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# AUSTROBAILEYA

A Journal of Plant Systematics

Queensland Herbarium

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*(continued)*

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# A taxonomic revision of *Ixora* L. (Rubiaceae: *Ixoroideae*) in Australia

**S.T. Reynolds & Paul I. Forster**


## Summary

Reynolds, S.T. & Forster, P.I. (2006). A taxonomic revision of *Ixora* L. (Rubiaceae: *Ixoroideae*) in Australia. *Austrobaileya* 7(2): 253–278. The genus *Ixora* L. has seven species in Australia. Five species are endemic – *Ixora baileyana* Bridson & L.G.Adams, *I. beckleri* Benth., *I. biflora* Fosberg, *I. oreogena* S.T.Reyn. & P.I.Forst. sp. nov. and *I. queenslandica* Fosberg, and one species *I. timorensis* Decne., occurs elsewhere in Malesia. *Ixora coccinea* L. occurs as a semi-naturalised adventive at a small number of localities in Queensland and Western Australia. All species are described, native species illustrated and a key to native and naturalised species and a key to Australian cultivated species are provided.


Key Words: Rubiaceae, *Ixoroideae*, *Ixora baileyana*, *Ixora beckleri*, *Ixora biflora*, *Ixora coccinea*, *Ixora oreogena*, *Ixora queenslandica*, *Ixora timorensis*, *Ixora triflora*, new species, Australian flora, Queensland flora, taxonomy, identification keys

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## Introduction

The genus *Ixora* was named by Linnaeus in 1753; although historically it has been often combined with the genus *Pavetta* L. which was described at the same time (e.g. Lamarck 1789). Some early authors including Blume (1826) treated *Ixora* as a section under *Pavetta*, whereas other authors such as Bentham (1867) combined *Pavetta* under *Ixora* and recognised the former as one of the sections under the latter. De Candolle (1830) disagreed with Lamarck and his followers, and considered that the characteristics of the stigma and style, together with flower colour were sufficient to distinguish *Ixora* and *Pavetta*. This view was later accepted by Bentham (1873) and Schumann (1897). The latter author further distinguished the two genera on the form of the bracts at the base of the inflorescence. These two genera have since been recognised as distinct by various authors including Bailey (1900), Valeton (1911), Bremekamp (1934, 1937), Bridson (1988), Risdale (1988), Robbrecht (1988), Smith & Darwin (1988), Husain & Paul (1989), De Block (1998) and Andreasen & Bremer (2000).

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In its present circumscription *Ixora* is a pantropical genus of trees and shrubs with up to 400 species (Ridsdale 1988; Robbrecht 1988; De Block 1998). Recognition of *Ixora* as a genus is largely unequivocal, due especially to the articulate nature of the leaf petiole, the inflorescences that are terminal or terminal on side branches or short side shoots, and the stipules with apices that are apiculate or cuspidate (De Block 1998). On the basis of morphology *Ixora* was included in Rubiaceae, subfamily *Ixoroideae* Raf., tribe *Pavetteae* A.Rich. ex Dum. by Robbrecht (1988, 1993) together with *Captaincookia* Hallé, *Cladoceras* Bremek., *Coleactina* Hallé, *Dictyandra* Welw. ex Hook.f., *Doricera* Verdc., *Dupperrea* Pierre ex Pit., *Hitoa* Nad., *Leptactina* Hook.f., *Myonima* Comm. ex Juss., *Nichallea* Bridson, *Pachystylus* Schumann, *Pavetta*, *Rutidea* DC., *Tarenna* Gaertn., *Tennantia* Verdc. and *Versteegia* Valeton.

An initial molecular (*rbcL*) study by Andreasen & Bremer (1996) found that *Pavetteae sensu* Robbrecht (1988, 1993) was paraphyletic with *Ixora* included. Subsequent studies using nuclear (Ribosomal rbDNA) and chloroplast regions (*rbcL*) indicate that *Ixora* is most closely related to the genera *Myonima* and *Versteegia* (Andreasen & Bremer 2000) or when sequences from the plastid region

*trnL-F* were studied, to *Aleisanthia* Ridley, *Aleisanthiopsis* C.Tange and *Greenea* Wight & Arn. forming a clade that is sister to the *Vanguerieae* clade (Rova *et al.* 2002). Andreasen & Bremer (2000) formally placed *Ixora* in Rubiaceae, subfamily *Ixoroideae* Raf., tribe *Ixoreae* A.Gray and provided an updated morphological description of the tribe. Robbrecht & Manen (2006) reduced the number of subfamilies in Rubiaceae to two, with *Ixora* placed in subfamily *Cinchonoideae* Raf., supertribe *Ixoridinae* Robbr. & Manen, alliance *Vanguerieae*, tribe *Ixoreae*, together with *Aleisanthia*, *Aleisanthiopsis*, *Greenea*, *Myonima*, *Scyphiphora* and *Versteegia*.

The first reference to *Ixora* with respect to the native Australian flora was by Mueller (1865) when he described *I. klanderiana* F.Muell. (now a synonym of *I. timorensis* Decne.). Mueller (1861) had previously described *I. thozetiana* F.Muell.; however, this is now considered a synonym of *Aidia racemosa* (Cav.) Triveng. Bentham (1867) recognised seven species of *Ixora* L. under three sections for the Australian species *viz.* (1) sect. *Pavetta* with two species. *I.pavetta sensu* Benth. and *I. tomentosa sensu* Benth. (flowers 4-merous, stigma lobes coherent). (2) sect. *Ixora* with four species *I. beckleri* Benth., *I. coccinea* L., *I. timorensis* and *I. triflora* R.Br. ex Benth. (flowers 4-merous, stigma with 2 recurved lobes). (3) sect. *Pentadium* with one species *I. pentamera* Benth. (Flowers 5-merous, stigma undivided). Three of these species have been transferred to other genera, *viz. I. pavetta* and *I. tomentosa* to *Pavetta* (*P. australiensis* Bremek. and *P. brownii* Bremek. respectively) (Reynolds 1993), *I. pentamera* Benth. to *Tarenna* (as *T. pentamera* (Benth.) S.T.Reynolds) (Reynolds & Forster 2005), whereas one species *viz. I. triflora* R.Br. ex Benth. is a *nom. illeg.*, being predated by *I. triflora* (G.Forst.) Seem. Moreover the type elements (description and syntypes) of *I. triflora* R.Br. ex Benth. consist of several distinct species, one is an *Ixora* (subsequently renamed as *I. queenslandica* Fosberg), whereas the other is not an *Ixora* and referrable to *Diplospora ixoroides* F.Muell. (now *Triflorensia ixoroides* (F.Muell.) S.T.Reynolds (Reynolds & Forster 2005)). Bailey (1900) dispensed with an all encompassing concept of *Ixora*, recognising both this genus and *Pavetta*, the former with the species *I. beckleri, I. timorensis* and *I. pentamera.*

Four species *Ixora orophila* C.T.White, *I. biflora* Fosberg, *I. queenslandica* Fosberg and *I. baileyana* Bridson & Adams have since been added to this genus. *Ixora biflora* was based on new material and is still recognised. *Ixora orophila* was transferred to *Psydrax* with a new name as *P. montigena* S.T.Reynolds & R.J.F.Hend. (Reynolds & Henderson 2004). *Ixora queenslandica* was a new species based in part on elements applicable to the invalidly named *I. triflora* R.Br. ex Benth. (Fosberg 1938a). *Ixora baileyana* was a new name for the plant previously known as *Lasianthus graciliflorus* F.M.Bailey (Adams *et al.* 1987). These descriptions and transfers resulted in five, named native species being recognised for Australia (Forster & Halford 2002). A sixth native species, *I. oreogena* S.T.Reynolds & P.I.Forst. is described in the current paper.

## Materials and methods

The initial draft of this revision was undertaken by the first author prior to 1999. It has been updated in 2005 and 2006 by the second author, particularly in terms of introductory information about recent generic phylogenies, the typification and application of some names (especially the *Ixora queenslandica* – *I. triflora* conundrum) and new data pertaining to species distribution, habitat and conservation status.

The revision is based on morphological characters derived from herbarium specimens (dried sheets, spirit material) at BRI, CANB, DNA, K, NSW and QRS examined by the first author, with supplementary observations and measurements by the second author of specimens accessioned at BRI since 1995. All taxa have been examined and collected in the field by the second author. Measurements encompass the main range of variation, with aberrant or unusual data indicated in brackets, e.g. (8–)12–15.

Common abbreviations in the specimen citations are L.A. (= Logging Area), N.P. (=

National Park), S.F. (= State Forest), S.F.R. (= State Forest Reserve) and T.R. (= Timber Reserve). Two species keys are presented, the first to the native and naturalised species that occur in Australia, and the second to commonly cultivated species in Australian horticulture.

The species concepts used in this revision have been discussed previously (Forster 2005; Reynolds & Forster 2005).

## Taxonomy

**Ixora** L., *Sp. Pl.* 110 (1753). *Pavetta* section *Ixora* (L.) Blume, *Bijdr. Fl. Ned. Ind.* 1: 949 (1826). **Type:** *I. coccinea* L. [lecto, *fide* Hitchcock & Green (1929: 124)].

***Derivation of name*:** Portuguese form of the Sanskrit word *içvara* (Lord), for the Hindu God Çiwa.

Shrubs or small trees, erect. Stipules interpetiolar, with a truncate or triangular limb connate for most of its length, bearing a cuspidate or aristate apical awn, glabrous or variously hairy, especially near base inside. Leaves opposite, rarely ternate (not in Australia), entire, domatia absent, petiolate or ± sessile; petioles markedly articulate at base. Inflorescences terminal, pedunculate or sessile above the last pair of leaves, or occasionally terminal on very short axillary branchlets, the flowers arranged in 1–3-flowered cymes enclosed in a pair of broad foliaceous bracts, or in many-flowered compact cymes, corymbs or open trichotomously branched panicles with patent, opposite or alternate, often articulate branches; bracts showy or small; bracteoles small, usually paired. Flowers 4 (or rarely 5) -merous, usually showy and fragrant; sessile or pedicellate. Calyx tube ovoid, limb as wide as the tube, with small or well developed lobes at apex; lobes imbricate. Corolla white, yellow, orange, pink or red; tube cylindrical, straight, erect, slender, only slightly wider at mouth, glabrous outside, glabrous or hairy inside; corolla lobes as long as or shorter than the tube, contorted in bud, lanceolate, ovate or oblong, patent, reflexed or revolute in flower. Stamens attached near the mouth of the corolla tube, exserted, spreading and erect; filaments very short, anthers dorsifixed, submedifixed, narrowly ovate or ovate, base usually sagittate, apex with an apiculate and aristate connective, spreading or erect, hanging down in open flowers. Disc annular, fleshy. Ovary 2–4 (–6) locular, ovule solitary in each locule, immersed in the fleshy placenta attached to the septum; style filiform, exserted or included in corolla tube; stigmatic lobes 2–4 (–6 in *I. biflora*), divaricate, recurved. Fruits drupaceous, globose to subglobose and flattened at both ends, red or black, containing 1–4 (–7 in *I. biflora*), subglobose, thin-walled pyrenes that are solitary in each cell of the fruit; seeds ± same shape as pyrenes, plano-convex, brown, with a deep round excavation on the ventral side.

***Distribution*:** Pantropical, about 400 species (De Block 1998); seven species in Australia (six native, five endemic).

***Diagnostic characters*:** The genus *Ixora* is characterised by the articulate base of the leaf petiole, the inflorescences that are terminal or terminal on side branches or short side shoots, the stipules with apices that are apiculate or cuspidate, inflorescences and cymes enclosed in a pair of large foliaceous bracts, flowers that are 4 (rarely 5) -merous with stigmatic lobes that are divergent and recurved. *Ixora* may be readily distinguished from the allied genera *Tarenna* Gaertn. and *Pavetta* by the above characters.

***Sectional Classification*:** Bremekamp (1937) recognised subgenera, sections and series under *Ixora*, whereas other authors including Fosberg (1942) and Smith & Darwin (1988) recognised the major species groups of *Ixora* as sections only. The latter authors are followed here.

Species from five sections are present in Australia; however, since each of these sections are represented by one or two species only, the species are keyed out together in a combined species key, rather than under each section. In the species account, native taxa are arranged alphabetically, followed by the naturalised species. Their sectional affinity is indicated in the following conspectus of the sections.

**Conspectus of *Ixora* sections represented in Australia**

**1. Ixora** sect. ***Ixora*** ('*Ixorastrum*') Bremek., *Bull. Jard. Bot. Buitenzorg* ser. 3, 14: 208 (1937). **Type:** *I. coccinea* L.

Inflorescence branches opposite, articulate in axil of bracts; inflorescence corymbiform, much branched and densely flowered; bracteoles shorter than ovary; flowers red, pink, orange or yellow; calyx with minute lobes.

One species in Australia (*I. coccinea*) that is widely cultivated and occasionally naturalised as a localised adventive since European settlement.

**2. Ixora** sect. ***Phylleilema*** A.Gray, *Proc. Amer. Acad. Arts Sci.* 4: 40 (1858). **Type:** not designated.

Inflorescences with 1–3 flowered subumbellate cymes enclosed in a pair of large ovate cuspidate bracts; flowers sessile.

Two species in Australia, both endemic (*I. biflora* and *I. queenslandica*).

**3. Ixora** sect. ***Vitixora*** Fosberg, *Sargentia* 1: 124 (1942). **Type:** not designated.

Inflorescence small, comprising head-like cymes with many-flowers that are borne at the apices of short axillary branchlets; flowers surrounded by linear bracts; calyx lobes well developed, lanceolate or elliptic-ovate, elongate in fruit.

One endemic species in Australia (*I. baileyana*).

***Note*:** This section was previously thought to be endemic to Fiji where it is represented by four species (Fosberg 1942; Smith & Darwin 1988).

**4. Ixora** sect. ***Pavettopsis*** Bremek., *Bull. Jard. Bot. Buitenzorg* ser. 3, 14: 210 (1937). **Type:** *I. blumei* Zoll. & Mor.

Stipules showy, with a long aristate awn; inflorescences paniculiform, few branched, lower branches opposite and articulate at base, the ultimate branches terminated by 2 or 3-flowered cymules, one flower always sessile and articulate at base, the others stalked; pedicels articulate at base; corolla glabrous at throat.

Two endemic species in Australia (*I. beckleri* and *I. oreogena*).

**5. Ixora** sect. ***Pogonanthus*** Bremek., *Bull. Jard. Bot. Buitenzorg* ser. 3, 14: 210 (1937). **Type:** *I. timorensis* Decne.

Stipules small, shortly cuspidate; inflorescences pedunculate or subsessile, paniculiform, many-flowered, laxly branched with patent opposite, subopposite or alternate branches; ultimate cymules 2–5-flowered; bracts subtending the inflorescence branches showy or small; corolla throat hairy.

One non-endemic species in Australia (*I. timorensis*).

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**Key to the species of *Ixora* present (native and naturalised) in Australia**

1 Inflorescences 1–3-flowered, enclosed in a pair of large bracts . . . . . 2
Inflorescences usually more than 3-flowered, never enclosed in a pair of large bracts . . . . . 3

2 Leaves broadly elliptic; inflorescences sessile; fruits broadly ellipsoid, up to 7-seeded, red; stigma 2–6-lobed, style hardly exceeding the corolla tube; anthers ovoid . . . . . **3. I. biflora**
Leaves narrowly elliptic; inflorescences pedunculate; fruits globose, 2-seeded, black; stigma 2-lobed, style long exserted from the corolla tube; anthers elongate, narrowly ovoid or lanceolate . . . . . **5. I. queenslandica**

**3** Inflorescences borne at apex of short axillary branchlets, subcapitate; bracts linear, hairy . . . . . **1. I. baileyana**
Inflorescences terminal on the main branchlet, open paniculiform or comprised of corymbs and subumbels; bracts ovate or subulate, glabrous . . . . . 4

**4** Corolla red, orange or yellow, tube 20–45 mm long; inflorescences compact, corymbiform or umbelliform, much branched with opposite articulate branches; bracts and bracteoles foliaceous and well developed . . . . . **7. I. coccinea**
Corolla white or cream, corolla tube 2–8 (–10) mm long; inflorescences open, loosely branched, paniculiform, with only the lower branches usually opposite and articulate; bracts subtending the inflorescences showy or small, others minute; bracteoles minute or absent . . . . . 5

**5** Stipules shortly cuspidate; leaves (115–) 157–230 × (45–) 65–90 mm, base subcordate, obtuse or subacute; bracts subtending the three inflorescence branches showy or small; corolla tube densely hairy at mouth; style hairy in the middle; calyx and pedicels hairy or glabrous . . . . . **6. I. timorensis**
Stipules cuspidate with a long aristate awn; leaves 65–135 × 21–55 (–70) mm, base acute or obtuse; bracts subtending the inflorescence branches stipule-like; corolla tube glabrous inside; style, calyx and pedicels glabrous . . . . . 6

**6** Leaf lamina 95–135 × 35–70 cm; petioles 10–14 mm long; inflorescences shortly pedunculate (primary peduncle 5–7 (–12) mm long), ultimate cymules 3-flowered, middle flower sessile, lateral ones shortly pedicellate (pedicels 0.5–1.5 mm long); corolla tube 2–4.5 mm long, lobes obtuse . . . . . **2. I. beckleri**
Leaf lamina 65–95 × 21–31 cm; petioles 5–10 mm long; inflorescences sessile, ultimate cymules 2 or 3-flowered, one flower sessile, the others pedicellate (pedicels 2.5–3 mm long); corolla tube 7–8 mm long, lobes acuminate . . . . . **4. I. oreogena**

## A. Native Australian species of *Ixora*

**1. Ixora baileyana** Bridson & L.G.Adams, *Kew Bull.* 42: 214 (1987).

*Lasianthus graciliflorus* F.M.Bailey, *Queensland Dept. Agric. Bull.* 18:18 (1892); non *Ixora graciliflora* Benth., *Linnaea* 7: 448 (1850). **Type:** Queensland. Cook District: Tringilburra (Behana) Creek, Bellenden Ker, in 1889, *F.M. Bailey s.n.* (holo: BRI [AQ318077]; iso: K).

***Illustrations*:** Hyland *et al.* (1999, 2003).

Subshrubs with erect to decumbent slender stems to 1.5 m high; indumentum of erect to spreading, short (<0.5 mm long), simple trichomes; branchlets terete to somewhat angular, cream-grey, indumentum scattered to sparse. Stipules 4–9 mm long, with sparse to dense indumentum externally and internally, colletors at base internally; shortly connate for up to 2 mm, limbs ovate-triangular and up to 2 mm long, keeled towards apex and aristate (awn 1.8–7 mm long). Leaves thinly coriaceous, subsessile to shortly petiolate; petioles 2–4 mm long; lamina elliptic-ovate, lanceolate, oblanceolate, occasionally wider above the middle, 100–210 × 25–65 mm; apex acute or abruptly acuminate, narrowing towards base; base subcordate or obtuse at base; upper surface dark glossy-green when live, drying dark brown with reddish nerves, glabrous; lower surface with scattered indumentum especially on the midrib and nerves; lateral nerves 9–14 pairs, ± patent and looping near margins, interlateral venation

reticulate and prominent on the lower surface. Inflorescences in small dense clusters at branchlet apices, ± sessile or shortly pedunculate; bracts small, *c.* 2 mm long, ciliate. Flowers usually bisexual (unisexual in one collection), 4-merous, sessile, scented. Calyx *c.* 1 mm long, lobes lanceolate, < 0.2 mm long, fimbriate and with sparse to dense indumentum. Corolla white; tube 8–10 mm long, with dense indumentum inside; lobes acuminate, 4–4.5 × 1–1.3 mm, ciliate. Stamens at mouth of tube (only the anther tips exserted), anthers lanceolate-ovoid, 0.8–1 mm, filaments 7–8 mm long. Ovary 4-locular; style and stigma 10–12 mm long, shortly exceeding corolla tube, style glabrous, stigmatic arms 4, linear and spreading, 1–1.2 mm long. Fruits subglobose, depressed on top and bottom and obscurely 4-lobed, *c.* 10 mm long and wide, red, with persistent sparse indumentum, crowned by persistent calyx, pyrenes 1 or 2; seeds subglobose, *c.* 4 mm long and 4 mm wide. **Fig. 1.**

***Additional selected specimens examined*: Queensland.** Cook District: N.P.R. 133, Daintree, above tributary of McKenzie Creek, WNW of Mt Hutchinson, 16°11′S, 145°24′E, Nov 2002, *Ford AF3677 & Holmes* (BRI); Baileys Creek, N of Daintree, 1962, *Webb & Tracey 6529* (BRI); S.F. 310 Goldsborough, 12 km along Goldsborough Valley road, 17°12′S, 145°45′E, Oct 2001, *Forster PIF27675 et al.* (A, BRI, K, L, MEL, NSW); S.F. 310 Goldsborough, 13.5 km along Goldsborough road, 17°13′S, 145°45′E, Jul 2000, *Forster PIF25891 et al.* (BRI, MEL); base of Bellenden Ker Cable Car installation, N of Babinda, 17°16′S, 145°54′E, Aug 1989, *Bostock 954 & Guymer* (BRI); S of junction of E and W Mulgrave Rivers, S.F.R. 310, Goldfield L.A., 20 km SSE of Little Mulgrave township, 17°18′S, 145°47′E, Nov 1988, *Jessup GJM1624 et al.* (BRI); Fishery falls, between Gordonvale & Babinda, 1962, *Webb & Tracey 7477* (BRI); W of lower Kraft Creek, Wooroonooran N.P., 17°18′S, 145°47′E, Jul 1995, *Hunter JH3368* (BRI); Kraft Creek, Wooroonooran N.P., 17°19′S, 145°48′E, Jul 1995, *Hunter JH4719* (BRI); Mulgrave River, Wooroonooran N.P., 17°21′S, 145°46′E, Apr 1995, *Hunter JH3266* (BRI); S.F.R. 755, Bartle Frere, Gosschalk L.A., 17°24′S, 145°47′E, Nov 1991, *Hyland 14335* (BRI, QRS); Barong L.A., S.F.R. 755, 17°30′S, 145°50′E, Oct 1976, *Unwin GU87* (BRI, QRS); Cooroo Lands, Canal L.A., 17°30′S, 145°55′E, Nov 1974, *Dansie 20102* (BRI, QRS); 1.4 km SE of Cooroo Peak at head of Culla Creek, 17°31′S, 145°53′E, Oct 1988, *Jessup GJM2515 et al.* (BRI); Gregory Falls, lower Palmerston via Innisfail, 1962, *Webb & Tracey 6588* (BRI); Miriwinni near Mt Bartle Frere, 1962, *Webb & Tracey 6714A* (BRI); Boobaa Creek, Basilisk Range, 2 km SW of Moresby, 17°38′S, 146°00′E, Oct 1997, *Forster PIF21791 et al.* (BRI); S.F.R. 756, West McNamee L.A., 17°41′S, 146°52′E, Nov 1977, *Gray 797* (BRI, QRS). North Kennedy District: Mission Beach, 17°52′S, 146°07′E, Oct 1965, *Altena 4055* (BRI).

***Distribution and habitat*:** *Ixora baileyana* is endemic to the Wet Tropics bioregion of north-eastern Queensland (**Map 1**). It grows as an understorey subshrub in lowland rainforests (semi-deciduous, complex notophyll to mesophyll vineforests) on substrates (often alluvial) derived from granite or metamorphic rocks.

***Notes*:** *Ixora baileyana* is distinguishable from the other Australian species by its hairy lanceolate or ovate-elliptic, subsessile leaves, inflorescences that are borne on short axillary (or supra-axillary) branchlets, linear bracts surrounding the flowers, style with four stigmatic arms and 4-locular fruits.

This species is referable to *Ixora* sect. *Vitixora* Fosberg, previously thought to be endemic to Fiji. *Ixora baileyana* is putatively androdioecious (Adams *et al.* 1987) whereas all other species in the genus are thought to be hermaphroditic (De Block 1998).

***Conservation status*:** *Ixora baileyana* is infrequent, although reasonably widespread throughout its known range. It is not considered threatened. Present in various National Parks, e.g. Daintree and Wooroonooran.

***Etymology*:** The specific epithet honours Frederick M. Bailey (1827–1915), Queensland Colonial Botanist, who originally described this species as *Lasianthus graciliflorus*.

**2. Ixora beckleri** Benth., *Fl. Austral.* 3: 416 (1867) (as '*becklerii*'). **Type:** New South Wales. Richmond River & Clarence River, *Beckler s.n.* (holo: K)

***Illustrations*:** Floyd (1989: 311); Hauser & Blok (1998: 292); Logan River Branch SGAP (QLD Region) Inc. (2005: 290).

Shrubs or small trees to 5 m high with stiff branches; indumentum largely absent, where present of erect, short (<0.5 mm long), simple trichomes; branchlets terete to somewhat flattened and angular, glabrous, cream-grey. Stipules 3.5–8 mm long, glabrous, internally with dense colletors near base;

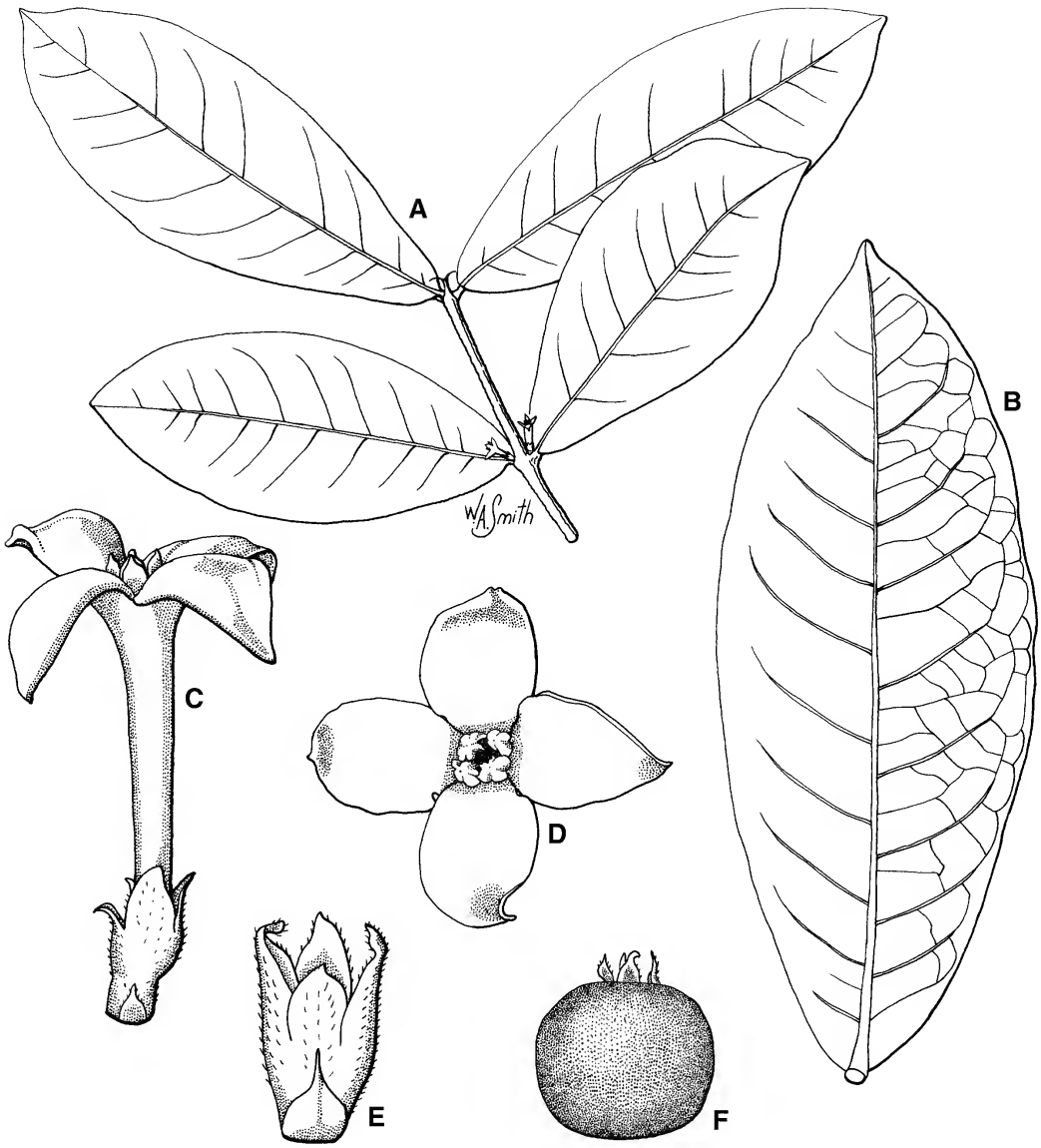


**Fig. 1.** ***Ixora baileyana.*** A. habit of flowering stem × 0.5. B. leaf viewed from below showing detail of venation × 0.8. C. lateral view of flower on peduncle showing bracts × 6. D. face view of flower × 6. E. peduncle with bracts × 8. F. lateral view of fruit × 4. A–E from *Forster PIF27675* (BRI); F from *Webb & Tracey 6714a* (BRI). Del. W. Smith.

shortly connate for up to 2 mm long, limbs broadly ovate-triangular to truncate, 1–2 mm long, keeled towards apex and aristate (awn 1.5–6 mm long). Leaves coriaceous, petiolate, glabrous; petioles slender, 7–8 mm long; lamina elliptic, ovate-elliptic or subovate, (50–) 110–165 × (25–) 40–58 mm; apex acute, abruptly shortly acuminate or obtuse; base acute or obtuse; upper surface glossy, dark-green when live, drying dark brown; lower surface matt, pale-green; lateral nerves 6–12 pairs, patent or suboblique and looping near margins, interlateral venation reticulate and prominent on lower surface. Inflorescences shortly pedunculate, glabrous or with scattered indumentum; peduncle 7–10 mm long, terminated by 3 branches each carrying cymes at their apex; branches

(secondary peduncles) 16–22 mm long, lateral ones patent, the central one sometimes with one internode; bracts at top of the peduncle foliaceous, or small, broadly ovate, aristate with fine points, bracts at apex of the branches (those subtending the cymes), broadly ovate, obtuse, finely aristate or represented by lateral, narrowly ovate subulate lobes. Flowers bisexual, 4-merous, sessile, scented. Calyx 1.5–2 mm long, shortly 4-toothed with the lobes truncate-ovate and up to 0.2 mm long. Corolla white; tube 3–5 mm long; lobes ovate, acute or acuminate, 2.5–3 mm long. Stamens near mouth of tube, anthers linear-oblong, 1.5–1.8 mm long, filaments 3–5 mm long. Ovary 2-locular; style and stigma 4–6 mm long, style shortly exceeding the corolla tube, glabrous, stigmatic lobes 2, ± erect, linear, 1–1.2 mm long. Fruits obovoid or subglobose, 8–12 × 8–12 mm, crowned by persistent calyx, black, glabrous, pyrenes 1 or 2; seeds subglobose, 5–8 × 5–6.5 mm. **Fig. 2.**

***Additional selected specimens examined*: Queensland**. Port Curtis District: Keppel Bay, in 1872, *Eaves s.n.* (MEL); S.F. 585 Wietalaba, 32 km S of Calliope, 24°17′S, 151°12′E, May 1993, *Gibson TOI1309* (BRI); Wietalaba S.F., *c.* 31 km S of Calliope, 24°17′S, 151°12′E, Nov 1997, *Halford Q3444* (BRI); Bulburin S.F. 67, Scott Road, *c.* 3 km ENE of Forest Station, Apr 1980, *McDonald 3184 et al.* (BRI). Burnett District: Pine Mountain Creek, N of Monto, 24°36′S, 151°09′E, Jul 1995, *Bean 8772* (BRI, MEL); S.F. 695, Kalpowar, Mt Fort William, 24°38′S, 151°20′E, Mar 2000, *Forster PIF25438 & Booth* (A, BRI, MEL, QRS); T.R. 533, Mungore L.A., Pine Creek headwaters, 25°37′S, 152°00′E, Dec 1989, *Forster PIF6155* (BRI, L, MEL, MO, QRS). Wide Bay District: Upper reaches of Broken Creek, SE of Builyan, 24°39′S, 151°29′E, Nov 1995, *Bean 9166 & Turpin* (BRI); Mudlow Gap, T.R. 26, 8 km N of Kilkivan, 26°01′S, 152°13′E, Nov 1990, *Forster PIF7629* (BRI, K, MEL, QRS); Imbil, Aug 1935, *White 1411* (BRI, CANB). Moreton District: Pedwell Road, edge of Wamuran Basin, Mt Mee, Delany Creek S.F., 27°02′S, 152°48′E, Dec 1993, *Grimshaw G231 & Franks* (BRI); Waterfall Gully No. 2, Somerset Dam, *c.* 20 km SW of Kilcoy, 27°06′S, 152°33′E, Apr 1989, *Sharpe 4855 & Forster* (BRI); Sankeys scrub, Dec 1887, *Simmonds 227* (BRI); Brisbane, Coomera, Logan River, in 1887, *Scortechini 52* (MEL). **New South Wales**. Lismore, Apr 1891, *Bauerlen* (NSW); Tumbulgam, Apr 1898, *Bauerlen* (NSW); Booyong Recreation Reserve, May 1982, *Floyd 1872* (NSW); Clarence River, *s.dat.*, *Moore 223* (MEL1537266); Turnstall, Lismore, Dec 1910, *Tanner 35* (NSW).

***Distribution and habitat*:** *Ixora beckleri* is endemic to eastern Australia where it is found from central Queensland south to northern New South Wales (**Map 1**), in dry rainforests (araucarian microphyll to notophyll vineforests).

***Notes*:** *Ixora beckleri* is distinguishable by its glossy green elliptic leaves, shortly pedunculate, trichotomously-branched inflorescences, each branch ending in a small cyme, and by its short corolla tube with short, acute lobes (which are usually as long as the tube).

***Conservation status*:** *Ixora beckleri* is common and widespread and is present in numerous State Forests and National Parks, *viz.* Main Range, Mt Bauple, Mt Pinbarren, Noosa, Mapleton Falls, Kondalilla, Moogerah Peaks, Burleigh Head, Nicoll Scrub (Forster *et al.* 1991).

***Etymology*:** The specific epithet honours Hermann Beckler (1828–1914), medical doctor, botanist and plant collector.

**3. Ixora biflora** Fosberg, *J. Bot.* 76: 235 (1938); *I. biflora* var. *biflora* (as var. 'typica'), Fosberg, *loc. cit.* 76: 276 (1938). **Type:** Queensland. Cook District: Slopes of Mt Demi, W of Daintree, 6 February 1932, *L.J.Brass 2050* (holo: BRI).

