(2): 321–349. A number of new taxa are described: *Eucalyptus gigantangion*, *E. pachycalyx* subsp. *waajensis*, *E. eucentrica*, *E. kabiana*, *E. beaniana*, *E. granitica*, *E. atrata*, *E. persistens* (with subspecies *tardacidens*), *E. sicilifolia*, *E. suffulgens*, *E. dura*, *E. reducta*, *E. mensalis* and *E. microcodon*.

### Introduction

Over past decades, increased activity and interest in eucalypt taxonomy has revealed a large number of undescribed taxa. This paper is one of a series of contributions towards an overall revision of the eucalypts, validating names of new taxa for use in forthcoming regional treatments. Taxa treated here are predominantly from Queensland, with some from Central Australia and the Northern Territory.

At this stage, *Eucalyptus* L'Hérit. will be used in the traditional sense. The species are not allocated alphabetic codes according to the system of Pryor & Johnson (1971) since these are being revised. Species are treated in the order in which they occur in the revised classification developed from Pryor & Johnson.

Rare or threatened species are allocated conservation status codes according to the system of Briggs & Leigh (1988); see summary of codes at back of issue.

We are acquainted with all the new and related taxa in the field.

### Terminology

The term 'stemonophore' is used throughout as a more acceptable combination of Greek elements than the Latin-Greek hybrid 'staminophore' (after Johnson & Briggs 1984).

The term 'calyptra' is used throughout as in Johnson & Briggs in place of 'operculum'. The latter term has been traditionally used in *Eucalyptus* alone, whereas the former is the accepted term for the fused perianth structures occurring widely in Myrtaceae (Johnson & Briggs 1984, following McVaugh 1968).

The calyptra in all *Monocalyptus* taxa is described as 'appearing single' in reference to the actually complex nature and origin of this structure, to be discussed elsewhere.

The hairs on juvenile leaves of stringybark taxa are described as 'stellate hairs' for brevity. These are not stellate hairs as occurring in for example certain Chenopodiaceae, but are distinctive structures in which a number of simple hairs arise from a raised oil gland (discussed by Johnson (1972) and Ladiges (1984)).

Bark is described as 'persistent' in cases where it is not regularly shed, and 'smooth' when regularly shedding. The former includes 'stringybark', 'box' and 'ironbark' among other types, and the latter covers the 'gum' barks.

Species authorship is to be cited as presented under each taxon described. They are not cases for the use of 'ex'.

### 1. *Eucalyptus gigantangion* L. Johnson & K. Hill, sp. nov.

Ab *E. miniata* distinguitur: folia adulta angustiora, alabastra costata et non glauca, fructus maximi.

TYPE: NORTHERN TERRITORY: Twin Falls, Kakadu National Park (13°18'S 132°51'E), C. Dunlop 6722 & G. Wightman, 16 July 1984 (holo NSW; iso DNA).

Tree to 12 m tall. *Bark* persistent on trunk, fibrous with included scales, dark red-brown; smooth on branches, white or grey-white. *Adult leaves* disjunct, bright green, discolorous, linear to lanceolate, 8–14 cm long, 9–20 mm wide; petioles 9–15 mm long; lateral veins distinct, regularly pinnate, moderately spaced, at 50°–60° to mid-rib; reticulum irregular; intramarginal vein distinct, within 0.5 mm of margin. *Inflorescences* simple, axillary; umbellasters 7-flowered; peduncles basally thickened, 15–30 mm long, to 7 mm diam., 15 mm diam. at base. *Buds* ovate to broadly fusiform, sessile, ribbed, 25–30 mm long, 10–14 mm diam.; calyptra convex-conical, ± apiculate,  $\frac{1}{2}$  –  $\frac{2}{3}$  as long as hypanthium. *Stamens* bright orange, all fertile; filaments regularly inflexed in bud; anthers oblong, dorsifixed, dehiscent by parallel slits. *Fruits* urceolate, ribbed, 3-locular, 45–70 mm long, 35–50 mm diam.; calyptra scar and stemophore raised, 2–3 mm wide; disc steeply depressed, 10–15 mm wide; valves deeply enclosed. Figure 1.

Distinguished from *E. miniata* A. Cunn. ex Schauer by the narrow adult leaves (lanceolate to broad-lanceolate in the latter), the ribbed, non-glaucous buds, and the large fruits (to 50 mm long, 40 mm diam. in the latter).

DISTRIBUTION: Known only from the Arnhem Land escarpment, now largely in Kakadu National Park (Figure 2).

ECOLOGY: Locally frequent but restricted to skeletal sands on broken siliceous sandstone around the immediate upper edge of the Kombolgie Formation sandstone cliffs that form the Arnhem Land escarpment. A distinctive form of *E. miniata* with grotesquely ribbed and strongly glaucous buds occurs on the footslopes of the same cliffs and around their bases.

The epithet is derived from the Greek *gigas*, *gigantos*, a giant, and *aggeion* (usually transliterated as *angion*), a vessel or receptacle, from the extremely large fruits.

CONSERVATION STATUS: Locally abundant over a considerable area; not considered to be at risk.

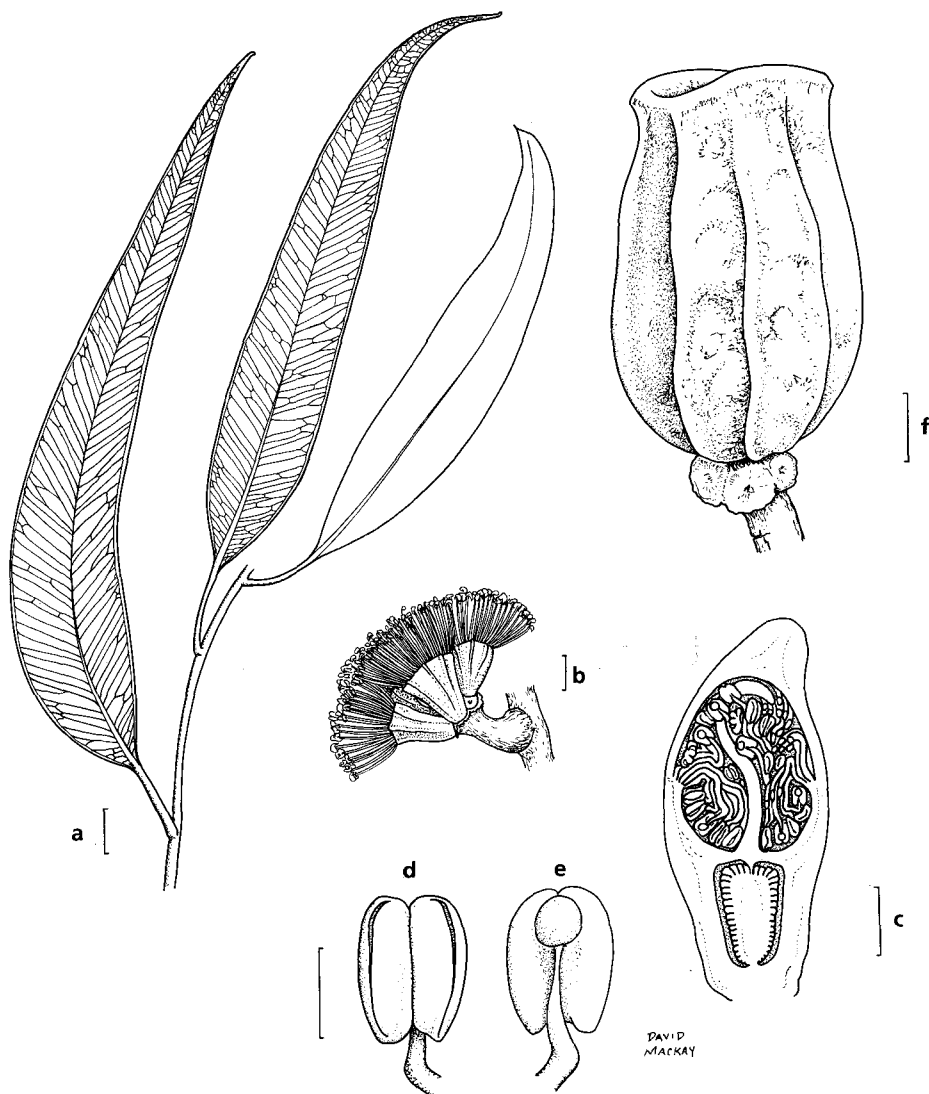
SPECIMENS EXAMINED: NORTHERN TERRITORY: 41 miles [65.6 km] from Pine Creek towards UDP Falls, Gittins 2716, Aug 1973 (NSW); Deaf Adder Gorge, Kakadu National Park, Boland 2143, 2155 & Wardman, 18 Nov 1984 (CANB, NSW).

### 2. *Eucalyptus pachycalyx* Maiden & Blakely, Maiden & Blakely, Crit. Revis. Eucalyptus 8: 15, pl. 289, fig. 12 (1929)

TYPE CITATION: 'A kind of Spotted Gum growing on the ranges at the back of Cairns, Qld. Stunted tree, bluish bark with black spots (H.W. Mocatta, No. 13, December, 1915). This is the only locality known to us.'

TYPE: holo NSW.

Tree to 10 m high. Bark smooth, glossy, mottled, pink, grey, yellow, orange, varying with season. Juvenile leaves opposite or later disjunct, petiolate, broad-lanceolate, to 15 cm long, 5.5 cm wide. Adult leaves disjunct, lanceolate, acuminate, falcate, dull, 5–15 cm long, 10–22 mm wide; petioles terete, grooved above, 10–25 mm long; lateral veins at c. 45° to midrib, moderately spaced, branching, densely reticulate between; intramarginal vein distinct, 0.5–1.0 mm from margin. Umbellasters axillary, 11- or sometimes 7-flowered; peduncles terete, 6–16 mm long; pedicels terete, 2–5 mm long. Mature buds ovoid to subglobular, 6–10 mm long, 4–5 mm diam.; calyptra hemispherical, ± as long as hypanthium. Stamens all fertile;



**Figure 1.** *Eucalyptus gigantangion*. a, adult leaves; b, flowers; c, median section of bud; d, e, anther; f, fruit (all from Dunlop 6722 & Wightman). Scale bar: a, b, f = 1 cm; c = 5 mm; d, e = 0.1 mm.

filaments inflexed in bud; anthers basifixed, versatile, globular, dehiscing through lateral pores. *Fruits* hemispherical or cup-shaped, 3–4-locular, 5–6 mm long, 6–8 mm diam.; calyptra scar and stemonophore distinct, flat, c. 1 mm wide (each c. 0.5 mm wide); disc c. 1 mm wide, sharply depressed; valves deeply enclosed basally, acuminate, tips vertically exerted, remnants of persistent style forming tips of valves.

Two subspecies are recognised.

### Key to the subspecies

- 1 Calyptra conical; peduncles 6–14 mm long; pedicels 2–4 mm long ..... 2A. subsp. **pachycalyx**  
 1\* Calyptra hemispherical; peduncles 12–16 mm long; pedicels 4–5 mm long ..... 2B. subsp. **waajensis**

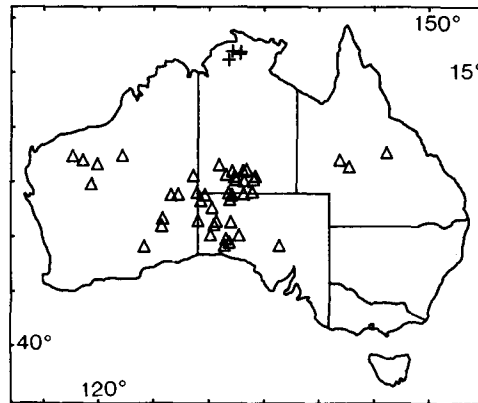
### 2A. *Eucalyptus pachycalyx* Maiden & Blakely subsp. **pachycalyx**

Adult leaves 10–15 cm long, 13–20 mm wide; petioles 13–20 mm long. Peduncles terete, 6–14 mm long; pedicels terete, 2–4 mm long. Mature buds ovoid to sub-globular, 7–10 mm long, 4–5 mm diam.; calyptra conical,  $\pm 1.5$  times as long as hypanthium. Fruits hemispherical or cup-shaped, 3–4-locular, 5–6 mm long, 7–8 mm diam.

**DISTRIBUTION:** restricted to a zone along the west of the Atherton Tableland. Figure 3.

**ECOLOGY:** Locally abundant in low dry sclerophyll woodland on sandy soils over sandstones, acid volcanics and siliceous granites in hilly country.

**SELECTED SPECIMENS** (from 25 examined): QUEENSLAND: Mount Mulligan, *Clarkson* 5876, 16 Apr 1985 (BRI, CANB, MEL, NSW, PERTH, QRS); c. 18 km S of Mutchilba on road to Stannary Hills, *Rodd* 4503 & *Hardie*, 21 Apr 1985 (NSW, BRI, CANB); in rocky hills near Bakerville, *Brooker* 3359, 25 Jan 1972 (CANB, NSW); west of the road from Ravenshoe to Koombaloo Dam, *Clarkson* 2674, 11 Oct 1979 (BRI, K, NSW).



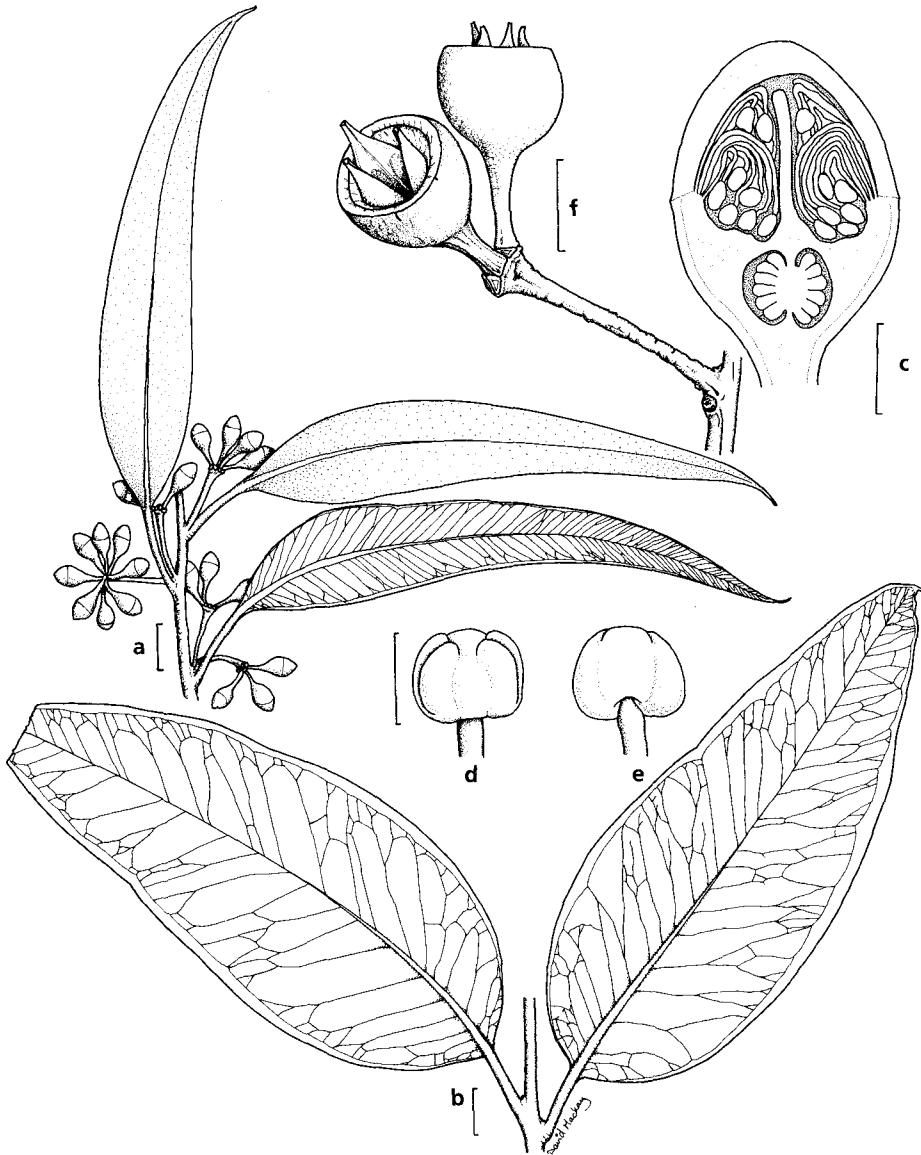
**Figure 2.** Distribution of *E. gigantangion* (+) and *E. eucentrica* (Δ).

**2B. *Eucalyptus pachycalyx* Maiden & Blakely subsp. *waajensis* L. Johnson & K. Hill, subsp. nov.**

Ab subspecie *pachycalyxi* distinguitur: calyptra hemisphaerica, pedunculi pedicellique longiores, fructus saepe triloculares.

TYPE: QUEENSLAND: Waaje, NW corner of Barakula State Forest (26°09'S, 150°21'E), A. Bean 19, 9 Apr 1983 (holo NSW).

Adult leaves 5–12 cm long, 10–22 mm wide; petioles 10–25 mm long. Peduncles terete, 12–16 mm long; pedicels terete, 4–5 mm long. Mature buds ovoid to subglobular, 6–7 mm long, 4–5 mm diam.; calyptra hemispherical, ± as long as hypanthium. Fruits hemispherical or cup-shaped, 3-locular, 5–6 mm long, 6–7 mm diam. Figure 3.



**Figure 3.** *E. pachycalyx* subsp. *waajensis*. **a**, adult leaves and buds; **b**, juvenile leaves; **c**, median section of bud; **d**, **e**, anther; **f**, fruits (all from Bean 19). Scale bar: **a**, **b** = 1 cm; **c** = 2 mm; **d**, **e** = 0.5 mm; **f** = 5 mm.

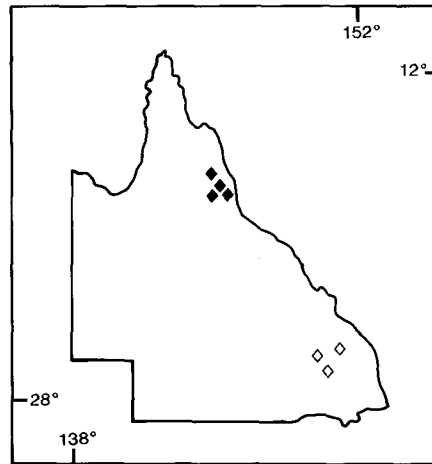


Figure 4. Distribution of *Eucalyptus pachycalyx* subsp. *pachycalyx* (◆) and subsp. *waajensis* (◇).

Distinguished from subsp. *pachycalyx* by the hemispherical calyptra and the relatively long peduncles and pedicels. Fruits are often 3-locular (more frequently 4-locular in the latter).

DISTRIBUTION: Known from scattered populations in southern Queensland, at Waaje in the Barakula State Forest, east of Tambo, and near Eidsvold (Figure 4).

ECOLOGY: Found in open woodland on shallow sandy soil over sandstone, on low ridges. Associated with *E. bloxsomei* Maiden, *E. watsoniana* F. Muell., *E. trachyphloia* F. Muell., *E. sideroxylon* A. Cunn. ex Woolls, and *E. tenuipes* (Maiden & Blakely) Blakely.

The subspecific epithet refers to the first known occurrence of this species at Waaje in the Barakula State Forest, near Barakula.

CONSERVATION STATUS: 2V. Occurs in small relict populations that are not in reserved areas.

SELECTED SPECIMENS (from 5 examined): QUEENSLAND: 24.3 km from Cracow on Nathan Gorge road, *Blaxell 89/238 & Johnson*, 10 Aug 1989 (NSW); Panda Lane, Compartment 28, Barakula State Forest, *Wallace 83032*, 19 Aug 1983 (NSW).

### 3. *Eucalyptus eucentrica* L. Johnson & K. Hill, sp. nov.

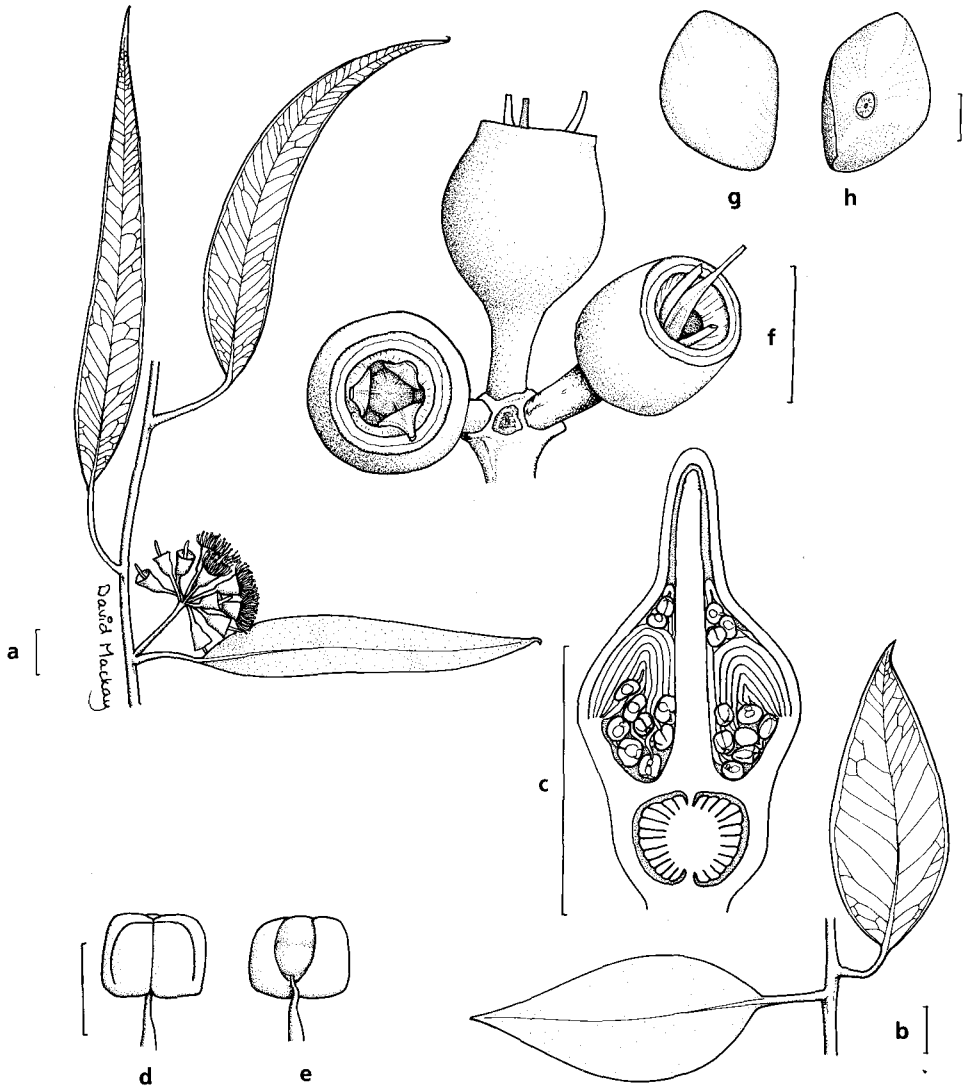
Ab *E. sociali* distinguitur: folia adulta majora, alabastra fructusque majores et filamenta staminum flavescientia.

TYPE: NORTHERN TERRITORY: 39.4 km N of Erldunda on Stuart Highway (24°52'S 133°11'E), *K. Hill 858, L. Johnson & D. Benson*, 10 July 1984 (holo NSW; iso BRI, CANB, DNA).

Erect mallee. Bark persistent on lower trunk, shortly fibrous-flaky, smooth above, grey. Juvenile leaves disjunct, petiolate, broad-lanceolate to ovate. Adult leaves disjunct, lanceolate to broad-lanceolate, dull grey-green, 6–13 cm long, 14–34 mm wide; petioles 16–30 mm long. Inflorescences simple, axillary; umbellasters 7–13-flowered; peduncles terete or angular, 5–14 mm long; pedicels terete, 2–6 mm long. Buds fusiform, glaucous, 10–18 mm long, 4–5 mm diam.; calyptra elongate-conical, rostrate, 1½ – 2½ times longer than hypanthium. Stamens all fertile, yellow; filaments irregularly flexed and inflexed in bud, anthers basifixed, sub-versatile,

globular, dehiscing through lateral pores. Fruits globular to cylindrical, glaucous, 3–4-locular, 5–9 mm long, 5–9 mm diam., stemonophore and calyptra scars level, less than 0.5 mm wide; disc vertically depressed; valves basally enclosed, apically vertically exerted with subulate tips of persistent style. Figure 5.

Distinguished from *E. socialis* F. Muell. ex Miq. by the larger adult leaves (to 9 cm long in the latter), the larger buds (to 13 mm long in the latter) and the larger fruits (to 6 X 6 mm in the latter), and the yellow flowers (cream in the latter). *E. yumbarrana* Boomsma from southern South Australia is similar in flower colour, but coarser again in leaves (to 14 cm long), buds (5–7 mm diam.) and fruits (to 12 mm long).



**Figure 5.** *E. eucentrica*. **a**, adult leaves and flowers; **b**, juvenile leaves; **c**, median section of bud; **d**, **e**, anther; **f**, fruits; **g**, **h**, seed (all from Chippendale & Johnson NT 3971). Scale bar: **a**, **b** = 1 cm; **c**, **f** = 5 mm; **d**, **e**, **g**, **h** = 0.5 mm.

**DISTRIBUTION:** Sporadic and locally abundant over a wide area in Central Australia (N.T., S.A. and W.A.), with isolated outlying populations in the Pilbara region of W.A. and in central Queensland (Figure 4).

**ECOLOGY:** A locally abundant species on a wide range of sites and substrates. Often on red sand with a calcareous horizon, in swale areas in dune systems, or on stony slopes, again with calcareous deposits in the soil.

Intergrading populations occur with *E. yumbarrana* (widespread from near Ooldea to the northwestern Eyre Peninsula). These in turn intergrade in a contact zone with *E. socialis* further east in northern Eyre Peninsula.

The epithet is from the Greek *eu-*, well, and *kentrikos*, of the centre, referring to the species' wide occurrence in the interior regions of Australia. An epithet earlier used by us in determining specimens is now pre-occupied by the name *E. centralis* applied to a bloodwood by Carr & Carr (1985).

**CONSERVATION STATUS:** Locally abundant over a wide area; not considered to be at risk.

**SELECTED SPECIMENS (from 98 examined):** QUEENSLAND: 5.4 km NE of Shuttleworth bore, 'Lou Lou Park' Station (22°15'S 146°09'E), Hill 1183 & Johnson, 21 Aug 1984 (NSW, BRI, CANB, DNA, MEL). NORTHERN TERRITORY: 40 miles [64 km] E of Alice Springs, Forde 61, 21 Jan 1956 (CANB, NSW); Corroboree Rock, E of Alice Springs, Nelson 1820, 4 Jan 1969 (DNA, NSW); 45.6 miles [72 km] WSW of Finke townsite, Chippendale & Johnson, 14 Oct 1957 (DNA [NT 3971], NSW); Alice Springs, at back of dump, Brooker 5367, 9 Oct 1976 (CANB, NSW); road into Serpentine Gorge, Leach 528, 24 Feb 1985 (DNA, NSW, CANB); near Nulcharra Creek, 19 km E of 'Mulga Park' Station, Hill 851, Johnson & Benson, 10 July 1984 (NSW); Red Bank Gorge, Beauglehole 10509, 9 July 1965 (AD, NSW, CANB). SOUTH AUSTRALIA: 6.3 km S of NT-SA border on Stuart Highway, Hill 848, Johnson & Benson, 9 July 1984 (NSW, AD, CANB, PERTH); Vokes Hill junction (28°34'S 130°41'E), Symon 12372, 21 Aug 1980 (AD, CANB, NSW, PERTH); eastern end of Champ de Mars, Tomkinson Range (29°09'S 129°06'E), Barker 3269, 5 May 1978 (AD, NSW); Serpentine Lakes (28°31'S 129°01'E), Donner 7427, 25 Aug 1980 (AD, NSW); 50 miles [80km] NW of Pimba, Martin, July 1951 (NSW); Ooldea, Donner 7559, 31 Aug 1980 (AD, NSW); 17 km N of Watson towards Maralinga, Brooker 5599, 31 Mar 1977 (CANB, NSW). WESTERN AUSTRALIA: Lake Hopkins area (24°22'S 128°33'E), Henry 409, 9 Apr 1972 (DNA, NSW); 74 km E of Warburton, Brooker 9219, 4 Apr 1986 (CANB, NSW); Neale Junction, Brooker 8561, 12 May 1984 (CANB, NSW); just S of Rudall River (22°34'S 122°11'E), George 10800, 22 May 1971 (PERTH, NSW); 54.3 km S of Kumarina roadhouse on Great Northern Highway, Hill 502, Johnson, Blaxell & Brooker, 2 Nov 1983 (NSW, CANB, PERTH); top of Mt Meharry, Hill 482, Johnson, Blaxell, Brooker & Edgcombe, 1 Nov 1983 (NSW, CANB, PERTH).