*Ixora biflora* var. *fleckeri* Fosberg, *J. Bot.* 76: 277 (1938). **Type:** Queensland. Cook District: Intake, Mossman Gorge, 20 June 1937, *H.Flecker 3521* (holo: BRI; iso: QRS).

***Illustrations*:** Jones (1986: 90); Hyland *et al.* (1999, 2003); Cooper & Cooper (2004: 443).

Small shrubs to 2 m high; indumentum of erect, short (<0.2 mm long), simple trichomes; branchlets terete, brown, glabrous. Stipules 2–8 mm long; shortly connate for up to 3 mm long, limbs broadly ovate to truncate, keeled towards apex and aristate (awn 0.5–5 mm long), glabrous. Leaves thinly coriaceous, petiolate, glabrous; petioles 3–8 mm long; lamina elliptic, elliptic-oblong or narrowly elliptic, (56–) 74–116 (–160) × (18–) 22–44 mm; apex subacute, abruptly shortly acuminate or obtuse; base acute or obtuse; upper surface dark glossy-green, paler on lower surface; lateral nerves 8–13 pairs, patent or suboblique, looping at margins, faint above, prominent below (drying reddish

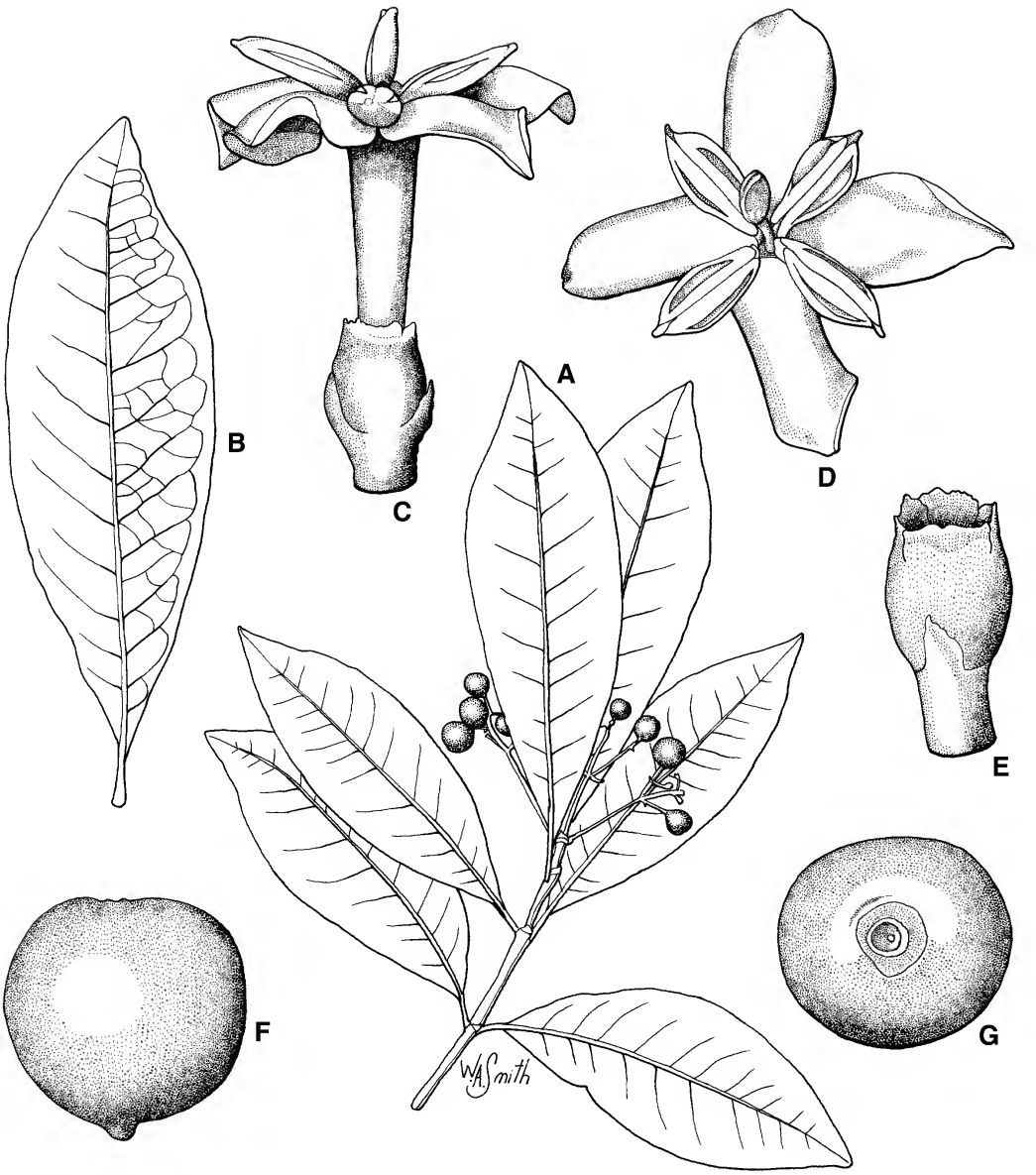


**Fig. 2.** ***Ixora beckleri.*** A. habit of fruiting stem × 0.5. B. leaf viewed from below showing detail of venation × 0.8. C. lateral view of flower on peduncle showing bracts × 8. D. face view of flower × 8. E. peduncle with bracts × 12. F. lateral view of fruit × 3. G. apical view of fruit × 3. A & B from *Forster PIF25438 & Booth* (BRI), C–E from *Forster PIF7597* (BRI), F & G from *Sharpe 4885* (BRI). Del. W. Smith.

brown), interlateral venation reticulate and largely obscure. Inflorescences sessile at branchlet apices, 2 or 3-flowered, subtended by a pair of elliptic and apiculate bracts; bracts conspicuous, (8–) 12–20 × 5–12 mm, elliptic-ovate, shortly aristate at apex, obtuse or subcordate at base, prominently nerved with 11–15 pairs of fine patent lateral nerves, colletors occasionally present inside. Flowers bisexual, 4-merous, sessile, scented. Calyx *c.* 4 × 2.5 mm, with sparse indumentum; lobes broadly ovate or ± rounded, 0.7–1 × 0.2–0.6 mm, thin. Corolla small and inconspicuous, white to pale pink, glabrous; tube slender, 10–

15 mm long; lobes elliptic, obtuse, 4–7 × 2–3.2 mm, recurved; stamens much shorter than lobes, anthers squat, ovoid, 0.8–1.5 × 0.5–1 mm; filaments *c.* 0.5 mm long; ovary 2-many locular; style and stigma 13–14 mm long, the style not exceeding the corolla tube, glabrous, stigmatic lobes 5 or 6, erect, ellipsoid, 0.8–1 mm long. Fruits subglobose, 7–14 × 12–18 mm, squat and flattened at both ends, red, glabrous, pyrenes 1–7; seeds rounded on top, angular on side, *c.* 7 × 5 mm. **Fig. 3.**

***Additional selected specimens examined*: Queensland**. Cook District: Mt Finnigan, west slopes, Sep 1948, *Brass 20042* (BRI); Gap Creek, *c.* 38 km S by E of Cooktown, 15°43′S, 145°14′E, Aug 1959, *Smith 10735* (BRI); 1 mile [0.6 km] NW of Stuckies' Gap, Bloomfield River area, 15°50′S, 145°19′E, May 1969, *Webb & Tracey 8419* (BRI, QRS); Mt Misery, 15°52′S, 145°13′E, Jun 1992, *Forster PIF10756 et al.* (BRI, L, MEL, QRS); Daintree N.P., Mt Sorrow track, 2.5 km W of Cape Tribulation, 16°04′S, 145°27′E, Dec 1997, *Forster PIF21973 et al.* (BRI, MEL, QRS); Oliver Creek, a tributary of Noah Creek, 16°06′S, 145°27′E, May 1972, *Webb & Tracey 11211* (BRI, CANB, QRS); Entrance to Coconut Village, Cape Tribulation, 16°07′S, 145°27′E, Aug 1993, *Cooper WWC597 & Cooper* (QRS); Daintree N.P., Noah Creek, 16°08′S, 145°26′E, May 2000, *Forster PIF25755 & Booth* (A, BRI, K, L, MEL); 1 km N of Cyanide Creek – Cape Tribulation Road, 16°08′S, 145°27′E, Sep 1976, *Williams 76062* (BRI); Baileys Creek, 16°13′S, 145°25′E, Oct 1962, *Smith 11531* (BRI); Pinnacle Rock track, 2 km W of Karnak, 16°23′S, 145°18′E, Jun 1992, *Forster PIF10684 et al.* (BRI); Creek behind Karnak, Daintree River N.P., tributary of Whyanbeel Creek, 16°24′S, 145°19′E, Nov 1996, *Jago 4155* (BRI); Saltwater Creek, 4 km NW of Mossman, 16°25′S, 145°20′E, Nov 2001, *Forster PIF27797 & Booth* (BRI, MEL); Rex Range, *c.* 2.8 km from Mossman – Julatten road intersection, *c.* 9 km NE of Julatten, 16°32′S, 145°22′E, Dec 1988, *Jessup GJM5201 et al.* (BRI, DNA); Rex Range, NE of Julattan, 16°34′S, 145°23′E, Jan 1993, *Bean 5681 & Forster* (BRI); Devil Devil Creek, *c.* 9.6 km S of Mossman, Sep 1948, *Smith 3951* (BRI).

***Distribution and habitat*:** *Ixora biflora* is endemic to north-eastern Queensland in the Wet Tropics bioregion from a northern limit at Mt Finnigan, south to Rex Range (**Map 2**). The species occurs in lowland (<850 m altitude), wet rainforest (evergreen, complex notophyll to mesophyll vineforest) on ridges, sides of gorges or along permanent streams or in sand behind beach, on substrates derived from metamorphics or stabilised sand-dunes.

***Notes*:** *Ixora biflora* is characterised by its elliptic or narrowly elliptic leaves with fine parallel nerves; large red subglobose squat fruits, and sessile 2 or 3-flowered inflorescences enclosed in finely nerved large bracts. It resembles *I. queenslandica* in its 2 or 3-flowered inflorescences enclosed in large bracts but that species differs by its pedunculate inflorescences, and small ellipsoid, black fruits.

This species has no close relative in Australia. It differs from all the Australian *Ixora* species by its many-lobed stigmas and many-celled large fruits. The leaves are variable, ranging from broad, elliptic or elliptic-oblong (typical of the type collection) to narrow-elliptic (as in the type of *I. biflora* var. *fleckeri*). Fosberg (1938b) recognised two varieties in this species on the basis of leaf size; however, they are not recognised here because the leaves can vary on the same branchlet.

***Conservation status*:** *Ixora biflora* is widespread and common throughout its range. It is not considered threatened. Present in Cedar Bay and Daintree National Parks.

***Etymology*:** The specific epithet is derived from the Latin *bi-* (two) and *flos* (flower) and refers to the floral arrangement as viewed by Fosberg (1938a).

**4. Ixora oreogena** S.T.Reynolds & P.I.Forst., **species nov.** *I. beckleri* Benth. valde simile autem inflorescentiis et foliis parvioribus, floribus fructibusque majoribus, corollae lobis acuminatis differt. **Typus:** Queensland. Cook District: State Forest 194, Mt Baldy, Herberton Range, 17°18′S, 145°24′E, 24 January 2001, *P.I.Forster PIF26596 & R.Booth* (holo: BRI [1 sheet + spirit]; iso: MEL).

*Ixora* sp. (North Mary LA *B.P.Hyland 8618*) (Forster & Halford 2002).

*Ixora* sp. (N. Mary L.A. *B.Hyland 8618*) (Hyland *et al.* 2003).

***Illustrations*:** Hyland *et al.* (1999, 2003).

Shrubs or small trees 4–18 m high; indumentum of spreading, short (<0.2 mm long), simple trichomes; branchlets terete, pale cream or reddish brown, glabrous. Stipules 3–7 mm long, externally glabrous, internally with dense trichomes and colletors at base; shortly connate for up to 1.2 mm, limbs broadly ovate,

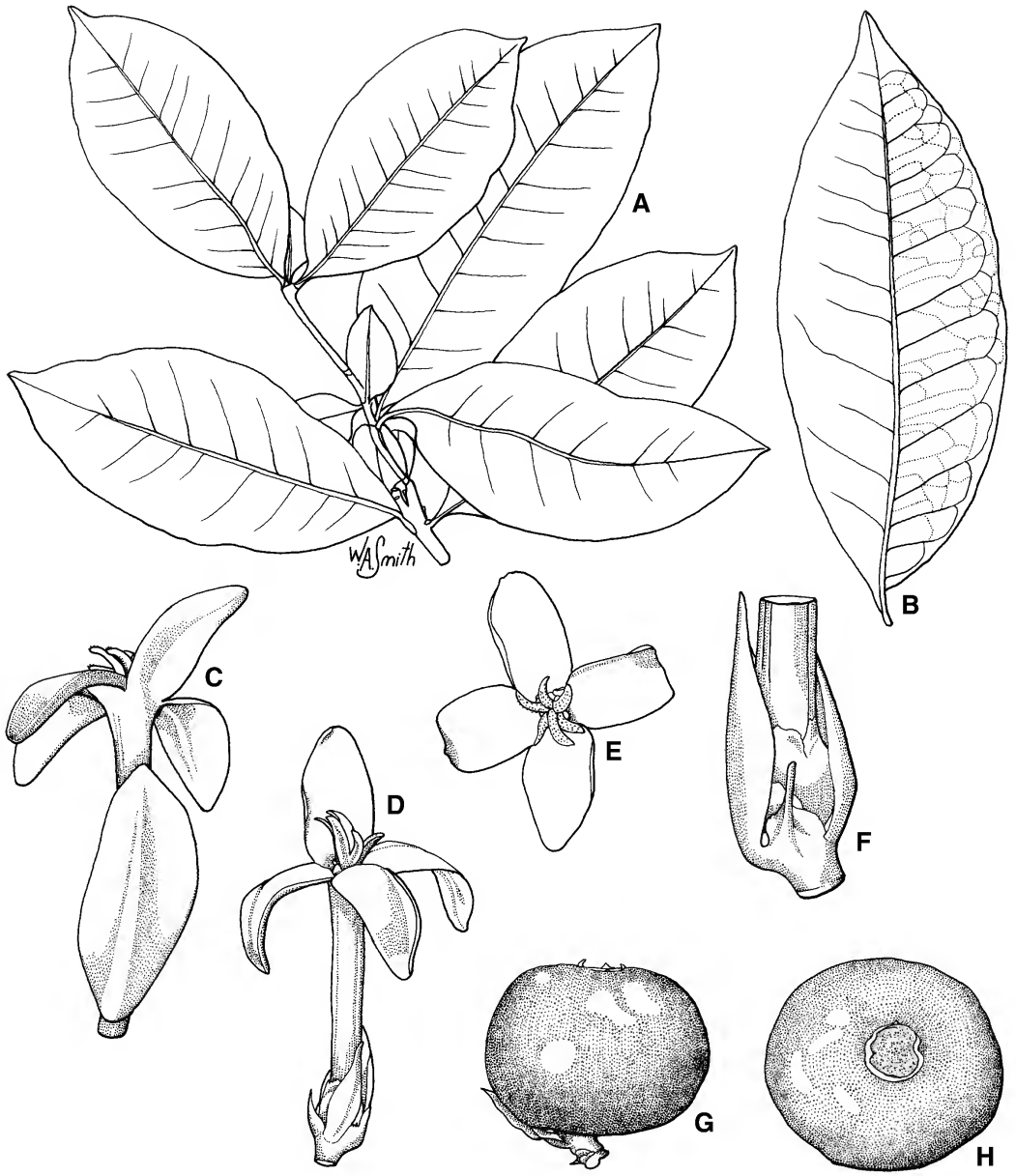


**Fig. 3.** ***Ixora biflora.*** A. habit of flowering stem × 0.6. B. leaf viewed from below showing detail of venation × 0.8. C. lateral view of flower on peduncle showing large bract × 3. D. lateral view of flower × 3. E. face view of flower × 3. F. peduncle with bracts × 6. G. lateral view of fruit × 2. H. apical view of fruit × 2. A, C–H from *Bean 5681* (BRI); B from *Smith 11531* (BRI). Del. W. Smith.

keeled towards apex and aristate (awn 1–5 mm long). Leaves coriaceous, petiolate, glabrous; petioles 5–10 mm long; lamina narrowly elliptic, 65–95 (–112) × 21–31 (–42) mm; apex acute, or shortly acuminate and apiculate; base acute to obtuse; upper surface dark glossy-green, drying ± glossy; lower surface matt pale-green; lateral nerves indistinct, 8–10 pairs, patent or arcuate, interlateral venation reticulate, visible on lower surface only in dried specimens. Inflorescences glabrous, the three branches sessile at apex of reduced

leaves or shortly pedunculate (peduncle 2–4 mm long); each of the three branches articulate at base, trichotomously branched, and sometimes each of these branches are branched again (internodes 2–7 mm long); ultimate cymules or cymes 2–6-flowered, one flower oldest (usually the central flower of the cymule) sessile or subsessile, flanked by stalked 2 or 3-flowered cymules; bracts subtending the main inflorescence branches foliaceous, ovate-elliptic, to 16 × 5 mm, obscurely nerved, those subtending the cymes at apex of the three branches shortly connate, fimbriate at apex, and often with lateral ovate lobes; those subtending 5-flowered cymes with erose margin, whereas those subtending the 2 or 3-flowered ultimate cymules small, ovate. Flowers bisexual, 4-merous, sessile to subsessile (the oldest flower sessile or subsessile (pedicels to 1.5 mm long); the pedicellate flowers on slender pedicels (2.5–3 mm long), scented; pedicel bracteoles paired, ovate, 0.5–0.75 mm long and wide. Calyx 2–3 × 1.5–2 mm, glabrous; lobes broadly ovate or ± hemispherical, 0.5–1 × *c.* 1 mm, slightly fimbriate. Corolla white; tube slender, slightly dilated near apex, 7–8 mm long, glabrous inside; lobes elliptic-ovate, acuminate, 4–5 × *c.* 2 mm, ciliolate, reflexed. Stamens slightly shorter than corolla lobes, anthers ovoid, acuminate, *c.* 2 mm long, filaments 0.2–0.3 mm long. Ovary 2–3-locular; style and stigma 5–6 mm long, style barely exceeding tube, glabrous, stigmatic lobes 2, erect, linear, 1.8–2 mm. Fruits globose to subglobose, 8–18 × 8–22 mm, black, glabrous, pyrenes 2 or 3; seeds obovoid to subglobose, 5–8 mm long, 5–6 mm diameter. **Fig. 4.**

***Additional specimens examined*** (*tentative identification on sterile collection): **Queensland**. Cook District: S.F.R. 143, Kanawarra, Carbine L.A., 16°29′S, 145°16′E, Nov 1987, *Hyland 25244RFK* (BRI, QRS); Daintree N.P., near end of Mt Lewis road, 12 km SW of Mossman, 16°29′S, 145°16′E, Nov 1988, *Jessup GJM116 et al.** (BRI); North Mary L.A., S.F.R. 143 Mt Lewis, 16°30′S, 145°16′E, Sep 1973, *Sanderson 368* 430* (QRS); S.F.R. 143, North Mary L.A., 16°32′S, 145°15′E, Feb 1976, *Hyland 8618* (QRS); Mt Lewis road, South Mary L.A., 16 km NNW of Mt Molloy, 16°32′S, 145°17′E, Nov 1988, *Jessup GJM1581 et al.** (BRI); S.F.R 143, Carbine L.A., 16°33′S, 145°15′E, Dec 1974, *Hyland 3157* (BRI, QRS); S.F.R. 143, Carbine L.A., 16°33′S, 145°15′E, Feb 1988, *Gray 4729* (BRI, QRS); T.R. 66, Mt Lewis, 16°34′S, 145°17′E, Sep 1978, *Moriarty 2456* (QRS); Kaarru L.A., SW corner, 14.5 km SSE of Millaa Millaa, 17°37′S, 145°40′E, Oct 1988, *Jessup GJM5035 et al.** (BRI); Davies Creek, 1962, *Webb & Tracey 8016** (BRI); Forestry track, Mt Formartine, 16°44′S, 145°37′E, Nov 1988, *Jessup 922 et al.** (BRI); Peeramon, *s.dat.*, *Bick s.n.* (BRI [AQ124623]); Mt Misch, Herberton Range, tributary of Rocky Creek, 17°14′S, 145°25′E, Dec 1996, *Ford 1838* (BRI, QRS); S.F.R. 194, 17°15′S, 145°17′E, Aug 1968, *Hyland 1749* (QRS); E fall of Bellenden Ker, Wooroonooran N.P., 17°16′S, 145°52′E, Jan 1995, *Hunter JH929** (BRI); Palmerston Track ridge, Wooroonooran N.P., 17°24′S, 145°45′E, Jun 1995, *Hunter JH3828** (BRI); Tick Camp, Bellenden Ker, Aug 1959, *Webb & Tracey 3736* (BRI).

***Distribution and habitat***: *Ixora oreogena* is endemic to the Wet Tropics bioregion of north-east Queensland (**Map 3**) where it occurs in montane rainforests (complex notophyll vineforests) between 600 and 1100 m on substrates derived from basalt or granite.

***Notes***: *Ixora oreogena* is characterised by its elliptic leaf lamina, inflorescences that are small and open paniculiform, flowers with slender long corolla tubes, fruits that are subglobose or globose and black. It resembles *I. beckleri* Benth. in its leaves and inflorescences, but that species differs by its larger inflorescences, smaller fruits and flowers with shorter corollas.

***Conservation status***: The species is widespread, although never locally common, in the Wet Tropics. No conservation status listing is necessary. It occurs in various Forest Reserves and National Parks (Daintree and Wooroonooran).

***Etymology***: The specific epithet alludes to the mountainous habitat for the species and is derived from the Greek *oreogenus* (mountain-born).

**5. Ixora queenslandica** Fosberg, *J. Bot.* 76: 234 (1938). **Type:** [Queensland. Port Curtis District:] Bay of Inlets, May 1770, *Banks & Solander s.n.* (holo: BM; iso: BRI).

*Ixora triflora* R.Br. ex Benth. *pro parte,* non (G.Forst.) Seem.; *Fl. Austral.* 3: 416 (Jan 1867), *nom. illeg.*

*Diplospora ixoroides* auct. non F.Muell.: Britten (1901); Bailey (1912).

***Illustration***: Britten (1901: t. 141 [as *Diplospora ixoroides*])

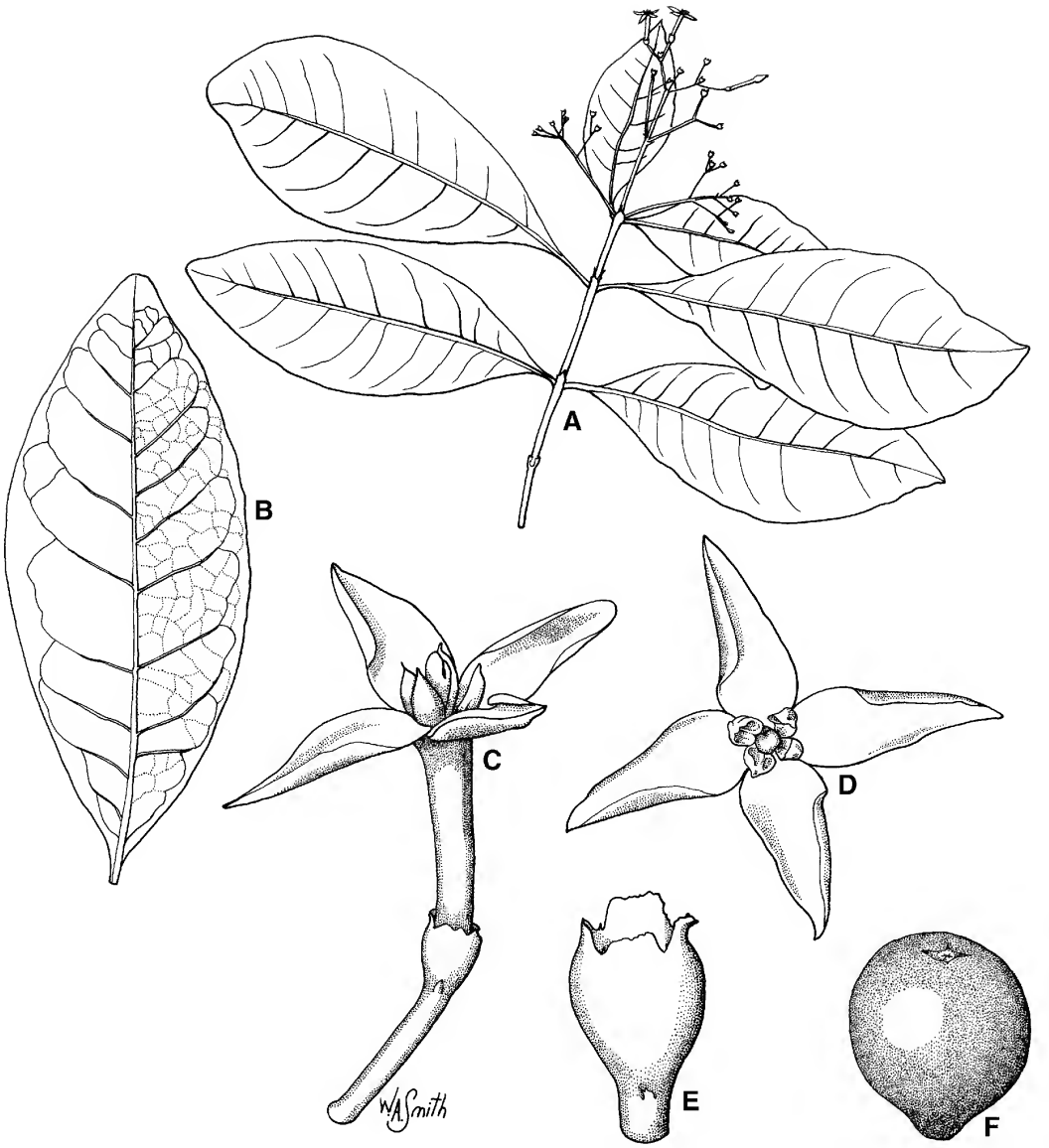


**Fig. 4.** ***Ixora oreogena.*** A. habit of flowering stem × 0.5. B. leaf viewed from below showing detail of venation × 0.8. C. lateral view of flower × 5. D. face view of flower × 5. E. peduncle with bract × 12. F. lateral view of fruit × 3. A–E from *Forster PIF26596 & Booth* (BRI); F from *Hyland 25244RFK* (BRI). Del. W. Smith.

Shrubs or small trees to 4 m high; indumentum of spreading, short (<0.5 mm long), simple trichomes; branchlets terete to somewhat angular and flattened, brown grey to light brown blotched, glabrous. Stipules 2.5–4.5 mm long, externally glabrous or with scattered to sparse indumentum near base, internally with sparse indumentum and dense colletors at base; shortly connate for *c.* 0.5 mm, limbs ovate to lanceolate-ovate and up to 2 mm long, keeled towards apex and aristate (awn 1.7–3.5 mm long). Leaves coriaceous, petiolate, glabrous; petioles 5–7 mm long; lamina elliptic, obovate or suborbicular (the suborbicular leaves often subtending branchlets carrying normal elliptic leaves or inflorescences), 47–108 × 25–45 mm; apex obtuse to rounded; base obtuse to subacute;

upper surface glossy dark green; lower surface pale green; lateral nerves 7–9 pairs, suboblique, interlateral venation reticulate, indistinct. Inflorescences pedunculate; peduncles 20–35 mm long, side branches to 6 mm long with 3-flowered cymes that are terminated by a pair of large bracts enclosing the 3 sessile flowers; bracts ovate, acute or cuspidate at apex, obtuse or subcordate at base, 15–28 × 11–22 mm, faintly nerved (nerves 5 or 6 pairs, patent). Flowers bisexual, 4-merous, sessile, scented. Calyx *c.* 2.5 × 1–1.5 mm, glabrous; limb subentire or broadly and indistinctly 4-lobed with acute lobes <0.2 mm long, ciliate. Corolla white; tube slender, 4–17 mm long, 1–1.5 mm diameter at throat; lobes elliptic, acute, 4.5–10 × 1.5–2.5 mm, patent or recurved. Stamens slightly shorter than the corolla lobes to shortly exserted, anthers oblanceolate to narrowly ovoid, apiculate, 2.5–5 × 0.8–1 mm; filaments 1–1.5 mm long. Ovary 2-locular; style and stigma *c.* 19 mm long, style slender, hardly exceeding the corolla tube, glabrous; stigmatic arms 2, linear, recurved, 1.8–2 mm long. Fruits ellipsoid, 9–12 × 8–8.5 mm, dark brown or blackish, glabrous, pyrenes single; seeds ellipsoid, 6.5–8 × 4.5–5 mm. **Fig. 5.**

***Additional selected specimens examined*: Queensland.** South Kennedy District: Port Mackay, May 1869, *Dietrich 2450* (MEL); Keswick Island, Singapore Bay, 20°54′S, 149°23′E, Sep 1996, *Batianoff 960929* (BRI); Prudhoe Island N.P., 53 km SE of Mackay, 21°19′S, 149°41′E, Nov 1992, *Batianoff 92113K & Robins* (BRI); Irving Island, SE of Sarina, 21°27′S, 149°28′E, Dec 1989, *Thompson 168* (AD, BRI). Port Curtis District: coast just S of Bluewater Creek, *c.* 12.5 km SE of Carmila, 21°59′S, 149°29′E, Jul 1994, *McDonald 6039 et al.* (BRI); S of Stanage Bay, NW end of Shoalwater Bay, Apr 1945, *Blake 15678 & Webb* (BRI, CANB); Clairview Beach, 25 km N of St Lawrence, 22°06′S, 149°32′E, Apr 1985, *Rodd 4414 & Hardie* (BRI, NSW); Shoalwater Bay Training Area, Reef Point, 22°19′S, 150°34′E, Sep 1993, *McDonald 5776 & Tweedie* (BRI); Wedge Island, 23°17′S, 150°53′E, Nov 1987, *Batianoff 9814 & Dillewaard* (BRI, NSW); Pine Island, Percy Islands, Mar 1906, *Tryon s.n.* (BRI [AQ124688]); Bluff at northern end of Keppel Sand Beach, 23°19′S, 150°47′E, Apr 1986, *Anderson 4139* (BRI); Keppel Sands, 8 km S of Emu Park, 23°20′S, 150°48′E, Jul 1977, *Batianoff 207 & McDonald* (BRI); S.F. 150, 12 km SW of Gladstone, 23°57′S, 151°11′E, Feb 1995, *Worthington 1482* (BRI); Eurimbula Holding between Eurimbula & Middle Creeks, 24°10′S, 151°50′E, Dec 1970, *Tracey 14561* (BRI); *c.* 1.8 km WSW of Eurimbula Beach, 24°11′S, 151°50′E, May 1981, *Guymer 1536 & Jessup* (BRI, CANB); Deepwater Creek N.P., on track to Deepwater Creek, 24°21′S, 151°58′E, Sep 1992, *Sharpe 5175* (BRI); Rules Beach near Baffle Creek, NW of Bundaberg, 24°29′S, 152°02′E, Oct 1996, *Bean 11068* (BRI). Wide Bay District: Sloping Hummock, 3 km SW of Bargara, 24°50′S, 152°25′E, Feb 1997, *Forster PIF20210 et al.* (BRI); Coonarr Creek, 24°59′S, 152°29′E, Jul 1983, *Young 654* (BRI); Coonarr Creek, adjoining Kinkuna N.P., 25°01′S, 152°26′E, Sep 2001, *Schmitt s.n.* (BRI [AQ551495]).

***Distribution and habitat*:** *Ixora queenslandica* occurs in coastal and subcoastal central and south-eastern Queensland, from a northern limit at Keswick Island, south to Kinkuna National Park (**Map 2**). Plants occur in coastal or subcoastal locations and offshore islands where they grow in dry rainforests (araucarian microphyll vineforest, littoral microphyll vineforest) on stabilised sand-dunes and rocky headlands.

***Notes*:** *Ixora queenslandica* is distinguishable by its long pedunculate, 3-flowered inflorescences, and sessile flowers enclosed in showy ovate-cuspidate bracts. It resembles *Ixora biflora* in its 3-flowered cymes, but that species differs by its sessile inflorescences, greater number of nerves on its bracts and larger, subglobose, red fruits that are depressed at both ends.

There is considerable variation in leaf size and shape depending on the degree of exposure to radiation, wind sheer and salt spray. Material from exposed situations tends to have small, thickened foliage, often with more orbicular leaf laminas, whereas that from within the canopy or understorey tends to be thinner and with more elliptic or obovate leaf laminas. Material from either extreme may appear markedly dissimilar; however, this is typical of other plants that occur in similar situations. In some instances both extremes may be found on the same plant (e.g. *McDonald et al. 6039*; *Sharpe 5175* [both BRI]).

***Typification*:** The correct application of the earliest, legitimate validly published name of this taxon has been beset with difficulty and complications that have not been helped with long term misidentifications and misapplications of names by several authors. Since 1938 this taxon has been known in

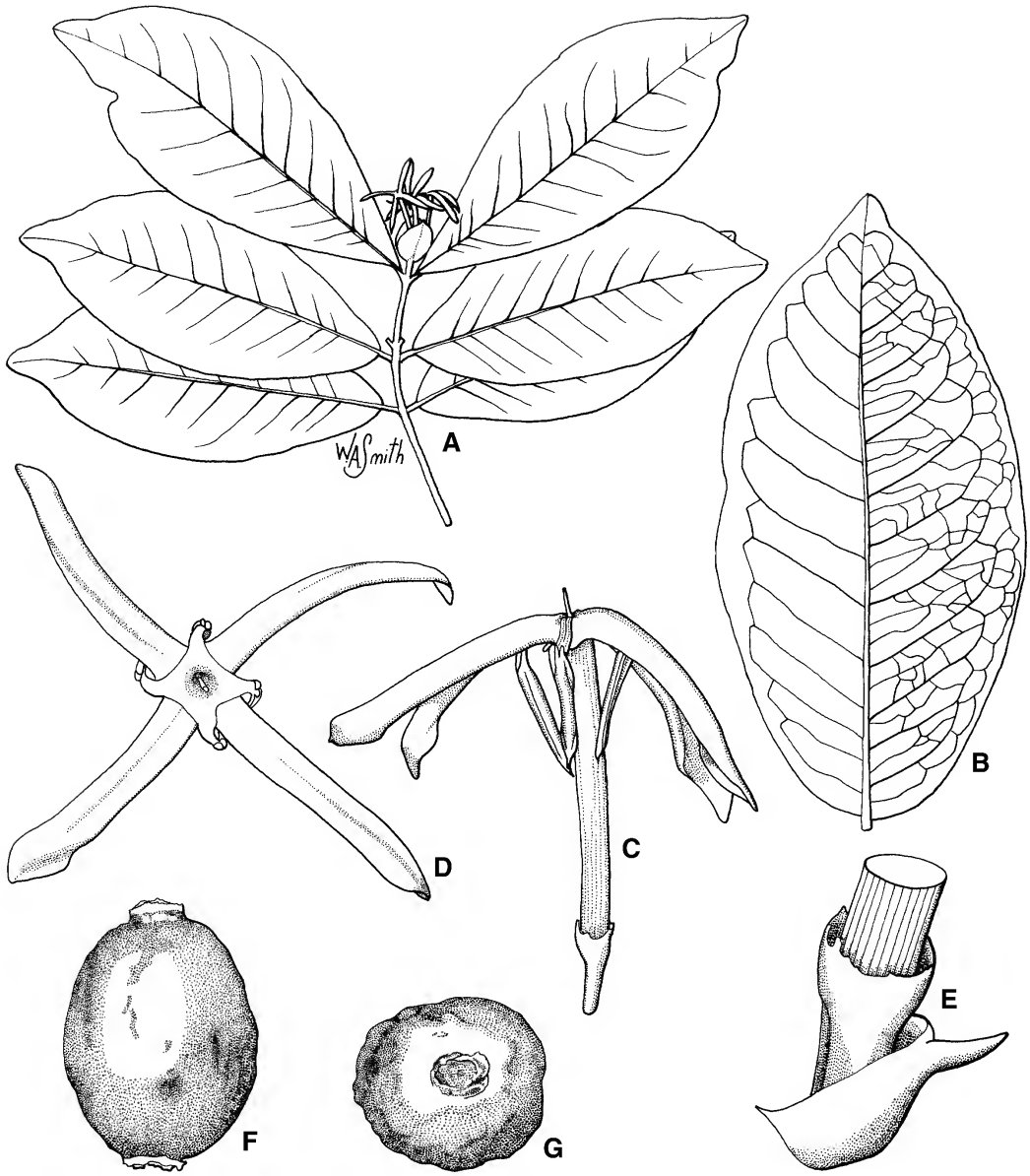


**Fig. 5.** ***Ixora queenslandica.*** A. habit of flowering stem × 0.6. B. leaf viewed from below showing detail of venation × 0.8. C. side view of flower × 4. D. face view of flower × 4. E. peduncle with bract × 12. F. lateral view of fruit × 4. G. apical view of fruit × 4. A from *Gibson 549* (BRI); B from *Forster PIF20210* (BRI); C–G from *Champion 1083c* (BRI). Del. W. Smith.

Australia as *Ixora queenslandica* Fosberg (McGillivray 1972; Reynolds 1997; Forster & Halford 2002). Prior to this it was known as *Ixora triflora* R.Br. ex Benth. (Bentham 1867) based on material collected on the east coast of Australia; however, this name is invalid as it is predated by *I. triflora* (G.Forst.) Seem. that is based on material collected in Polynesia. Forster (1787) originally named his Polynesian collection (made jointly with his father) as *Coffea triflora*.

In respect to *Ixora triflora* R.Br. ex Benth., the following sequence of events is worth repeating. Both Daniel Solander and

Robert Brown left manuscript names on many specimens that they collected whilst in Australia. As outlined by McGillivray (1972) Banks and Solander collected flowering material at Thirsty Sound that they labelled *Pavetta triflora* and Solander prepared a manuscript description of it. Robert Brown revisited the general locality in 1802 and collected fruiting material of what he thought was the same taxon, labelling the material as *Ixora triflora*, directly taking up Solander's specific epithet, but in another genus. Solander's name was never published and Bentham (1867) subsequently validated Brown's manuscript name (itself based on the Solander ms.); however, Bentham (*op. cit.*) cited several different collections at the time, including the Brown collection from 1802 that is a mixture of two species (Reynolds & Forster 2005). Bentham's (1867) "species" description reflects this, being an amalgam of data from species in two genera. Both Moore (1926) and Fosberg (1938a) correctly concluded that *Ixora triflora* R.Br. ex Benth. was based on several elements; however, Moore (1926) was unaware of the earlier name *I. triflora* (G.Forst.) Seem.

After exclusion of the Brown material (flowering) that was referable to *Diplospora ixoroides* F.Muell. (Reynolds & Forster 2005), Fosberg (1938a) considered that the remaining elements cited by Bentham (1867) under *Ixora triflora* R.Br. ex Benth. were indeed referable to *Ixora* and in need of a new name (as a nom. nov.) – *I. queenslandica.* Fosberg (1938a) did not provide a Latin diagnosis for *I. queenslandica*, nor did he clearly indicate a type in the traditional sense, citing specimens collected by Tryon (A, BRI) that he had examined and referring to the material seen by Moore (1926). McGillivray (1972) pointed out that "Fosberg refers to S.Moore's paper [Moore 1926]….as a source of information of the colour of the flowers and shape of the fruit, but in so doing gives "a reference to a previously and effectively published Latin description…." (I.C.N.B. Article 36) viz., Moore's citation on p. 215 of that portion of Brown's description which Brown transposed, in a slightly modified form, from Solander's manuscript…. All the requirements of valid publication are fulfilled provided that one is prepared to accept the name as a "sp. nov." instead of a "nom. nov.". The name *Ixora queenslandica* Fosberg is typified by the specimen:- Bay of Inlets, Banks and Solander, May 1770 (BM, holotype)." McGillivray (1972) made this conclusion on the basis of the flowering material that Moore (1926) was referring to, namely the collection at BM made by Banks and Solander and from which the Latin diagnosis was derived. Lectotypification of this name is not considered necessary, as the application appears to be tied to the single collection of Banks and Solander in BM. A duplicate of this specimen is present in BRI and is considered an isotype.

***Conservation status*:** *Ixora queenslandica* is widespread and common. No conservation status listing is necessary. It occurs in National Parks such as Deepwater, Eurimbula, Keppel Bay Islands, Prudhoe Island and South Cumberland Islands.

***Etymology*:** The specific epithet is for the occurrence of this plant within Queensland.

**6. Ixora timorensis** Decne., *Nouv. Ann. Mus. Hist. Nat.* 3: 418 (1834).

*Pavetta timorensis* (Decne.) Miq., *Fl. Ind. Bat.* 2: 278 (1857). **Type:** Timor, [*Decaisne s.n.*] (holo: ?S *n.v., fide* Bremekamp (1937: 338); iso: L908217977).

*Ixora klanderiana* F.Muell., *Fragm.* 5: 18 (1865). **Type:** Queensland. North Kennedy District: Seaview Range, 4 November 1864, *Dallachy* (lecto [here designated]: MEL 1537416-7).

*Ixora kochii* Bremek., *Bull. Jard. Bot. Buitenz.*, ser. 3, 14: 340 (1937). **Type:** Indonesia. Papua Province: Merauke, 1904, *J.W.R.Koch 566* (holo: BO *n.v., fide* Bremekamp (1937: 340); iso: L908217929).

***Illustrations*:** Brock (2001) [as *Ixora klanderana* (sic)]; Hyland *et al.* (1999, 2003) [as *I. klanderiana*]; Nicholson & Nicholson (2004: 45).

Slender shrubs or small trees 2–8 m high; indumentum of spreading, short (<0.5 mm long), simple trichomes; bark smooth or scaly, brown, grey brown; branchlets terete to somewhat flattened, glabrous. Stipules

4–6 mm long, externally glabrous, internally with dense indumentum and colletors at base; shortly connate for 1–2 mm, limbs ovate-triangular, 2–3 mm long, keeled towards apex and aristate (awn 1.5–4 mm long). Leaves coriaceous, petiolate, glabrous; petioles 6–15 mm long, thickened; lamina elliptic, elliptic-lanceolate, broadly elliptic-oblong or ovate-elliptic, (102–) 120–230 (–260) × (30–) 45–90 (–110) mm; apex acuminate, abruptly shortly acuminate or obtuse; base broad truncate, subcordate (usually with the opposite sides of lamina folded inwards), or obtuse, subacute, oblique and sometimes shortly decurrent into the petiole; upper surface olive green, drying pale or dark brown, paler below; lateral nerves distinct, 10–14 (–18) pairs, subpatent or arcuate; interlateral nerves reticulate. Inflorescences loosely branched, paniculiform, the three branches clustered on a short or long peduncle (this 0.6–6.8 cm long), subtended by a pair of large or small bracts; the central branch with 1 or 2 internodes (these 2–11 mm long) ultimately 10–80-flowered; branches (lateral) patent 52–85 mm long, trichotomously branched, occasionally with one internode, ultimate branches 5–16 mm long terminated by trichotomously branched cymes (these 6–42-flowered), the ultimate cymules 2 or 3-flowered, one flower (the oldest) on a shorter pedicel; bracts subtending the inflorescence branches either large (then ovate or broadly elliptic-ovate (sometimes represented by reduced leaves), apiculate at apex, obtuse or subcordate at base), or small, then stipule-like, 10–50 (–95) × 12–24 (–45) mm; bracts higher on the inflorescence branch (usually at junction of the branches) smaller, ovate, often represented by lateral subulate lobes only. Flowers 4 or occasionally 5-merous, pedicellate; pedicels slender, (2–) 4–10 mm long, glabrous or with sparse indumentum. Calyx ellipsoid, lobes minute, ovate, (<0.2 mm long), finely puberulous or glabrous. Corolla small and inconspicuous, cream, sometimes with pinkish tinge, sweetly scented; tube (3–) 6–10 mm long, slightly dilated at mouth (to 1.5 mm wide at mouth), finely hairy at throat; lobes twisted to the left in bud, elliptic, subacute or obtuse, 5–7 × 1.5–2.5 mm, spreading or reflexed. Stamens inserted at mouth of corolla tube, anthers linear-ovate, apiculate, 4.5–7 × 0.5 mm, filaments 1.5–2.5 mm long. Ovary 2-locular; style and stigma 10–17 mm long, shortly exserted from tube, the style usually sparsely hairy from below lobes, stigmatic lobes 2, glabrous, 1.8–2.2 mm long, linear, recurved or suberect. Fruit subglobose, 6–9 × 6–10 mm, black when ripe, glabrous, pyrenes single; seeds subglobose, rounded on top, 4.5–5 × 4.5–5 mm. **Fig. 6.**

***Additional selected specimens examined*: Northern Territory**. Melville Island, Snake Bay, Sep 1986, *Fensham 287** (DNA); Croker Island, Minjilang, 11°09′S, 132°34′E, Oct 1986, *Wightman 3220 & Smith** (DNA); 8 km W of Three Ways, Melville Island, 11°40′S, 130°38′E, Apr 1987, *Russell-Smith 2127 & Lucas* (DNA); Ganpura turnoff, Elcho Island, 11°53′S, 135°48′E, Jun 2002, *Mitchell 7298* (BRI, DNA); Inverell Bay, 6 km W of Nhulunbuy, 12°12′S, 136°43′E, Nov 1989, *Forster PIF5956* (BRI, DNA); 1.5 km NW of Yirrkala, 12°15′S, 136°52′E, Nov 1989, *Forster PIF5972* (BRI, DNA); Koolatong River, near road crossing, 13°06′S, 135°44′E, Oct 1996, *Cowie 7383* (BRI, DNA); Angurugu, Groote Eylandt, 13°59′S, 136°27′E, Jul 1973, *Levitt 319** (DNA). **Queensland**. Cook District: Dauan Island, Torres Strait, 9°25′S, 142°30′E, Jul 1975, *Cameron 2324** (QRS); Yorke Island, 9°45′S, 143°24′E, Oct 1981, *Clarkson 3976* (BRI, QRS); Lockerbie, Cape York road, 10°48′S, 142°28′E, Sep 1985, *Williams 85190* (BRI); Bolt Head, Temple Bay, 12°15′S, 143°05′E, Jun 1996, *Forster PIF19380* (BRI, MEL); Lake Patricia, Weipa, 12°39′S, 141°49′E, Jun 1994, *Forster PIF15267* (BRI); Rocky River, 13°55′S, 143°30′E, Sep 1971, *Hyland 5483** (QRS); Fishtail Hill, McIlwraith Range, Silver Plains, 13°41′S, 143°26′E, Jul 1997, *Forster PIF21399 et al.* (BRI, MEL, QRS); Bonanza Creek, Peach River, Aug 1948, *Brass 19824* (BRI, CANB); Kowanyama Aboriginal Reserve, South Mitchell River, *c.* 6 km from the river mouth, 15°24′S, 141°33′E, Aug 1980, *Clarkson 3384* (BRI); Craiglie, *c.* 5 km S of Port Douglas, 16°31′S, 145°28′E, Sep 2002, *Halford Q7388* (BRI, DNA). North Kennedy District: Conway Beach, 20°28′S, 148°44′E, Nov 1985, *Sharpe 4087* (BRI, CANB). South Kennedy District: Cathu S.F. 658 Macartney, 20°45′S, 148°34′E, Nov 1989, *McDonald 4423 et al.* (BRI, QRS); St Helen's Gap, Eungella N.P., 20°55′S, 148°30′E, Mar 1995, *Pearson SP586* (BRI).

***Distribution and habitat*:** *Ixora timorensis* has a wide distribution in Indonesia (Lesser Sunda Islands, Moluccas, Celebes, Papua), Papua New Guinea, East Timor and northern Australia in the Northern Territory and Queensland (**Map 4**). It occurs in coastal vine thickets on dunes, riparian rainforests, sometimes on sandstone in gorges, hillsides and gullies.

***Notes*:** *Ixora timorensis* is readily recognisable from the other species here

by the shortly stalked elliptic-oblong or lanceolate, coriaceous leaves that are somewhat amplexicaule at the base and the large, many-flowered, loose-paniculiform inflorescences that are subtended by showy bracts.

Bentham (1867) considered *Ixora timorensis* and *I. klanderiana* to be conspecific and combined *I. klanderiana* under the earlier name. Use of the name *I. timorensis* was accepted by Bailey (1900), Ewart & Davies (1917) and Domin (1929). Bremekamp (1937) kept the species separate because the flowers of *I. klanderiana* were described as 5-merous (as compared to 4-merous in *I. timorensis*); however, he was not able to check the Australian specimens to confirm this distinction. Australian specimens in herbaria largely remained under the name *I. klanderiana* after Bremekamp's account. *Ixora klanderiana* is considered here to be a synonym of *I. timorensis* as the flowers are 4-merous in the majority of specimens seen in this study (including some of the syntypes of *I. klanderiana*) and the Australian specimens are hardly distinguishable from specimens of *I. timorensis* from Indonesia (especially Timor) and New Guinea in their aspect, leaves, inflorescence, bracts and corolla size and shape.

*Ixora timorensis* was recorded from New Guinea by Valeton (1911) who also recognised *I. timorensis* var. *pauciflora* Valeton from the same island. Bremekamp (1937) however, considered the New Guinea specimens to be distinct from *I. timorensis* and described two new species *viz, I. brachypogon* Bremek. (previously known as *I. timorensis* var. *pauciflora* Valeton) and *I. kochii* Bremek. and cited one or two specimens under each. His new species were distinguished from *I. timorensis* by their hairy inflorescences and from each other by their leaf shape (base), size of corolla and hairiness of calyx). Most specimens seen from New Guinea have glabrous inflorescences which are typical of *I. timorensis*. Both hairy and glabrous variants are present in the Australian specimens, and one of the specimens Bremekamp (1937) cited under *I. kochii* is hardly distinguishable from the Australian specimens under *I. timorensis*. Moreover, the other distinguishing characters he used, namely the shape of leaves, size of flowers and hairiness are unreliable because they are all very variable in the specimens seen in this study. His two new species appear to be just local forms of the very variable *I. timorensis*.

As indicated above, pubescent (indicated * in list of specimens above) and glabrous variants are distinguishable in the Australian specimens available for study, but are not formally recognised here because with the exception of hairiness (of the inflorescences) the specimens have more or less the same leaves, inflorescences, bracts and corollas.

The variant with glabrous peduncles, pedicels and calyx is typical for the species. The majority of specimens from Queensland (including syntypes of *I. klanderiana*) are of this type. These possess a distinct (usually long) main peduncle which is terminated by a pair of large showy bracts (at the base of the trichotomous inflorescence branches). These specimens resemble collections from Timor and New Guinea in their inflorescence axes and calyx, shape and size of leaves and corolla (corolla tube 4–7 mm long), but the showy bracts which are usually present (at the base of the main inflorescence) in the Queensland specimens are sometimes absent on the specimens from those places; however, specimens seen from those regions are too few to be certain of this. The character of the bract is variable in the Australian collections, with the majority of specimens from the Northern Territory (and a few from far northern Queensland) having the small bracts as in specimens from the above islands.

The majority of collections from Northern Territory are of the pubescent variant. It resembles the above type in the shape and size of its leaves, inflorescences and flowers, but differs by its hairy inflorescence axes and hairy calyx, and a short, usually reduced main peduncle subtended by the uppermost pair of leaves or the main inflorescence subtended by stipule-like small bracts (the showy bracts typical of the glabrous variant only occasionally present), and also by its longer corollas (corolla tube 8–12 mm long). This variant appears to be the same as the plant described as *I. kochii* Bremek. from New Guinea (see above).

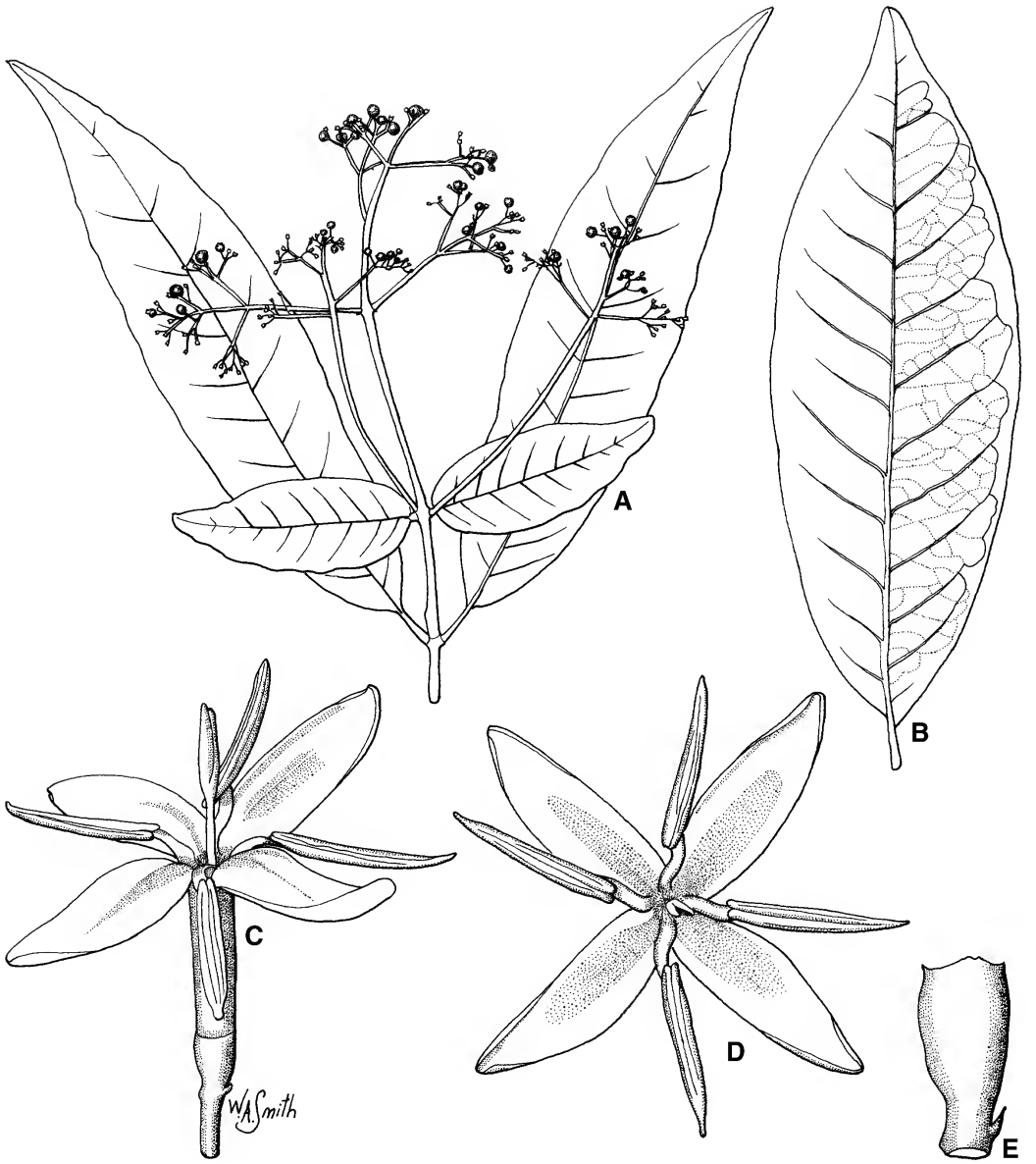


**Fig. 6.** ***Ixora timorensis.*** A. habit of fruiting branchlet × 0.5. B. leaf viewed from below showing detail of venation × 0.6. C. lateral view of flower × 4. D. face view of flower × 4. peduncle with bract × 8. A from *Forster PIF19380* (BRI); B from *Forster PIF19349* (BRI); C–E from *Halford Q813* (BRI). Del. W. Smith.

Typification: Mueller cited three syntypes in the protologue for Ixora klanderiana (Herbert River, Dallachy; Mt Elliot, Dallachy; Seaview Range, Dallachy). All of these syntypes are represented by multiple sheets in MEL. The best specimen is the Seaview Range collection of 4 November 1864 by John Dallachy that is fully fertile with many flowers. This specimen (MEL1537416-7) is selected as lectotype for the name.

***Conservation status*:** The species is common and widespread.

***Etymology*:** The specific epithet refers to the island of Timor from where the species was first described.

## B. Exotic species of *Ixora* naturalised in Australia

A single species (*I. coccinea*) is sparingly naturalised as an adventive in Australia. It is commonly cultivated and likely to be confused with other cultivated species in the genus.

### Key to commonly cultivated species of *Ixora* in Australia

1 Bracts and calyx lobes similar in shape; calyx lobes much longer than tube, lanceolate, veined, 4–5 mm long, drying paler than tube, persistent in fruit; flowers white, very fragrant . . . . . **I. finlaysoniana** Wall. ex G.Don
Bracts and calyx dissimilar in shape; calyx lobes much shorter than tube, ovate; flowers red, pink, yellow or orange, usually not fragrant . . . . . 2

2 Inflorescences longer than leaves, open, paniculiform with few widely spaced opposite or alternate branches, terminated by densely-flowered cymes or corymbs; flowers very small (corolla tube 7–9 mm long, lobes *c.* 2 mm long); style usually hairy . . . . . **I. parviflora** Vahl
Inflorescences usually shorter than the leaves, corymbiform or subumbellate, compact with opposite branches, terminated by densely flowered corymbs or subumbels; flowers showy (corolla tube 20–35 mm long, lobes 5–10 mm long); style glabrous . . . . . 3

3 Leaves obtuse or cordate and clasping the stem at base, very shortly petiolate; corolla red or sometimes yellow, lobes 9–10 mm long, lanceolate or rhomboidal, acute, acuminate or obtuse . . . . . **I. coccinea** L.
Leaves cuneate or subobtuse at base, usually distinctly petiolate; corolla reddish-pink or orange, lobes 5–7 mm long, obovate, rounded . . . . . **I. chinensis** Lam.

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**7. Ixora coccinea** L., *Sp. Pl.* 110 (1753). **Type:** Rheede, *Hot. Mal.* 2: 17, t. 13 (1679) (lecto [icono]: Fosberg & Sachet 1989b: 486).

***Illustrations*:** Whistler (2000: 278).

Shrub or small tree 1–2 m high, usually much branched with stiff branches; indumentum of erect, short (<0.2 mm long), simple trichomes; branchlets flattened angular, with short, dense indumentum when young, green-grey, glabrescent. Stipules 2–6 mm long, externally glabrous, internally with sparse indumentum and colletors near base; shortly connate for up to 0.8 mm, limbs ovate-truncate, 1–3 mm long, keeled towards apex and aristate (awn 1.5–4 mm long). Leaves coriaceous, subsessile to shortly petiolate, glabrous; petioles 0–5 mm long; lamina elliptic, elliptic-oblong or obovate, 35–100 × 20–50 mm; apex acute or obtuse and shortly mucronate; base cuneate, obtuse or subcordate, sometimes slightly amplexicaul; lateral nerves 10–13 pairs, suboblique, interlateral venation reticulate. Inflorescences sessile, three branched, corymbiform, densely flowered, subtended by leaf-like bracts; the three branches branched again (to about 5 times ramified), each terminated by dichasial cymes; ultimate cymules 3–5-flowered, the oldest (central flower) usually sessile, laterals pedicellate; bracts at base of inflorescence consist of reduced leaves, those on branches smaller, ovate-subulate, acuminate; bracteoles paired, ovate-acuminate, 1–10 mm long. Flowers bisexual, 4-merous, pedicellate, inodorous; pedicels 2–4 mm long. Calyx red; tube ± urceolate, 2–3 mm long, with short, sparse indumentum; lobes triangular, acute, 1.5–3.5 mm long. Corolla large and showy, red, orange or orange-red; tube slender, 10–45 mm long; lobes ovate-elliptic, acute, 7–15 × 3–5 mm. Stamens exserted, anthers linear-oblong, 2.5–3 mm long, filaments 0.7–2 mm long. Ovary 4-locular; style and stigma 10–50 mm long, exserted for 3–4 mm, stigmatic lobes 2, glabrous, 1.8–2 mm long. Fruits globose to subglobose, 5–6 × 5–6 mm, reddish black, glabrous, pyrenes 2–4; mature seeds not seen.

Additional selected specimens examined (naturalised): Western Australia. Black Madonna Retreat near Gregory's Well, c. 10 km N of Lombadina Mission, 16°28′S, 122°54′E, Jul 1997, Mitchell 4813 (BRI). Queensland. North Kennedy District: Daydream Island, Whitsunday Region, 20°15′S, 148°53′E, Mar 1990, Batianoff 900349 (BRI); Sinclair Bay, Cape Gloucester, 20°07′S, 148°27′E, Sep 1992, Batianoff 9209198 (BRI); Sinclair Bay, 20°05′S, 148°26′E, Mar 1994, Batianoff 9403257 (BRI). South Kennedy District: Netherdale, E of Eungella, Nov 1981, McConnell & McConnell s.n. (NSW193804).

***Distribution and habitat*:** Ixora coccinea is a native of India and widely cultivated in the tropics, especially in south-east Asia, Africa, Malesia, Pacific Islands and northern Australia, as an ornamental shrub or hedge plant (Whistler 2000). It is undoubtedly the most widely cultivated species of this genus in the tropics and is now naturalised in many countries, albeit as a localised adventive. Ixora coccinea was reported as occurring in Australia from very early times (Hooker 1859: 44); however, it is unclear as to the application of the name by Hooker. Bentham (1867) stated "this may have been one of the exotic shrubs planted during the time that Port Essington was colonised". It has never become fully naturalised and at the most should be regarded as a persistent adventive. Despite Ewart & Davies (1917) reporting it as naturalised in the Northern Territory, and subsequent widespread cultivation in gardens until the present day, it has not persisted as a weed and is not currently regarded as naturalised there (I. Cowie, pers. comm. August 2005). The species has been collected as a naturalised adventive on a handful of occasions in central coastal Queensland (Map 2).

***Notes*:** Ixora coccinea is readily recognisable by its densely flowered corymbiform inflorescences, with clusters of red or orange-red flowers, long slender corolla tube, broad acute corolla lobes, thick leaves that are sessile or shortly stalked, and usually subcordate and slightly amplexicaule at their base. It may be distinguished from the other cultivated species of Ixora in Australia (I. chinensis Lam., I. finlaysoniana Wall. ex G.Don and I. parviflora Vahl) by the above key. A single record of 'naturalised' I. finlaysoniana from Cooktown in 1980 (Scarth-Johnson 1167A – BRI) has not been corroborated in recent times (B. Waterhouse, pers. comm. 2006) and is discounted.

*Ixora coccinea* is reported to be very variable by Smith & Darwin (1988), Fosberg & Sachet (1989a) and Rajaseger *et al.* (1999). The penultimate authors recognised four varieties and two forms in Micronesia. At least two of these are present in Australia, namely var. *coccinea* and var. *bandhuca,* as well as a number of cultivars with Spencer (2002) listing over thirty. They are not further treated here.

***Etymology*:** The specific epithet is from the Latin *coccineus* (deep red, crimson) and refers to the corolla colour.

## Excluded species and misapplications

*Ixora dallachiana* (F.Muell.) F.Muell., *Census Austral. pl.,* 1: 75 (1882) = **Tarenna dallachiana** (F.Muell. ex Benth.) S.Moore

*Ixora expandens* (F.Muell.) F.Muell., *Census Austral. pl.* 1: 75 (1882) = **Tarenna dallachiana** subsp. **expandens** (F.Muell.) S.T.Reynolds & P.I.Forst.

*Ixora indica* Kuntze, *Rev. Gen. Pl.* 1: 286 (1891) = **Pavetta australiensis** Bremek.

*Ixora orophila* C.T.White, *Proc. Roy. Soc. Queensland* 53: 220 (1942); non Bremek. = **Psydrax montigena** S.T.Reynolds & R.J.F.Hend.

*Ixora pavetta sensu* Benth., *Fl. Austral.* 3: 414 (1867) = **Pavetta australiensis** Bremek.

*Ixora pentamera* Benth., *Fl. Austral.* 3: 416 (1867) = **Tarenna pentamera** (Benth.) S.T.Reynolds

*Ixora thozetiana* F.Muell., *Fragm.* 2: 132 (1861) = **Aidia racemosa** (Cav.) Triveng.

*Ixora tomentosa sensu* Benth., *Fl. Austral.* 3: 414 (1867); Ewart & Davies, *Fl. Northern Territory* 258 (1917) = **Pavetta brownii** Bremek.

*Ixora triflora* R.Br. ex Benth., *Fl. Austral.* 3: 416 (1867) *p. p.* = **Triflorensia ixoroides** (F.Muell.) S.T.Reynolds (see also under **Ixora foetida** (L.f.) Fosberg)

*Ixora vinosa* F.Muell. ex Rchbf. (1866), *nomen* = **Pavetta australiensis** Bremek.