#### 4. *Eucalyptus kabiana* L. Johnson & K. Hill, *sp. nov.*

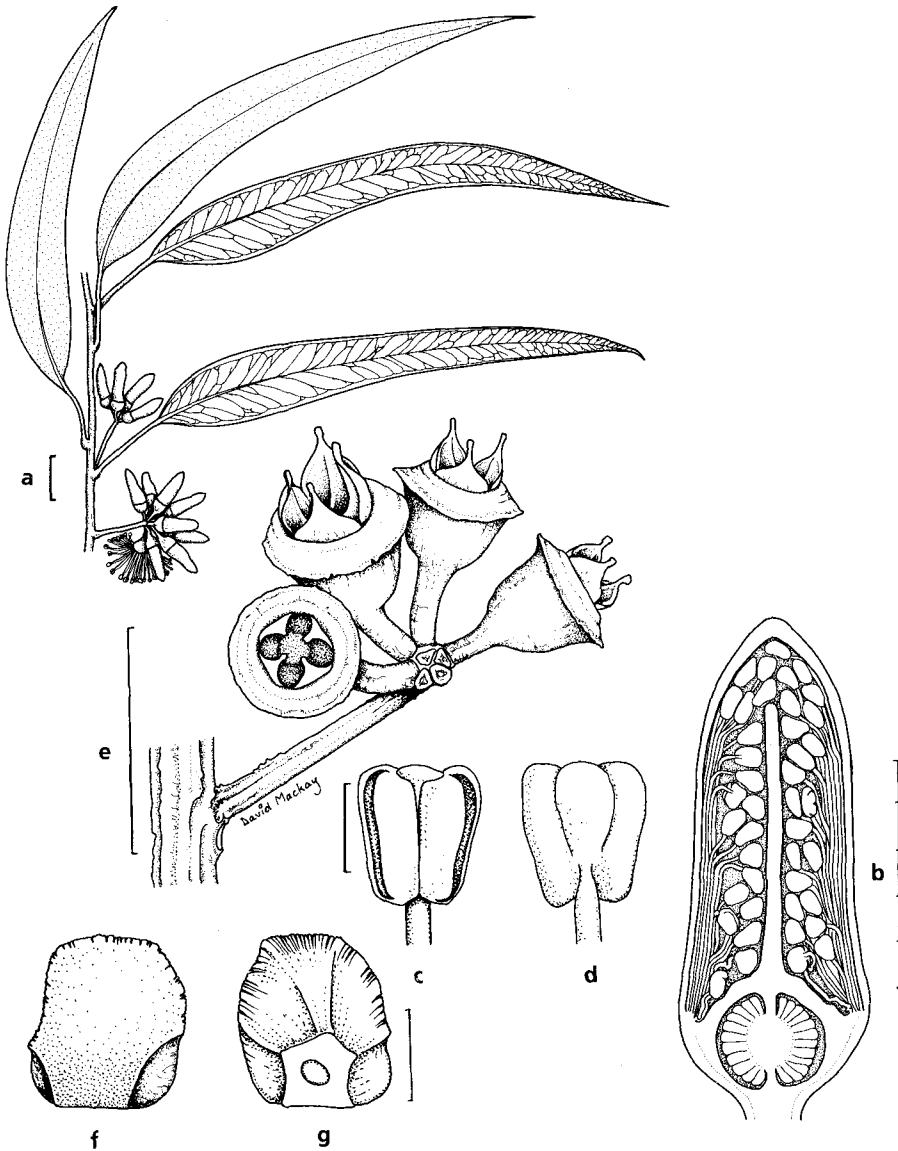
Ab *E. tereticorni* distinguitur: habitus multicaulis, pedunculi pedicellique breviores, calyptra brevior, folia adulta juveniliaque plerumque minora, umbellastra 11-flora.

**TYPE:** QUEENSLAND: lower N slope of Mt Beerwah (26°54'S, 152°53'E), K. Hill 1247, L. Johnson & A. Bean, 26 Aug 1984 (holo NSW; iso BRI, CANB, MEL).

Mallee to 5 m high, usually less, rarely a small tree to 10 m high. Bark smooth throughout, whitish to light grey, glossy; sometimes with a short fibrous stocking in larger plants. Seedling leaves opposite for 4–6 nodes, oblanceolate, petiolate. Juvenile leaves disjunct, lanceolate to broad-lanceolate, dull grey, petiolate. Young stems quadrangular. Adult leaves disjunct, similifacial, narrow-lanceolate to lanceolate, falcate, acuminate, 6–12 cm long, 8–16 mm wide; petioles 11–20 mm long, terete or ± angular; lateral veins moderately spaced, irregular, at 30–50° to midrib; reticulum open, degenerate; intramarginal vein continuous, distinct, 1.0–1.5 mm from margin. Inflorescences simple, axillary; umbellasters 7–11-flowered; peduncles terete, 5–14 mm long; pedicels terete or ± ribbed, 2–4 mm long. Mature buds cylindrical-fusiform, 10–



12 mm long, 3–4 mm diam.; calyptra elongate conical, convex, acute, 3–4 times longer than hypanthium. *Stamens* all fertile; filaments erect in bud; anthers elliptical, dorsifixed, versatile, dehiscent by parallel slits. *Fruits* hemispherical, 3–4-locular, 4–5 mm long, 5–7 mm diam.; calyptra scar raised at c. 45°, continuous with stemonophore, the two c. 0.5 mm wide combined; disc raised at c. 45°, ultimately flattened, 1.5–2.5 mm wide; valves broadly triangular, apiculate, strongly exerted, raised at c. 90°, tips



**Figure 6.** *E. kabiana*. **a**, adult leaves, buds and flowers; **b**, median section of bud; **c**, **d**, anther; **e**, fruits; **f**, **g**, seed (**a**, **e**, **f**, **g** from Bean 4; **b**, **c**, **d** from Bean 5). Scale bar: **a**, **e** = 1 cm; **b** = 5 mm; **c**, **d**, **f**, **g** = 0.5 mm.

slightly incurved. *Seeds* semi-glossy, charcoal black, angular, cuboid or pyramidal with dentate fringes, deeply loosely reticulate, c. 1.0 mm long; hilum ventral; chaff red-brown, semi-glossy. Figure 6.

*E. kabiiana* differs from *E. tereticornis* Sm. in the frequently 11-flowered umbellasters (7-flowered in the latter), the mallee habit, the 'stocking' of rough bark in older but still small plants, the shorter peduncles and pedicels (to 25 mm and 10 mm long respectively in the latter), the shorter calyptra and the generally smaller adult and juvenile leaves (to 20 cm long in the latter) and narrower juvenile leaves (ovate in the latter).

DISTRIBUTION: Glasshouse Mountains, in the Moreton District of Queensland (Figure 7).

ECOLOGY: Known only from two mountain peaks (Mt Beerwah and Mt Coolum), occurring on skeletal soils over steep trachyte slopes, often in mallee-heath with *Leptospermum luehmannii*, or in low woodland with *Lophostemon confertus*.

The specific epithet commemorates the Kabi Aboriginal people, who originally inhabited the Glasshouse Mountains region.

CONSERVATION STATUS: 2VC. Known only from two small populations.

SELECTED SPECIMENS (from 8 examined): QUEENSLAND: N slopes of Mt Beerwah (26°54'S, 152°53'E), *Bean* 4, 6 Sep 1980 (NSW); N slopes of Mt Beerwah (26°54'S, 152°53'E), *Bean* 5, 6, 9 Sep 1983 (NSW); N slope of Mt Beerwah, *Brooker* 8269, 5 Aug 1983 (CANB, NSW, BRI).

### 5. *Eucalyptus beaniana* L. Johnson & K. Hill, *sp. nov.*

Ab *E. decorticans* distinguitur: alabastra minora, fructus minores angustioresque, cortex persistens usque ad ramos minores.

TYPE: QUEENSLAND: Isla Gorge Lookout, to W of carpark (25°12'S, 149°58'E), *K. Hill* 1231, *L. Johnson* & *A. Bean*, 24 Aug 1984 (holo NSW; iso BRI, FRI, K, MEL, PERTH).

Tree to 10 m tall. *Bark* persistent to smaller branches, hard, black 'ironbark'; smooth, brownish white on branches < 5 cm diam. *Adult leaves* disjunct, similifacial, narrow-lanceolate to lanceolate, acute or acuminate, 7–13 cm long, 9–23 mm wide; petioles to 17 mm long; lateral veins moderately spaced, regular, at 40°–50° to midrib; reticulum

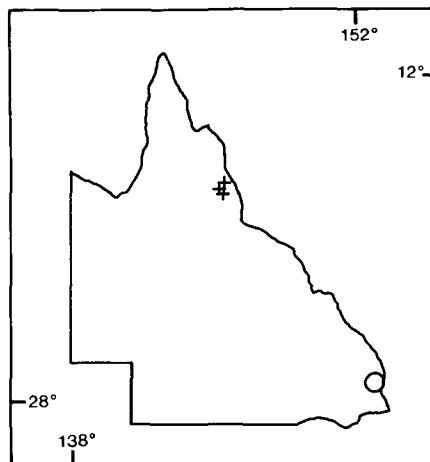
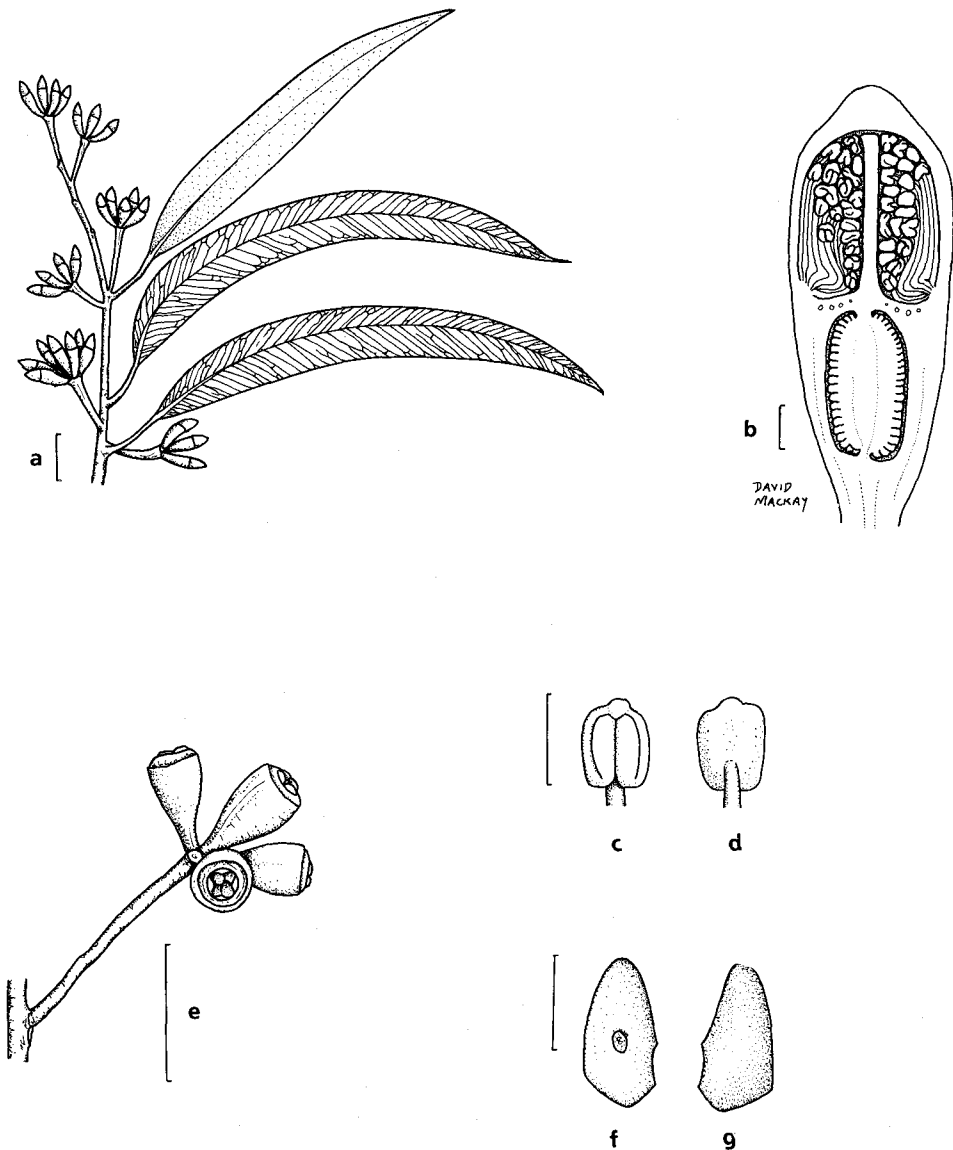


Figure 7. Distribution of *E. kabiiana* (○) and *E. atrata* (+).

even; oil glands small; intramarginal vein continuous, distinct, 0.2–0.5 mm from margin. *Inflorescences* simple or compound, terminal or axillary; umbellasters 7-flowered; peduncles  $\pm$  2-winged, 5–11 mm long; pedicels  $\pm$  angular, thick, 1–3 mm long, tapering into buds or fruits. *Mature buds* elongate-ovoid, 6–7 mm long, 2–3 mm diam.; calyptra conical, convex, as long as hypanthium or slightly shorter. *Fruits* obconical, 4–5-locular, 4–6 mm long, 3–5 mm diam.; calyptra scar and stemophore continuous, flat, 0.2–0.4 mm wide; disc narrow, initially raised, ultimately incurved, 0.3–0.6 mm wide; valves broadly triangular, obtuse, basally slightly enclosed, apically exert-



**Figure 8.** *E. beaniana*. a, adult leaves and buds; b, median section of bud; c, d, anther; e, fruits; f, g, seed (all from Hill 1231, Johnson & Bean). Scale bar: a, e = 1 cm; b, f, g = 1 mm; c, d = 0.5 mm.

ed, raised at c. 45°. *Seeds* semi-glossy, red-brown, rounded, elliptical, almost smooth; hilum ventral; chaff red-brown. Figure 8.

*E. beaniana* is distinguished from *E. decorticans* Maiden by the smaller buds (3–5 mm diam. in *E. decorticans*), the smaller and narrower fruits (5–7 mm diam. in *E. decorticans*), and the more extensive rough bark.

DISTRIBUTION: Isla Gorge area, north of Taroom, Queensland (Figure 9).

ECOLOGY: Known only from cliff tops around Isla Gorge. Locally frequent in woodland on skeletal sandy soil on sandstone, associated with *E. suffulgens* L. Johnson & K. Hill, *E. watsoniana* F. Muell., *E. trachyphloia* F. Muell., *E. tenuipes* (Maiden & Blakely) Blakely and *E. cloeziana* F. Muell.

The epithet honours naturalist Anthony Bean of Nambour, whose industrious investigations in the field have thrown much light on the distribution of Queensland eucalypts and other plants.

CONSERVATION STATUS: 2VC. Known only from the type population.

SELECTED SPECIMENS (from 5 examined): QUEENSLAND: Isla Gorge, c. 1 km S of lookout, *Blaxell* 1538 & *Armstrong*, 3 Sep 1977 (NSW, BRI, CANB); Isla Gorge lookout, *Boyland* 8022, 11 Sep 1979 (BRI, CANB, NSW).

#### 6. *Eucalyptus granitica* L. Johnson & K. Hill, *sp. nov.*

Inter species *Crebrarum* combinatione characterum sequentium distinguitur: folia juvenilia nitentia lanceolata subsessilia disjunctaque, folia adulta nitentia late lanceolata.

TYPE: QUEENSLAND: 11.8 km from Atherton on Herberton road, (17°20'S, 145°25'W), *J.R. Clarkson* 5706, 3 Feb 1985 (holo NSW; iso AD, BRI, DNA, FRI, K, MEL, MO, PERTH, PRE, QRS).

Tree to 20 m high, often less. *Bark* persistent throughout or to smaller branches, soft or hard, 'corky' ironbark. *Juvenile leaves* disjunct, glossy, subsessile, lanceolate, to 2.5

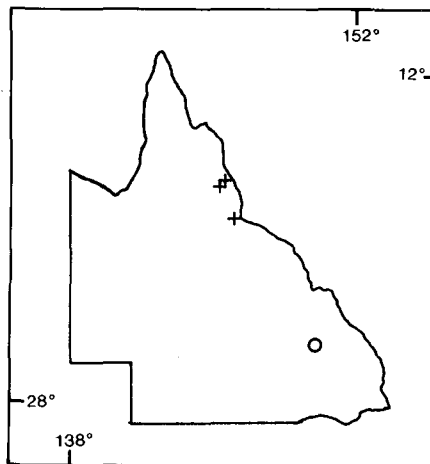
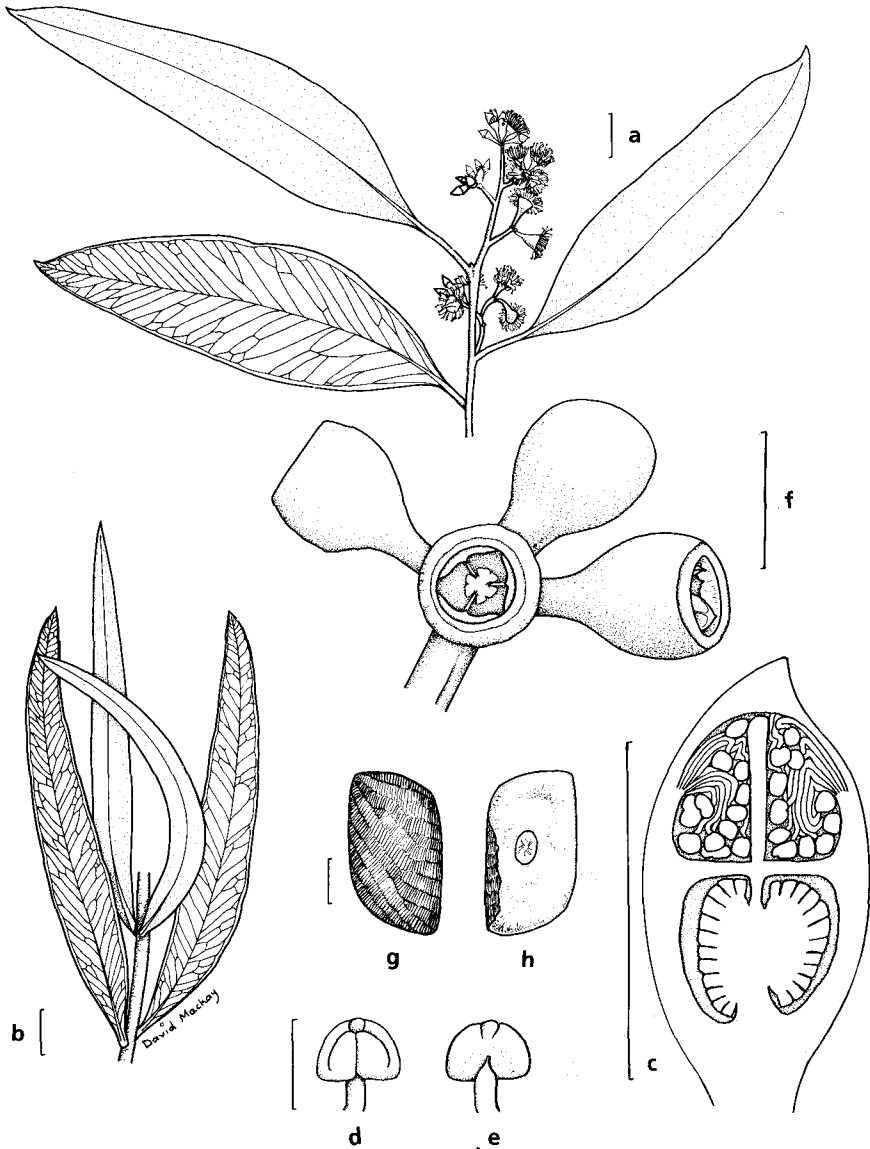


Figure 9. Distribution of *E. granitica* (+) and *E. beaniana* (O).

cm wide, 15 cm long. *Adult leaves* disjunct, somewhat dorsiventral,  $\pm$  glossy,  $\pm$  broad-lanceolate, sometimes finely crenulate, acute, 8–15 cm long, 16–32 mm wide; petioles to 18 mm long; lateral veins moderately spaced,  $\pm$  irregular; reticulum regular; oil glands medium size, moderately spaced; intramarginal vein continuous, distinct, 1.0–2.0 mm from margin. *Inflorescences* simple or compound, terminal or axillary; umbellasters usually 7-flowered; peduncles  $\pm$  terete, 3–11 mm long; pedicels  $\pm$  terete, 2–4 mm long. *Mature buds* ovoid to clavate, 5–6 mm long, 2–2.5 mm diam.; calyptra hemispherical, broadly apiculate, about  $\frac{1}{2}$  as long as hypanthium. *Fruits* cup-shaped, 3- sometimes 4-locular, 4–6 mm long, 4–5 mm diam.; calyptra scar and stemophore  $\pm$  continuous, flat, 0.2–0.4 mm wide; disc vertically depressed, c. 0.5 mm wide; valves



**Figure 10.** *E. granitica*. **a**, adult leaves, buds and flowers; **b**, juvenile leaves; **c**, median section of bud; **d**, **e**, anther; **f**, fruits; **g**, **h**, seed. (a from Blaxell 2069, b, f, g, h from Hill 1111, Johnson & Blaxell; c, d, e from Clarkson 5706). Scale bar: a, b = 1 cm; c, f = 5 mm; d, e, g, h = 0.5 mm.

broadly triangular, obtuse or acute, basally enclosed, apically  $\pm$  at rim-level, raised at  $60^{\circ}$ – $90^{\circ}$ . *Seeds* dull, charcoal-grey, rounded, elliptical, regularly shallowly reticulate; hilum ventral; chaff pale brown. Figure 10.

*E. granitica* is relatively isolated in the *Crebrae*, and is distinguished by the glossy, lanceolate, sessile, disjunct juvenile leaves and the glossy, broad-lanceolate, adult leaves. Adult leaves are also sometimes finely crenulate.

DISTRIBUTION: North-eastern Queensland, Atherton Tableland to Paluma (Figure 9).

ECOLOGY: Locally abundant on undulating to steep country, usually on coarse sandy soils over granite or acid volcanics, in areas of medium rainfall. Common associates are *E. abergiana* F. Muell., *E. intermedia* R. Baker, *E. resinifera* Sm., *E. citriodora* Hook., *E. cloeziana* F. Muell., *E. tereticornis* Sm. and *E. leichhardtii* Bailey.

The epithet is from the neo-Latin *graniticus*, relating to granite, and refers to the most common substrate.

CONSERVATION STATUS: Locally abundant over a wide area; not considered to be at risk.

SELECTED SPECIMENS (from 16 examined): QUEENSLAND: Herberton Range, Atherton to Herberton road, Hill 1111, Johnson & Blaxell, 15 Aug 1984 (NSW); 11.8 km from Atherton post office on Herberton road, Blaxell 2069, 28 Aug 1983 (NSW, BRI); 6.2 km from Herberton on Irvinebank road, Hill 1117, Johnson & Blaxell, 15 Aug 1984 (NSW, BRI, CANB, PERTH); 2.3 km from Herberton to Ravenshoe road on Kalunga road, Hill 1129, Johnson & Blaxell, 16 Aug 1984 (NSW, BRI, CANB, PERTH); 6.7 km E of Hidden Valley on Paluma road, Hill 1160, Johnson & Blaxell, 18 Aug 1984 (NSW, AD, BRI, CANB, MEL, PERTH).

### 7. *Eucalyptus atrata* L. Johnson & K. Hill, *sp. nov.*

Ab *E. drepanophylla* distinguitur: folia juvenilia adultaque glauca, alabastra fructusque glauca, fructus majores.

TYPE: QUEENSLAND: c. 4 km from Irvinebank on Herberton road, D.F. Blaxell 2067, 27 Aug 1983 (holo NSW; iso AD, BRI, CANB, DNA, HO, MEL, MO, PERTH).

Tree to 15 m tall, often less. *Bark* persistent to smaller branches, hard black 'ironbark', smooth, cream or brown on branches less than 2 cm diam. *Juvenile leaves* disjunct, broad-lanceolate to ovate, to 7 cm long, 4.5 cm wide; petioles thick, to c. 12 mm long. *Adult leaves* disjunct, simlifacial, lanceolate, acute, 8–13 cm long, 12–30 mm wide; petioles to 35 mm long (often less); lateral veins moderately spaced; intramarginal vein continuous,  $\pm$  distinct, 0.5–1.5 mm from margin. *Inflorescences* simple or compound, terminal or axillary; umbellasters 3–7-flowered; peduncles terete to  $\pm$  angular, 4–10 mm long; pedicels  $\pm$  angular, 3–7 mm long. *Mature buds* ovoid, 5–7 mm long, 3–4 mm diam.; calyptra hemispherical to convex-conical, broadly apiculate, slightly shorter than hypanthium. *Fruits* cup-shaped to obconical, 3–4-locular, 5–7 mm long, 5–6 mm diam.; calyptra scar and stemophore vertically raised,  $\pm$  0.5 mm wide; disc  $\pm$  slightly depressed, 1–2 mm wide; valves broadly triangular, obtuse, basally enclosed, apically vertically exerted. *Seeds* dark brown, dull to slightly lustrous, finely regularly reticulate, elliptical; hilum ventral; chaff light brown. Figure 11.

Nearest to *E. drepanophylla* F. Muell. ex Benth., from which it is distinguished by the glaucous juvenile and adult foliage, buds and fruits, and the larger fruits (4–6 mm long in *E. drepanophylla*).

This taxon has in the past been confused with *E. whitei* Maiden & Blakely, which is characterised by opposite juvenile leaves, small adult leaves (often less than 9 cm long) on short petioles (less than 10 mm long), and the ovoid fruits with a steeply descending disc and deeply enclosed valves. *E. whitei* as now circumscribed ranges

from near Forsayth south to near Yalleroi.

DISTRIBUTION: Known only from the south-western fall of the Atherton Tableland, North Queensland (Figure 6).

ECOLOGY: Locally a community dominant in grassy forest or woodland on sandy soils over siliceous granites or rhyolites. Although on poor soils, this species favours the somewhat richer accumulations in surroundings of even lower nutrient status.

The epithet is from the Latin *atratus*, clothed in black, from the dark bark.