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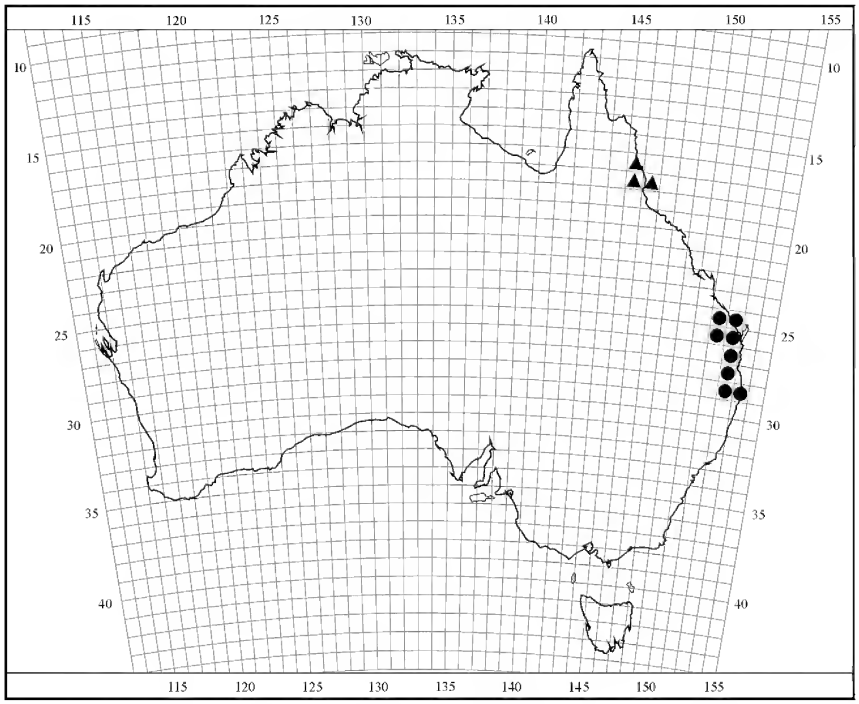
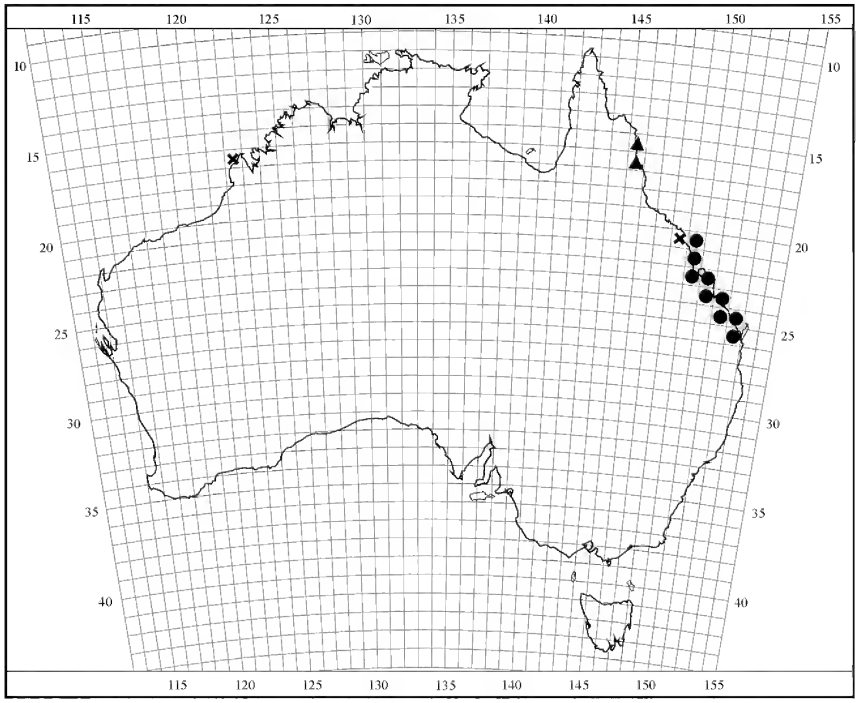
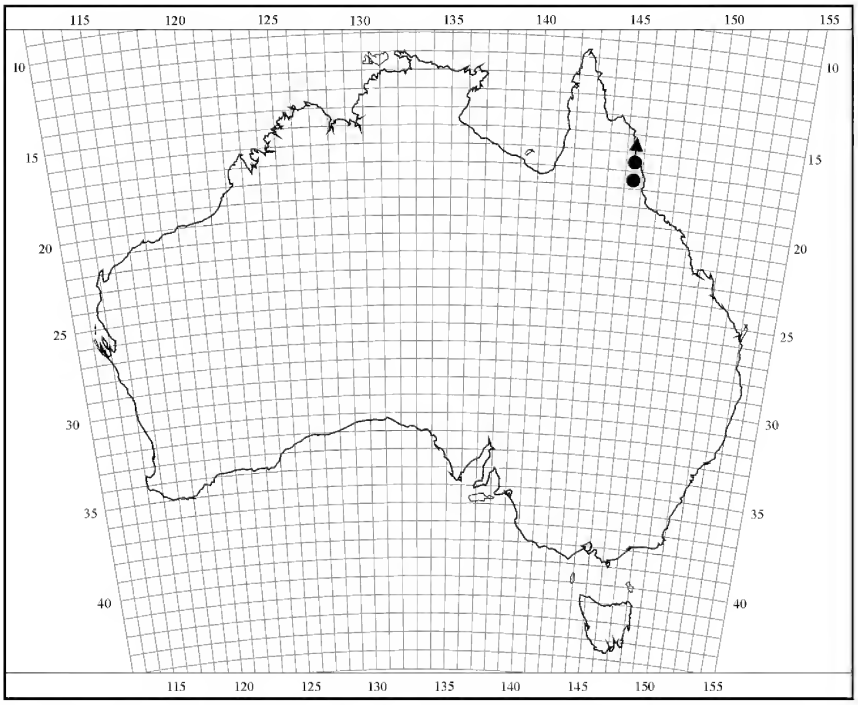


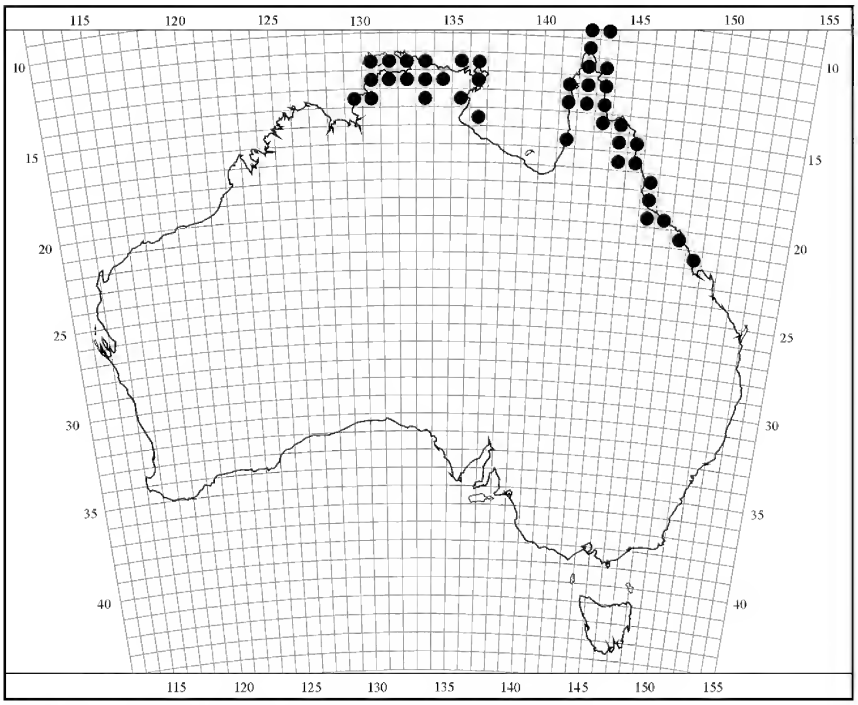

**Map 1.** Distribution in 1° grids in Australia for *Ixora baileyana* ▲ and *Ixora beckleri* ● .




**Map 2.** Distribution in 1° grids in Australia for *Ixora biflora* ▲ , *Ixora coccinea* × , *Ixora queenslandica* ● .




**Map 3.** Distribution in 1° grids in Australia for *Ixora finlaysoniana* ▲ and *Ixora oreogena* ● .




**Map 4.** Distribution in 1° grids in Australia for *Ixora timorensis* ● .

# *Mischarytera megaphylla* P.I.Forst. (Sapindaceae), a new species from the 'Wet Tropics' of north-east Queensland

**Paul I. Forster**

**Summary**

Forster, P.I. (2006). *Mischarytera megaphylla* P.I.Forst. (Sapindaceae), a new species from the 'Wet Tropics' of north-east Queensland. *Austrobaileya* 7(2): 279–283. The new species, *Mischarytera megaphylla,* is described and illustrated. It is known from lowland tropical rainforest in a small area at Oliver and Noah Creeks in the 'Wet Tropics' of north-east Queensland. A key to the Australian species of *Mischarytera* is provided.

Key Words: Sapindaceae, *Mischarytera megaphylla*, new species, Wet Tropics biodiversity, Cape Tribulation, Australian flora, Queensland flora, identification key

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## Introduction

The genus *Mischarytera* H.Turner was described in 1995 to accomodate three species from Australia and New Guinea that had been previously included in *Arytera* Blume (Turner 1995). *Mischarytera* was distinguished from *Arytera* by the fruit being glabrous inside (versus glabrous or variously hairy inside) and having a sclerenchymatic layer inside the pericarp that radiates from the placenta and separates from the endocarp when ripe (versus lacking); a punctate calyx with teeth that have a membranous margin (versus lacking); the 3–11-jugate leaves (versus 1–4–(6-) jugate) and leaflets that are densely punctate (versus not, or only sparsely) (Turner 1995). *Arytera* has fruit that always open loculicidally, whereas in *Mischarytera* the fruit open loculicidally or loculifragally, as in the new species described below.

In 1972, Len Webb and Geoff Tracey collected fruiting material of a large leaved Sapindaceae plant at Oliver Creek in the Cape Tribulation area. This collection was tentatively identified as an *Harpullia* sp. by the collectors, then later as *H. vaga* Merr. & Perry by P.W.Leenhouts in 1980 with the note that the "fruit does not belong here!". This small tree has been rarely and irregularly collected at Noah Creek and Oliver Creek in the intervening 30+ years and ended up being listed at BRI as "*Mischarytera* sp. (Oliver Creek L.J. Webb+ 10903)" (Forster & Jessup 2002) and at QRS as "Sapindaceae sp. (Noah Creek BG 6026)" (Hyland *et al.* 2003).

The collection of both flowering and fruiting material of this tree by Bruce Gray has enabled critical examination of both its generic and specific placement. In nearly all respects, this species fulfills the character states necessary for it to be included in *Mischarytera*, *viz.* fruit glabrous inside; calyx punctate, teeth with a membranous margin; leaves 3–11-jugate; leaflets densely punctate. From the very limited fruiting material to hand it does not appear to have the sclerenchymatic layer on the inside of the pericarp that radiates from the placenta and separates from the endocarp when ripe (Turner 1995: 143). The regular occurrence of this layer in the fruits of the species referred to *Mischarytera* requires further study utilising fresh or spirit material as although it was illustrated (from dried material) for *M. lautereriana* (F.M.Bailey) H.Turner by Turner (1995) it appears absent from the illustrations of fresh material of that species and for *M. macrobotrys* (Merr. & L.M.Perry) H.Turner (Cooper & Cooper 1994, 2004).

This new species is named here in *Mischarytera*, although with some reservations. It will be interesting to see where its relationships lie once molecular analyses are undertaken for the *Arytera* – *Mischarytera* group of species

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and whether recognition of the latter genus is justified on molecular grounds.

## Materials and methods

The data presented in this paper are derived from herbarium collections at BRI and QRS. The species description is modelled partly on those of Turner (1995) for *Mischarytera* species with amendments to enable accurate venation description.

Species of *Arytera* and *Mischarytera* appear to possess functionally unisexual flowers, with the 'male' and 'female' flowers generally having rudimentary components of the other sex (Turner 1995). Male flowers usually predominate in inflorescences and careful observation is required to ensure that flowers of both sexes are collected. As a result separate descriptions are provided for male (below) and female (not seen at anthesis) flowers.

Venation terminology largely follows Hickey (1973) and Ash *et al.* (1999) with the recognition of a midrib (1° vein order), lateral veins (2° vein order) and intercostal veins (3° and onwards vein orders) within any leaf lamina. When an intercostal vein comprises a continuous raised line of cells it is termed 'distinct'; if it is discontinuous or fades away into the body of the lamina, it is termed 'indistinct'. Indumentum cover is described using the terminology of Hewson (1988), except that 'scattered' is used instead of 'isolated'. The shapes of leaves, sepals and petals are described using the terminology of Hickey & King (2000). Length and width dimensions are indicated as length measurement × width measurement followed by the measurement unit.

## Taxonomy

**Mischarytera megaphylla** P.I.Forst., **species nov.** affinis *M. macrobotryi* sed foliis majora (31–75 cm longitudine contra 14–43 cm), foliolis elliptico-oblongis (adversum elliptica usque obovata) et apicibus caudatis usque longe acuminatis (contra breviter acuminatos), cymulis circinalibus (in illa dichasialibus), pedicellis longioribus (2–4 mm longitudine adversum 1.5–2 mm ), floribus masculinis majoribus (2.5–3.5 mm diametro contra 1–1.2 mm) et seminibus majoribus (*c.* 28 × 23–24 mm adversum *c.* 13 × 12 mm) differens. **Typus:** Queensland. Cook District: Cape Tribulation road, 16°09′S, 145°26′E, 21 March 1995, *B.Gray 6026* (holo: QRS; iso: BRI).

*Mischarytera* sp. (Oliver Creek L.J.Webb+ 10903) in Forster & Jessup (2002).

Sapindaceae sp. (Noah Creek BG 6026) in Hyland *et al.* (2003).

***Illustration*:** Hyland *et al.* (2003).

Trees to 8 m high. Indumentum of simple trichomes, dirty-straw in colour. Branchlets lenticellate, with sparse to dense indumentum when young, glabrescent; flowering twigs 5–6 mm diameter. Leaves 31–75 cm long, 6–8-jugate; petiole 15–24 cm long, pulvinate, sparsely lenticellate; rhachis 29–41 cm long, slightly flattened and somewhat winged to ± rounded; leaflets opposite, subopposite to alternate, petiolules 5–12 × 0.6–1.5 mm, distinctly grooved above, rounded below; lamina coriaceous, elliptic-ovate to elliptic-oblong, rarely slightly falcate, (8–) 11.2–32 × (23–) 4–8.2 cm, length/width ratio 2.2–4.6; apex caudate to long-acuminate; base acute to cuneate, unequal; margin entire, flat to slightly undulating; venation brochidromous, 2° lateral veins 15–21 per side of midrib (1° vein), 3–22 mm apart; upper surface dark green, glossy, venation ± flat and inconspicuous, 2° veins slightly raised towards 1° vein, intercostal veins inconspicuous; lower surface pale green, matt, venation prominent, 2° veins prominently raised, 3° intercostal veins slightly raised to indistinct, 4° intercostal veins reticulate and indistinct. Inflorescences axillary or pseudoterminal; rhachis terete, 3.4–5.7 cm long; first order branches 2–13 cm long, cymules cincinnate, 1–4-flowered; bracts triangular, 0.5–1.2 × 0.2–0.4 mm. Flowers functionally unisexual. Male flowers 2.5–3.5 mm diameter; pedicels filiform, 2–4 × 0.2–0.3 mm, with dense indumentum, bracteoles lanceolate-ovate, 1–2 × 1–1.5 mm, with dense indumentum, margin entire; calyx 0.6–1 mm high, teeth ovate, 0.5–0.8 × 0.7–0.8 mm, externally weakly punctate and with sparse indumentum, margin entire to dentate, apex acute; petals ovate, 0.8–1 × 0.6–0.8 mm, externally weakly punctate with

sparse indumentum in centre, internally with claw 0.3–0.4 mm long, blade not abruptly decurrent into claw, with short indumentum, margin glabrous or with scattered cilia; stamens (7–) 8; filaments 0.7–0.8 mm long, pilose for entire length, denser towards base; anthers 1–1.2 × 0.5–0.7 mm, with sparse indumentum; pistillode *c.* 0.5 mm long, with dense antrorse indumentum; ovary *c.* 0.5 mm long, with dense antrorse indumentum. Female flowers not seen. Fruit capsule slightly obcordate to globose, with 1 well-developed lobe, opening loculifragally, 28–30 mm high, 23–28 mm wide; exocarp smooth, green; endocarp entire, glabrous; stipe 2–4 mm long, glabrous. Seed orbicular-ovoid, *c.* 28 × 23–24 mm, brown; arilloid ± entirely enclosing seed (apart from tip), unwinged (non-alate), fleshy, orange-yellow; hilum ellipsoid *c.* 8 × 6 mm. **Fig. 1.**

***Additional specimens examined*: Queensland.** Cook District: Oliver Creek, a tributary of Noah Creek, Cape Tribulation area, 16°06′S, 145°27′E, Aug 1972, *Webb & Tracey 10903* (BRI); Oliver Creek, V.C.L. Noah, EP/41, Jun 1978, *Sanderson 1549* (QRS); Hewitson property on the southern side of Noah Creek, 16°09′S, 145°26′E, Oct 2002, *Cooper WWC1784* & *Cooper* (BRI); Cape Tribulation road, 16°09′S, 145°26′E, Jul 1995, *Gray 6245* (QRS); *loc. cit.*, Oct 1995, *Gray 6318* (QRS).

***Distribution and habitat*:** *Mischarytera megaphylla* is endemic to the Noah Creek – Oliver Creek area at Cape Tribulation in the Wet Tropics bioregion of north-east Queensland. Plants occur in lowland tropical rainforest (complex mesophyll vineforest) on alluvial/colluvial soils derived from a mixture of metamorphic and mudstone at altitudes below 100 m.

***Notes*:** *Mischarytera megaphylla* has some similiarities to *M. macrobotrys* that occurs in New Guinea and on Cape York Peninsula in Queensland; however it differs noticeably from that species in the much larger leaves (31–75 cm long versus 14–43 cm long) with generally much longer leaflets that are elliptic-ovate to elliptic-oblong (versus elliptic to obovate) and that have a caudate to long-acuminate tip (versus short-acuminate), the cincinnate cymules (versus dichasial), male flowers with longer pedicels (2–4 mm versus 1.5–2 mm) and a greater diameter (2.5–3.5 mm diameter versus 1–1.2 mm diameter), and seeds that are twice as large (28 × 23–24 mm versus *c.* 13 × 12 mm).

## Key to Australian *Mischarytera*

1 Leaflets 0.9–3.7 mm wide; lateral (2°) veins in leaflets narrowly spaced (1.5–7 mm apart); fruit capsule 9–19 × 5–20 mm; seeds 6.5–12 × 4.8–8 mm . . . . . **M. lautereriana**

Leaflets 3.3–8.2 mm wide; lateral (2°) veins in leaflets widely spaced (3–22 mm apart); fruit capsule 18–30 × 18–28 mm; seeds 13–28 × 12–24 mm . . . . . 2

2 Leaves 31–75 cm long; leaflet blade elliptic-oblong to elliptic-ovate, apex caudate to long-acuminate; cymules cincinnate; pedicels 2–4 mm long; male flowers 2.5–3.5 mm diameter; seeds *c.* 28 × 23–24 mm . . . . . **M. megaphylla**

Leaves 14–43 cm long; leaflet blade elliptic to obovate, apex short-acuminate; cymules dichasial; pedicels 1.5–2 mm long; male flowers 1–1.2 mm diameter; seeds *c.* 13 × 12 mm . . . . . **M. macrobotrys**

*Mischaryera megaphylla* may also occur in the McIlwraith Range as three sterile collections at BRI greatly resemble the material from the Cape Tribulation area (*viz.* headwaters of Massey Creek near old mining site, McIlwraith Range, 13°50'S, 143°20'E, Oct 1969, *Webb & Tracey 9270*; Rocky River, eastern foothills of McIlwraith Range, 13°47'S, 143°25'E, Oct 1969, *Webb & Tracey 9401*; headwaters of Lankelly Creek, western fall of McIlwraith Range, 13°52'S, 143°20'E, Oct 1969, *Webb & Tracey 9570*).

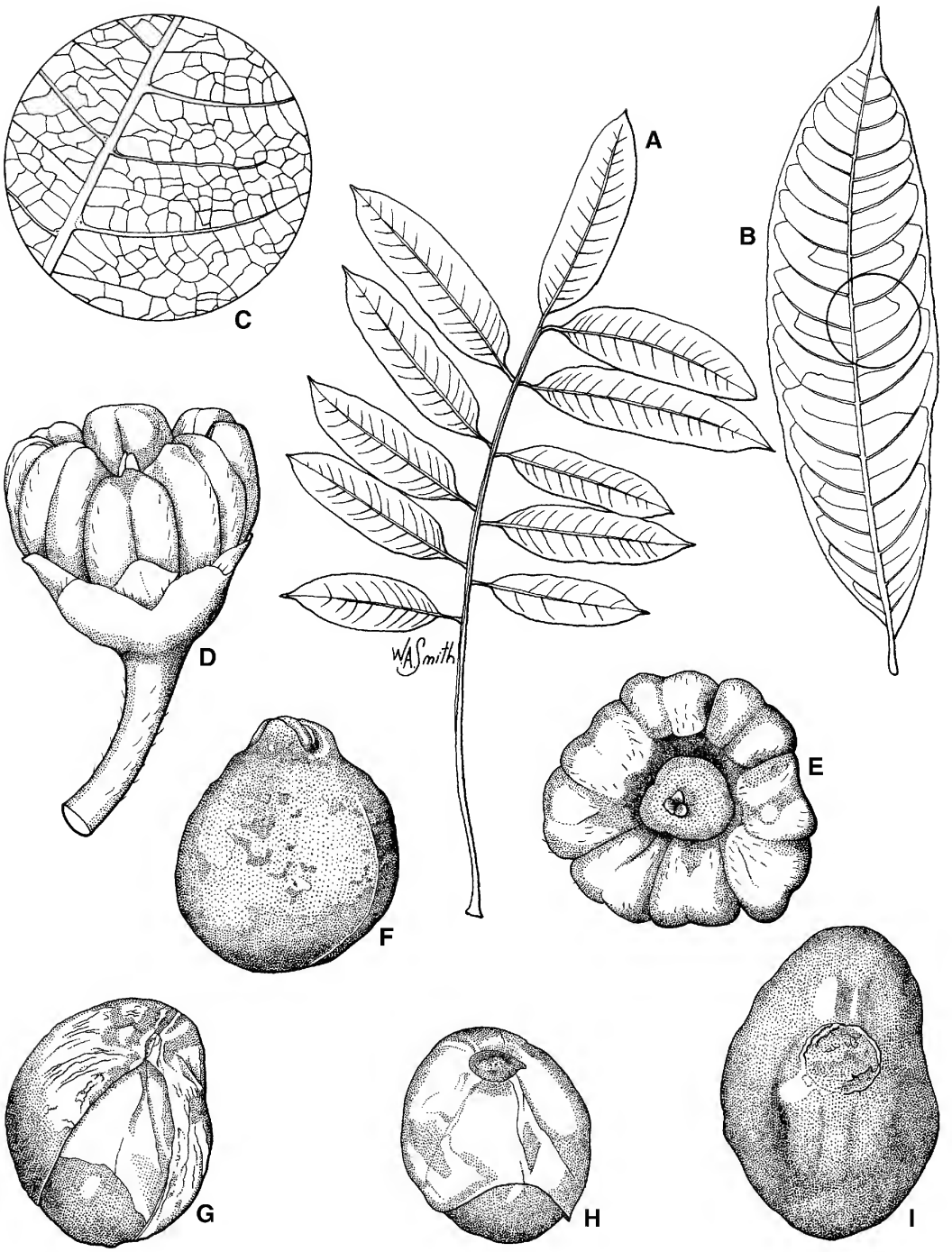


**Fig. 1.** ***Mischarytera megaphylla.*** A. leaf × 0.3. B. individual leaflet showing 1° and 2° venation × 0.5. C. detail of intercostal 3° and 4° venation × 1.5. D. lateral view of male flower × 12. E. apical view of male flower × 12. F. lateral view of intact fruit × 1. G. lateral view of seed enclosed in arilloid × 1. H. basal view of seed enclosed in arilloid showing point of attachment × 1. I. basal view of seed showing hilum × 1.5. A, *Gray 6245* (BRI); B–E, *Gray 6026* (QRS); F–I, *Gray 6318* (QRS). Del. W. Smith.

If *Mischarytera megaphylla* is truly restricted to the Cape Tribulation area, then it adds to the growing list of narrow or near endemics that are known only from there, *viz. Euodia hylandii* T.G.Hartley, *E. pubifolia* T.G.Hartley and *Gardenia actinocarpa* Puttock.

***Conservationstatus:*** *Mischarytera megaphylla* occurs infrequently at Oliver and Noah Creeks. There is no information as to its occupancy or to the number of individuals that exist and urgent survey work is required to determine its overall distribution and abundance. Although most of its known occurrences are within the Daintree National Park, the species may still warrant conservation coding based on its restricted distribution and apparent small population sizes. It should be regarded as Data Deficient (*cf.* IUCN 2001) at this stage.

***Etymology:*** The specific epithet is derived from the Greek *mega* (big, large) and *phyllus* (leaved) and alludes to the large size of the leaves and leaflets in this species when compared to the other species from Australia.

## Acknowledgements

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# *Synima reynoldsiae* P.I.Forst. (Sapindaceae), a new species from the 'Wet Tropics' of north-east Queensland

**Paul I. Forster**


## Summary

Forster, P.I. (2006). *Synima reynoldsiae* P.I.Forst. (Sapindaceae), a new species from the 'Wet Tropics' of north-east Queensland. *Austrobaileya* 7(2): 285–291. A new species from the 'Wet Tropics' rainforest of north-east Queensland, *Synima reynoldsiae* is described and illustrated. This species is restricted to upland rainforest (simple to complex notophyll vineforests) on basalt, granite or rhyolite derived substrates. A revised key to the Australian species of *Synima* is provided.


Key Words: Sapindaceae, *Synima reynoldsiae*, new species, Wet Tropics biodiversity, Australian flora, Queensland flora, identification key

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## Introduction

The genus *Synima* Radlk. is endemic to Australia and New Guinea with two species recognised (Reynolds 1985b; Leenhouts & Adema 1994). *Synima* is thought to be related to genera such as *Mischocarpus* Blume, *Sarcotoechia* Radlk. and *Toechima* Radlk., at least with respect to its placement in taxonomic accounts of the family. These putative affinities have been based on floral and fruit morphology and it is likely that molecular analyses will provide alternative data sets to build future generic classifications in the Sapindaceae.

Sterile collections of a Sapindaceous tree, superficially similar to *Guioa montana* C.T.White, have been made in the 'Wet Tropics' bioregion of north-east Queensland since the early 1950's. Fertile specimens of flowers (both sexes), fruits and seeds of this tree, collected mainly in the late 1980's and early 1990's, led Sally Reynolds to place tentative identifications of several fruiting and sterile collections as *Sarcotoechia* sp. nov. (November 1979) and later as *Synima* sp. nov. (November 1985); however, the latter generic assignation was not taken up at the time. Features of its fruit morphology led to it being listed at BRI as *Sarcotoechia* sp. (Mt Carbine L.W.Jessup+ GJM995) (Reynolds 1987b; Forster & Jessup 2002) and at QRS as *S.* sp. (Mountain Sarcotoechia WWC100) (Hyland *et al.* 2003); however, this generic assignation was based on an incomplete character data set. Several characters, especially those of the petals (crested, versus uncrested) and seed sarcotesta (covering the seed apart from an adaxial dorsal strip, versus annular around the hilum to cupular and covering up to one-third of the seed) negate its inclusion in *Sarcotoechia* and reinforce its placement in *Synima.*

The genus *Synima* is distinguished by the leaflets without domatia, a shortly cupular calyx with ovate sepals that are hairy on both surfaces, crested scales on the petals, the unwinged and shortly stipitate fruit capsule with valves that are thin when dried, villous hairy inside and with keeled sutures, and the seed with a fleshy, yellow-orange sarcotesta that is small and basal or mantle-like and ± covering the seed (Reynolds 1985b; Leenhouts & Adema 1994). The fruit are bright red and the black or dark brown seeds are ± entirely covered by the sarcotesta in *S. cordieriorum* (F.Muell.) Radlk., whereas in *S. macrophylla* S.T.Reynolds this structure is small and only at the base of the seed. Although this fleshy seed covering has been described as an aril (Reynolds 1985b; Hyland *et al.* 2003; Cooper & Cooper 2004) it is more correctly termed a sarcotesta as it is adnate to the exotesta of the seed (Adema *et al.* 1994).

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All of the above mentioned generic features of *Synima* are present in the undescribed species being considered here, with the seed sarcotesta being most similar to that of *S. cordieriorum*. The foliage of this undescribed species is markedly different to that of both *S. cordieriorum* and *S. macrophylla* in size, colour and indumentum cover. Florally it is similar to both these species, apart from the unkeeled petals and several aspects of size and indumentum cover. The flowers are unisexual as with most Sapindaceae (Adema *et al.* 1994; Gross 2005) and the two other species of *Synima*. Although plants may appear dioecious, observations over a period of time usually reveal that they are functionally monoecious. The fruits of the new species are very similar to those of *S. cordierorum* but differ slightly in shape and most noticeably in the colour of the interior of the valves (Cooper & Cooper 2004). It is here described as the new species *Synima reynoldsiae*.

## Material & methods

The data and description presented in this paper are based on holdings at BRI and QRS. Latitude and longitude records on QRS specimens have not been corroborated or localised, so may be inaccurate due to the use of 'generic' site records. The species description is loosely modelled on that for *Cupaniopsis cooperorum* (Forster 2002), but with more detail given to venation description following the terminology of Hickey (1973) and Ash *et al.* (1999). In their scheme the different components of venation are described using a numerical system with the recognition of a midrib (1° vein order), lateral veins (2° vein order) and intercostal veins (3° and onwards vein orders) within any leaf lamina. When an intercostal vein comprises a continuous raised line of cells it is termed 'distinct'; if it is discontinuous or fades away into the body of the lamina, it is termed 'indistinct'. Indumentum cover is described using the terminology of Hewson (1988), except that 'scattered' is used instead of 'isolated'. The shapes of leaves, sepals and petals are described using the terminology of Hickey & King (2000). Length and width dimensions are indicated as length measurement × width measurement followed by the measurement unit.

## Taxonomy

**Synima reynoldsiae** P.I.Forst., **species nov.** a *S. cordierorum* foliolis integris (adversum foliola dentata in foliis juvenilibus, saepe apicem versus dentata in foliis adultis), venis secundariis lateralibus 12–22 utrinque costae (non 8–14) et paginis inferioribus impolitis cremeo-flavis usque fere albis (adversus paginas subvirides in sicco brunneas); pedicellis longioribus (2–5 mm non 1–1.5 mm longis); petalis quam sepalis longioribus (in illa adversum petala sepala aequantia vel eis longioribus) et indumento denso externe (adversus indumentum sparsum adspersum vel localiter dispositum), carina absente (adversum carinam praesentem) et squamis cristatis (in illa incristatis); et fructu subgloboso (non obovoideo) differt. **Typus:** Queensland. Cook District: Harrington Property, Seamark road, Tarzali, 17°26′S, 145°32′E, 25 November 2002, *W. Cooper & W.T. Cooper WWC1798* (holo: BRI [3 sheets]; iso: A, L, MEL, MO, NSW, Z distribuendi).

*Sarcotoechia* sp. (Mt Carbine L.W.Jessup+ GJM995) in Forster & Jessup (2002).

*Sarcotoechia* sp. (Mountain Sarcotoechia WWC100) in Hyland *et al.* (2003) & Cooper & Cooper (2004: 484).

***Illustrations*:** Hyland *et al.* (2003); Cooper & Cooper (2004: 484).

Trees to 20 m high, functionally monoecious. Stem surface shallowly corrugated, lenticels small, round, in longitudinal vertical lines; blaze granular and layered, cream, then pink-brown, with 'Poison Peach' (*Trema tomentosa*) odour. Indumentum (unless otherwise stated) of pale, fawn-yellow, antrorse simple trichomes, rarely sessile, stellate trichomes or short, papillate trichomes. Branchlets angular, somewhat winged, dark black-grey, with scattered, longitudinally distributed lenticels; new growth with dense indumentum, glabrescent; flowering twigs 1–3 mm thick. Leaves (1–) 2–4 (–6) -jugate, rarely unifoliate; petiole angular, 18–115 × 0.8–1.5 mm, deeply grooved on top, with sparse indumentum of simple trichomes and short papillate trichomes; rhachis ± flattened, unwinged, 10–160 (–240) mm long, with

sparse indumentum of simple trichomes and short papillate trichomes. Petiolules 5–13 × 0.8–1 mm, deeply grooved on top, with scattered to sparse indumentum; pulvini 2–5 mm long. Leaflets alternate to subopposite, coriaceous, elliptic to oblanceolate, rarely elliptic-ovate, oblong or obovate, (24–) 32–115 (–175) × (9–) 18–55 mm, length-width index 2.4–4.3, base acute, obtuse or rounded, often assymetric; apex acute, shortly acuminate or obtuse, rarely retuse; margins entire, flat; upper suface dark-green, glossy, glabrous; lower surface cream-yellow to almost white, with scattered indumentum mainly on veins. Leaflet lamina venation prominent; 1° venation comprising a midrib that is prominently raised below and visible, but flat to the leaflet surface above; 2° venation comprising 12–22 lateral vein pairs per side of the midrib, 4–12 mm apart in the central part of the leaflet, visible on both surfaces but prominently raised, dark-yellow and with scattered indumentum below; 3° venation markedly reticulate, prominently raised below, visible but not raised above, dark-yellow and with scattered to occasional indumentum below; 4° venation reticulate, indistinct above and below; 5° venation very indistinct on both surfaces. Inflorescences erect to decumbent, axillary or pseudoterminal, thrysoid, not branching from base, 8–15 mm long and with side branches to 7 cm long, with sparse to dense indumentum; bracts and bracteoles deltoid-triangular, 0.8–1.2 mm × 0.3–0.6 mm, with dense indumentum. Flowers in shortly pedunculate cymules. Male flowers 1–5 per cymule, 2–4 × 2.5–5 mm; pedicels filiform, 2–5 × *c.* 0.3 mm, with dense indumentum; calyx cupular, sepals 5, fleshy, elliptic-ovate, 1.8–3 × 1.3–2 mm, weakly imbricate at base, green, externally with dense indumentum, internally with sparse indumentum; petals 5, spathulate, as long or shorter than the sepals, 1.8–3 × 1.8–2 mm wide at top, *c.* 0.5 mm wide at base, cream, externally unkeeled and with scattered long indumentum, internally with crested scales 1.5–2 × *c.* 1 mm, with dense, shaggy indumentum; disk fleshy-annular, 2–2.5 mm diameter, glabrous; stamens (7 or) 8; filaments 1.2–3.5 × 0.1–0.3 mm, thicker towards base, with shaggy indumentum; anthers 0.6–0.8 × *c.* 0.5 mm, with scattered indumentum; pistillodes 1–1.2 mm long, with dense indumentum. Female flowers generally one per cymule, not seen at anthesis; calyx cupular, sepals 5, fleshy, elliptic-ovate, 2.2–3 × 1.8–2.2 mm, weakly imbricate at base, externally with dense indumentum, internally with sparse indumentum; petals ?absent; disk fleshy-annular, *c.* 3.5 mm diameter; pistil 1.8–2 × *c.* 0.4 mm, with sparse to dense indumentum, style slightly lobed; ovary *c.* 4 × 2 mm, with dense indumentum. Fruit a fleshy, subglobose capsule, very shortly stipitate, 10–18 × 14–21 mm, 2 or 3-lobed, pink-red; valves opening loculicidally, slightly rugose and with scattered indumentum at dehiscence, thinly keeled to 2 mm on sutures, internally with dense, shaggy white or pink trichomes, suture edges recurving at dehiscence exposing the seeds, yellowish. Seeds obovoid, 12–14 × 7–10 mm, black, ± entirely covered in orange-yellow sarcotesta apart from area around pseudohilum and a dorsal slit. **Fig. 1.**

***Additional specimens examined*** **(*sterile collections, tentative identification; [fl]flowering collection; [fr]fruiting collection): Queensland.** Cook District: S.F.R. 0.5 km past W Spencer Creek forestry camp, S.F. 144, Cockatoo L.A., 33 km NNW of Mt Carbine, 16°15′S, 145°02′E, Nov 1988, *Jessup GJM1148 et al.** (BRI); 0.4 km before W Spencer Creek forestry camp, S.F. 144, Cockatoo L.A., 16°15′S, 145°02′E, Nov 1988, *Jessup GJM1296 et al.** (BRI); *loc. cit.,* Nov 1988, *Jessup GJM1385 et al.*[fl] (BRI); 144, Fantail L.A., E/P 44, 16°12′S, 145°05′E, Nov 1980, *Sanderson 1815** (QRS); Mt Windsor, S.F.R 144, E/P 30, 16°17′S, 145°05′E, Jul 1976, *Unwin 10** (QRS); Mt Misery, E of Mt Spurgeon, 16°26′S, 145°13′E, Nov 1988, *Jessup GJM959 et al.** (BRI); 15.4 km NNE of Mt Carbine, track near Mt Spurgeon – Mt Carbine Tableland near 7-cornered house, 16°27′S, 145°12′E, Nov 1988, *Jessup GJM995 et al.*[fl] (BRI); S.F.R. 143, Cow L.A., near Schillers Hut, 16°27′S, 145°12′E, Sep 1996, *Ford 1766** (QRS); Mt Lewis road, boundary of Round L.A. & Carbine L.A., 20 km NNW Mt Molloy, Nov 1988, *Jessup GJM218 et al.** (BRI); North Mary L.A., S.F.R. 143 Mt Lewis, 16°30′S, 145°16′E, Oct 1973, *Sanderson 465*, 488** (QRS); ; Davies Creek Plot (ridge), 17°05′S, 145°34′E, *s. dat., Webb & Tracey 13119** (BRI); Noel L.A., 17°05′S, 145°35′E, Feb 1978, *Risley 475*[fr] (BRI, QRS); Emerald LA., S.F.R. 607, 17°09′S, 145°33′E, Jul 1973, *Sanderson 301** (QRS); E/P 3, S.F.R. 607, Emerald L.A., 17°09′S, 145°38′E, Nov 1977, *Sanderson 1328** (QRS); Mt Misch, Herberton Range, near Bones Knob, 17°15′S, 145°25′E, Sep 1996, *Ford 1762** (QRS); S.F. 194, Mt Baldy, 6 km from Rifle Range end, 17°16′S, 145°25′E, Jun 1996, *Forster PIF19219 et al.** (BRI); Mt Baldy, 5.4 km W of Atherton near Walsh Falls, 17°17′S, 145°25′E, Nov 1988, *Jessup GJM1973 et al.** (BRI); Herberton Range, 1962, *Webb & Tracey 7958** (BRI); S.F.R. 194, Moomin,

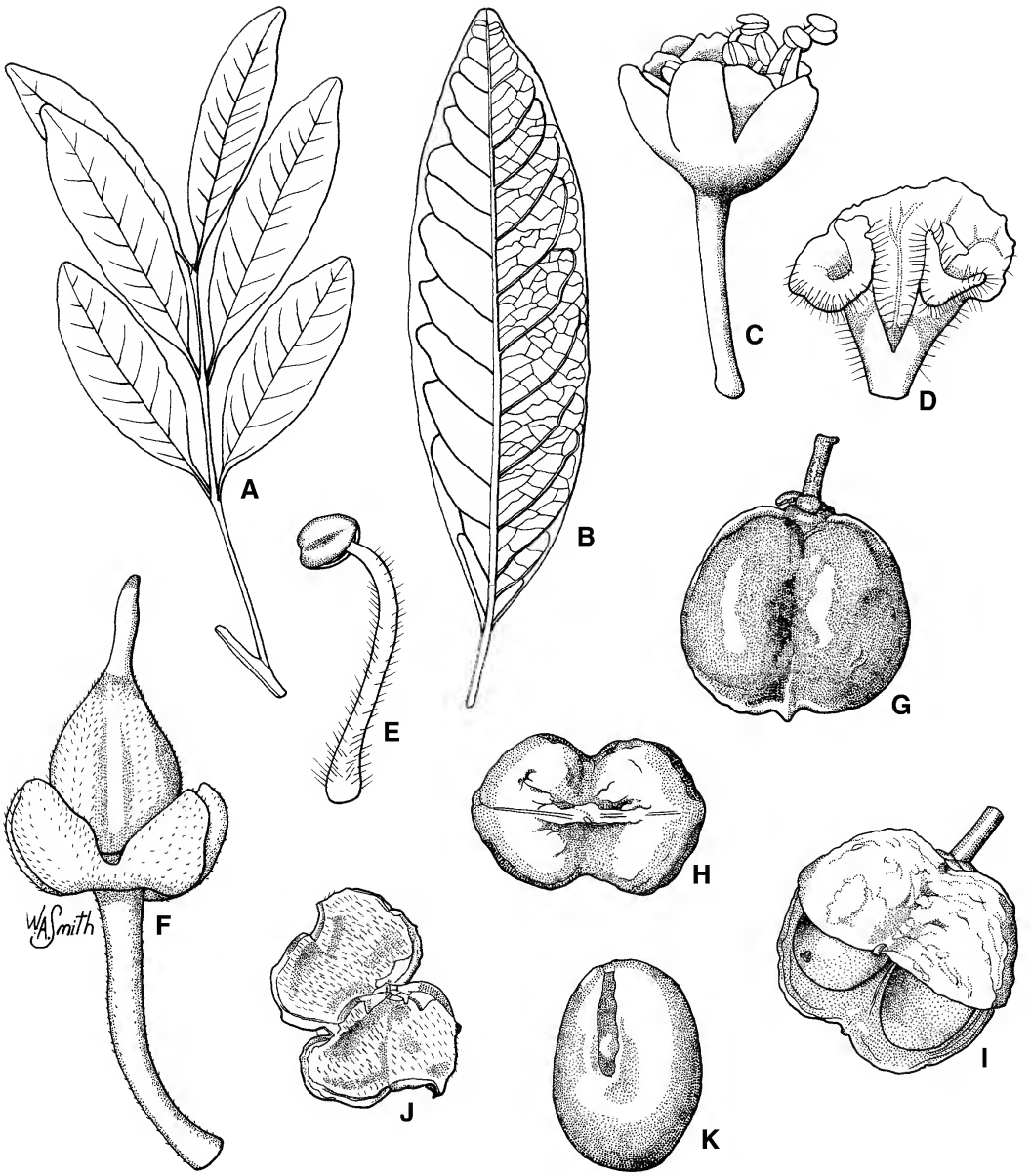



**Fig. 1.** ***Synima reynoldsiae.*** A. leaf × 0.6. B. detail of venation in individual leaflet viewed from below × 1. C. side view of male flower × 6. D. internal view of petal showing two scales covered in indumentum × 12. E. stamen × 12. F. side view of female flower × 6. G. side view of intact capsule × 1.5. H. face view of intact capsule × 1.5. I. lateral view of dehising capsule with seed in situ × 1.5. J. face view of dehisced, empty capsule × 1.5. K. lateral view of seed covered in sarcotesta showing dorsal split × 2. A–E, *Cooper WWC1798* (BRI); F, *Cooper WWC449* (BRI); G–K, *Cooper WWC100* (BRI). Del. W.Smith.

17°17′S, 145°27′E, May 1971, *Dockrill 115** (BRI, QRS); S.F.R. 194, Cpt 53, Western, 17°18′S, 145°26′E, Jan 1990, *Bragg 20111** (QRS); S.F.R. 194 Western, Cpt. 59, E/P 36, 17°19′S, 145°26′E, Mar 1977, *Unwin 270** (QRS); Harrington Property, Seamark road, Malanda, 17°26′S, 145°32′E, Jan 1992, *Cooper & Cooper WWC100*[fr] (QRS); *loc. cit.,* Nov 1992, *Cooper & Cooper WWC449*[fl] (QRS); along Microwave tower access road, Longlands Gap, 17°28′S, 145°29′E, May 1996, *Ford 1712** (BRI, QRS); Mt Fisher, off Sluice Creek road, 17°32′S, 145°32′E, Dec 1996, *Jensen 808** (QRS); Portion 25, Ravenshoe, 17°33′S, 145°31′E, Oct 1951, *Volck AFO70** (QRS); S.F.R. 251, South Coochimbeerum L.A., 1.5 km SE of Mt Koolmoon, 17°42′S, 145°32′E, May 2001, *Ford AF2843 & Hewett** (BRI); S.F.R. 605, Hilton L.A., 17°50′S, 145°35′E, Dec 1984, *Gray 3791*[fr] (QRS).

***Distribution and habitat*:** *Synima reynoldsiae* occurs widely in the Wet Tropics bioregion of north-east Queensland with a northern limit at Mt Windsor Tableland in State Forest 144 and a southern limit near Mt Koolmoon in State Forest 251 (**Map 1**). There appears to be a natural disjunction in the populations between Mt Lewis south-west of Mossman and Davies Creek south-east of Mareeba, presumably due to the lack of suitable habitat. Plants occur as scattered individuals in upland rainforest (simple to complex notophyll vineforests) on substrates derived from basalt, granite or rhyolite at altitudes between 1000 and 1300 m.

***Notes*:** *Synima reynoldsiae* is unique within this genus by its leaflets that are always entire with cream-yellow to almost white undersides; the petals that are not keeled externally, not longer than the sepals, with dense indumentum externally; and the fruit capsule valve sutures that are pale yellow. It is distinguished from the other species of *Synima* by the following key.

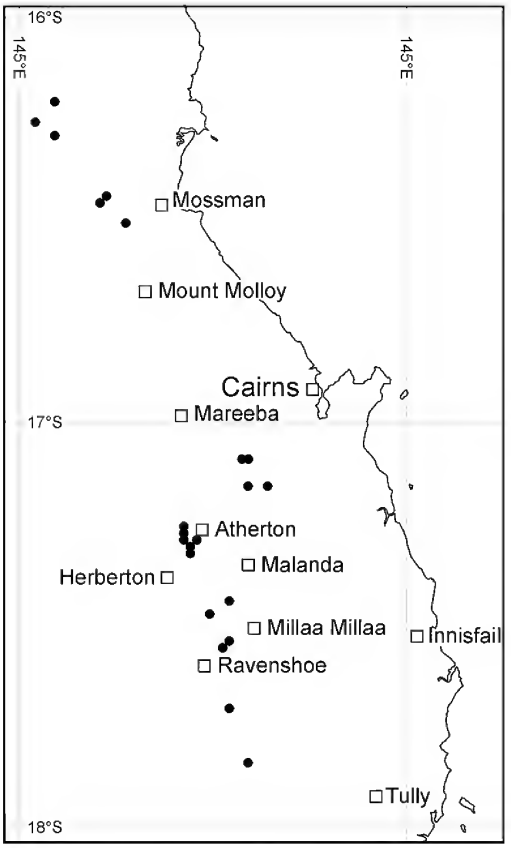
**Key to the species of *Synima***

**1** Branchlets 6–10 mm diameter; inflorescences unbranched, or with only 1 to 3 side branches; cymules subsessile; sarcotesta covering only base of seed . . . . . **S. macrophylla**
Branchlets less than 5 mm diameter; inflorescences thyrsoid with 3 or more branches; cymules pedunculate; sarcotesta covering lower third or nearly whole of seed . . . . . 2

**2** Leaflets toothed in juvenile foliage, often toothed towards apex in adult foliage; 2° lateral veins 8–14 per side of leaflet midrib, leaflets glossy pale-green (drying brown) below; pedicels 1–1.5 mm long; petals slightly keeled and with scattered to localised sparse indumentum externally, scales uncrested; fruit capsules obovoid, valve sutures white . . . . . **S. cordierorum**
Leaflets entire in juvenile and adult foliage; 2° lateral veins 12–22 per side of leaflet midrib, leaflets matt cream-yellow to almost white below; pedicels 2–5 mm long; petals unkeeled and with dense indumentum externally, scales crested; fruit capsules subglobose, valve sutures yellowish . . . . . **S. reynoldsiae**

***Conservation status*:** Based on current knowledge of its distribution *Synima reynoldsiae* is widespread and relatively common within the Wet Tropics bioregion. It is present in State Forests 143, 144, 194, 251, 605 and 607. No conservation coding is required.

***Etymology*:** The specific epithet honours Sally T. Reynolds, formerly a Principal Botanist at the Queensland Herbarium and specialist on Australian Sapindaceae (Reynolds 1981, 1982, 1984, 1985a, 1985b, 1987a, 1991). Sally established the modern taxonomic framework for this family in Australia with the description of 45 new species and four subspecies or




**Map 1.** Distribution of *Synima reynoldsiae* in north-east Queensland.

varieties in the genera *Alectryon* (4 spp., 2 subsp.), *Arytera* (3 spp.), *Atalaya* (6 spp.), *Cossinia* (1 sp.), *Cupaniopsis* (4 spp., 1 var.), *Diploglottis* (6 spp.), *Distichostemon* (1 sp.), *Elattostachys* (2 spp.), *Jagera* (1 sp., 1 var.), *Lepiderema* (3 spp.), *Mischocarpus* (4 spp.), *Rhysotoechia* (1 sp., 1 subsp.), *Sarcopteryx* (3 spp.), *Sarcotoechia* (3 spp.), *Synima* (1 sp.) and *Toechima* (2 spp.).

## Acknowledgements

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# *Cupaniopsis papillosa* P.I.Forst. (Sapindaceae), a new species from the 'Wet Tropics' of north-east Queensland

**Paul I. Forster**


## Summary

Forster, P.I. (2006). *Cupaniopsis papillosa* P.I.Forst. (Sapindaceae), a new species from the 'Wet Tropics' of north-east Queensland. *Austrobaileya* 7(2): 293–298. A new species from the 'Wet Tropics' rainforest, *Cupaniopsis papillosa* is described and illustrated. This species is restricted to upland rainforest (complex notophyll vineforest) on basalt-derived substrates near Ravenshoe. A revised key to the species of Australian *Cupaniopsis* is provided.


Key Words: Sapindaceae, *Cupaniopsis dallachyi, Cupaniopsis papillosa*, new species, Wet Tropics biodiversity, Australian flora, Queensland flora, identification key

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## Introduction

The genus *Cupaniopsis* Radlk. comprises at least 61 species and is distributed in Malesia (New Guinea, Celebes, Moluccas), various islands in the Western Pacific and Australia (Adema 1991). Fifteen described species have been recognised for Australia (Forster 2002), although Adema (1991) only recognised twelve more broadly defined ones in his monograph.

The new species *Cupaniopsis papillosa* is described in the current paper. Specimens of this species were first collected by Bruce Gray in 1978 near Ravenshoe and were referred to *C. dallachyi* S.T.Reynolds in the original description of that species (Reynolds 1985). Field observations and collections of fruiting plants near Ravenshoe led Wendy Cooper to realise that a second species was involved due to the highly distinctive fruit and seed of those plants when compared to plants of *C. dallachyi* near to the type locality at Jaggan near Malanda (Cooper & Cooper 2004).

## Material & methods

The data and description presented in this paper are based on holdings at BRI and QRS. The species description is modelled on that for *C. cooperorum* (Forster 2002), but with more detail given to venation description following the terminology of Hickey (1973) and Ash *et al.* (1999). In their scheme the different components of venation are described using a numerical system with the recognition of a midrib (1° vein order), lateral veins (2° vein order) and intercostal veins (3° and onwards vein orders) within any leaf lamina. When an intercostal vein comprises a continuous raised line of cells it is termed 'distinct'; if it is discontinuous or fades away into the body of the lamina, it is termed 'indistinct'. Indumentum cover is described using the terminology of Hewson (1988), except that 'scattered' is used instead of 'isolated'. The shapes of leaves, sepals and petals are described using the terminology of Hickey & King (2000). Length and width dimensions are indicated as length measurement × width measurement followed by the measurement unit.

## Taxonomy

**Cupaniopsis papillosa** P.I.Forst., **species nov.** a *C. dallachyi* foliolorum numero in eodem folio (5–6 (–7)-jugato non 2–4-jugato), intervallo secundario laterali minore venarum in parte media foliolorum (3–9 mm non 10–16 mm), fructus pagina minute papillosa (in illa glabra) et colore hinnuleo-flavo non fulvo, arilli colore (rubro non aurantiaco-flavo) et seminibus ellipsoideo-obovoideis (adversum semina planato-ellipsoidea) differt. **Typus:** Queensland. Cook District: Gold Coast road, near Ravenshoe, 17°38′S, 145°31′E, 19 March

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2004, *W.Cooper WWC1838 & R.Jensen* (holo: BRI [3 sheets + spirit]; iso: A, L, MEL, MO, NSW, NE distribuendi).

*Cupaniopsis* sp. (Tully Falls) in Cooper & Cooper (2004: 484).

***Illustrations*:** Hyland *et al.* (2003) as *C. dallachyi pro parte* [leaf x-ray image based on *Gray 1037*]; Cooper & Cooper (2004: 484).

Shrubs or small trees to 12 m high, often multistemmed, functionally monoecious. Indumentum (unless otherwise stated) of uncoloured simple trichomes, rarely comprising stellate trichomes. Branchlets terete, longitudinally lenticellate, brown-grey, new growth with short, sparse to dense indumentum of simple trichomes (sometimes stellately clustered), glabrescent; flowering twigs 3–4 mm diameter. Leaves 5–6 (–7) -jugate; petiole somewhat flattened and slightly winged, 50–75 mm long, 2.5–3 mm diameter, glabrous; rhachis somewhat flattened and slightly winged, 40–275 mm long, glabrous. Petiolules 7–12 mm long, often indistinct from the leaflet lamina base; pulvini grooved on top, 4.5–6 mm long, glabrous. Leaflets subopposite to strongly alternate, coriaceous, elliptic, oblanceolate or obovate, 42–185 × 15–56 mm, length-width index 2.3–5.3, glabrous; domatia in 1°/2° vein axils below, dome-shaped, ± ellipsoid, 0.2–0.4 mm long; base attenuate to cuneate, often unequal; apex obtuse, retuse, truncate, rarely acute; margins flat, entire; both sides glabrous and glossy. Leaflet lamina venation prominent; 1° venation comprising a midrib that is prominently raised below and visible but only slightly raised above; 2° venation comprising 11–14 lateral vein pairs per side of the midrib, 3–9 mm apart, prominently raised below, visible but not prominently raised above; 3° venation reticulate, prominently raised below, visible but not raised above; 4° venation reticulate, indistinct above and below; 5° venation very indistinct on both surfaces. Inflorescences pendulous, axillary or ramiflorus, occasionally branching from base, 70–300 mm long, panicles with long side branches to 250 mm long, with scattered to sparse, antrorse indumentum; bracts and bracteoles triangular-ovate, 0.8–1.8 × 0.6–0.8 mm, with sparse to dense indumentum; flowers either functionally male or female, and with reduced sterile organs of the opposite sex. Male flowers 3–5 × 5–9 mm, cream; pedicels 3–4 × 0.5–0.8 mm, thicker towards top, with sparse, antrorse indumentum; sepals 5, 2-seriate, weakly imbricate, ciliolate, green, externally with scattered to sparse indumentum, internally glabrous, outer ones broadly-elliptic to ovate, concave, 3–4.5 × 2.5–3 mm, inner ones broadly-elliptic, 2.8–4 × 3–3.5 mm; petals 5, broadly flabellate, 1.8–3 × 1.8–2.5 mm, white, apex margin irregularly lobed, externally glabrous, internally with two scales 0.5–0.7 mm long that are densely pilose with antrorse indumentum; disc glabrous, 1.6–2 mm diameter. Stamens 8 (probably reduced to staminodes in female flowers), filaments 1.2–1.5 × 0.2–0.3 mm, with dense shaggy indumentum along entire length, anthers 1.7–2.2 × 1–1.3 mm, with an occasional trichome. Pistillodes *c.* 0.2 × 0.2 mm; ovary 3– (4)-locular, 0.8–0.9 mm long, with scattered long simple trichomes and scattered to sparse, short-papillate trichomes. Female flowers not seen. Fruit capsule with (1–) 3 (–4) well developed lobes, 22–35 × 15–30 mm; outside initially smooth, becoming slightly rugose when ripe, fawn-yellow, surface covered in scattered to sparse, minute papillate trichomes; inside densely villous, pale pink-brown; stipe 4–5 mm long. Seeds ellipsoid-obovoid, 15–22 × 8–12 mm, glossy tan-brown; hilum 2.8–3 mm wide, pseudohilum 3–6 mm wide; arilloid ribbed, red, covering around three-quarters to four-fifths of the seed. **Fig. 1**.

***Additional specimens examined*: Queensland**. Cook District: Tully Falls road, Charmillan L.A., [S.F. 251], just below start of Wabunga Wayemba walking track, 17°41′S, 145°31′E, Apr 2002, *Booth 3055 & Jensen* (A, BRI, MEL); Gold Coast road, Cassowary Heights, near Ravenshoe, 17°38′S, 145°31′E, Nov 1995, *Cooper & Cooper WWC956* (BRI, QRS); *loc. cit.*, Oct 2004, *Cooper & Cooper WWC1900* (BRI, L, MEL, NSW); S.F.R. 251, Blunder L.A., 17°43′S, 145°31′E, Oct 1978, *Gray 1037* (BRI, QRS).

***Distribution and habitat*:** *Cupaniopsis papillosa* is highly restricted in its occurrence and known only from a small area south-south-east of Ravenshoe with most collections from State Forest 251 (**Map 1**). Plants have been

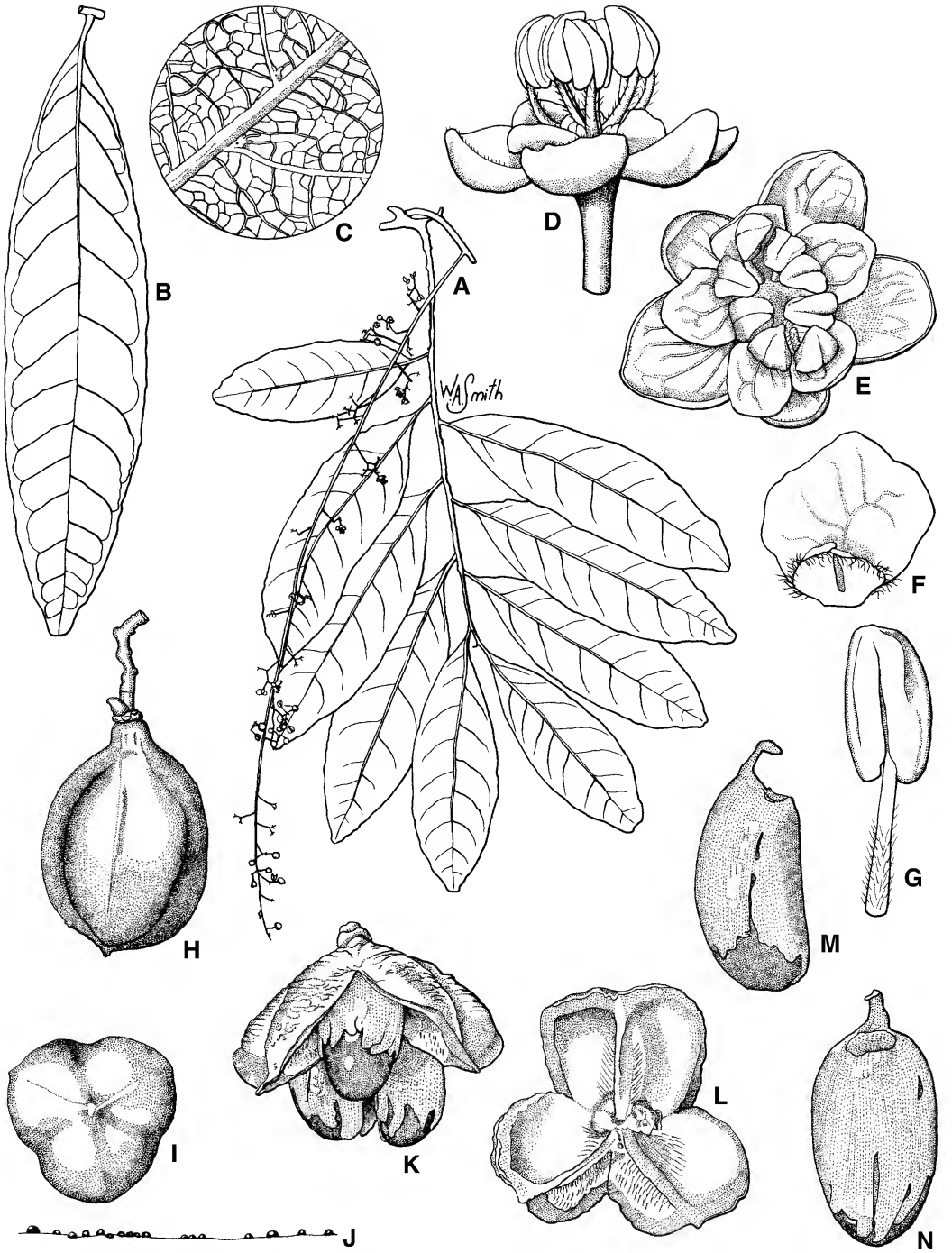



**Fig. 1.** ***Cupaniopsis papillosa.*** A. stem segment with leaf and inflorescence × 0.25. B. detail of venation in individual leaflet × 0.5. C. domatia in axil of 1° and 2° venation × 30. D. side view of male flower × 5. E. face view of male flower × 5. F. internal view of petal showing two scales covered in indumentum and the irregular apex × 10. G. stamen × 10. H. side view of intact fruit capsule × 1. I. face view of intact fruit capsule × 1. J. papillose surface of fruit capsule. K. lateral view of dehiscing fruit capsule with seed in situ × 1. L. face view of dehisced, empty fruit capsule showing hairs × 1. M. lateral view of seed covered in arilloid with pseudohilum at top × 1.5. N. base view of seed showing pseudohilum at top × 1.5. A–G, *Cooper & Jensen WWC1838* (BRI); H–N, *Cooper & Cooper WWC1900* (BRI). Del. W. Smith.

found in upland rainforest (complex notophyll vineforest) on red soils derived from basalt at altitudes between 840 and 1100 m.

***Notes*:** This new species has a superficial resemblance to *Cupaniopsis dallachyi* (in the sense of the type collection) when only foliage is compared. Material of *Gray 1037* (here referred to *C. papillosa*) was used by both Reynolds (1985) and Adema (1991) in construction of their descriptions for the earlier described species, especially with respect to leaflet number. Critical examination of the foliage, fruit and seed of the two species reveals a number of differences (**Table 1**) and the markedly different fruit and seed are well illustrated in Cooper & Cooper (2004). The two species are allopatric in the Wet Tropics bioregion with *C. dallachyi* occurring to the east and north of *C. papillosa* (**Map 1**).

*Cupaniopsis papillosa* is functionally monoecious, as are many Australian Sapindaceae (Gross 2005) and species of this genus in particular (Adema 1991). Individual trees may first produce inflorescences comprising solely male flowers (e.g. *Cooper & Jensen WWC1838*), but later the same tree will produce fruit (e.g. *Cooper & Cooper WWC1900*) (W. Cooper, pers. comm. Sept. 2005).

**Table 1. Comparison of characters for *Cupaniopsis dallachyi* and *C. papillosa***

| Character State | *Cupaniopsis dallachyi* | *Cupaniopsis papillosa* |
|---|---|---|
| Number of leaflets per leaf | 2–4-jugate | 5–6 (–7)-jugate |
| 2° lateral vein spacing in central part of leaflet | 10–16 mm | 3–9 mm |
| Capsule surface | glabrous | minutely papillose |
| Capsule colour | tan-brown | fawn-yellow |
| Arilloid colour | orange-yellow | red |
| Seed colour | glossy dark-brown | glossy tan-brown |
| Seed shape | flattened ellipsoid | ellipsoid-obovoid |

A revised key is presented here to the Australian species of *Cupaniopsis* based on that published by Forster (2002), but now including *C. papillosa*. The key requires flowering and/or fruiting material to be successful. Collectors should also ensure that they procure young shoot tips in order that the character of stem apex indumentum is accurately determined.

## Key to the Australian species of *Cupaniopsis*

**1** Leaflets mainly cuneate, widest at or near apex . . . . . 2
Leaflets elliptic, ovate, obovate or oblanceolate, widest well below apex . . . . . 3

**2** Leaves 2–8(–10)-jugate, with pseudostipules. Leaflets spinose-dentate . . . . . **C. shirleyana** (F.M.Bailey) Domin
Leaves 1–2(–3)-jugate, without pseudostipules. Leaflets apically with 2–4 obtuse teeth, rarely entire . . . . . **C. wadsworthii** (F.Muell.) Radlk.

**3** Young stem-apices glabrous . . . . . **C. cooperorum** P.I.Forst.
Young stem-apices pubescent . . . . . 4

**4** Young stem-apices villous or tomentose (noticeably hairy with dense indumentum cover) . . . . . 5
Young stem-apices strigose (finely puberulent with scattered to sparse indumentum cover) . . . . . 9

**5** Sepals internally glabrous. Fruit capsules 15–20 × 22–28 mm, internally glabrous . . . . . **C. tomentella** (F.Muell. ex Benth.) S.T.Reynolds
Sepals internally with appressed hairs, rarely glabrous. Fruit capsules 9–20 × 13–18 mm, internally villous . . . . . 6

**6** Margin of leaflets entire. Fruit pericarp 2.4 mm thick or more . **C. diploglottoides** Adema
Margin of leaflets ± dentate to crenate. Fruit pericarp 0.5–1.8 mm thick . . . . . 7

**7** Teeth of leaflets hard. Inflorescences 1.5–6.5 cm long. Disc glabrous . . . . . **C. serrata** (F.Muell.) Radlk
Teeth of leaflets soft. Inflorescences (6.5–) 11–60 cm long. Disc with hairs in five tufts . . . . . 8

**8** Petiole 3.5–9 cm long; leaves 4–10-jugate. Anthers hairy . . . . . **C. flagelliformis** (F.M.Bailey) Radlk.
Petiole 8–16 cm long; leaves (8–) 10–12-jugate. Anthers glabrous . . . . . **C. newmanii** S.T.Reynolds

**9** Leaflets crenate-dentate . . . . . 10
Leaflets entire . . . . . 11

**10** Trees over 10 m high. Leaflets with dome-shaped to pocket-like domatia below. Fruit capsules 18–22 × 18–20 mm; seeds 17–18 × *c.* 9 mm (SE Qld, NE NSW) . . . . . **C. baileyana** Radlk.
Shrubs or small trees to 12 m high. Leaflets with pustulate domatia below. Fruit capsules *c.* 15 × 13–15 mm; seeds 8–10 × 6.5–7 mm (north Qld) . . . . . **C. foveolata** (F.Muell.) Radlk.

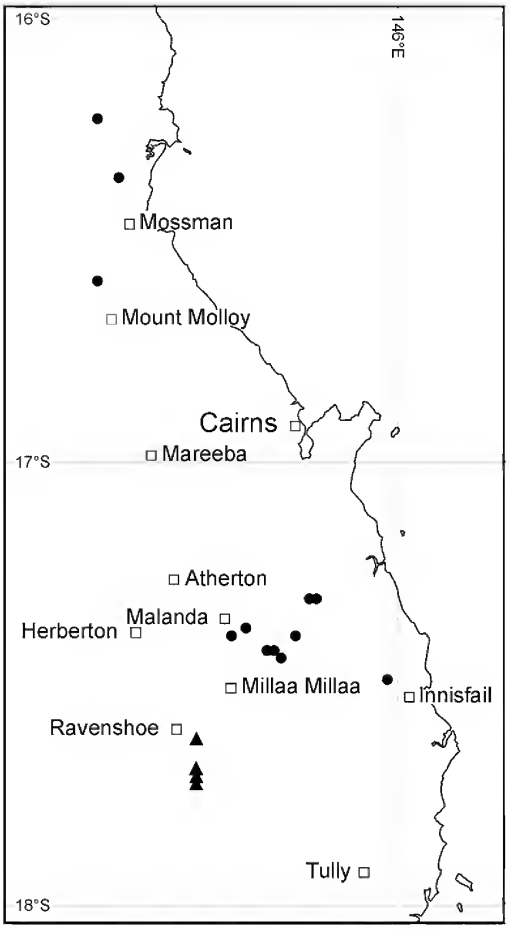
**11** Leaflets with domatia below. Disc glabrous or short hairy all over . . . . . 12
Leaflets without domatia below. Disc with hairs in 5 tufts . . . . . 14

**12** Leaflets ovate to narrow-ovate . . . . . **C. dallachyi** S.T.Reynolds
Leaflets elliptic, oblanceolate, obovate . . . . . 13

**13** Leaflets small (18–72 (–85) × 8–32 (–37) mm). Petals ± ovate, 1.3–1.8 mm long. Fruit capsules 11–12 mm long, orange; arilloid yellow, seed black (Cape York Peninsula) . . . . . **C. fleckeri** S.T.Reynolds
Leaflets large (42–185 × 15–56 mm). Petals ± flabellate, 1.8–3 mm long. Fruit capsules 22–35 mm long, fawn-yellow; arilloid red, seed tan-brown (Wet Tropics) . . . . . **C. papillosa** P.I.Forst.

**14** 2° veins in leaflets 2–5 mm apart . . . . . **C. parvifolia** (F.M.Bailey) L.A.S.Johnson
2° veins in leaflets 6–20 mm apart . . . . . 15

**15** Small spreading tree to 15 m tall. Leaflet upper surface vernicose; 3° and 4° venation fine. Fruit capsules externally glabrous . . . . . **C. anacardioides** (A.Rich.) Radlk.
Tall straight trees to 25 m tall. Leaflet upper surface slightly shiny; 3° and 4° venation coarse. Fruit capsules externally puberulent . . . **C. simulatus** S.T.Reynolds




**Map 1.** Distribution of *Cupaniopsis dallachyi* ● and *C. papillosa* ▲ in north-east Queensland.

***Conservation status*:** *Cupaniopsis papillosa* has a highly restricted area of distribution (less than 10 km²) and is known from three populations, two in State Forest 251. No obvious threats are known, although the degree of population fragmentation remains to be determined and survey work is required to determine the area of occupancy, number of individuals and whether other populations exist. Under IUCN (2001) conservation coding it should be regarded as Data Deficient at this stage.

***Etymology*:** The specific epithet is derived from the Latin word *papillosus* (papillose, covered with papillae) and alludes to the highly reduced hairs on the ripe fruit exocarp that are papillate in appearance.

## Acknowledgements

Thanks to Wendy Cooper for bringing this species to attention and for collecting material and providing observations; Will Smith (BRI) for the illustrations; Peter Bostock (BRI) for translation of the diagnosis into Latin and production of the distribution map; and the referee for comments on the manuscript.

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# *Cryptandra triplex* K.R.Thiele ex Kellermann, a new species of Rhamnaceae (*Pomaderreae*) from Arnhem Land, Northern Territory

**Jürgen Kellermann**

**Summary**

Kellermann, J. (2006). *Cryptandra triplex*, K.R.Thiele ex Kellermann, a new species of Rhamnaceae (*Pomaderreae*) from Arnhem Land, Northern Territory. *Austrobaileya* 7(2): 299–303. A new species of *Cryptandra* Sm. is described from the Kakadu and Nitmiluk National Parks in Arnhem Land, Northern Territory, *viz.*, *C. triplex* K.R.Thiele ex Kellermann. It is closely related to *C. intratropica* W.Fitzg. and *C. filiformis* A.R.Bean. A distribution map, a photograph of the holotype and a key to *Cryptandra* species from northern Australia are provided.

Key Words: Rhamnaceae, *Pomaderreae*, *Cryptandra triplex*, new species, Australian flora, Northern Territory flora, Arnhem Land, identification key

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## Introduction

*Cryptandra* Sm. is a genus of about 55 species and occurs predominantly in the temperate to subtropical, semi-arid regions of Australia with centres of diversity in south-western Western Australia and south-eastern Australia. There are also a few species distributed in northern tropical Australia. Two species occur in northern Western Australia, *Cryptandra intratropica* W.Fitzg. and *C. monticola* Rye & Trudgen from the Kimberley and the Pilbara, respectively, one species has been described from Arnhem Land in the Northern Territory, *C. gemmata* A.R.Bean, and three species are known from the Cook District of Queensland, *C. debilis* A.R.Bean, *C. filiformis* A.R.Bean and *C. pogonoloba* A.R.Bean (with two subspecies: *C. pogonoloba* subsp. *pogonoloba* and *C. pogonoloba* subsp. *septentrionalis* Kellermann).