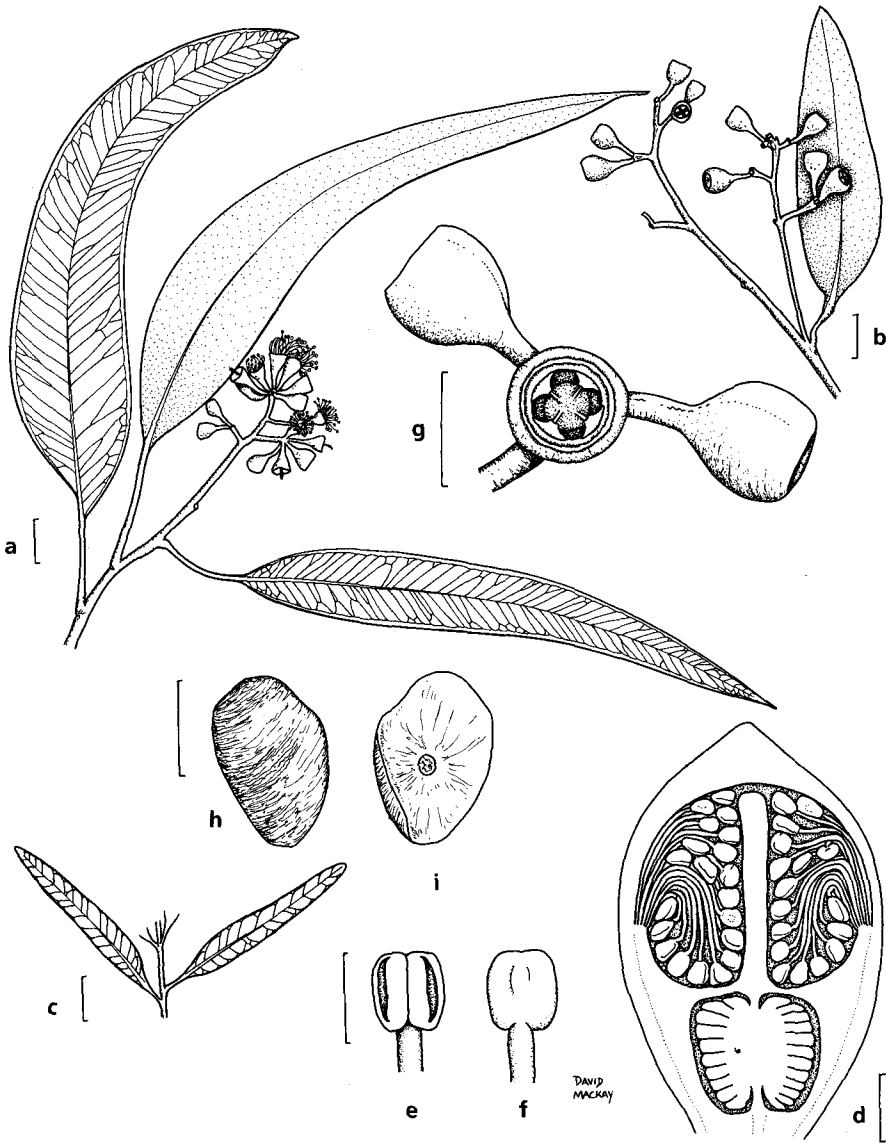


Figure 11. *E. atrata*. a, adult leaves and buds; b, adult leaves and fruits; c, seedling leaves; d, median section of bud; e, f, anther; g, fruits; h, i, seed (a, d, e, f from Hyland 5802; b, g, h, i from Blaxell 1612; c from Hyland 5584). Scale bar: a, b, c = 1 cm; g = 5 mm; d, h, i = 1 mm; e, f = 0.5 mm.

SELECTED SPECIMENS (FROM 13 EXAMINED): QUEENSLAND: Jumna Mine, Herberton to Irvinebank road, Hill 1123, 1124, Johnson & Blaxell, 15 Aug 1984 (NSW, BRI, CANB); 9 km from Herberton to Ravenshoe road on Kalunga road, Hill 1131, Johnson & Blaxell, 16 Aug 1984 (NSW, BRI, CANB, PERTH); c. 2 miles [3.2 km] W of Ravenshoe, Johnson, 21 May 1962 (NSW); Herberton - Watsonville road, Hyland 5584, 27 Oct 1971 (QRS, NSW); Hyland 5802, 25 Jan 1972 (QRS, NSW); camping reserve near 'Evelyn' homestead, NW of Ravenshoe, Blaxell 1612, 3 June 1978 (NSW, BRI).

### 8. *Eucalyptus persistens* L. Johnson & K. Hill, sp. nov.

*E. normantonensis* affinis sed ab illa distinguitur: habitus arborescens, cortex sub-fibrosus pro parte maxima persistens, atque calyptra externa persistens vel regulariter tarde sed ante anthesin cadens.

TYPE: QUEENSLAND: 4.8 km NE of Shuttleworth bore, 'Lou Lou Park' Station (22°15'S 146°09'E), K. Hill 1182 & L. Johnson, 21 Aug 1984 (holo NSW; iso BRI, CANB, MEL).

Bark persistent to branches smaller than 2 cm diam. *Seedling leaves* linear, basally tapered, sessile, opposite for 5-8 nodes. *Juvenile leaves* disjunct, lanceolate, petiolate. *Adult leaves* disjunct, narrow-lanceolate to lanceolate, falcate, acuminate, 5-14 cm long, 5-28 mm wide, petioles 7-18 mm long; lateral veins well-spaced, irregular and anastomosing, at c. 10-30° to midrib; intramarginal vein distinct, 1-2 mm from margin. *Umbellasters* 7-flowered, axillary, on short, branched, leafless lateral or terminal shoots resembling panicles; peduncles slender, ridged, 4-15 mm long; pedicels slender, ridged, 3-8 mm long. *Mature buds* oval or pyriform, 3-5 mm long, 2-3 mm diam.; calyptra hemispherical, sometimes minutely apiculate, ½ as long as hypanthium; outer calyptra persisting to anthesis, or shedding some time beforehand and remaining attached to bud. *Stamens* all fertile; filaments erect and inflexed in bud; anthers basifixed, adnate, globular, cells indistinct, dehiscing by round terminal pores. *Fruits* cup-shaped to pyriform, 3-4-locular, 3-5 mm long, 3-4 mm diam.; calyptra scar distinct, depressed, less than 0.5 mm wide; disc depressed, less than 0.5 mm wide, continuous with calyptra scar; valves deeply enclosed, more or less erect.

*E. persistens* is nearest to *E. normantonensis* Maiden & Cabbage, from which it differs in the tree habit and more extensive persistent bark. The latter is a half-barked mallee species from western Queensland and the Northern Territory. The outer calyptra sheds early and cleanly in *E. normantonensis*.

DISTRIBUTION: North-eastern Queensland, from Laura to Mareeba, west to Hughenden and Forsayth, south to around Marlborough (Figure 13).

The epithet is from the Latin *persistens*, persisting, referring to the abscission of the outer (calycine) calyptra being delayed compared with the condition in *E. normantonensis*, and also to the more extensive persistent bark.

Two subspecies are recognised.

#### Key to the subspecies

- 1 Outer calyptra persistent to anthesis ..... 8A. subsp. **persistens**  
 1\* Outer calyptra abscising before anthesis ..... 8B. subsp. **tardecidens**

#### 8A. *Eucalyptus persistens* L. Johnson & K. Hill subsp. **persistens**

Adult leaves narrow-lanceolate to broad-lanceolate, 5-14 cm long, 7-28 mm wide, petioles 7-15 mm long. Peduncles 5-15 mm long; pedicels 3-8 mm long. Mature buds 3-5 mm long, 2-3 mm diam.; calyptra hemispherical; outer calyptra abscising early



but remaining as a small cap until near anthesis. Fruits cup-shaped to pyriform, 3–4-locular, 3–5 mm long, 3–4 mm diam.

Subspecies *persistens* differs from subsp. *tardecidens* in that the outer calyptra is consistently persistent to anthesis, shedding with the inner calyptra.

DISTRIBUTION: Mt Garnet south to around Marlborough and west almost to Hughenden and Lake Buchanan (Figure 13). The area is separate from that of subsp. *tardecidens*, but adjacent.

ECOLOGY: Locally abundant but sporadic, in open woodland on lighter soils, often on elevated sites, or on skeletal soils on stony ridges.

CONSERVATION STATUS: Locally abundant over a wide area; not considered to be at risk.

SELECTED SPECIMENS (from 43 examined): QUEENSLAND: 2 miles [3.2 km] S of Middle Creek, Mt Garnet, *Hyland* 5073, 1 June 1971 (QRS, NSW); 35 miles [56 km] SSW of Mt Garnet, *Brooker* 3411, 1 Feb 1972 (CANB, NSW); 6 miles [9.8 km] ESE of 'Conjuboy' Station, *Perry* 3745, 5 July 1953 (CANB, NSW); 18.2 km S of Lynd Junction on Greenvale road, *Hill* 1065 & *Johnson*, 11 Aug 1984 (NSW, BRI, CANB, DNA, PERTH); Mingela, *Brooker* 8962, 30 Apr 1985 (CANB, NSW); Charters Towers, *Blake* 11695, 11 June 1936 (BRI, NSW); Bogie Range, *Smith* 4529, 9 Sep 1950 (BRI, NSW); 85 miles [136 km] N of Hughenden on The Lynd road, *Carolin* 8514, 11 Apr 1974 (NSW); Torrens Creek, *Hyland* 6133, 18 May 1972 (QRS, NSW); 2 km NW of Hazelwood Creek on Lizzie Creek Road, W of Mackay, *Brooker* 5256, 21 July 1976 (CANB, NSW); ca 15.4 km from 'Moo-noomoo' Station turnoff on 'Bowie' to 'Yarromere' road, *Martensz* 1229, 6 Oct 1978 (CANB, NSW); 65 miles [104 km] NW of Rockhampton, *Lazarides* 6872, 29 June 1963 (CANB, NSW).

**8B. *Eucalyptus persistens* L. Johnson & K. Hill subsp. *tardecidens* L. Johnson & K. Hill, subsp. nov.**

Similis subspecie *persistenti* sed distinguitur: calyptra externa regulariter tarde sed ante anthesin cadens.

TYPE: QUEENSLAND: 5.0 km S of Mt Carbine on Mareeba road (16°33'S 145°09'E), *K. Hill* 1066, *L. Johnson & D. Blaxell*, 12 Aug 1984 (holo NSW; iso BRI, CANB, MEL).

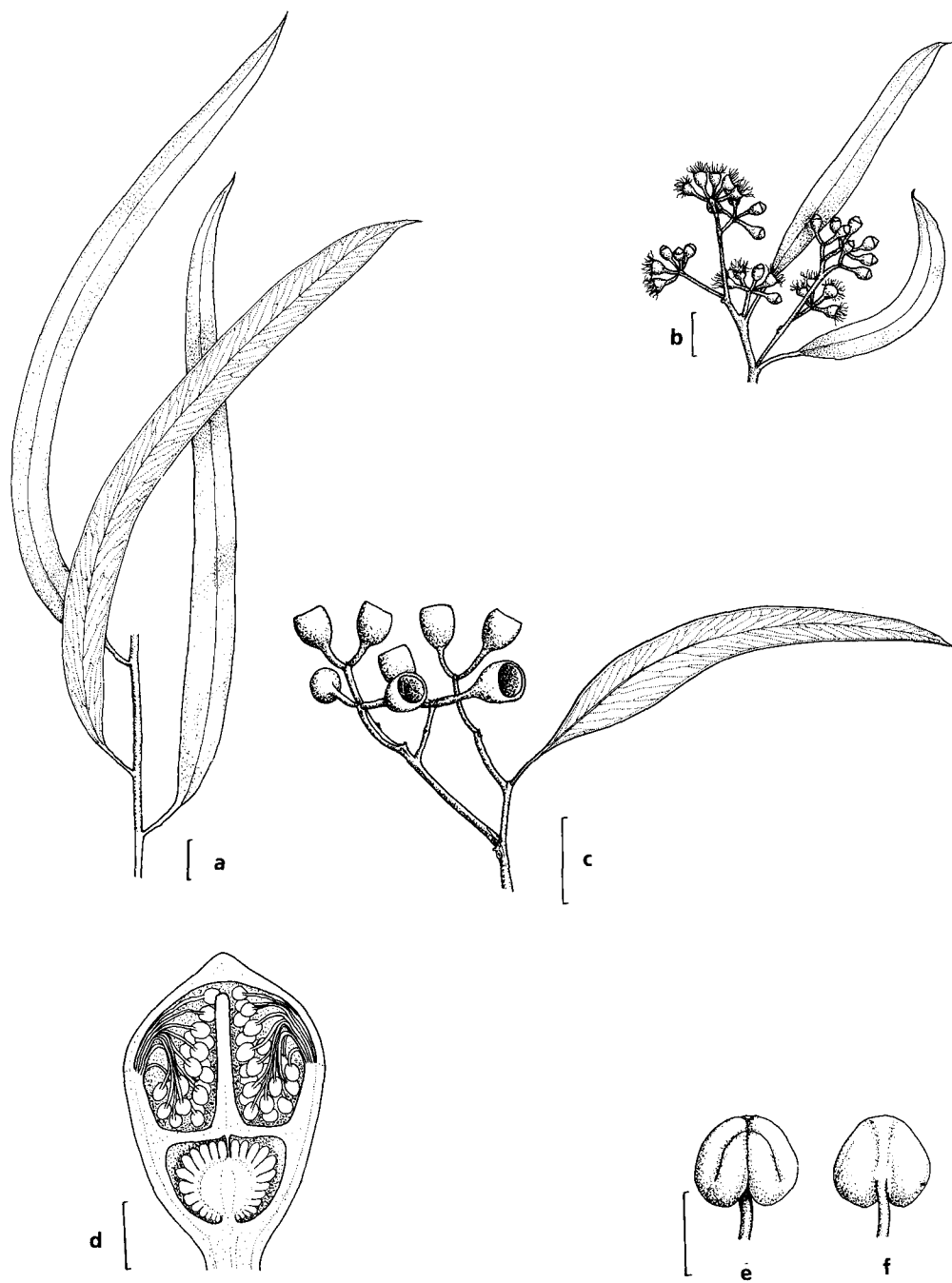
Adult leaves narrow-lanceolate to lanceolate, 5–14 cm long, 5–25 mm wide, petioles 9–18 mm long. Peduncles 4–11 mm long; pedicels 3–6 mm long. Mature buds 3–5 mm long, 2–3 mm diam.; calyptra hemispherical; outer calyptra abscising early but remaining as a small cap until near anthesis. Fruits cup-shaped to pyriform, 3–4-locular, 3–5 mm long, 3–4 mm diam. Figure 12.

Subsp. *tardecidens* differs from subsp. *persistens* in that the outer calyptra abscises before anthesis, though it usually remains as a small cap on top of developing buds until shortly before anthesis. In contrast, the outer calyptra of *E. normantonensis* falls away completely long before anthesis.

DISTRIBUTION: North-eastern Queensland, from Birricania north to Laura, in a zone passing through Hughenden and Forsayth. Subsp. *tardecidens* occupies a narrow band lying to the north and west of the distribution of subsp. *persistens* (Figure 13).

ECOLOGY: Sporadically distributed but not uncommon, often on sandy soil in dry woodland in generally higher sites on undulating topography, or on stony rises, associated with a variety of species, or occasionally a community-dominant.

CONSERVATION STATUS: Locally abundant over a wide area; not considered to be at risk. The epithet is from the Latin *tarde*, tardily, and *-cidens* (combining form of *cadens*), falling, referring to the shedding of the outer (calycine) calyptra. Since it is a compound formed from an adverb (not an adjective or a noun) and a participle, article 73.8 of the I.C.B.N. does not apply, and the word is formed like *benevolens* or *suaveolens*, and does not have the connecting vowel '-i-'. The stress is on the (short) 'e'.



**Figure 12.** *E. persistens* subsp. *tardecidens*. **a**, adult leaves; **b**, adult leaves, buds and flowers; **c**, adult leaf and fruits; **d**, median section of bud; **e**, **f**, anther (all from Hyland 5694). Scale bar: **a**, **b**, **c** = 1 cm; **d** = 1 mm; **e**, **f** = 0.25 mm.

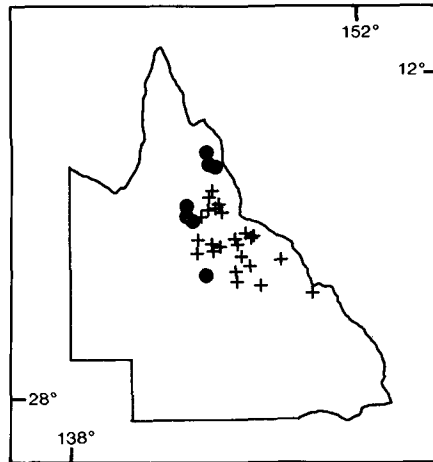


Figure 13. Distribution of *E. persistens* subsp. *tardecidens* (●) and subsp. *persistens* (+).

SELECTED SPECIMENS (from 25 examined): QUEENSLAND: Butchers Hill, c. 40 miles [64 km] direct SW of Cooktown, *B.G. Briggs 2024*, 5 Aug 1968 (NSW); Crest of dividing range north of Palmer River on Cooktown road, *Pedley 1914*, 21 Nov 1965 (BRI, NSW); Campbell Ck on Curraghmore Holding (16° 25'S, 145° 00'E), *Hyland 5694*, 18 Jan 1971 (QRS, NSW); 3 km N of Mt Carbine, *Bale*, 30 July 1975 (NE, NSW); 15 miles [24 km] E of Forsayth, *Johnson & Pryor*, 21 Oct 1964 (NSW); 20 km S of 'Robin Hood' Station on track to 'Percy Vale' Station, *Hill 1062 & Johnson*, 10 Aug 1982 (NSW, BRI, CANB, PERTH); Birricania, *White 18*, Apr 1919 (NSW).

### 9. *Eucalyptus sicilifolia* L. Johnson & K. Hill, sp. nov.

Inter species affinitatis *E. paniculatae* combinatione characterum sequentium distinguitur: folia juvenilia linearia, folia adulta nitentia linearia vel anguste lanceolata, alabastra fructusque parvi.

TYPE: QUEENSLAND: Little St Peter Mountain, N of Springsure (23°55'S 148°01'E), *K. Hill 1190*, *L. Johnson & A. Bean*, 22 Aug 1984 (holo NSW; iso BRI, CANB, MEL).

Tree to 10 m tall. Bark persistent, dark grey ironbark, smaller branches smooth to c. 2.5 cm diam., cream. Juvenile leaves disjunct, linear, glossy, distinctly discolorous, to 10 cm long, 7 mm wide; petioles to 4 mm long. Intermediate leaves linear, to 16 cm long, 12 mm wide; petioles to 5 mm long. Adult leaves disjunct, linear to narrow-lanceolate, acute or acuminate, falcate, glossy, green, concolorous, amphistomatic, 7–12 cm long, 6–16 mm wide; petioles 9–17 mm long; lateral veins well-spaced, regular, at 30–50° to midrib, finely regularly reticulate between; intramarginal vein distinct, 0.5–1 mm from margin. Inflorescences compound, comprising 3–7-flowered umbellasters aggregated on short lateral or terminal shoots, or sometimes axillary; peduncles 2–8 mm long; pedicels 2–5 mm long. Mature buds ovoid to broadly fusiform, 4–5 mm long, 2–3 mm diam.; calyptra double; outer shedding early; inner about two-thirds as long as and narrower than hypanthium, hemispherical or conical. Stamens regularly inflexed, outer whorls longer and infertile; anthers adnate, cuboid, oblique, dehiscing through terminal pores. Fruits ovoid-truncate, 4–5 mm long, 4–5 mm diam., 3–5-locular; stemonophore not persistent; disc depressed; valves enclosed or rim-level. Seeds ovoid to ellipsoid, dull to sub-glossy, dark red-brown, shallowly reticulate; hilum ventral; chaff red-brown. Figure 14.

Distinguished within the *E. paniculata* Sm. group by the linear juvenile leaves, the glossy, lanceolate or narrower, and distinctly falcate adult leaves, and the small buds and fruits. The only species with comparable bud and fruit size and shape in the group is *E. beyeriana* L. Johnson & K. Hill from New South Wales, which has dull grey-green juvenile and adult leaves.

DISTRIBUTION: Known only from the type locality and nearby volcanic hills (Figure 15).

ECOLOGY: Restricted to low woodland on the rocky top of trachytic volcanic plugs and the tops of surrounding scree slopes. Associated with *E. trachyphloia* F. Muell. and *Triodia*.

The epithet is from the Latin *sicilis*, a sickle, and *folium*, a leaf, alluding to the commonly curved (falcate) leaves.

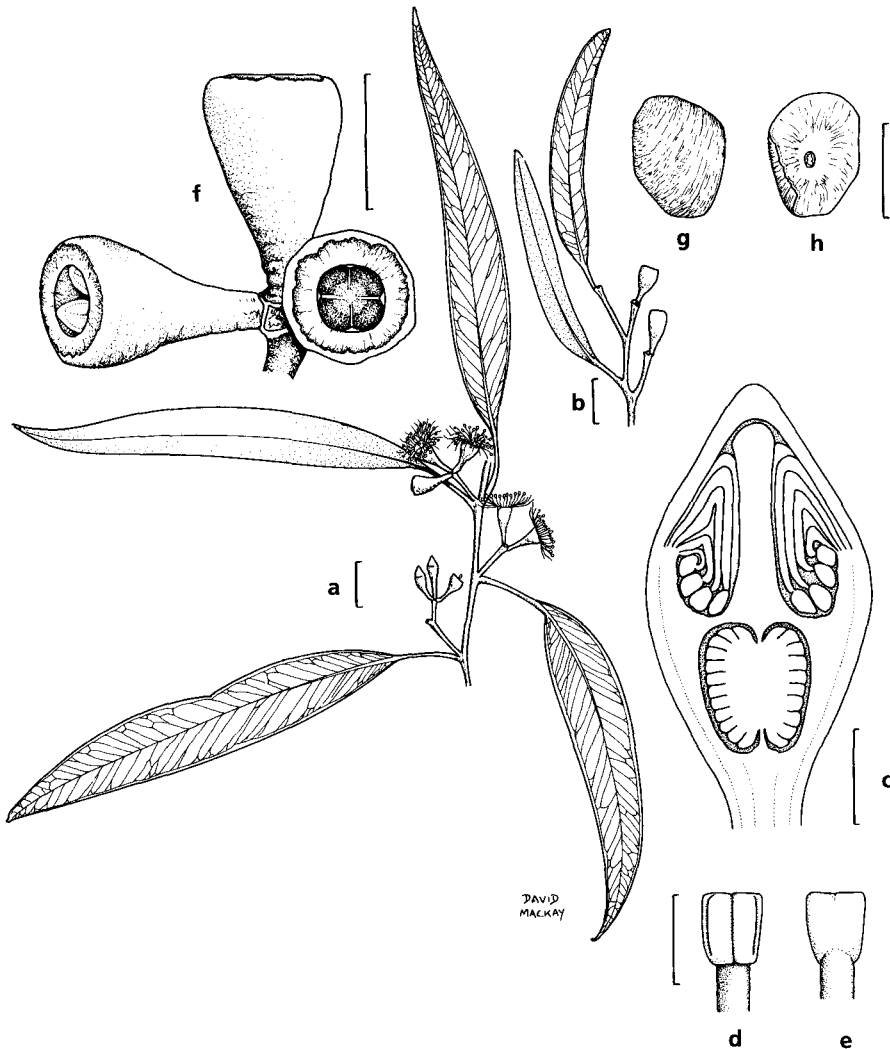


Figure 14. *E. sicilifolia*. a, adult leaves, buds and flowers; b, adult leaves and fruits; c, median section of bud; d, e, anther; f, fruits; g, h, seed (all from Wallace 83065 & Hind). Scale bar: a, b = 1 cm; g, h, i = 1 mm; e, f = 0.5 mm.

CONSERVATION STATUS: 2RC. Known from a restricted area, but included in the Mt Zamia Environmental Park.

SELECTED SPECIMENS (from 4 examined): QUEENSLAND: Little St Peter, near Springsure, Wallace 83065 & Hind, 23 Aug 1983 (NSW, BRI, CANB); Little St Peter, Lexington, N of Springsure, Blake 6987, 23 July 1934 (BRI, NSW).

**10. Eucalyptus suffulgens** L. Johnson & K. Hill, *sp. nov.*

Inter species affinitatis *E. paniculatae* combinatione characterum sequentium distinguitur: folia adulta subnitentia amphistomatica anguste lanceolata vel lanceolata, alabastra plerumque clavata calyptra breviuscula plerumque acuta, fructus majusculi ovoidei vel ellipsoidei.

TYPE: QUEENSLAND: Callide open cut, c. 25 km north-east of Biloela (24°18'S 160°37'E), L.A.S. Johnson 7123, 2 June 1971 (holo NSW; iso BRI, CANB).

Tree to 25 m tall. Bark persistent, dark grey ironbark, smaller branches smooth to c. 5 cm diam., grey or cream. Juvenile leaves disjunct, petiolate, broad-lanceolate to narrow-ovate, glossy, distinctly discolorous, to 9 cm long, 4 cm wide. Adult leaves disjunct, narrow-lanceolate to lanceolate, acute or acuminate, sub-glossy, green, very slightly discolorous or concolorous, amphistomatic, 8–17 cm long, 10–23 mm wide; petioles 9–17 mm long; lateral veins well-spaced, regular, at 30–50° to midrib, finely regularly reticulate between; intramarginal vein distinct, 0.5–2 mm from margin. Inflorescences compound, comprising 7-flowered umbellasters aggregated on short lateral or terminal shoots, or sometimes axillary; peduncles 8–22 mm long; pedicels 3–10 mm long. Mature buds ovoid, clavate or pyriform, 9–11 mm long, 5–6 mm diam.; calyptra double; outer shedding early; inner about half as long as and narrower than hypanthium with a distinct constriction at the junction, hemispherical or conical, rounded to acute or apiculate. Stamens regularly inflexed, outer whorls longer and infertile; anthers adnate, cuboid, oblique, dehiscing through terminal pores. Fruits ellipsoid to ovoid, 8–15 mm long, 6–11 mm diam., 4–5-locular; stemonophore persistent; disc vertically depressed; valves deeply enclosed. Seeds ovoid to ellipsoid, dull to sub-glossy, dark red-brown, shallowly reticulate; hilum ventral; chaff orange-brown. Figure 16.

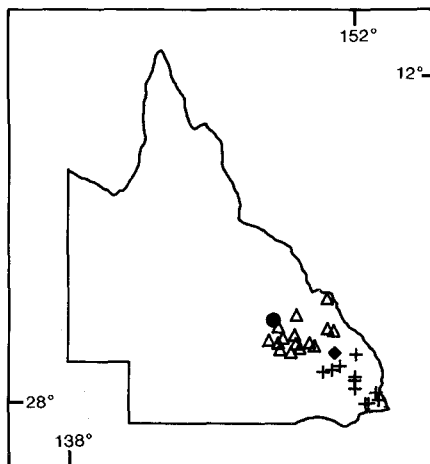
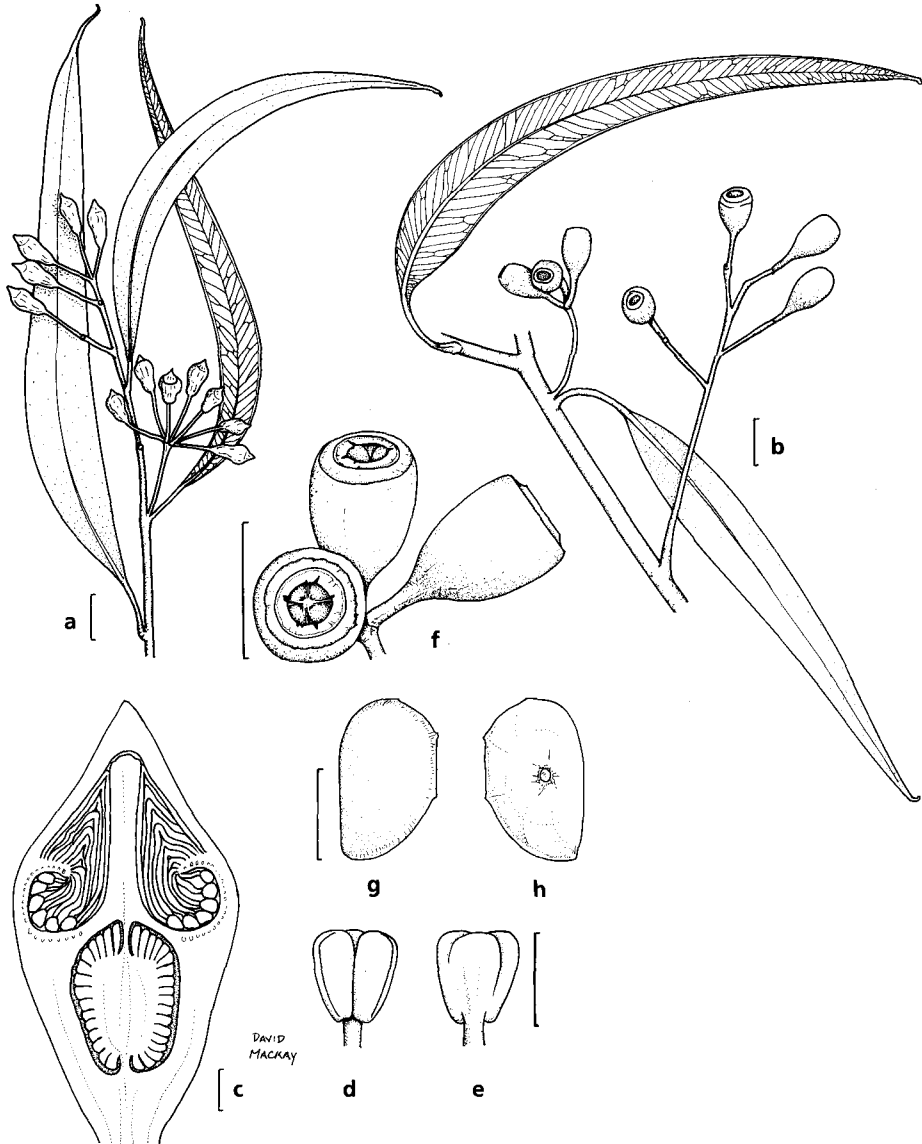


Figure 15. Distribution of *E. sicilifolia* (●), *E. suffulgens* (△), *E. dura* (+), and intergrades between the latter two species (◆).