This paper recognises a further new species of *Cryptandra* for northern Australia, *C. triplex* K.R.Thiele ex Kellermann. It was first collected in fruit by Lyn Craven in 1980 from an area near Jabiru in Kakadu National Park (N.P.) in the Northern Territory (N.T.), and in flower the following year. Subsequently, more collections were made from Kakadu N.P. and the adjoining Nitmiluk N.P. During the preparation of the 'Flora of Australia' treatment of Rhamnaceae, Kevin Thiele recognised it as a distinct taxon, closely allied to *C. intratropica*. However, uncertainties regarding the circumscription of the genera of Australian Rhamnaceae prevented formal naming of the species. I have here adopted Kevin Thiele's manuscript name, but am solely responsible for the validating description of this species.

Recent molecular systematic analyses (Kellermann *et al.* 2005) showed that *Cryptandra triplex* and *C. intratropica* were nested deep within a clade of typical *Cryptandra* species. *Cryptandra intratropica*, *C. triplex* and *C. filiformis* are unique within the genus in having a consistently dense indumentum of stellate hairs on both surfaces of the leaves, flowers and stems, in addition to having flowers in few-flowered contracted cymes, which are sometimes arranged in short panicles. More typical species of *Cryptandra* have single flowers which are subtended by one to several rows of bracts, and are usually glabrous on the upper surface of the leaves (Thiele & West 2004).

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## Taxonomy

**Cryptandra triplex** K.R.Thiele ex Kellermann, **species nov.** a *Cryptandra intratropica* W.Fitzg. ovario tri-loculari et fructu parviore toro fere basali differt. **Typus:** Northern Territory, ARNHEM LAND: 15 km NNE of Jabiru East, 12°32′S, 132°57′E, 22 March 1981, *L.A. Craven 6546* (holo: MEL; iso: CANB, DNA *n.v.*, MEL; A, AD, B, BISH, BRI, CHR, E, G, HO, K, L, NE, NSW, NY, P, PRE, RSA, UC, US, *distribuendi*).

*Cryptandra* D019989 Jabiru, Dunlop (1995: 21).

*Cryptandra* sp. 5 (Jabiru; L.A.Craven 6484), Briggs & Leigh (1996: 161).

*Cryptandra* sp. Jabiru (L.A.Craven 6484), Cowie & Albrecht (2005).

*Cryptandra* sp. 'Jabiru East', Kellermann *et al.* (2005), Ladiges *et al.* (2005).

Evergreen *shrub* to 1.2 m high; young stems, leaves and flowers densely and closely greyish stellate-pubescent. *Leaves* alternate: *stipules* linear-filiform or narrowly triangular, (1.5–) 2–3.5 mm long, persistent, free, moderately to densely stellate-pubescent; *petiole* 0.5–2 mm long; *lamina* narrowly elliptical to oblanceolate or obovate, 10–22 mm long, (2.5–) 3–6 mm wide, flat with the margins narrowly recurved, base cuneate, apex obtuse to subacute or slightly emarginate, venation penninerved, the veins clearly visible below or obscure, ± concolorous. *Inflorescences* contracted cymes with 1–5 flowers, axillary towards the branch tips, the cymes sometimes forming short, leafy panicles. *Pedicels* up to 0.5 mm long, subtended by 3–5 bracts; *bracts* ovate, 0.6–1 mm long. *Flowers* bisexual, 5-merous, white or cream to yellowish. *Hypanthium tube* 0.4–0.6 mm long, 1.8–2 mm diameter. *Sepals* 1–1.2 mm long, incurved or erect at anthesis, persistent in fruit. *Petals* cucullate, 0.8–1 mm long, erect, distinctly clawed. *Stamens* subequal to petals, 0.8–0.9 mm long, erect; *anthers* 0.3–0.4 mm long. *Disk* conspicuous, pubescent, forming a narrow rim around the ovary at the base of the hypanthium tube. *Ovary* inferior to half-inferior at anthesis; roof densely stellate-hairy; carpels 3; *style* (0.6–) 0.8–1.3 mm long, glabrous, unbranched. *Fruit* an obovoid schizocarpic capsule, 1.6–2.2 mm long, grey or brown, apex obtuse; torus in the lower third; *fruitlets* splitting along their inner surface to release the seeds. *Seed* 1.1–1.4 mm long, reddish brown, arillate; aril *c.* 0.4 mm long. **Fig. 1.**

***Additional specimens examined*: Northern Territory**. ARNHEM LAND. 15 km NNE of Jabiru East, Jun 1980, *Craven 6484* (MEL, CANB, DNA *n.v.*; A, AD, *distribuendi*); Kakadu N.P., N outliers, 14 km NE Jabiru Airstrip, Mar 2004, *Brennan 6133* (DNA, MEL; duplicates not seen: AD, B, BRI, CANB, MO, NSW, NT, PERTH); Kakadu N.P., S end of N Outliers, 13 km NE of Jabiru Airfield, Mar 2004, *Kerrigan 801* (DNA); N UDP Range, Map 5371 Mundogie, Apr 1990, *Brennan 64 & Orr* (DNA); Kakadu N.P., Gravesite Gorge, Mar 2004, *Brennan 6202* (DNA); Kakadu N.P., Gravesite Gorge, Feb 2005, *Egan 5506* (DNA); Nitmiluk N.P., Art Site, Edith Region, May 2001, *Short 5116 & Kerrigan* (DNA); Nitmiluk N.P., Feb 2001, *Michell 3147 & Boyce* (DNA); Nitmiluk N.P., Feb. 2001, *Michell 3148* (DNA); Nitmiluk N.P., W side of site 496, Apr 2001, *Risler 1631 & Waetke* (DNA).

***Distribution & habitat*:** Known only from Kakadu and Nitmiluk National Parks in the N.T. Occurs on sandstone plateaux, cliffs and outcrops with mixed shrubland, woodland of *Eucalyptus phoenicea* F.Muell. and *Acacia latescens* Benth., or localised *Allosyncarpia* S.T.Blake forests. **Map 1.**

***Affinities*:** *Cryptandra triplex* is closely related to *C. intratropica*, which differs in its 2-carpellate flowers, and longer capsule (2.5–3 mm long) with the ovary roof less domed so that the torus lies in the middle or upper third. Both species can be distinguished from *C. filiformis* by their obovate flat or recurved leaves, compared to the narrowly elliptic to linear, revolute leaves of *C. filiformis*; the torus of that species is also in the middle third.

***Phenology*:** Flowers recorded February to April; fruits April to May.

***Conservation status*:** The species is known only from Kakadu and Nitmiluk National Parks, in isolated and rugged country. It is probably highly localised but not under any known threat. A conservation code of **2RC-** was suggested by Briggs & Leigh (1996).

***Etymology*:** The epithet is derived from the Latin *triplex* (three-fold), as the species has a 3-carpellate ovary, in comparison to the 2-carpellate gynoecium of the closely related *C. intratropica*.


**Fig. 1.** Holotype of ***Cryptandra triplex*** (MEL).

**Key to species of *Cryptandra* from northern Australia**

**1** Ovary 2-locular; Kimberley, W.A. . . . . **C. intratropica**
Ovary 3-locular; north Qld, N.T. and Pilbara, W.A. . . . . 2

**2** Flowers pedicellate in open cymose inflorescences; densely stellate-pubescent on young stems, leaves, inflorescences and flowers . . . . . 3
Flowers sessile, single or clustered into conflorescences at the branch tips; indumentum of stellate and simple hairs . . . . . 4

**3** Leaves narrowly elliptic to linear, revolute; eastern Qld . . . . . **C. filiformis**
Leaves obovate, flat or recurved; northern N.T. . . . . **C. triplex**

**4** Leaves minute, 0.8–1.6 (–2) mm long, strongly revolute, glabrous above, northern N.T. . . . . **C. gemmata**
Leaves 2.3–12 (–18) mm long, recurved or revolute, glabrous or with papillae, simple and/or stellate hairs above . . . . . 5

**5** Young stems soon becoming glabrous or near glabrous, often with reddish bark; leaves with an incurved dark mucro; shrubs to 0.3 m high; south-eastern Cape York Peninsula, Qld . . . . . **C. debilis**
Young stems with stellate and/or simple hairs presisting to older stems of current season's growth, bark brown to dark brown; mucro erect or recruved, if present; shrubs 0.2–2 m high . . . . . 6

**6** Leaves 1–2.5 (–3) mm wide, margins recurved, upper surface covered in stellate hairs and longer antrorse simple hairs; conflorescence of 4–12 flowers; hypanthium tube 1.1–1.4 mm long; Pilbara, W.A. . . . . **C. monticola**
Leaves 0.4–1.2 mm wide, margins recurved or revolute, indumentum not as above; conflorescences of 1–5 flowers; hypanthium tube 0.6–0.8 mm long; Qld . . . . . 7

**7** Leaves (1.4–) 3–9 mm long, 0.5–1.2 mm wide, margins recurved or revolute; lower surface or at least midrib partly visible; upper leaf surface with papillae or tubercles, simple or stellate hairs; flowers solitary or in clusters; southern Cape York Peninsula, Qld . . . . . **C. pogonoloba** subsp. **pogonoloba**
Leaves 2.3–4.5 mm long; 0.4–0.6 mm wide, margins strongly revolute; lower surface and midrib usually concealed; upper leaf surface glabrous, smooth; flowers always solitary; northern Cape York Peninsula, Qld . . . . . **C. pogonoloba** subsp. **septentrionalis**

**Acknowledgments**

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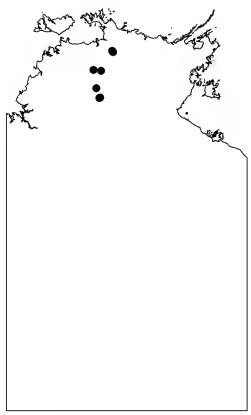

**Map. 1.** Distribution of ***Cryptandra triplex*** in the Northern Territory.

# *Eucalyptus megasepala* A.R.Bean (Myrtaceae), a new species from Queensland allied to *E. tetrodonta* F.Muell.

**A.R. Bean**

**Summary**

Bean, A.R. (2006), *Eucalyptus megasepala* A.R.Bean (Myrtaceae), a new species from Queensland allied to *E. tetrodonta* F.Muell. (Myrtaceae). *Austrobaileya* 7(2): 305–310. Full descriptions, illustrations and distribution maps are provided for both *Eucalyptus tetrodonta* and *E. megasepala* sp. nov., the latter found in north-east Queensland.

Key Words: Myrtaceae, *Eucalyptus megasepala*, *Eucalyptus tetrodonta*, taxonomy, new species, Australian flora, Queensland flora, identification key

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## Introduction

*Eucalyptus tetrodonta* F.Muell. is a very common species occurring right across the north of Australia, from the northern Kimberley of Western Australia to north-eastern Queensland. Frequently it is a dominant or co-dominant species of tropical woodlands or open-forest. It is commonly called Darwin stringybark, stringybark, or sometimes messmate. It is a useful timber tree species. The heartwood is pale red, fairly hard, dense, and moderately durable. It is used for poles and general house construction (Boland *et al.* 1984).

*Eucalyptus tetrodonta sens. lat.* is highly distinctive in the field because of its grey stringy bark (the only species with that bark type in its area of occurrence, except *Corymbia jacobsiana*) and long grey-green falcate leaves. It is also readily distinguished in the herbarium, because of its 3-flowered axillary inflorescences, opposite or sub-opposite adult leaves and buds with conspicuous free sepals.

Hill & Johnson (1998) recognised its taxonomic isolation by placing it into a new, monotypic but informal section (*Eucalyptus* sect. '*Fibraria*'). This section does not, and was not intended to conform to the rules of the ICBN. Brooker (2000) maintained *E. tetrodonta* in a monotypic section, which he named *Eucalyptus* sect. *Complanatae* Brooker, validly published under the ICBN rules.

Boland *et al.* (1984) documented an unusual form of *Eucalyptus tetrodonta* known from near Laura in north Queensland. This taxon has been collected numerous times from numerous locations since that time. It is described here as *E. megasepala*. Surprisingly, Hill & Johnson (1998) made no mention of variation within *E. tetrodonta*, or the possibility of undescribed taxa within it. At least one of the specimens that they cited under *E. tetrodonta* belongs in *E. megasepala*. Their description of *E. tetrodonta* included the following erroneous statements: the adult leaves 'disjunct', the lateral veins 'at 30° to the midrib', the mature buds 10–25 mm long, the peduncles 1–5 mm long and the stamens as being arranged 'in 4 fascicles'.

## Materials and methods

When the leaves are more or less evenly spaced along the branchlet, the often used terms 'alternate' or 'alternating' are suitable. The term 'disjunct' has been used in taxonomic eucalypt descriptions only by L.A.S. Johnson and his co-authors. This term, as applied by those authors, has the same meaning as 'alternate', judging by its usage in the great majority of species descriptions.

The arrangement of the adult leaves for *E. tetrodonta* was described by Brooker & Kleinig (1994) as 'alternating', when in fact it is either 'sub-opposite' or opposite.

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Detailed descriptions, illustrations and distribution maps are provided for both *E. tetrodonta* and *E. megasepala*. Stigma morphology follows Boland & Sedgley (1986).

## Taxonomy

**Eucalyptus tetrodonta** F.Muell., *J. Proc. Linn. Soc., Bot.* 3: 97 (1859). **Type:** [Northern Territory] entrance to Victoria River, September 1855, *F. Mueller* (lecto: MEL *n.v.*, photo!), *fide* Maiden (1921).

***Illustrations*:** Brooker & Kleinig (1994: 139); Milson (2000: 230–231); Boland *et al.* (1984: 241).

Tree 10–20 metres high, occasionally to 30 metres, lignotuberous. Bark persistent throughout, fibrous to stringy, grey when exposed. Juvenile leaves opposite, ovate to broad-lanceolate, 15–30 × 3.5–10 cm, concolorous, petiolate. Adult leaves lanceolate or falcate, 9.5–19.5 × 1.5–3.5 cm, opposite or sub-opposite, leathery, concolorous, dull; apex attenuate, base cuneate to attenuate, lateral veins at 45–60° to the midrib, intramarginal vein present; reticulation sparse or moderately dense, with small island oil glands; petioles 12–18 mm long, flattened. Inflorescences axillary, unbranched, 3-flowered, floral bracts sometimes present, *c.* 3 mm long; peduncles erect or recurved, 6–16 mm long, 1.9–2.9 mm wide, terete to angular; pedicels 2.5–5 mm long, angular. Mature buds obovoid to globular, 8.5–11.5 mm long, 6.5–10 mm in diameter. Hypanthium unribbed to 2-ribbed; sepals 4, 1–2.5 mm long, persistent, lower part fused to hypanthium, upper part free; operculum hemispherical, smooth to faintly ribbed; stamens white, inflexed, all fertile, arranged in a continuous ring on the staminophore. Anthers oblong, versatile, dorsifixed, opening in longitudinal slits. Style terete, stigma blunt. Ovary 3-locular. Fruiting peduncles 1.8–3 mm wide, terete or angular; fruits cupular, cylindrical or truncate-ovoid, circular in cross-section, 15–20 mm long, 11–14 mm diameter, longitudinal ribs absent or 2, disc descending, valves 3, enclosed or at rim level. Seeds grey, ± circular, concavo-convex, surface not reticulate, hilum ventral. Chaff brown, cuneate to cuboid. **Fig. 1.**

***Additional selected specimens examined*: Queensland.** BURKE DISTRICT: 45 km NW of Torrens Creek, Apr 1993, *Thompson HUG390 et al.* (BRI); Glenore, S of Normanton, May 1998, *Wannan839* (BRI). COOK DISTRICT: above Little Laura River, SSW of Laura, Jul 1990, *Bean 1691* (BRI); 8.4 km S of 'Burlington' crossroads, N of Mt Surprise, Aug 1997, *Bean 12232* (BRI, CANB); 46 miles [74 km] by road from Laura towards Coen at Hann River crossing, Aug 1973, *Brooker 4054* (BRI, CANB); Bulleringa N.P., 80 km NW of Mt Surprise, Apr 1998, *Forster PIF22676 & Booth* (BRI, DNA, MEL); near Lynd River, on Dimbulah–Normanton road, Jul 1999, *Fox IDF412 & Middleton* (BRI); 11.3 km E of Wenlock River crossing on road to Iron Range, Aug 1977, *Hind 2039 & Ingram* (BRI, CANB, NSW); 'Kalpowar', *c.* 45 km N of homestead towards outstation, Aug 1978, *Kanis 1988* (BRI, CANB); 45 km along Palmerville road, from Cape York development road, Jul 1994, *Slee et al. 3627* (BRI, CANB, MEL). **Northern Territory.** Cutta Cutta, Jul 1990, *Evans 3274* (BRI, CANB, DNA, MEL); 40 km E of Calvert River crossing, Jun 1974, *Maconochie 2042* (BRI, CANB, DNA, NSW); Frenchmans Landing, NW of Peppimenaiti, Aug 1988, *Orr 217* (CANB, DNA); 2 km E of Borroloola, Jun 1988, *Smith 1224* (DNA); Oenpelli road, 2.25 km NE of Ja Ja, Aug 1980, *Waterhouse UNSW10547* (BRI); Yapilika, Melville Island, Sep 1986, *Wilson 10* (DNA). **Western Australia.** 20 miles [32 km] NW of Beverley Springs Station, Jul 1973, *Aplin 5678* (BRI, CANB); 24 miles [40 km] SE of Kimberley Research Station, Jul 1952, Perry 2939 (CANB, DNA); E of Kununurra, Aug 1978, *Petheram 112* (DNA); 12 miles [20 km] NE of Kalumburu Mission, Sep 1954, *Speck 4893* (CANB, DNA).

***Distribution and habitat*:** *Eucalyptus tetrodonta* is widespread from the northern Kimberley of Western Australia to Cooktown in Queensland, and inland to roughly the 800 mm isohyet (**Map 1**). It is most often recorded from sandy soils, on plains, creekbanks and hillsides, but also on laterite. It is associated with wide variety of other eucalypt species, but especially *E. miniata*.

***Phenology*:** Flowers are borne from July to October; fruits from October to April.

***Notes*:** The protologue for *Eucalyptus tetrodonta* cited specimens collected by Cunningham and Armstrong, in addition to Mueller's broad description of where he saw the species. However, Hill & Johnson (1998) correctly pointed out that the Cunningham and Armstrong citations were added by the editor of the journal in London, and that Mueller did not have access to those specimens.

Maiden (1921) effectively lectotypified *Eucalyptus tetrodonta* with the words "the type came from the entrance to the Victoria

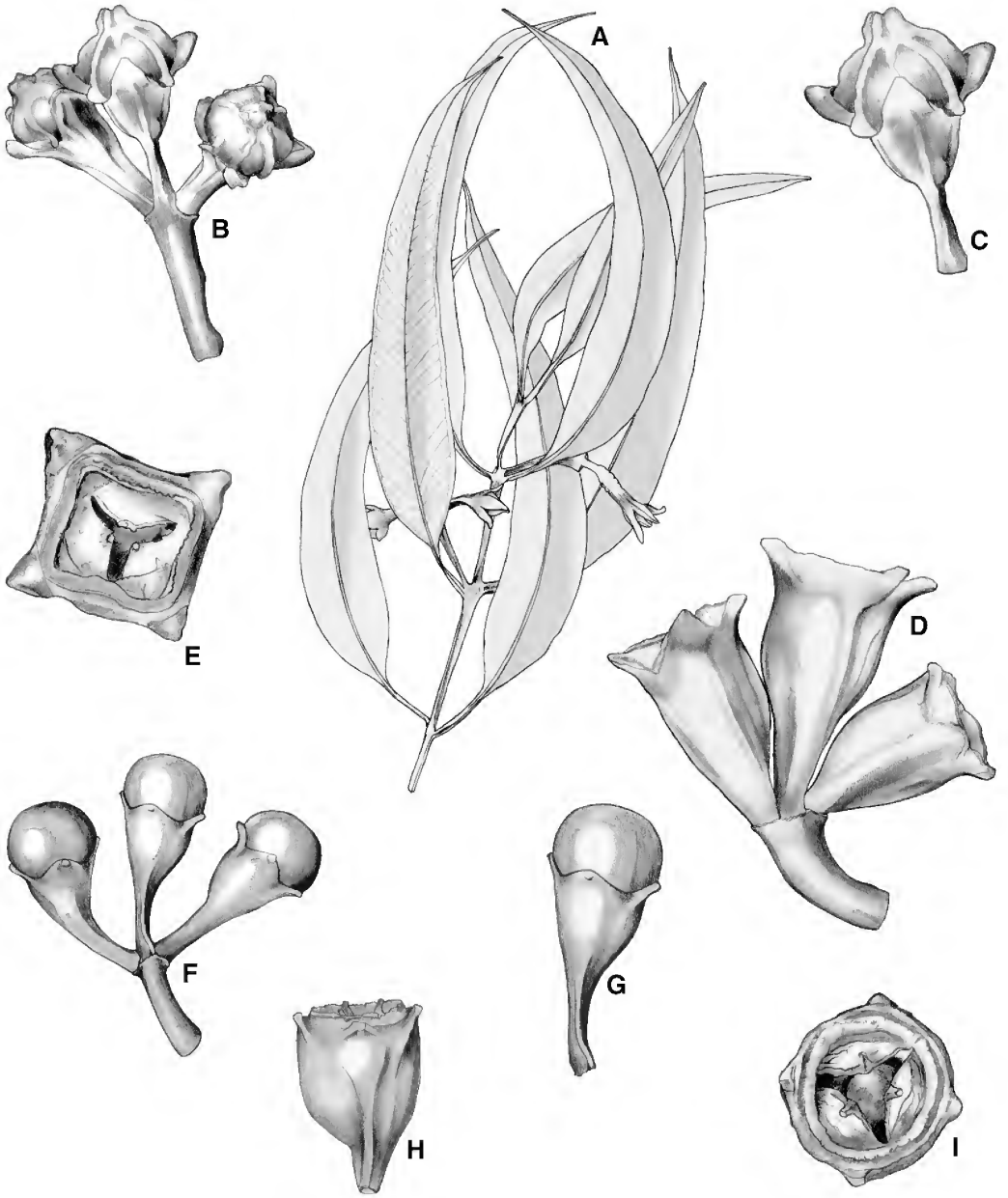


**Fig. 1.** ***Eucalyptus megasepala.*** A. branchlet showing opposite to sub-opposite leaves and axillary inflorescences × 0.5. B. single umbel of buds, close to maturity × 1.5. C. bud, showing the conspicuously ribbed operculum and the large sepals × 2. D. single umbel of fruits × 1.5. E. fruit viewed from above × 2. ***Eucalyptus tetrodonta.*** F. single umbel of buds, close to maturity × 1.5. G. bud, showing the unribbed operculum and the relatively small sepals × 2. H. single fruit × 1.5. I. fruit viewed from above × 2. A, *Forster PIF10108*; B–C, *Hyland 5178*; D–E, *Clarkson 9725*; F–G, *Clarkson 10563*; H–I, *Milson 1193* (all BRI). Del. W.Smith.

River and the elevated sterile districts of Arnhem's Land. Stringybark. (Mueller)". The latter part of this statement is taken from the protologue, but the reference to "entrance to the Victoria River" can only have come from the label of Mueller's specimen at MEL. The lectotype bears fruits only, and the fragment packet contains fruits only (V. Stajsic pers. comm.). There is a photograph of it in Blake (1953: plate 9). Chippendale (1988) incorrectly referred to this specimen as the holotype.

***Conservation status*:** Common and widespread.

**Eucalyptus megasepala** A.R.Bean, **species nov.** ab *E. tetrodonta* alabastris pervalde 4-vel 8-costatis, 12–17 × 10–14 mm sub maturitate; operculo conico usque apiculato; sepalis 5–9 mm longis; pedunculis ubi fructiferis valde complanatis, 4–7.5 mm latis, fructibus in sectione transversali ± quadratis, costis longitudinalibus 4 differt. **Typus:** Queensland. Cook District: 7 km W of Jowalbinna, 5 July 1990, *A.R. Bean 1732* (holo: BRI; iso: CANB, NSW, distribuendi).

Tree 10–20 metres high, lignotuberous. Bark persistent throughout, fibrous to stringy, grey when exposed. Juvenile leaves unknown. Adult leaves lanceolate or falcate, 10.5–22 × 1.5–3.2 cm, opposite or sub-opposite, leathery, concolorous, dull; apex attenuate, base cuneate to attenuate, lateral veins at 45–60° to the midrib, intramarginal vein present; reticulation sparse or moderately dense, with small island oil glands; petioles 10–22 mm long, terete or somewhat flattened. Inflorescences axillary, unbranched, 3-flowered, floral bracts sometimes present, 5–7 mm long; peduncles erect or recurved, 9–21 mm long, 3–5 mm wide, strongly flattened; pedicels 3–9 mm long, flattened. Mature buds broadly ellipsoid, 12–17 mm long, 10–14 mm diameter. Hypanthium strongly 4-ribbed, sometimes 8-ribbed; sepals 4, 5–9 mm long, persistent, lower part fused to hypanthium, upper part free; operculum conical to apiculate, strongly ribbed; stamens white, inflexed, all fertile, annular on the staminophore. Anthers oblong, versatile, dorsifixed, opening in longitudinal slits. Style terete, stigma blunt. Ovary 3-locular. Fruiting peduncles 4–7.5 mm wide, strongly flattened; fruits cupular, cylindrical or truncate-ovoid, quadrangular in cross-section, 18–23 mm long, 12–16 mm in diameter, longitudinal ribs 4, disc descending, valves 3, enclosed or at rim level. Seeds grey, ± circular, concavo-convex, *c.* 3 mm long, part of margin with rudimentary wing, surface not reticulate, hilum ventral. Chaff brown, cuneate to cuboid. **Fig. 1**.

***Additional selected specimens examined*: Queensland.** Cook District: 41.5 km from Almaden towards Mt Surprise, Jun 1987, *Bean 599* (BRI); 15 km from Wrotham Park–Chillagoe road, towards 'Blackdown', Jan 1993, *Bean 5585 & Forster* (BRI); Wenlock, Batavia River, Jul 1948, *Brass 19723* (BRI, CANB); 17.3 km N of the Archer River crossing on the Peninsula Development road, Aug 1983, *Clarkson 4864* (BRI, CANB, NSW, QRS); 6.7 km E of the Peninsula Development road on the road to Iron Range, Jul 1985, *Clarkson 6120* (BRI, CANB, DNA, NSW, PERTH, QRS); *c.* 14 km from Laura on Cairns road, Apr 1975, *Craven 3236* (BRI, CANB); Killarney Road, 12 km N of Kimba–Laura road, Jun 1988, *Dalliston CC54* (BRI, CANB); 10 km along road to Leo Creek mine, McIlwraith Range, Jun 1992, *Forster PIF10108* (BRI); Pannikin Springs area, Blackdown Station, May 1999, *Forster PIF24374 & Booth* (BRI); Wrotham Park station, *c.* 10 miles [16 km] S of the Mitchell River, May 1971, *Gill s.n.* (BRI [AQ3821]); Kennedy road N of Morehead River, Jul 1965, *Gittins 985* (BRI); 28 miles [45 km] NW of Laura, Jun 1971, *Hyland 5177* (BRI, CANB, QRS); between Maytown and Spring Creek, Jun 1975, *Hyland 8277* (BRI, CANB, QRS); Iron Mountain, 8 km S of Emuford, Mar 1990, *Liddle s.n.* (BRI [AQ484358], CANB); 5 km S of Laura road, *c.* 68 km SW of Cooktown, Apr 1975, *McDonald 1634 & Batianoff* (BRI); *c.* 20 miles [32 km] NW of Chillagoe, Nov 1965, *Pedley 1828* (BRI); near Normanby River, 32 miles [51 km] ENE of Laura, Jun 1968, *Pedley 2636* (BRI, CANB).

***Distribution and habitat*:** *Eucalyptus megasepala* is endemic to Queensland, and has a considerable north-south range from south-west of Iron Range to near Irvinebank (**Map 2**). It is most often recorded from sandstone ridges, plateaux or outcrops, but also on gently undulating areas with sandy-loam soils. In sandstone areas, it is commonly associated with *Corymbia stockeri* subsp. *stockeri, C. pocillum* or *C. gilbertensis*; on more gentle landforms, it grows with *E. platyphylla, E. cullenii* and *C. stockeri* subsp. *peninsularis*.

***Notes*:** While *Eucalyptus megasepala* and *E. tetrodonta* are clearly closely related sister taxa, they are as distinct, or more distinct, than several other eucalypt pairs currently recognised at species rank e.g. *E. biturbinata*

and *E. longirostrata; E. lirata* and *E. similis; E. pleurocarpa* and *E. extrica; E. notabilis* and *E. resinifera; E. seeana* and *E. interstans; E. moluccana* and *E. microcarpa; Corymbia pocillum* and *C. ellipsoidea; C. dallachiana* and *C. aparrerinja*. They are very readily distinguishable with either budding or fruiting material.

Species rank for *Eucalyptus megasepala* is further supported by the fact that although it often occurs in the same general vicinity as *E. tetrodonta*, its habitat is different, and there is no evidence of intergradation with the related species.

*Eucalyptus megasepala* is known only from Queensland. In the Northern Territory, *E. tetrodonta* appears to be quite variable, and additional taxa may exist within it.

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The two species are distinguished by the following key:

Mature buds 8.5–12 × 6.5–10 mm; sepals 1–3 mm long; buds smooth or with very faint ribs, operculum hemispherical; fruiting peduncles 1.8–3 mm wide, terete or angular; fruits circular in cross-section, longitudinal ribs absent or 2 . . . . . **E. tetrodonta**

Mature buds 12–17 × 10–14 mm; sepals 5–9 mm long; buds very strongly 4- or 8-ribbed, operculum conical to apiculate; fruiting peduncles 4–7.5 mm wide, strongly flattened; fruits ± square in cross-section, longitudinal ribs 4 . . . . . **E. megasepala**

***Phenology*:** Flowers are borne from April to July; fruits from July to January. The phenology of *Eucalyptus tetrodonta* (in Queensland) and *E. megasepala* is significantly different, as is the habitat. I have observed both species in the Laura area; trees of *E. tetrodonta* (*Bean 1691*) were on sandy alluvium, and bore mature buds but no flowers; trees of *E. megasepala* (*Bean 1732*) were on a sandstone outcrop, and were in full flower. Judging by the extensive herbarium collections at BRI, *E. megasepala* flowers earlier than *E. tetrodonta* in any given location, and July is the only month when both species are in flower. It seems clear that the correlations between morphology–habitat and morphology–phenology apply throughout the ranges of the species in Queensland.

***Conservation status*:** Common and widespread.

***Etymology*:** From the Greek *mega* (large) and *sepalum* (sepal). This refers to the sepals of this species that are much larger than those on the related *E. tetrodonta*.

## Acknowledgements

I am grateful to the Director of the Darwin Herbarium (DNA) for access to their specimens, to Will Smith for the illustration, to Les Pedley for the Latin diagnosis and to Val Stajsic (MEL) for checking the type specimen for me.

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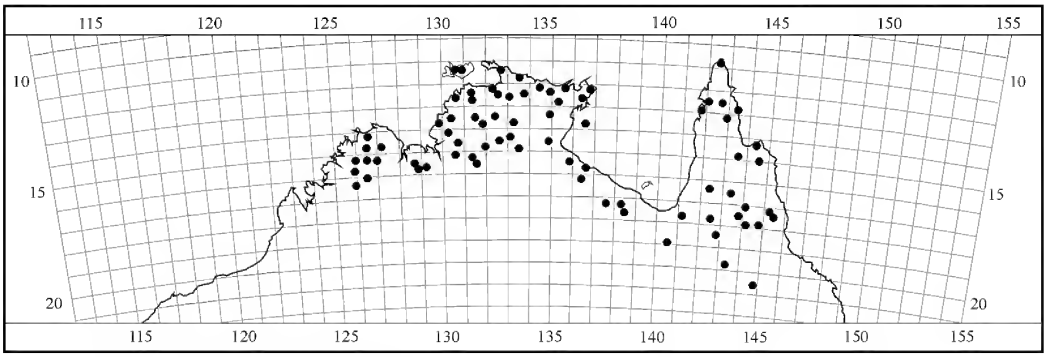
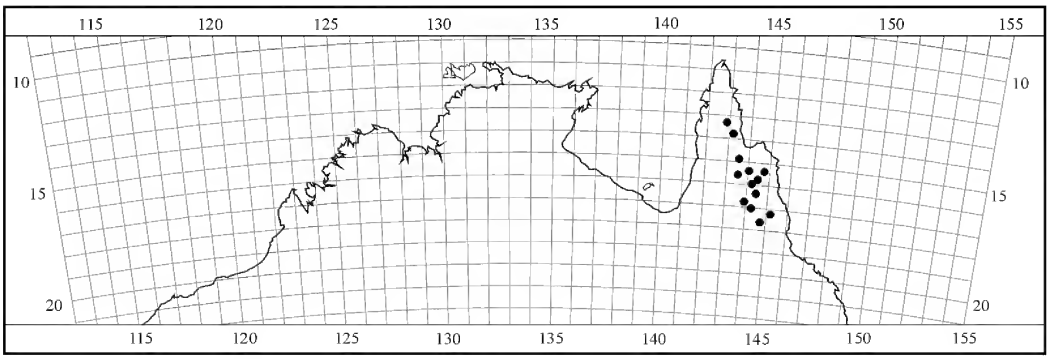



**Map1.** Distribution of *Eucalyptus tetradonta* • .




**Map2.** Distribution of *Eucalyptus megasepala* • .

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# The enigmatic *Ipomoea polpha* R.W.Johnson (Convolvulaceae)

**R.W. Johnson**

**Summary**

Johnson, R.W. (2006). The enigmatic *Ipomoea polpha* R.W.Johnson (Convolvulaceae). *Austrobaileya* 7(2): 311–317. Variation within *Ipomoea polpha* is discussed and three subspecies recognised, two subspecies, *I. polpha* subsp. *latzii* R.W.Johnson and *I. polpha* subsp. *weirana* R.W.Johnson are described as new. Causes of the widely disjunct current distribution of the three subspecies are postulated.

Key Words: Convolvulaceae, *Ipomoea polpha*, *Ipomoea polpha* subsp. *polpha*, *Ipomoea polpha* subsp. *latzii*, *Ipomoea polpha* subsp. *weirana*, new subspecies, Australian flora, Northern Territory flora, Queensland flora, identification key

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## Introduction

The taxonomic problems associated with *Ipomoea polpha* R.W.Johnson began when Mueller & Hill described *I. calobra* from a specimen collected by Hill from the Barcoo River (Mueller 1879). The specimen was collected from a vine climbing up mulga trees and only one flower was available for description. This specimen was associated with the name "Calobra". Later in the same volume Mueller (1881) added further information to the description following receipt of a specimen with flowers and fruit from Fitzgerald, collected from between the Moonie and Balonne Rivers. The common name "Weir" was associated with the latter specimen. However, the Fitzgerald specimen was not of *I. calobra* but of the south Queensland population now associated with *I. polpha*. The description of *I. calobra* provided by Bailey (1901) in the Queensland Flora was based on these mixed collections.

*Ipomoea polpha* was described from a specimen collected south of Mareeba in northern Queensland (Johnson 1986). The author noted that beside the populations from North Queensland, a population in the Northern Territory probably belonged to this species and warranted subspecific rank. In addition, populations from the Surat – St George district in southern Queensland also appeared to be related to the other populations.

Austin *et al.* (1993) treated these three population groups under *I. polpha sensu lato*. Restriction fragment length polymorphism (RFLP) analysis was used in their study on a group of species related to *I. gracilis* R.Br. This showed the three population groups were tightly grouped. Molyneux *et al.* (1995) studied the glycosidase inhibitors swainsonine and calystegine $B_2$ in each of the three population groups. They suggested a close chemotaxonomic relationship among the populations but noted differences in the composition of minor constituents suggesting they may be specifically distinct.

These three population groups are very discrete geographically and are separated from each other by more than 1000 km (**Map 1**). All three taxa have well-developed tuberous root systems which provided a very valuable source of food for local aboriginal tribes. The close morphological similarity and the very discrete distribution indicate these populations should be regarded as subspecies of *I. polpha*.

The three population centres are:

**1. North Queensland populations.** These populations extend along coastal ranges from southwest of Lakeland Downs (north of Mareeba) in the north to southwest of Home Hill and west to Hughenden.

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**2. Northern Territory populations.** These populations are confined to approximately 100 km$^2$ on Stirling and Ti Tree stations, *c.* 200 km northeast of Alice Springs.

**3. South Queensland populations.** These populations are found in the Roma– Surat– St George area of southern Queensland except for an outlier *c.* 42 km northwest of Adavale.

## Taxonomy

**Ipomoea polpha** R.W.Johnson, *Austrobaileya* 2: 220 (1986). **Type:** Queensland. Cook District: *c.* 3.5 km N of Walkamin on road to Mareeba, 30 January 1980, *J.R.Clarkson 2754* (holo: BRI).

Perennial herb with a well-developed tuberous root system, with trailing, terete, annual stems to 4 m, becoming thick, hollow and ribbed, glabrous to sparse or rarely moderately hairy with very short hairs. Leaves petiolate; petiole 15–80 mm long, petiole length to blade length 0.25–0.6; leaf blade broadly ovate, oblong-ovate to elliptic, 50–280 mm long, 25–230 mm wide, length: breadth ratio 1–3.5, apex obtuse to rounded, rarely acute, slightly emarginate, mucronate, base tapering, obtuse, truncate to cordate, glabrous to sparsely or rarely moderately hairy with very short, tubercle-based, weakly ascending to erect hairs, 0.1–0.2 mm long, with a midrib and 7–14 pair of secondary veins, bearing at the base dark red irregularly linear to narrowly oval glands, 0.3–2 mm long. Inflorescence axillary, cymose, compound, bearing 1–10 flowers; peduncle terete, becoming slightly ribbed, stout, 20–300 mm long, hairs as for the stem; bracteoles opposite to sub-opposite, occasionally alternate, ovate to triangular, rarely oblong, 2–7 mm long, 2–3 mm wide, apex rounded or obtuse, rarely acute, shortly mucronate, ± glabrous, often with short hairs at mucro, deciduous at flowering; pedicel stout, terete, dilated upwards, 8–55 mm long, glabrous to sparsely, rarely moderately hairy, bearing at the base of the calyx 5 linear to lens-shaped dark reddish-purple glands, with raised margins, 0.5–3 mm long. Outer sepals concave, ovate, ovate-elliptic or oblong-elliptic, 7.5–16 mm long, 4–11 mm wide, apex obtuse to rounded, occasionally emarginate, mucronulate, base rounded, ± glabrous, with a few very short hairs at the tip, thick, becoming leathery, with a thin hyaline margin, surface smooth, with 3–5 or more fine darker longitudinal veins; inner sepals concave, ovate, ovate-elliptic, oblong-elliptic to ovate-oblong, 10–18 mm long, 6–14 mm wide, apex obtuse to rounded, occasionally emarginate, shortly apiculate, mucronulate, base slightly cordate, truncate or rounded, thick with a narrow hyaline margin, ± glabrous, occasionally with a few very short hairs at tip. Corolla funnel-shaped, deep pink to pinkish-purple with a darker throat and midpetaline bands, 50–100 mm long, 75–120 mm across, glabrous, except for occasional short hairs in the upper part of the midpetaline band; petal segments 60–110 mm long, 40–75 mm wide at the limb, distally rounded, bilobed, often apiculate. Stamens affixed for 6–15 mm from base of corolla, terete, dilated downwards, free for 8–30 mm with dense, cylindrical, sinuate, 2-celled hairs, 0.5–1.5 mm long, around the point of attachment and for 2.5–11 mm up the filament; anthers linear, linear-oblong to narrowly ovate-lanceolate, 5–11 mm long, 1.5–2.5 mm wide, apex obtuse to rounded, apiculate, occasionally emarginate, base sagittate, lobes 0.8–1.5 mm, splitting lengthwise, curling back and slightly twisted. Ovary ovoid, 2–2.5 mm high, on a raised yellow disk, glabrous; style 20–42 mm long, glabrous, stigma biglobular. Capsule ovoid to globular-ovoid, with a persistent style base, 15–25 mm long, 10–13 mm diameter, glabrous, splitting longitudinal into 4 valves. Seeds 1/4 pear-shaped, light brown to black, 10–12 mm long, 5–7 mm wide, ± glabrous to sparsely hairy, with short brown hairs to 0.5 mm around hilum and occasionally along the 2 outer margins.

The three populations mentioned above are morphologically very similar. They are certainly isolated geographically, and are evolving independently of each other. However, finding clear-cut diagnostic features to discriminate the populations has been difficult.

## Key to subspecies of *Ipomoea polpha*

1 Leaves ovate to oblong-ovate, length:breadth >1.4; leaf base rounded to truncate, occasionally sub-cordate in older parts; outer sepals at fruiting 11–14 mm long . . . . . **I. polpha** subsp. **polpha**
Leaves broadly ovate to ovate-orbicular, length:breadth <1.4 . . . . . 2

2 Outer sepals at fruiting 13–16 mm long; leaf base obtuse to truncate, becoming sub-cordate in older parts . . . . . **I. polpha** subsp. **latzii**
Outer sepals at fruiting 8–12 mm long; leaf base sub-cordate to cordate, occasionally rounded to truncate . . . . . **I. polpha** subsp. **weirana**

**Ipomoea polpha** R.W.Johnson subsp. **polpha**

Leaves ovate to oblong-ovate, base rounded to truncate, rarely sub-cordate, length:breadth >1.4; outer sepals at fruiting 11–14 mm long.

***Additional selected specimens examined*: Queensland.** Burke District: main track W of Blackbraes, N of Hughenden, Apr 2002, *Bean 18866* (BRI); off Hughenden road opposite Yarramulla, 1977, *Mitchell s.n.* (BRI [AQ228696]); Chudleigh Park, Hughenden, Mar 1958, *Walter s.n.* (BRI [AQ348164]). Cook District: Yarramulla Stn, off Gulf Development road, 100 km SSW of Mt Garnet, Jan 1990, *Batianoff 900119 & Smith* (BRI); Davies Creek Forestry Access road, 16 km from Mareeba, Mar 1973, *Broadley 123* (BRI [AQ9236]); the jump up, *c.* 3.5 km N of Walkamin on road to Mareeba, Jan 1980, *Clarkson 2754* (BRI); 12 km SE of Mount Janet, *c.* 11.5 km SW of Lakeland Downs Township, Jan 1986, *Clarkson 6290* (BRI); "Whitewater" (Grid Ref 7861–470892), Jan 1993, *Fensham 449* (BRI); Biboohra, Dec 1935, *Flecker s.n.* (BRI [AQ276641]); Jump Up, Mareeba, Mar 1977, *Gray 346* (BRI); Price Creek road, 40 km W of Mareeba, Apr 1973, *Halfpapp 127* (BRI); the jump-up, *c.* 20 km S of Mareeba on road to Atherton, Mar 1977, *Henderson H2460* (BRI); Mt Surprise, Dec 1981, *Hinton 221* (BRI); 82 km N of Lynd Junction, Dec 1999, *McDonald KRM196* (BRI); St Ronan's Stn, Mt Garnet, Dec 1960, *Myers s.n.* (BRI); "The Jump Up", 3.5 km N of Walkamin, Feb 1990, *Neldner 2860* (BRI); Maitland Downs Station - Upper Einasleigh River, Apr 2003, *Sankowsky 1906* (BRI); 81 km from Mt Garnet along Kennedy Highway towards the Lynd, Feb 1983, *Telford & Butler 9481* (BRI); Davies Creek, E of Mareeba, Feb 1963, *Wyatt 22* (BRI); 10 km S of Mareeba by roadside, Dec 1973, *Wyatt 2* (BRI). North Kennedy District: N of Cardwell, Jul 1978, *Collet A4* (BRI); Connolly near pig-trap, S of Ravenswood, Mar 1981, *Jackes 3* (BRI); 13 km N of Greenvale, Mar 1991, *Jeffrey TWR449* (BRI); Me[a]dowbank Station, *c.* 100 km S of Mt Garnet, Dec 2002, *Kerr s.n.* (BRI [AQ771223]); Home Hill – Bowen road *c.* 17 km from Home Hill, Oct 1974, *Moriarty 1624* (BRI); *c.* 100 km NW of Greenvale, Jan 1982, *Pedley* 4826 (BRI); 20 km S of Irvinebank, Jan 1985, *Sankowsky & Sankowsky 390* (BRI); 4 miles [6.4 km] S of Inkerman, 11 miles [17.6 km] S of Home Hill, Oct 1968, *Williams 224* (BRI); Meadowbank Station road, 3 km from Kennedy Development road, Apr 1980, *Williams 80013* (BRI).

***Distribution and habitat*:** This subspecies extends along coastal ranges from southwest of Lakeland Downs (north of Mareeba) in the north to southwest of Home Hill and as far west as Hughenden **(Map 1)**. This subspecies is commonly found in grassy eucalypt woodlands and open forests with *Eucalyptus crebra*, *E. cullenii*, *E. leptophleba and Corymbia clarksoniana* prominent. It is commonly found on tablelands (jump-ups) and is frequently found along roadsides where disturbance promotes growth from tubers.

***Notes*:** Notes on a specimen collected from the Burdekin (*Bowman 366*, MEL95512) state "The yam which is produced at the root of this *Ipomoea* is one of the principal articles of food of the aborigines in this district". There is also one record of this taxon being suspected of poisoning stock (*Jeffrey TWR 449*).

***Conservation Status*:** This subspecies is not rare or threatened.

**Ipomoea polpha** subsp. **latzii** R.W. Johnson, **subsp. nov.** differt a *I. polpha* subsp. *polpha* foliis plus late ovatis rationibus longitudinum latitudinibus minus quam 1.4 et a *I. polpha* subsp. *weirana* sepalis exterioris ubi fructiferis longioribus. **Typus:** Northern Territory. 39 km ENE of Ti Tree roadhouse, 6 November 1986, *P.K. Latz 10406* (holo: BRI; iso: DNA, *n.v.*).

Leaves broadly ovate to ovate-orbicular, length:breadth <1.4, base obtuse to truncate, becoming sub-cordate in older parts; outer sepals at fruiting 13–16 mm long.

***Additional specimens examined*: Northern Territory.** Stirling–Tea Tree boundary, May 1979, *Latz 8252* (BRI, DNA); 39 km ENE of Ti Tree roadhouse, Nov 1986, *Latz 10406* (BRI, DNA); Alice Springs Arid Zone Research Institute (cultivated), Feb 1988, *Soos s.n.* (BRI [AQ368008]); 20 km SE of Merino Bore, Stirling Station, Mar 1983, *Thomson 511* (BRI, DNA).

***Distribution and habitat*:** This subspecies is confined to approximately 100 km$^2$ on Stirling and Ti Tree stations, approximately 200 km north-east of Alice Springs (Soos & Latz 1987) **(Map 1)**. It is commonly found in grassy shrublands of mulga (*Acacia aneura*) and witchetty bush (*A. kempeana*) in sandy to red clay loam soils on run-on areas. In moister areas, it can occur under mature bloodwood (*Corymbia opaca*) and coolibah (*E. coolabah*) (Soos & Latz 1987).

***Notes*:** The current and past status of this population and its management has been intensively studied (Soos & Latz 1987). They found "the native sweet potato was a favoured and reliable food for the Anmatyerre [Anmatjirra] people [of the Northern Territory], its large edible tuber being collected at any time of the year". Because this subspecies was widely known among the aboriginal people beyond those living within its current geographical distribution, they believed the plant was either previously more widespread in the Northern Territory, traded or that neighbouring tribes were involved in sweet potato ceremonies.

***Conservation status*:** This subspecies is listed under '*Ipomoea* A83192 Stirling' as Vulnerable in the Northern Territory and under '*Ipomoea* sp. Stirling (P.K. Latz 10408)' as Vulnerable under the *Environmental Protection and Biodiversity Conservation Act 1999*.

***Etymology*:** It is named in honour of the botanist Peter Latz, a colleague, who with Antal Soos studied the uses, status and conservation management of this plant.

**Ipomoea polpha** subsp. **weirana** R.W.Johnson, **subsp. nov.** differt a *I. polpha* subsp. *polpha* foliis plus late ovatis rationibus longitudinum latitudinibus minus quam 1.4 et a *I. polpha* subsp. *latzii* sepalis exterioris ubi fructiferis brevioribus. **Typus:** Queensland. MARANOA DISTRICT: 26 km from St George towards Dalby, 25 January 1998, *A.R. Bean 13086* (holo: BRI; iso: DNA, *n.v.*).

Leaves broadly ovate to ovate-orbicular, length:breadth <1.4, base sub-cordate to cordate, rarely rounded or truncate; outer sepals at fruiting 8–12 mm long.

***Additional selected specimens examined*: Queensland**. WARREGO DISTRICT: 41.5 km from Adavale on Adavale – Blackall road, Apr 1973, *Percy s.n.* (BRI [AQ9461]). MARANOA DISTRICT: St George, May 1962, *Allison s.n.* (BRI [AQ276178]); St George on Wanganui property, Mar 1970, *Barnes & McEwan s.n.* (BRI [AQ276180]); 90 km S of Mitchell on St George road, Mar 1994, *Burton s.n.* (BRI); South Coogoon turnoff, 73 km S of Roma, Nov 1986, *Dowling s.n.* (BRI [AQ407777]); *c.* 70 km S of Roma on old southern road opposite entrance to South Coogoon, Oct 1986, *Dowling s.n.* (BRI [AQ407774]); 91.6 km W of Westmar, Moonie Highway, just past Drain Creek, Oct 1984, *Forster PIF1920* (BRI); between Condamine and St George, May 1920, *Gunn s.n.* (BRI [AQ276183]); *c.* 10 miles [16 km] N of St George on Surat road, Nov 1972, *Johnson & Blaxell 983* (BRI, NSW); 65 km S of Roma on the southern road, Dec 1994, *McKenzie s.n.* (BRI [AQ633648]); 6.4 km W of Moonie River [along Moonie Highway?], Nov 1973, *Pederson s.n.* (BRI [AQ12437]); 15 miles [24 km] E of St George on Moonie Highway, Nov 1961, *Pedley 910* (BRI); 36 miles [57.6 km] E of St George, Apr 1963, *Pedley 1238* (BRI); *c.* 16 km from Ballaroo on Ballaroo – Surat road, Apr 1973, *Percy s.n.* (BRI [AQ9460]); 20 km E of St George on the St George – Dalby road, Mar 1976, *Purdie s.n.* (BRI [AQ400762]); Nindigully District, Nov 1938, *Roe 7694* (BRI); Glenearn Station, 40 miles [64 km] S of Surat, Mar 1963, *Sewell s.n.* (BRI [AQ276175]); "Glenearn", Surat, 90 miles [144 km] SSE of Roma, Apr 1963, *Webster s.n.* (BRI [AQ276177]); 70 km W of Westmar on Moonie Highway, Oct 1981, *Williams 81235* (BRI).

***Distribution and habitat*:** This subspecies is found in the Roma – St George – Moonie area of southern Queensland except for an outlier *c.* 42 km NW of Adavale. It is known locally as "Weir Vine" **(Map 1)**. It occurs in mulga (*Acacia aneura*) and poplar box (*Eucalyptus populnea*) grassy woodlands on red brown loam soils. It is frequently found along roadsides where disturbance promotes growth from tubers.

***Notes*:** Associated with a specimen collected from the Balonne & Weir River in 1880 (*Done s.n.*, MEL 95475) is a letter of 10 May 1881 from George L. Done to Robert D. Fitzgerald. This letter was forwarded to Mueller and states "I have seen an old resident of the Moonie River and he states that the "Weir" grows wild all over the country between the Moonie and Balonne Rivers wherever the soil is red and rich but he never saw it growing on sand ridges. On the roots it produces a fruit which is like a turnip when cut but which he states is as juicy as a watermelon and which he has seen as large as 15 inches in diameter.

The fruit is relished by blacks and whites, by the former especially. He is certain the plant was growing wild when the country was first taken up and says he does not think it bears until it is 4 years old. The fruit is not good when cooked but is very much relished when eaten as soon as it is dug up".

Following the opening up of the area for pastoral activities this subspecies has proved to be highly toxic to sheep and also cattle (Everist 1974). Major stock losses have occurred following grazing of fresh growth particularly when other feed is scarce.

***Conservation status*:** Though the area of distribution of this taxon has been greatly developed for pastoral and agricultural uses it has persisted under this disturbance largely due to its ability to regrow from its protected tubers. It is not regarded as threatened.

***Etymology*:** The subspecific epithet and common name, Weir vine, refer to the Weir River, which passes through the geographic range of this taxon.

## General Discussion

### (a) Glasshouse studies

Seed from the three populations was grown in a glasshouse at Alice Springs. Specimens taken from the glasshouse plants are housed at BRI and DNA. The differences which are apparent from a study of the field specimens become blurred when the cultivated specimens are compared. The specimens grown from seed collected near Mareeba (*Ipomoea polpha* subsp. *polpha*) have the shorter outer sepals and sub-cordate leaf bases of *I. polpha* subsp. *weirana* while the specimens from seed from Surat (*I. polpha* subsp. *weirana*) has longer outer sepals and more rounded leaf bases. It is possible the seed forwarded to Alice Springs was incorrectly labelled or that some irregularity occurred at Alice Springs. If these populations have been only recently isolated it may be that differences in the subspecies as noted in the field may be caused as much by disparate environmental conditions as by genetic divergence. Certainly genetic and chemical analyses suggest these populations are distinct (Austin *et al.*, 1993; Molyneux *et al.*, 1995).

### (b) Comments on the disjunct distribution of the three subspecies

The morphological and genetic similarity of the three subspecies and their disjunct distribution poses questions as to their origin. All three subspecies seem to have been intensively used by local aboriginal populations. The two most likely explanations are that either the species was formerly widespread throughout northeastern Australia and has suffered extreme fragmentation or that its original distribution was more restricted but the tubers were widely traded and cultivated.

If it had a much wider distribution in the past then some explanation of the cause of the fragmentation is necessary. Two possible causes might be climate change or overexploitation by aboriginals. Because the subspecies currently occur in climatically and ecologically different areas it is hard to evoke climatic change. Overexploitation of the tubers for food could fragment the original population but there appears to be no historical evidence to support this claim.

To explain the current distribution on the basis of trading in tubers or seed is also difficult. Mulvaney (1976) remarked that food was rarely exchanged and I was unable to find any record of the widespread distribution of food over vast distances through trading. Soos & Latz (1987) provide evidence of trading of the tubers among neighbouring tribes in the Northern Territory. Similarly Hynes & Chase (1982) obtained evidence that yams (*Dioscorea* sp.) were transported from the mainland of northeastern Australia to offshore islands where they were planted. Though in both these cases distances involved were small, it does indicate aboriginals did transport food materials for growing in areas beyond their current range.

There is much evidence that a chain of connection existed between distant tribes in northern Australia (Mulvaney 1975, 1976). Trade and exchange networks crisscrossing the arid and semi-arid zones served as the main lines of communication between far-flung tribes (Mulvaney & Kamminga 1999). Many items such as shell, ochre and wooden tools were traded over long distances

(Mulvaney 1975). Perhaps the most striking example of diffusion concerns the occurrence of shell pendents, which were prized and sacred objects in rituals, more than 1000 miles [1600 km] away from their source. He cites a boomerang which was found at least 1200 km from its point of manufacture. Reports of long distance trading of pituri (*Duboisia hopwoodii*) are common (Mulvaney 1975; Latz 1995).

If past trading activities have played a role in the development of the disjunct distribution pattern of the species, then those populations in northeastern Australia being the most extensive and diverse may have been the original source of the traded material.

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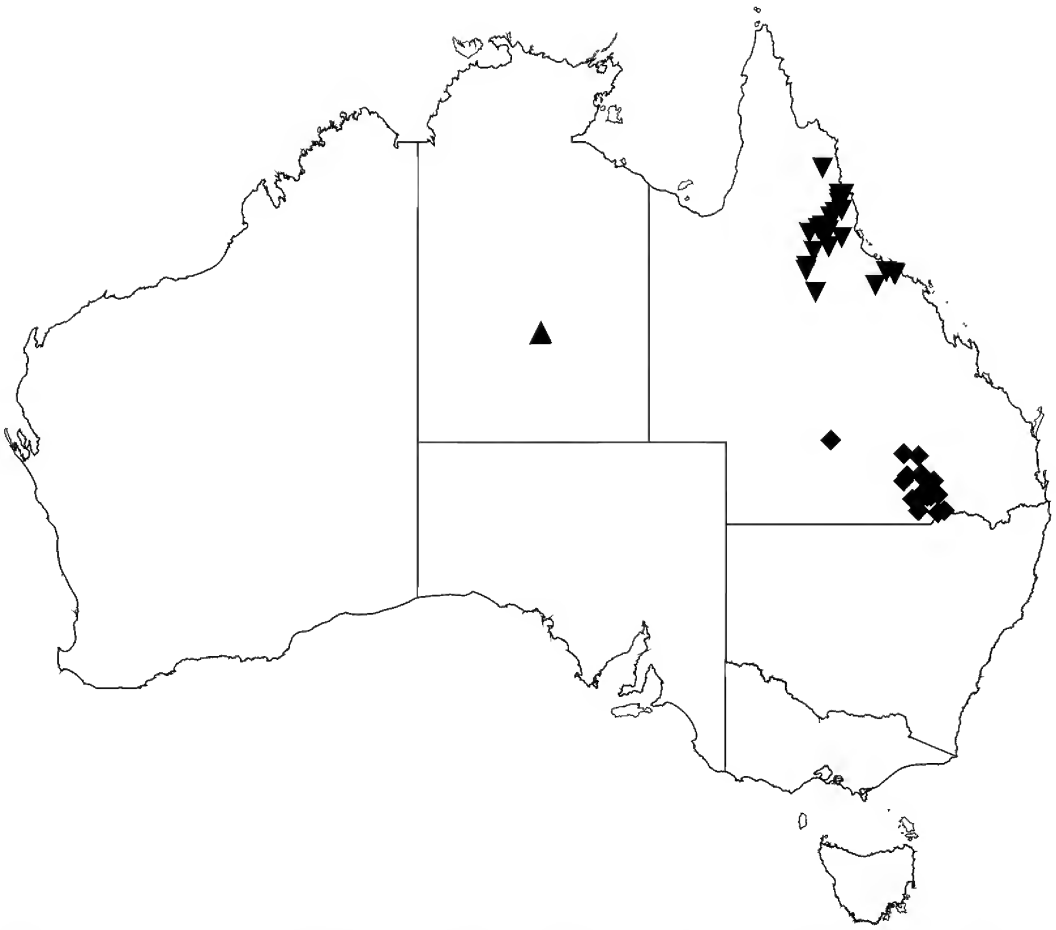

**Map1**. Distribution of *Ipomoea polpha* subsp. *polpha* ▼, *I. polpha* subsp. *latzii* ▲ and *I. polpha* subsp. *weirana* ◆.

# *Nepenthes tenax* C.Clarke & R.Kruger (Nepenthaceae), a new species from Cape York Peninsula, Queensland

**Charles Clarke[1] & Rodney Kruger[2]**

**Summary**

Clarke, C. & Kruger, R. (2006). *Nepenthes tenax* C.Clarke & R.Kruger (Nepenthaceae), a new species from Cape York Peninsula, Queensland. *Austrobaileya* 7(2): 319–324. *Nepenthes tenax*, endemic to the Cape York region of Queensland, is newly described and illustrated. The distribution, habitat and conservation status of this species are discussed, as well as the differences between *N. tenax* and its close relative, *N. mirabilis* (Lour.) Druce. An identification key to Australian Nepenthaceae is provided.

Key Words: Nepenthaceae, *Nepenthes mirabilis*, *Nepenthes rowanae* , *Nepenthes tenax*, new species, Australian flora, Queensland flora, Cape York, identification key

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## Introduction

The tropical pitcher plant genus *Nepenthes* consists of approximately 85 species, the majority of which occur in Southeast Asia, with outlying species in Madagascar, Sri Lanka, Seychelles, India, New Caledonia and Australia (Cheek & Jebb 2001; Clarke 1997, 2001). Bailey (1881, 1897, 1898, 1900, 1905) and Mueller (1866) described eleven species from the Cape York peninsula region of Queensland, but Danser (1928) reduced all of these to synonyms of the widespread species, *N. mirabilis* (Lour.) Druce. Danser's interpretations have been upheld in recent revisions or flora accounts of the genus (Stanley 1982; Jebb & Cheek 1997; Cheek & Jebb 2001), but the types of Bailey's taxa held at the Queensland Herbarium (BRI) have not been studied in detail since Danser's revision. Moreover, detailed field observations of Australian *Nepenthes* have perhaps never been conducted – much of the key material at BRI was collected by Frank Jardine in the 1890's and specimens collected after that time are mostly from well-explored, easily accessible localities where *N. mirabilis* (typical facies) is abundant. The most distinctive of Bailey's taxa, *N. rowanae* F.M.Bailey, is confined to low-lying swamps near the Jardine River which are flooded – and therefore inaccessible – for much of the year. As a result, this species has remained poorly known until very recently.

In 2001, the second author made several expeditions to Cape York to relocate the type locality of *Nepenthes rowanae* in the wild. He was successful and our subsequent research showed that *N. rowanae* is indeed a distinct species, which we recently reinstated at species rank (Clarke & Kruger 2005). While conducting field observations of *N. rowanae* in the Jardine River system, we encountered another *Nepenthes* taxon which could not be readily identified. After examining all of the *Nepenthes* specimens at BRI we concluded that it was an undescribed species, which is described as *Nepenthes tenax* here.

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## Taxonomy

**Nepenthes tenax** C.Clarke & R.Kruger, **species nov.** *N. mirabilis* similis sed ascidiis infundibuliformibus, lamina subpetiolata et habitu erecto nec scandenti differt. **Typus:** Queensland. Cook District: Head of Cowal Creek near Cape York, *F.W.Whitehouse s.n.* (holo: BRI [AQ46887]).

Monopodial shrub, new stems generally arising from the rootstock after the main stem dies. Indumentum: all young parts of the plant

sparsely to densely covered with short simple and stellate hairs, most of which are caducous. Stems terete, up to 0.5 (–1) m long, 2–6 mm thick, internodes 8–10 mm long. Rosette leaves sessile, very narrowly linear, up to 60 mm long and 8 mm wide, margins more or less parallel throughout, contracting gradually; apex acute; base slightly widened, clasping the stem for two-thirds of its circumference; tendrils up to 25 mm. Leaf blades of the erect stems subpetiolate, lanceolate, up to 110 mm long and 25 mm wide, the margins held close together so that the blade forms a highly pronounced "V-shape" in cross section; longitudinal veins 3 or 4 on each side of the mid-rib, often indistinct on dried specimens, pennate veins forming a densely branched network arising from the midrib and spreading towards the margins; apex acute; base clasping the stem for half to two-thirds of its circumference, not decurrent. Tendrils up to 60 mm long, highly tensile, with a tight curl (or occasionally a pronounced kink) in the middle, insertion simple. Upper two-thirds of the aerial pitchers held above the leaf blade. Rosette pitchers rarely produced, ovoid to infundibular in the lower third, cylindrical above, up to 55 mm high and 10 mm wide; two wings, up to 2 mm wide, bearing multicellular fringe elements (up to 2 mm long) that run from the peristome to the lower quarter of the pitcher. Tendril insertion at the front or side. Mouth round, oblique throughout, peristome cylindrical, up to 2 mm wide, ribs distinct but minute, teeth distinct, but very short (up to 0.2 mm long). Inner surface glandular in the portion below the hip, glands round, recessed in the upper portion, up to 0.1 mm wide, *c.* 1500 per cm². Lid wider than the pitcher mouth and held close to the peristome, resulting in a narrow opening to the pitcher, broadly ovate, indented at the apex, no appendages. Spur simple or bifid, up to 2 mm long. Aerial pitchers infundibular throughout, with or (more commonly) without a hip about one quarter of the way up from the bottom, up to 110 mm high and 20 mm wide, broadest at the mouth. Wings reduced to ribs and lacking multi-cellular fringe elements. Tendril joins the pitcher at the rear, but is generally positioned so that the apex of the leaf blade is pressed against the side of the pitcher in the lower quarter. Inner surface glandular in the lower one-quarter to one-third, glands as in the lower pitchers. Mouth round, oblique throughout, peristome cylindrical, up to 2 mm wide, ribs distinct but minute, up to 0.3 mm wide, teeth distinct but short, up to 0.4 mm long. Lid ovate, indented at the apex, no appendages, considerably broader than the mouth and positioned close to the peristome, so that the opening of the pitcher is very narrow. Glands on the underside of the lid ovate, up to 0.2 mm long, *c.* 100 per cm² near the centre. Towards the margins, the glands are smaller (up to 0.1 mm long) and somewhat more numerous (up to 150 per cm²) Inflorescence a raceme, peduncle up to 80 mm long, rachis up to 80 mm long. Pedicels (or, occasionally, two-flowered partial peduncles) up to 8 mm long, lacking bracteoles, sepals ovate, up to 4 mm long; column of male flowers ≤ 4 mm long. Mature fruits up to 12 mm long. **Fig. 1**.

***Additional specimens examined*: Queensland.** Cook District: Somerset, Cape York, *Jardine s.n.* (BRI [AQ46886]); S edge of Jardine swamp *c.* 3 km S of Jardine River on Old Telegraph Line road, Mar 1992, *Wilson 8190* (BRI); Jardine River N.P., swamp near head of Olive Creek, *c.* 2 km north of Jardine River, Aug 2003, *Clarke & Kruger 1, 2* (BRI).

***Distribution and habitat*:** Biogeographic region: CYP. This species is apparently confined to open sandy substrates or saturated peat in the lower portions of swamps on floodplains surrounding the Jardine River on northern Cape York peninsula. The surrounding habitat is described by Fox *et al.* (2001) as open heath, Type C15 – dominated by *Asteromyrtus lysicephala* (F.Muell. & F.M.Bailey) Craven (Kennedy's Heath). Other conspicuous plants in this habitat are various Cyperaceae, *Banksia dentata* L.f.., *Utricularia* spp., *Byblis liniflora* Salisb., *Drosera burmanii* Vahl. and *D. petiolaris* R.Br. ex DC.

***Phenology*:** This is yet to be fully documented. Mature fruits were observed on wild plants in August 2002. The period from which flowers open to the ripening of fruits in *Nepenthes* is usually about three months, which suggests that flowering in that year may have commenced in May. However, very few plants flowered in 2003, suggesting that flowering cycles are irregular.

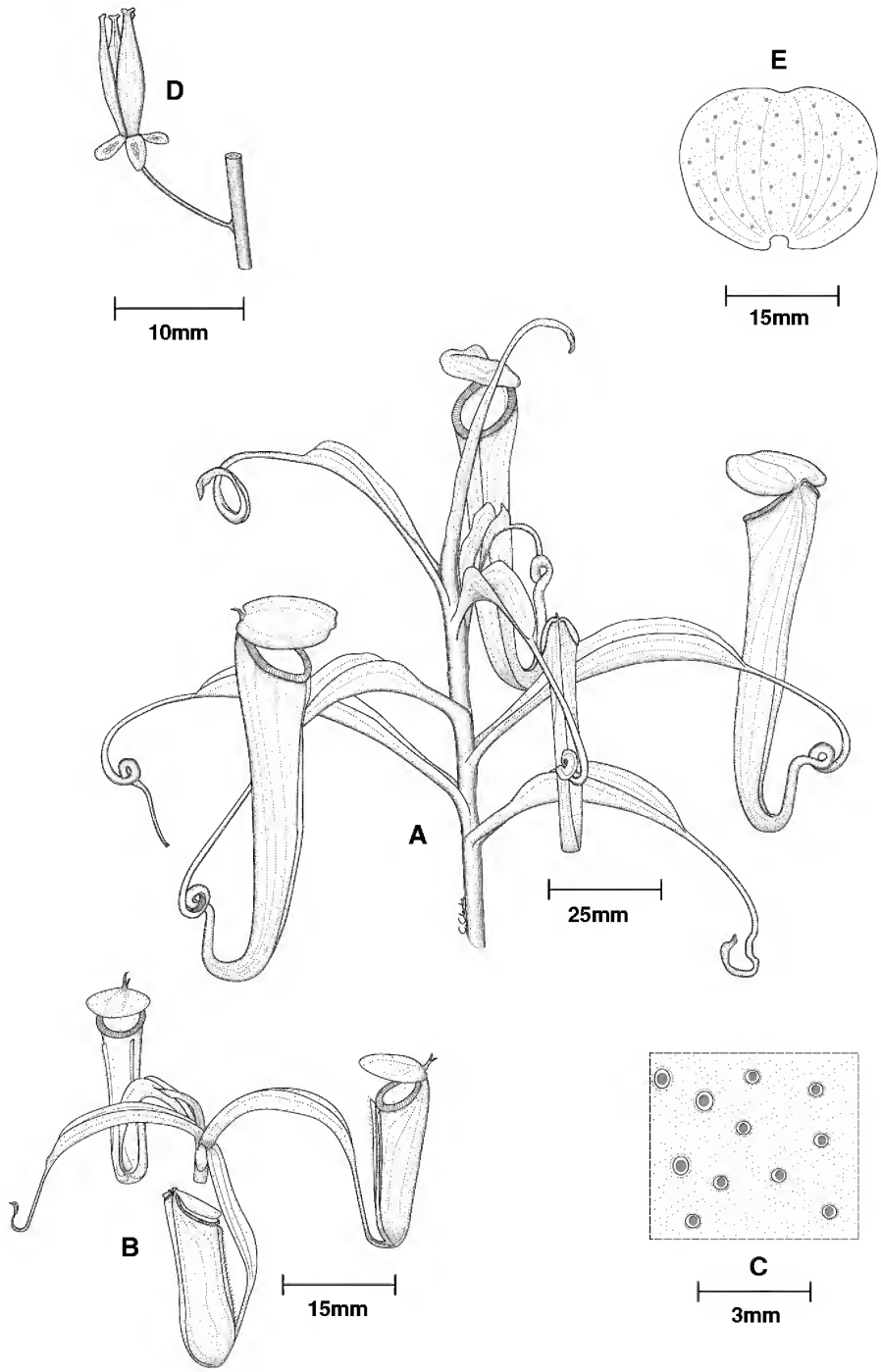


**Fig. 1.** ***Nepenthes tenax.*** A. fragment of stem bearing upper pitchers. B. rosette bearing lower pitchers. C. detail of glands on lower surface of lid (larger glands on left of illustration lie near the midline of the lid, smaller ones towards the margins). D. fruit. E. underside of lid. (A & B drawn from photographs of plants taken at the type locality, C–E from *Clarke & Kruger 1, 2, 1* respectively).