Distinguished within the *E. paniculata* Sm. group by the subglossy, narrow-lanceolate to lanceolate adult leaves, the usually clavate buds with a relatively short, usually acute calyptra, and the relatively large ovoid or ellipsoid fruits. *E. suffulgens* is nearest to *E. dura* (below), which has broader ovoid adult leaves and smaller, obconic fruits. The two taxa show considerable intergradation in the zone lying between their ranges.

This taxon was recognised as distinct by Pryor & Johnson (1971), with the code 'SUV:A'.



**Figure 16.** *E. suffulgens*. a, adult leaves and buds; b, adult leaves and fruits; c, median section of bud; d, e, anther; f, fruits; g, h, seed (all from Johnson 7123). Scale bar: a, b, f = 1 cm; c, g, h = 1 mm; d, e = 0.5 mm.

**DISTRIBUTION:** Ranges in the Byfield area, and the Blackdown Tableland and the Expedition, Dawson and Carnarvon Ranges and associated smaller ranges of Central Queensland (Figure 15).

**ECOLOGY:** A locally abundant species on shallow to skeletal soils over sandstone, often on crests of ranges and scarp lines.

Intergrading forms between this species and *E. dura* (below) occur where the ranges approach one another (24.3 km S of Cracow on Nathan Gorge road, *Blaxell 89/239, 241 & Johnson, 10 Aug 1989 (NSW)*).

The epithet is from the Latin *sub-* (assimilated to *suf* before *f*), in the sense of 'somewhat', and *fulgens*, shining, from the rather glossy foliage.

**CONSERVATION STATUS:** Locally abundant though patchy over a wide area; not considered to be at risk.

**SELECTED SPECIMENS** (from 32 examined): QUEENSLAND: Hills SW of Byfield, *Brooker 5269, 23 July 1976 (CANB, BRI, NSW)*; c. 3.2 km SW of Kroombit Lodge, *Martensz 1052 & Kleinig, 19 Aug 1976 (CANB, NSW)*; Wafers Spur, Blackdown Tableland (23°44'S 149°07'E), *Crisp 3009, 13 June 1977 (CBG, BRI, CANB, NSW)*; Blackdown Tableland, 19.8 km SW of Umolo railway station, *Chippendale 1111 & Brennan, 17 Sep 1974 (CANB, NSW)*; 15 miles [24 km] SE of Springsure on Rolleston road, *Blaxell 966 & Johnson, 28 Nov 1972 (NSW)*; Boolimbah Bluff, Carnarvon Gorge, *Hill 1327, 1 Jan 1986 (NSW)*; 65.8 km from Bauhinia Downs road on Glenhaughton road, *Brooker 7832, 4 Dec 1982 (CANB, NSW)*; 10 km SW of Isla Gorge lookout, *Johnson 7185 A, B, C, D & B.G. Briggs, 3 June 1971 (NSW)*.

### 11. *Eucalyptus dura* L. Johnson & K. Hill, sp. nov.

Inter species affinitatis *E. paniculatae* combinatione characterum sequentium distinguitur: folia adulta coriacea subnitentia amphistomatica lanceolata vel late lanceolata, fructus obconici.

**TYPE:** QUEENSLAND: Turkey Mtn, Barakula State Forest, *K. Hill 1242, L. Johnson & A. Bean, 25 Aug 1984 (holo NSW; iso BRI, CANB, PERTH)*.

Tree to 25 m tall. *Bark* persistent, dark grey ironbark, smaller branches smooth to c. 3 cm diam., grey or cream. *Juvenile leaves* disjunct, petiolate, broad-lanceolate to ovate, glossy, distinctly discolorous, to 12 cm long, 4.5 cm wide. *Adult leaves* disjunct, lanceolate to broad-lanceolate, often falcate, acute or acuminate, sub-glossy, green, very slightly discolorous or concolorous, amphistomatic, 9–14 cm long, 21–31 mm wide; petioles 9–26 mm long; lateral veins well-spaced, regular, at 30–50° to midrib, finely regularly reticulate between; intramarginal vein distinct, 0.5–2 mm from margin. *Inflorescences* compound, comprising 7-flowered umbellasters aggregated on short lateral or terminal shoots, or sometimes axillary; peduncles 7–20 mm long; pedicels 5–10 mm long. *Mature buds* ovoid, clavate or pyriform, 8–10 mm long, 4–5 mm diam.; calyptra double; outer shedding early; inner about half as long as and narrower than hypanthium with a distinct constriction at the junction, conical, acute or apiculate. *Stamens* regularly inflexed, outer whorls longer and infertile; anthers adnate, cuboid, oblique, dehiscing through terminal pores. *Fruits* obconical, 7–10 mm long, 5–7 mm diam., 4–5-locular; stemonophore persistent; disc vertically depressed; valves deeply enclosed. *Seeds* ovoid to ellipsoid, dull to sub-glossy, dark red-brown, shallowly reticulate; hilum ventral; chaff orange-brown.

Distinguished within the *E. paniculata* Sm. group by the coriaceous, sub-glossy, lanceolate to broad-lanceolate, amphistomatic adult leaves, and the obconical fruits. Nearest to *E. suffulgens* (above), but similar in leaf and fruit morphology to

*E. fusiformis* Boland & Kleinig, which differs in having dull adult and juvenile leaves, and somewhat more fusiform than conical fruits. *E. ancophila* L. Johnson & K. Hill from N.S.W. has similar subglossy lanceolate adult leaves that are considerably larger (to 20 cm long), and  $\pm$  obconic fruit that are shorter (6–8 mm long) and on shorter pedicels (4–6 mm long).

DISTRIBUTION: Southern Queensland, from the Biggenden district west to Chinchilla and south to Boonah (Figure 15).

ECOLOGY: Sporadic and localised, in grassy or dry sclerophyll forest on sandy soils over sandstone, most often on higher points.

The epithet is from the Latin *durus*, hard, referring to the bark.

CONSERVATION STATUS: Locally abundant though patchy over a wide area; not considered to be at risk.

SELECTED SPECIMENS (from 18 examined): QUEENSLAND: Mt Walsh, 6 km SW of Biggenden, *Crisp 2612*, 28 May 1977 (CBG, AD, BRI, CANB, NSW); Turkey Mtn, Barakula State Forest, *Brooker 9013*, 7 May 1985 (CANB, BRI, PERTH, NSW); Yarraman, *Cameron Y 19*, July 1924 (BRI, NSW); Plunkett district, 2.3 km (direct) WSW of Chardons Bridge, *J.D. Briggs 214*, 19 Aug 1978 (CANB, BRI, NSW); Mt French, about 7 km W of Boonah, *Sharpe 2303 & B.K. Simon*, 15 May 1977 (BRI, NSW).

## 12. *Eucalyptus reducta* L. Johnson & K. Hill, sp. nov.

*E. tindaliae* affinis sed ab illa distinguitur: folia adulta minora, alabastra filamenta antherae minores, fructus minores et triloculares.

TYPE: QUEENSLAND: 1 km W of Tumoulin on Kaban road (17°33'S 145°26'E), *K. Hill 1132*, *L. Johnson & D. Blaxell*, 16 Aug 1984 (holo NSW; iso BRI, CANB, MEL).

Tree to 40 m high. Bark persistent to smaller branches, grey on surface, red-brown when freshly broken, long fibrous ('stringybark'); smooth and white on very small branches. Juvenile leaves opposite for few nodes, then disjunct, ovate to elliptical, apiculate, cordate to rounded basally, with dense 'stellate hairs' on all surfaces, to 5 cm long, 3.5 cm wide, often smaller; petioles 1–3 mm long. Intermediate leaves disjunct, glabrous, ovate, to 10 cm long, 6 cm wide; petioles 3–8 mm long. Adult leaves disjunct, ovate-lanceolate, oblique, falcate, with a somewhat bluish sheen, 7–10 (rarely –14) cm long, 12–20 (rarely –30) mm wide; petioles 9–18 mm long; lateral veins well-spaced, at 15–30° to midrib; intramarginal vein distinct, 1–2.5 mm from margin. Umbellasters axillary, more than 7-flowered; peduncles 7–11 mm long, terete; pedicels 1–2 mm long, grooved. Mature buds ovoid, 4–6 mm long, c. 3 mm diam.; calyptra hemispherical, sometimes very shortly rostrate, slightly shorter than hypanthium. Anthers all fertile; filaments erect and inflexed in bud; stamens c. 0.5 mm wide, reniform. Fruits hemispherical to cup-shaped, 3- rarely 4-locular, 5–7 mm long, 6–7 mm diam.; calyptra scar c. 0.5 mm wide, recessed; disc domed, 1–2 mm wide, continuous with hypanthium and calyptra scar, ultimately incurved; valves broadly triangular, enclosed, with a small exerted apiculate tip. Seeds dull brown, reniform, to 1.5 mm long; chaff similar, slightly smaller. Figure 17.

*E. reducta* differs from *E. tindaliae* Blakely in the smaller adult leaves (often to 14 cm long in the latter), and the smaller and 3-locular fruits (7–11 mm diam. and mostly 4-locular in the latter). The buds, filaments and anthers also tend to be smaller in *E. reducta*.

*E. tindaliae* is here taken to include *E. phaeotricha* Blakely & McKie (erroneously included in *E. nigra* R. Baker by Pryor & Johnson (1971) and by Chippendale (1988)).



While the types of the two names appear rather different, a full range between the two variants may be found in a single population, and we would regard them as conspecific. The type of *E. nigra* we include in *E. eugenioides* Sieber ex Sprengel.

DISTRIBUTION: QUEENSLAND: Atherton Tableland south to the Paluma district (Figure 18).

ECOLOGY: Locally dominant on drier sites on higher parts of ranges, or sometimes in mixed forest with *E. tereticornis* Sm., *E. polycarpa* F. Muell., *E. intermedia* R. Baker, *E. tessellaris* F. Muell. and *E. drepanophylla* F. Muell. ex Benth.

The epithet is from the Latin *reductus*, with two meanings, 'reduced', referring to the smaller fruits with fewer loculi of this species in comparison with *E. tindaliae*, and 'remote', referring to the great disjunction in distributions of *E. reducta* and *E. tindaliae*.

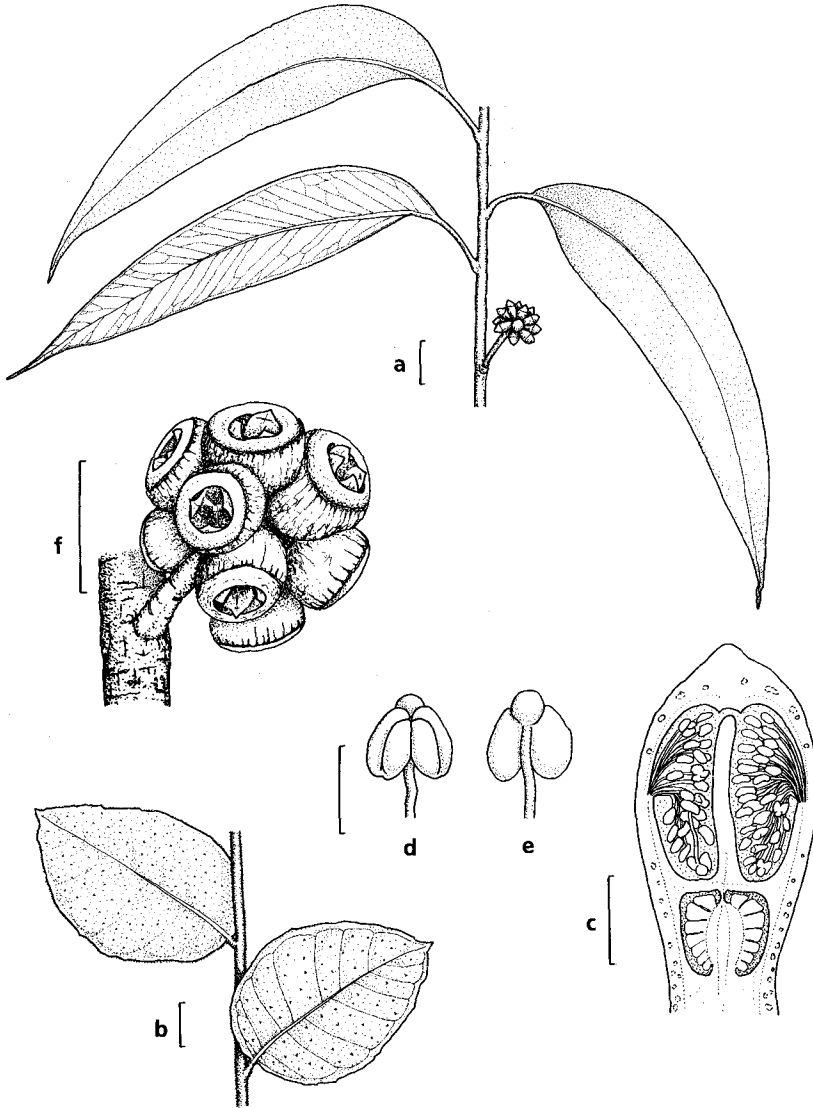


Figure 17. *E. reducta*. a, adult leaves and buds; b, juvenile leaves. c, median section of bud; d, e, anther; f, fruits (a, c, d, e, f from Brooker 6524, b from Brooker 3343A). Scale bar: a, b, f = 1 cm; c = 1 mm; d, e = 0.2 mm.

CONSERVATION STATUS: Locally abundant over a considerable area; not considered to be at risk.

SELECTED SPECIMENS (from 11 examined): QUEENSLAND: SFR 144, Windsor Tableland, *Hyland* 4878, 19 June 1969 (QRS, CANB, NSW); hills between Kuranda and Clohesy River, *Brooker* 3343, 3343A, 24 Jan 1972 (CANB, NSW); Herberton State Forest, *Brooker* 6524, 10 Oct 1979 (CANB, NSW); Herberton Range, c. 7 miles [11.1 km] S of Atherton, *Johnson*, 21 May 1962 (NSW); c. 5 km E of Wondecla, *Brooker* 6826, 10 Oct 1979 (CANB, NSW); Paluma road, 8 miles [12.8 km] W of Bruce Highway, near Paluma, *Johnson & Pryor*, 23 Oct 1964 (NSW).

### 13. *Eucalyptus mensalis* L. Johnson & K. Hill, sp. nov.

Affinis *E. cameronii* sed ab illa distinguitur: fructus minores plerumque triloculares, folia juvenilia lanceolata ad ovata, folia adulta late lanceolata ad anguste ovata.

TYPE: QUEENSLAND: 1.6 km S of Mimosa Ck, Blackdown Tableland, *D.F. Blaxell* 734 & *L.A.S. Johnson*, 26 June 1976 (holo NSW; iso BRI, CANB, MEL).

Tree to 45 m. Bark persistent to branches less than 3 cm diam., grey, long-fibrous ('stringybark'). Juvenile leaves mainly disjunct, lanceolate to ovate, acute to acuminate, with scattered 'stellate hairs' on all surfaces, to 7 cm long, 25 mm wide; petioles 2–6 mm long. Adult leaves disjunct, broad-lanceolate to narrow-ovate, oblique, falcate, glabrous, acute or acuminate, 4–10 cm long, 8–24 mm wide; petioles 7–13 mm long; lateral veins well-spaced, at 20–30° to midrib; intramarginal vein sometimes distinct, 0.5–2 mm from margin. Umbellasters axillary, more than 7-flowered; peduncles 7–12 mm long; pedicels c. 1 mm long. Mature buds ovoid, to 4 mm long, 2 mm diam.; calyptra broadly conical, obtuse, as long as hypanthium. Fruits hemispherical to cup-shaped, 3- rarely 4-locular, 4–5 mm long, 4–6 mm diam.; calyptra scar and stemonophore forming a distinct, narrow groove around hypanthium; disc slightly domed, c. 1 mm wide, ultimately incurved; valves broadly triangular, wholly enclosed or fine tips slightly exerted. Seeds dull, dark brownish black, reniform, to 1.5 mm long; chaff similar, smaller, brown. Figure 19.

*E. mensalis* is near *E. cameronii* Blakely & McKie, differing in the smaller, usually 3-locular fruits (5–6 mm diam. and usually 4-locular in the latter), the lanceolate to

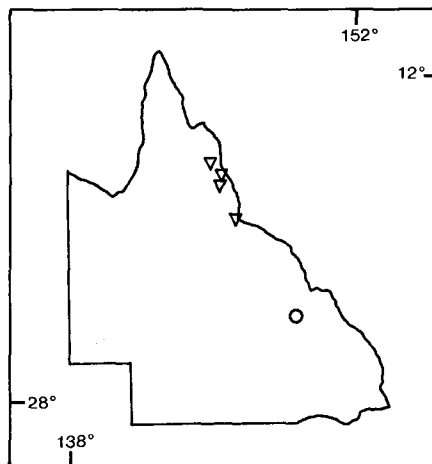


Figure 18. Distribution of *E. reducta* (▽) and *E. mensalis* (○).

ovate juvenile leaves (ovate in the latter) and the broad-lanceolate to narrow-ovate adult leaves (usually lanceolate in the latter).

This taxon has been placed with *E. tindaliae* (*E. phaeotricha*) in the past. It differs in generally closer crown of bright green leaves (distinctly blue-green in the latter), the more persistent hispid juvenile leaves, and the smaller buds and fruits. In both habit and habitat there is much more resemblance to the small-leaved, tall forest species *E. cameronii* than to *E. tindaliae* and *E. reducta*.

DISTRIBUTION: QUEENSLAND: Blackdown Tableland, west of Rockhampton (Figure 18).

ECOLOGY: Locally common in tall forest on ridge crests on basalt-derived, often lateritic soil, associated with *E. sphaerocarpa* L. Johnson & Blaxell, *E. aff. acmenoides* Schauer and *Allocasuarina torulosa*.

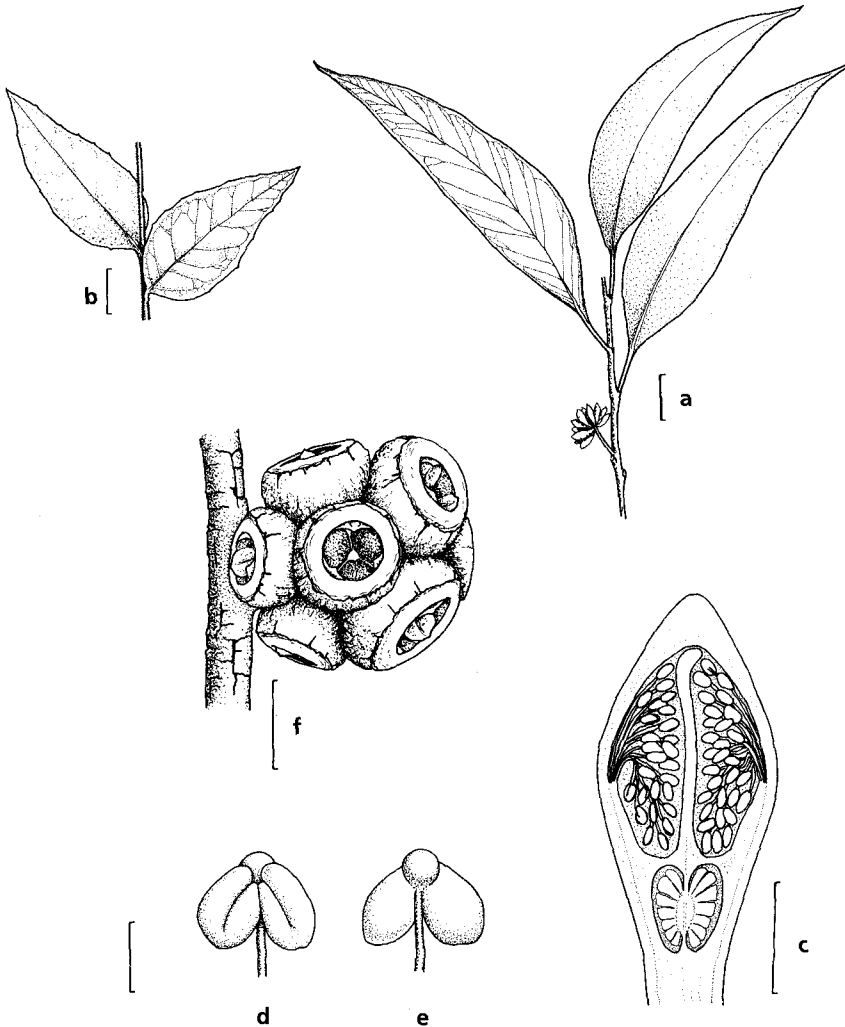


Figure 19. *E. mensalis*. a, adult leaves and buds; b, juvenile leaves; c, median section of bud; d, e, anther; f, fruits (all from Crisp 2945). Scale bar: a, b = 1 cm; f = 5 mm; c = 1 mm; d, e = 0.2 mm.

The epithet is from the Latin *mensa*, a table, and the Latin suffix *-alis*, belonging to, in reference to the occurrence of this species on tableland areas.

CONSERVATION STATUS: Locally abundant over a considerable area; not considered to be at risk.

SELECTED SPECIMENS (from 9 examined): QUEENSLAND: 2.5 km NW of Rainbow Falls, Blackdown Tableland, *Crisp* 2945, 11 June 1977 (CBG, CANB, NSW); campsite on Mimosa Creek, Blackdown Tableland, *Henderson* 1053, *Durrington & Sharpe*, 6 Sep 1971 (BRI, NSW); Blackdown Tableland, *Brooker* 3770, 31 Aug 1972 (CANB, NSW).

**14. *Eucalyptus microcodon* L. Johnson & K. Hill, sp. nov.**

Affinis *E. approximanti* et *E. codonocarpae* sed plus minusve intermedia. Ab *E. approximanti* distinguitur: folia adulta breviora latiora et tenuiora glandulis oleiferis minus prominentibus et venatione prominentiore acutioreque, umbellastra regulariter 7-flora. Ab *E. codonocarpa* distinguitur: folia adulta minora tenuioraque glandulis oleiferis minus prominentibus et venatione prominentiore acutioreque, fructus minores, umbellastra regulariter 7-flora.

TYPE: QUEENSLAND: Mt Barney, south ridge, C.R. Dunlop, 17 May 1969 (holo NSW; iso CBG).

Mallee to 6 m high. Bark smooth, cream, grey or brown, shedding in long strips. Adult leaves disjunct, lanceolate to broad lanceolate, 5–12 cm long, 8–16 mm wide; petioles 8–12 mm long; lateral veins often distinct, at 15°–30° to midrib; intramarginal vein distinct, 1.5–2 mm from margin. Umbellasters axillary, usually 7-flowered, rarely 3; peduncles narrowly flattened, 6–15 mm long; pedicels angular, 2–4 mm long. Mature buds pyriform, markedly verrucose, 5–7 mm long, 4–5 mm diam.; calyptra appearing single, hemispherical, sometimes broadly conical-obtuse, less than ½ as long as hypanthium. Fruits cup-shaped to urceolate, 3–4-locular, often apically flared, 6–8 mm long, 5–7 mm diam.; calyptra scar and stemonophore c. 0.5 mm wide, flat; disc 1.5–3 mm wide, flat or shallowly depressed; valves enclosed.

*E. microcodon* is intermediate between *E. approximans* Maiden and *E. codonocarpa* Blakely & McKie. It differs from *E. approximans* in shorter, broader, thinner leaves with less prominent oil glands and more prominent, more acute venation, and consistently 7-flowered umbellasters; and from *E. codonocarpa* in smaller, thinner leaves with less prominent oil glands and more prominent, more acute venation, the smaller fruits, and the consistently 7-flowered umbellasters. The nearest population geographically is *E. codonocarpa* at Mt Norman, which is predominantly 3-flowered.

DISTRIBUTION: Border Ranges region of Qld and N.S.W., from Mt Barney (Qld) and Mt Glennie (N.S.W.) to the Lamington Plateau.

ECOLOGY: Locally common on skeletal soils on cliff or mountain tops of siliceous granite or rhyolite, usually part of or fringing sclerophyllous shrub communities.

The epithet is from the Greek descriptive prefix *micro-*, small, and the Greek *codon*, a bell, referring to the bell-shaped fruits, which are generally smaller than in the related species.

CONSERVATION STATUS: 2RC. Although occurring in small, sporadic populations, this species is restricted to habitats that are unlikely to suffer disturbance. Almost all populations also occur in national parks and reserves.

SELECTED SPECIMENS (from 6 examined): QUEENSLAND: Mt Barney, *Everist* 1391, 13 Oct 1935 (NSW, BRI); Mt Barney, *Constable*, 15 Nov 1952 (NSW 24089); above Picnic Creek, Lamington National Park, *Johnson*, 20 May 1951 (NSW 172321). NEW SOUTH WALES: North Coast: Mt Glennie trig, *Floyd* 547, 4 Aug 1977 (NSW).

## Acknowledgements

Thanks are due to Leonie Stanberg, who has provided essential assistance through the project, and drafted the distribution maps. David Mackay prepared the illustrations. Lani Retter provided much assistance in earlier stages of the investigations. The work was in part supported by grants from the Australian Biological Resources Study, which are gratefully acknowledged.

## Index

New names and combinations are printed in **boldface**.

<i>Eucalyptus atrata</i> .....	334
<i>Eucalyptus beaniana</i> .....	330
<i>Eucalyptus dura</i> .....	343
<i>Eucalyptus eucentrica</i> .....	326
<i>Eucalyptus gigantangion</i> .....	322
<i>Eucalyptus granitica</i> .....	332
<i>Eucalyptus kabiana</i> .....	328
<i>Eucalyptus mensalis</i> .....	346
<i>Eucalyptus microcodon</i> .....	348
<i>Eucalyptus pachycalyx</i> .....	322
<i>Eucalyptus pachycalyx</i> subsp. <i>pachycalyx</i> .....	328
<i>Eucalyptus pachycalyx</i> subsp. <b><i>waajensis</i></b> .....	325
<i>Eucalyptus persistens</i> .....	336
<i>Eucalyptus persistens</i> subsp. <b><i>tardecidens</i></b> .....	336, 337
<i>Eucalyptus reducta</i> .....	344
<i>Eucalyptus sicilifolia</i> .....	339
<i>Eucalyptus suffulgens</i> .....	341

## References

- Bentham, G. (1867) *Flora Australiensis*, vol. 3 (L. Reeve: London).
- Blakely, W.F. (1934) *A key to the eucalypts*. (The Worker Trustees: Sydney).
- Briggs, J.D. & Leigh, J.H. (1988) *Rare or threatened Australian plants*. Revised edition. Australian National Parks and Wildlife Service Special Publication 14.
- Carr, D.J. & Carr, S.G.M. (1985) *Eucalyptus 1* (Phytoglyph Press: Canberra).
- Chippendale, G.M. (1988) *Eucalyptus*. In A.S. George (ed.), *Flora of Australia*, vol. 19 (AGPS: Canberra).
- Johnson, L.A.S. (1962) Studies in the taxonomy of *Eucalyptus*. *Contr. New South Wales Natl. Herb.* 3: 103–126.
- Johnson, L.A.S. (1972) Evolution and classification in *Eucalyptus*. *Proc. Linn. Soc. New South Wales* 97: 11–29.
- Johnson, L.A.S. & Briggs, B.G. (1984) Myrtales and Myrtaceae – a phylogenetic analysis. *Ann. Missouri Bot. Gard.* 71: 700–756.
- Johnson, L.A.S. & Hill, K.D. (1990) New taxa and combinations in *Eucalyptus* and *Angophora* (Myrtaceae). *Telopea* 4(1): 37–108.
- Ladiges, P.Y. (1984) A comparative study of trichomes in *Angophora* Cav. and *Eucalyptus* L'Hérit. *Austral. J. Bot.* 32: 561–574.
- Maiden, J.H. (1903–33) *A critical revision of the genus Eucalyptus* (Govt. Printer: Sydney).
- McVaugh, R. (1968) The Genera of American Myrtaceae – an interim report. *Taxon* 17: 354–418.
- Pryor, L.D. & Johnson, L.A.S. (1971) *A classification of the eucalypts* (ANU Press: Canberra).

Manuscript received 9 April 1990

Manuscript accepted 14 December 1990