***Notes*:** *Nepenthes tenax* is a diminutive plant, with free-standing, erect stems up to 1 m in length and pitchers rarely exceeding 15 cm in height. The pitchers are borne on very short tendrils, with 3–6 operative at any one time, giving the plant a "cartwheel" appearance when viewed from above. The tendrils generally have a tight curl in the middle, but unlike other species, they do not grip surrounding objects. Rather, they are highly tensile, holding the pitchers erect (even in strong winds), with the upper 2/3 of the pitcher held above the leaf blade. This habit is highly distinctive with only *Nepenthes madagascariensis* Poir recorded as growing in a similar manner. The pitchers and leaf blades are generally light greenish-yellow in colour. This combination of characteristics makes *N. tenax* instantly recognisable in the field, but at some localities there appears to be introgression with *N. mirabilis*, which can make identification of some plants difficult. In our explorations along the Jardine River we found a single population of an extraordinary "small form" of *N. tenax* that bears the smallest functional aerial pitchers of any *Nepenthes*. These are at most 50 mm high and 8 mm wide (but are usually half this size), while the leaf blades are ≤ 40 mm long and the stem rarely exceeds 150 mm in height. The inflorescences of these plants are approximately 100 mm long. The site at which the small form grows appears to be permanently inundated – even after two consecutive below-average wet seasons, as we were wading waist-deep through water and muddy peat when we came across them (during June 2003). In most years, this site would be inaccessible.

*Nepenthes tenax* has rarely been collected. At BRI there were, prior to this study, only three specimens that could be equated with this taxon. *Whitehouse s.n.* (BRI [AQ46887]) is a beautifully preserved specimen bearing upper pitchers and an inflorescence, and is designated here as the holotype.

*Nepenthes tenax* bears a superficial resemblance to the taxon described as *N. alicae* F.M.Bailey (reduced to a synonym of *N. mirabilis* by Danser (1928), an interpretation that we support), but several characteristics of the types serve to distinguish them. The holotype of *N. alicae* (*Jardine s.n.*, BRI [AQ278786]) consists only of a pair of short stems bearing several lower pitchers, plus a single upper pitcher and its tendril. According to notes on this specimen, Frank Jardine collected more material of *N. alicae* to assist Bailey in preparing his description. He put the material in his pocket for the trip home from the type locality, but most of it fell out on the way and was lost, except for the two short stems and single upper pitcher! *N. alicae* is similar in stature to *N. tenax*, but the tendrils of the rosette pitchers are approximately 60 mm long, whereas those of *N. tenax* rarely exceed 25 mm. The tendril of the sole aerial pitcher of *N. alicae* appears to be considerably longer than the pitcher itself, is not curled and based on its arrangement, the pitcher mouth would have been held below the leaf blade. In *N. tenax*, the tendrils of the upper pitchers are tightly curled (or have a very pronounced kink in the middle), shorter than the pitchers are tall, with the upper half of the pitcher held well above the leaf blade. The short, gnarled stems of the holotype of *N. alicae* appear to have grown slowly for a number of years prior to being collected. The stems had reached lengths of about 100 mm, yet the leaves were still producing rosette pitchers. All plants of *N. tenax* that we have seen produce aerial pitchers on stems that exceed 50 mm in length. Indeed, rosette pitchers are very rarely observed in *N. tenax*. Jardine made a further collection of material for Bailey's work on *N. alicae* (*Jardine s.n.* BRI [AQ46886]). This contains several fragments of *N. tenax* and it is quite possible that it was this taxon that Jardine felt was of primary interest. However, Bailey did not equate the *N. tenax* fragments with *N. alicae*, noting that the plants were merely "near alicae Bail." on the label. On this evidence, we conclude that the taxon Bailey described as *N. alicae* was based on stunted plants of *N. mirabilis*, or perhaps hybrids of *N. mirabilis* and *N. tenax*.

We have observed two putative natural hybrids involving *Nepenthes tenax* in the wild: *N. tenax* × *N. mirabilis* and *N. tenax* × *N. rowanae*. The former appears to be rather common, forming large swarms in some swamps, whereas the latter is rare and has

only been observed as singletons at a few sites where *N. rowanae* and *N. tenax* are sympatric.

***Conservation status*:** We observed twelve discrete populations of *Nepenthes tenax* in various swamps along and around the Jardine River, but few of these are currently represented by collections in herbaria. It is highly probable that further populations exist in swamps that are yet to be explored. According to the IUCN guidelines (IUCN 2001), a category of LR(cd) (= lower risk, conservation dependent) is proposed, as all known populations occur within protected areas.

***Etymology*:** The Latin, *tenax*, means tenacious and refers to the ability of this species to produce stems and pitchers that remain upright in open areas, despite regular exposure to strong winds and without the support of surrounding objects or plants, a characteristic that is not observed in other Nepenthaceae.

## Key to Australian *Nepenthes*

**1** Upper pitchers with a horizontal ridge (or "hip") immediately beneath the peristome; margins of leaf blade very gradually tapered towards the apex, which is obtuse and slightly peltate . . . . . **N. rowanae** F.M.Bailey
Upper pitchers with hip lacking entirely or present in the lower quarter; margins of leaf blade generally contracted abruptly towards the apex . . . . . 2

**2** Leaf blades with a distinct petiole at the base; upper pitchers bulbous or narrowly ovoid below the hip, stems climbing to 3 m, supported by surrounding vegetation . . . . . **N. mirabilis** (Lour.) Druce
Leaf blades sub-petiolate at the base, upper pitchers infundibular throughout, stems free-standing to 0.5 (–1) m . . . . . **N. tenax** C.Clarke & R.Kruger

## Acknowledgements

We thank the Australian Geographic Society for their generous support of this research. C.M. Wilmot-Dear kindly provided the Latin diagnosis. Permission to enter National Parks for the purposes of research and specimen collection was provided by the Queensland Parks and Wildlife Service (QPWS) in accordance with permit numbers WITK01337603 AND WISP01337403. Dr. Paul Forster and staff of the Queensland Herbarium (BRI) gave freely of their time and knowledge during our visits. We thank the staff of QPWS for their kind support throughout. We are also grateful to Datuk Chan Chew Lun and Professor John Beaman for their invaluable assistance.

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# New species of *Gossia* N.Snow & Guymer and *Rhodomyrtus* (DC.) Hassk. (Myrtaceae) from Papua New Guinea

**Neil Snow**


## Summary

Snow, N. (2006). New species of *Gossia* N.Snow & Guymer and *Rhodomyrtus* (DC.) Hassk. (Myrtaceae) from Papua New Guinea. *Austrobaileya* 7(2): 325–340. Two new species each of *Gossia* N.Snow & Guymer (*G. scottiana* N.Snow, *G. longipetiolata* N.Snow) and *Rhodomyrtus* (DC.) Hassk. (*R. kaweaensis* N.Snow, *R. mengenensis* N.Snow) in the myrtle family (Myrtaceae) are described from Papua New Guinea. All four species are known only from the type collections. Each species is considered "Data Deficient" following IUCN guidelines, and all are probably narrowly distributed. The new species of *Gossia* bring to six the number of species in this genus now known from the island of New Guinea. The newly described species in *Rhodomyrtus*, along with another undescribed species in preparation from Papua New Guinea, suggest that ten species of *Rhodomyrtus* occur on New Guinea. The new species of *Rhodomyrtus* have brochidodromous nervation, relatively long petioles, and narrowly elliptic to elliptic leaves. Included are photographs of the type specimens, a distribution map of the new species, separate keys to species of *Gossia* and *Rhodomyrtus* from Malesia, and a discussion of the biogeography of *Gossia* and *Rhodomyrtus*.


Key Words: Myrtaceae, Myrtineae, *Gossia longipetiolata*, *Gossia scottiana*, *Rhodomyrtus kaweaensis*, *Rhodomyrtus mengenensis*, new species, Malesian flora, Papua New Guinean flora, New Guinean flora, Australasian flora, biogeography, conservation, identification keys, Archbold Expeditions

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## Introduction

During the examination of previously indetermined material of Myrtaceae on loan to the author for several revisionary projects and a graduate thesis (Csizmadi 2006) two specimens each of *Gossia* N.Snow & Guymer and *Rhodomyrtus* (DC.) Hassk. from Papua New Guinea could not be assigned to known species. In light of the recent revision of *Gossia* from Australia (Snow *et al.* 2003), the transfer of several Malesian species of *Myrtus* L. and *Austromytrus* (Nied.) Burret into *Gossia* (Snow 2005), and the author's nearly completed treatment of *Gossia* for New Caledonia (Snow in prep.), it became clear that the two species of *Gossia* represented undescribed taxa. Because the new species of *Rhodomyrtus* described herein were recognized as such relatively late during preparation of the thesis (Csizmadi 2006), they are described here.

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## Materials and methods

Each of the newly described species was recognized as being distinct only after comparison against specimens representing all known taxa in their respective genera. Additional duplicates of *Gossia* were searched for by the author in some herbaria, and he was assisted by colleagues in several other herbaria (see Acknowledgements) who kindly searched for more duplicate material of the new species of *Rhodomyrtus*. Each of the new species is diagnosably distinct from congeners following species concepts and species criteria outlined previously (Snow 1997; Snow *et al.* 2003). The descriptive information provided for each species varies somewhat given the limited material available for study and because differing amounts of information are contained on the labels of the specimens themselves.

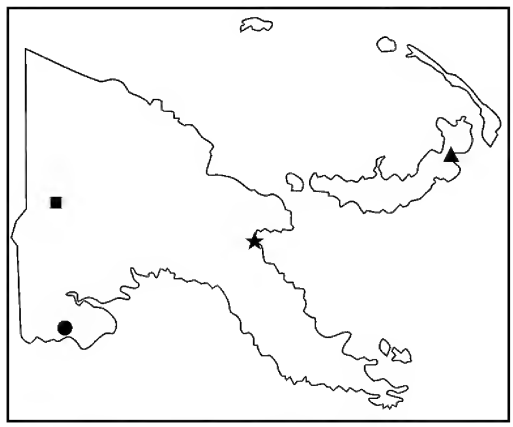
## Taxonomy

**Gossia scottiana** N.Snow, **species nov.** similis *G. longipetiolatae* a qua floribus 5-merous, petiolis brevioribus, laminis foliorum

sine glandibus manifestis, et nervo medio adaxiali prominente differt. **Typus:** Papua New Guinea. Western Province: Fly River, 528 mile camp, May 1936, *L.J.Brass 6766* (holo: L [photo, GREE]; iso: A, BRI, CANB). Tall slender trees, to unknown height. Bark smooth, thin, bright brown with hard brown wood beneath. Branchlets rounded, brownish-grey, smooth or somewhat flaking, glabrous, lacking evident oil glands. Leaves opposite, coriaceous, entire, concolorous, matt above and below. Stipular hairs ([Snow *et al.* 2003: 6–7], "acicular appendages" of some authors [e.g., Holst 2002]) not evident. Petioles 2–4.5 mm long, flat above. Leaf venation pinnate; blades elliptic, 65–125 × 30–45 mm, base rounded to cuneate, apex acuminate; adaxial and abaxial surfaces glabrous and lacking evident oil glands; adaxial midvein flush to somewhat raised; secondary and intramarginal veins indistinct to prominent. Flowers solitary, terminal, anthopodia and metaxyphylls absent (see Briggs & Johnson [1979] for specialized terminology regarding inflorescences), other features unknown. Peduncles rigid, 4.5–17 mm long, glabrous. Bracteoles and flowers unknown. Hypanthium in fruit densely covered with small glands; sepal lobes 5, glabrous, 1.5–2 mm long, apex broadly rounded, persistent and erect in fruit. Fruits, globose, 10–12 mm long (dry; the label indicating "up to 1.7 cm" when presumably fresh), black (dried). Seeds rounded, testa hard, embryo circinnate. **Figs. 1 & 2.**

Presently known only from the type collection.

***Distribution and habitat*:** The Fly River 528 camp of the Archbold Expedition, the location of the type collection, was located far inland near Macrossan Island at a point where the Fly River makes a sharp bend (Rand & Brass 1940). From an accompanying map in Rand & Brass (1940), it appears the camp was about 15 air-kilometres southwest of Palmer Junction Camp, which is in the Western Province of Papua New Guinea. This general region is downstream from where the Fly River meets the Palmer River at approximately *c.* 6°S and 141.5°E (**Map 1**; F.Lohrer, pers. comm. 2005). The local topography is hilly (Rand & Brass 1940), the specimen label indicating the species was growing at 80 m elevation in rainforest. Rand & Brass (1940: 368) report the ridges of this area as having reddish clay soils containing rounded or angular pebbles of quartz. The general vegetation of the area consisted of a very tall rainforest heavy with epiphytes (Rand & Brass 1940). Additional details regarding the vegetation are presented in Brass (1938).



**Map 1.** Distribution of *Gossia scottiana* ■, *G. longipetiolata* ●, *Rhodomyrtus kaweaensis* ▲, and *R. mengenensis* ★.

***Phenology*:** Flowering and fruiting in May, but likely fruiting well into June given that young fruits occur on some of the duplicates. For example, the specimen at BRI has just finished flowering and has young fruits.

***Diagnostic attributes*:** Leaves elliptic; oil glands on blades not visible on dried material; adaxial midvein of leaf raised; secondary and tertiary veins of leaf prominent above and below; flowers 5-merous.

***Affinities*:** Among species of the genus from New Guinea and on the basis of leaf morphology *Gossia scottiana* most resembles *G. longipetiolata*. However, *G. scottiana* has much shorter petioles, lacks evident oil glands on the leaf, and has pronounced secondary and tertiary veins on both laminar surfaces. Among Australian species the gross morphology of *G. scottiana* somewhat resembles *G. grayi* N.Snow & Guymer (Snow *et al.* 2003). However, *G. scottiana* has 5-merous flowers, a slightly raised midrib on the adaxial leaf surface and leaf surfaces lacking


**Fig. 1.** Holotype specimen of ***Gossia scottiana*** (*L.J.Brass 6766* [L]).

evident oil glands. In addition, *G. grayi* lacks the raised secondary and tertiary veins on the leaves. *G. scottiana* also resembles to some degree the widespread Australian species *G. bidwillii* (Benth.) N.Snow & Guymer, but the latter has a more deeply channeled petiole, moderately to densely glandular leaves, and lacks the pronounced attenuated leaf apex of *G. scottiana*. The description from the type specimen label indicates "with conspicuous


**Fig. 2.** Close up of fruits on holotype of ***Gossia scottiana.***

bright brown, v.[ery] thin bark and hard brown wood", suggesting the species may be related to members of the genus from Australia known commonly as the "python barks" (Snow *et al.* 2003), such as *G. bidwillii* and *G. acmenoides* (F.Muell.) N.Snow & Guymer.

***Notes*:** The placement of this taxon in *Gossia* is supported in part by a detailed pencil illustration of a circinate embryo on the isotype from A, which appears just to the left of the collection label. Presumably drawn by Merrill, the drawing reflects the coiled embryo that in part diagnoses *Gossia* from related genera (Snow *et al.* 2003). The hard testa of seeds in the fragment packet and other aspects of the fruit confirm its placement in *Gossia*. This same specimen evidently was seen and cited by Landrum (1988: 121; misspelled therein as *Bass* rather than *Brass*) while discussing embryo types as part of a revision of the neotropical genus *Myrteola* O.Berg. Additional material is needed to more fully characterize the inflorescence, bracteoles, flowers (which are unknown) and fruit.

***Etymology*:** The specific epithet honours Dr. Andrew John Scott (1950–) for his important contributions to our understanding of the berry-fruited genera of Myrtaceae (pro parte, Scott 1978a,b, 1979a,b, 1980a,b, 1984, 1985, 1990).

**Gossia longipetiolata** N.Snow, **species nov.** floribus 4-meris; petiolis 7–10 mm longis; laminis foliorum glandibus densis in quoque pagina, nervo medio adaxiali plano. **Typus:** Papua New Guinea: Western Province: Tarara, Wassi Kussa River, December 1936, *L.J.Brass 8588* (holo: L [photo, GREE]; iso: A, *n.v.*; BO, *n.v.*, BRI, CANB).

Slender trees 4–5 m tall. Bark smooth, thin, brown to grey. Branchlets rounded, light brown, smooth to slightly flaky, glabrous, oil glands common but indistinct. Leaves coriaceous, venation pinnate. Stipules not evident. Petioles 7–10 mm long, somewhat channeled above. Leaf blades elliptic, 75–120 × 33–55 mm, base cuneate, apex acute to acuminate. Adaxial and abaxial leaf surfaces matt, glabrous, with dense covering of oil

glands. Adaxial midvein flush. Secondary and intramarginal veins of abaxial surface indistinct to more or less prominent. Inflorescence terminal or lateral, monads or few-flowered racemes, solitary or paired in leaf axils. Anthopodia and metaxyphylls lacking. Peduncles rigid, 4–18 mm long, glabrous. Bracteoles two, linear, scale-like (lacking midrib), 0.5–1 mm long, < 0.5 mm wide, glabrous, persistent or (mostly) deciduous in fruit. Flowering material unknown. Hypanthium in fruits 4-merous, 1–1.5 mm long, upper surface sparsely sericeous, lower surface glabrous, held more or less erect in fruit. Fruits subglobose to globose, rounded at base, 5–8 × 5–8 mm, glabrous, dark blue-black at maturity. **Figs. 3 & 4.**

Known only from the type collection.

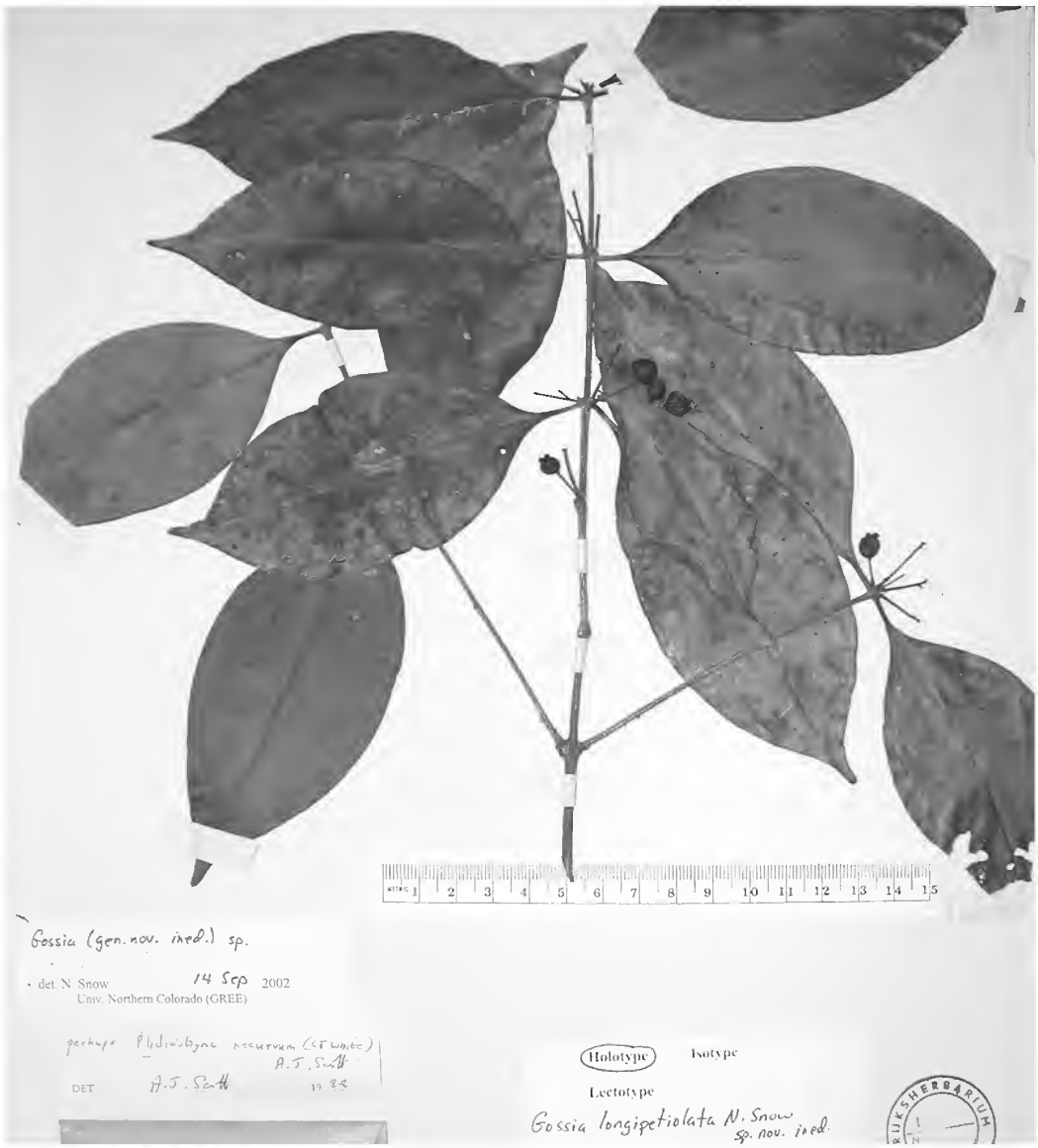



**Fig. 3.** Holotype specimen of ***Gossia longipetiolata*** (*L.J.Brass 8588* [L]).

**Fig. 4.** Close up of fruits on holotype of ***Gossia longipetiolata***.

***Distribution and habitat*:** The type locality (**Map 1**) occurs on the coastal lowlands of the Arafura Sea at the old village of Tarara on the Wassi Kusa River (Rand & Brass 1940: 355). Brass (1938) reports that Tarara is located about 55 km (35 miles) from the mouth of the river and indicates that the region (at the time) supported small communities of semi-nomadic agricultural residents. This general area forms the western boundary of Strachan Island at approximately 9°S, 142°E, (F.Lohrer, pers. comm. 2005). Brass (1938) indicates the country consists of a plain with low ridges that gradually increases in elevation further inland. The climate of the area is said to be markedly seasonal with the majority of rain occurring from December to April (Rand & Brass 1940). The area is underlain by limestone and mostly covered with savanna, but rainforest occurs along waterways in thin strips (Brass 1938; Rand & Brass 1940). The specimen label indicates the species as being common in the underbrush of light rainforests.

***Phenology*:** Known in mature fruit from December; presumably flowering approximately 4–6 weeks earlier.

***Diagnostic attributes*:** Petioles 7–10 mm long; oil glands dense on both leaf surfaces; adaxial midvein of leaf flush; secondary veins of leaves visible but not raised on adaxial surface; flowers 4-merous.

***Affinities*:** Among species of *Gossia* from the island of New Guinea the leaf morphology most resembles *G. scottiana*, but the dense oil glands of *G. longipetiolata* and longer petioles immediately distinguish it from the former. Using the "key for sterile specimens" for Australian species (Snow *et al.* 2003: 34–35), *G. longipetiolata* would key out with *G. bidwillii*, but it differs from that species by its longer petioles and acuminate leaf apices. More details are needed about the flower and inflorescence structure of *G. longipetiolata* and a molecular-based study of the genus will be necessary before the closest relatives of this species can be inferred.

***Notes*:** The label indicates that the bark is "very smooth, thin", suggesting this species, as with *Gossia scottiana*, might be related to the "python" group of species in this genus (Snow *et al.* 2003).

***Etymology*:** The specific epithet refers to the long petioles, which with an average length of about 8 mm are the longest within *Gossia*.

***Conservation status*:** Given its occurrence in only one known locality and following IUCN (2001) guidelines the appropriate designation is "Data Deficient" unless additional populations are found. The following key separates species of *Gossia* presently known from Malesia.

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**A key to the Malesian species of *Gossia***

**1** Flowers 5-merous (rarely 4-merous in *G. floribunda*); leaf apex acuminate to attenuate . . . . . 2
Flowers 4-merous; leaf apex obtuse, acute, or acuminate . . . . . 3

**2** Leaf blades mostly < 55 mm long; hypanthium sericeous; ovary apex villous . . . . . **G. eugenioides**
Leaf blades mostly > 75 mm long; hypanthium glabrous; ovary apex glabrous . . . . . **G. scottiana**

**3** Branchlets 4-angled . . . . . 4
Branchlets rounded to compressed . . . . . 5

**4** Leaves broadly elliptic, 12–28 mm long; hypanthium densely appressed-pubescent; stipular hairs (see Snow *et al.* 2003) prominent, much elongated apically . . . . . **G. versteeghii**
Leaves narrowly elliptic to ovate, 15–75 mm long; hypanthium glabrous to sparsely sericeous; stipular hairs somewhat obscure, only somewhat elongate apically . . . . . **G. floribunda**

**5** Short, spine-like bracts in inflorescence present . . . . . **G. salomonensis**
Short, spine-like bracts in inflorescence absent . . . . . 6

**6** Leaves membranous, narrowly elliptic . . . . . **G. randiana**
Leaves coriaceous, elliptic to ovate . . . . . 7

**7** Petioles 7–10 mm long; leaf apex acuminate . . . . . **G. longipetiolata**
Petioles 2–4 mm long; leaf apex acute . . . . . **G. aneityensis**

**Rhodomyrtus kaweaensis** N.Snow, **species nov.** a *R. pinnatinervi* C.T.White foliis pagina abaxiali sericea et apice acuto usque acuminato, et pedunculis tenuioribus differt. **Typus:** Papua New Guinea: Morobe Province: Lae Subdistrict, Mt. Kawea, 600 m, 7 July 1973, *D.B.Foreman LAE 52304* (holo: BISH; iso: CANB, BRI, K, US).

Slender trees to 4.5 metres, up to 3 cm d.b.h. Outer bark medium brown, smooth to flaky; inner bark rich brown; wood straw-coloured. Younger branchlets with two shallow longitudinal channels on each side of laterally compressed internodes, sericeous. Petioles 9–11 mm long, deeply channeled on upper surface, longitudinally striated when young, densely sericeous. Stipular hairs of two to several ferrugineous to dark red hairs up to 0.8 mm long. Leaves discolorous, matt above and below. Leaf blades narrowly elliptic, 55–100 × 17–27 mm, base cuneate to attenuate, apex acute to acuminate, margin flat; upper surface pannose while developing but becoming glabrous, oil glands not visible, midvein impressed throughout; lower surface moderately short-hairy throughout (use

magnification), oil glands common but faint, intramarginal vein lacking. Inflorescence terminal or ramiflorous, of solitary flowers; anthopodia and metaxyphylls absent. Peduncles 3–10 mm, densely short-sericeous. Bracteoles 2, ovate, 2.2–2.3 × 0.8–1.0 mm, tightly appressed to base of hypanthium, thickened and keeled abaxially, sericeous to densely tomentose. Hypanthium obconic, 3.5–4.5 mm, hypanthium tube not extended above ovary apex, densely sericeous-tomentose; ovary apex hairy. Calyx lobes 5, fused below, distinct in bud, *c.* 2.5 mm, light green, ovate to oblate, apex obtuse; upper surface densely sericeous, lower surface moderately to densely sericeous-tomentose. Petals ovate to obovate, 5–8 × 3–4.2 mm, white, glabrous above and below, oil glands common and relatively


**Fig. 5.** Holotype specimen of ***Rhodomyrtus kaweaensis*** (*D.B.Foreman LAE 52304* [BISH]).

prominent. Stamens 130–150, multiseriate, excluded, yellow; filaments 3–4 mm, pink; anthers subglobose, basifixed, *c.* 0.5 mm; connectives with a single apical gland and 1–6 additional glands between anther sacs; staminal disk shortly villous, diamter *c.* 2.5 mm. Style *c.* 5 mm, glabrous, capitate. Locules (in flower) 6, placenta one per locule, axile; ovules numerous. Fruit unknown. **Figs. 5 & 6.**

Presently known only from the type collection.

***Distribution and habitat*:** At the present time *Rhodomyrtus kaweaensis* is known only from forests on ridges at *c.* 600 metres altitude on Mt. Kawea in Morobe Province west of the Huon Gulf, about 80 air km south-southeast of Lae (**Map 1**).

***Phenology*:** Flowering in January, presumably fruiting in late January through much of February or longer.

***Diagnostic attributes*:** Internodes of flowering branchlets 2–7 mm long; leaves brochidodromous, narrowly elliptic; hypanthium irregularly creased longitudinally, densely sericeous-tomentose; petals sparsely hairy abaxially, densely sericeous adaxially; stigma peltate.

***Affinities*:** *Rhodomyrtus pinnatinervis* C.T.White is relatively common in New Guinea and differs from *R. kaweaensis* by its narrower leaves, acuminate (versus typically acute) leaf apex, less hairy abaxial leaf surface, completely glabrous petals, and glabrous styles lacking glands. On the basis of the shape and venation of leaves *R. mengenensis* also resembles *R. kaweaensis*, but the latter is easily diagnosed by its shorter (2–7 mm) internodes at the tips of branches.

***Notes*:** According to the label the leaves are light green, but in dried material they are dark brown (above) to light brown (below). The flowers are said to lack a scent.

***Etymology*:** The specific epithet is in reference to the type locality of Mt. Kawea.

***Conservation status*:** Since analyses have not been carried out to better document the range of the species the IUCN (2001) guidelines require a designation of "Data Deficient".

**Rhodomyrtus mengenensis** N.Snow, **species nov.** a *R. pinnatinervi* C.T.White indumento sericeo, et ramulis compressis et in quoque latere bicanaliculato differt. **Typus:** Papua New Guinea. East New Britain: Subdistrict Pomio, near mapping site at edge of Mengen Massif, 1200 m, 5°04′S, 151°48′E, 10 June 1973, *P.F. Stevens & Y. Lelean LAE58784* (holo: BRI; iso: A, CANB, E, K).

Slender trees to 4.5 metres tall, *c.* 3 cm dbh. Outer bark medium brown, flaky; inner bark darker brown; wood straw-coloured. Branchlets laterally compressed, those of the current year's growth with two longitudinal grooves on each side of the stem, moderately to densely sericeous. Petioles 10–16 mm long, deeply channeled on adaxial surface, densely short-sericeous. Leaves discolorous, matt above and below. Leaf blades narrowly elliptic, 75–100 × 22–30 mm, base cuneate to attenuate, apex acuminate, margin flat; adaxial surface sericeous-lanate adaxially when young, becoming glabrous (remaining sericeous around midvein), oil glands not visible, midvein deeply impressed; abaxial surface sparsely to moderately short-sericeous, especially along midvein and veins; oil glands sparse to moderate (best seen with magnification), secondary veins distinct, intramarginal vein lacking. Inflorescence terminal, axillary, or on naked branches, flowers solitary. Anthopodium and metaxyphylls lacking. Peduncles solitary, 9–11 mm, densely sericeous, typically reflexed away from stem (in fruit). Bracteoles 2, ovate, relatively thick and somewhat conduplicate at base, *c.* 2 mm × 1 mm, rigid and tightly appressed to base of hypanthium, sericeous-tomentose, persistent in fruit. Calyx lobes 5, fused below, broadly rounded, apex obtuse, 1.5–2 mm long, ascending in fruit; adaxial surface somewhat hairy; abaxial surface densely short-tomentose. Petals 3–4 mm long; glabrous above and below, oil glands common and relatively large. Stamens multiseriate; filaments *c.* 3 mm long; anthers subcylindrical, *c.* 0.6 mm long; staminal disk hairy. Styles glabrous; ovary apex hairy. Immature fruit a berry, globose, 5–6 ×


**Fig. 6.** Close up of flowers of holotype specimen of ***Rhodomyrtus kaweaensis*** (*D.B.Foreman LAE 52304* [BISH]).

5–6 mm, shortly sericeous-tomentose, dull orange. Locules 6; placentation axile. Seeds numerous, ovate, testa hard. Embryo slightly curved to c-shaped. **Figs. 7 & 8.**

Presently known only from the type collection.

***Distribution and habitat*:** *Rhodomyrtus mengenensis* is presently known only in Papua New Guinea from East New Britain on the edge of the Mengen Massif west of Wide Bay (**Map 1**); growing at 1200 metres in *Nothofagus*–dominated mossy forests with *Nastus* Juss.

***Phenology*:** Probably flowering at least May and June and fruiting June at least into July.

***Diagnostic attributes*:** Younger branchlets with two longitudinal grooves on each side of the somewhat compressed internode; leaves narrowly elliptic, venation brochidodromous; fruits reflexed from stem.

***Affinities*:** The combination of narrowly elliptic leaves with brochidodromous venation most closely resembles *R. kaweaensis*, which is restricted to the main island of New Guinea.

***Notes*:** The label from the type specimen reports the leaves as being slightly shiny above when fresh. The fruits are reportedly dull orange in color, although it is unlikely that they are fully developed.

***Etymology*:** The specific epithet refers to the type collection from the Megen Massif.

***Conservation status*:** IUCN (2001) guidelines require a designation of "Data Deficient".

## General discussion

*Rhodomyrtus sensu lato* is demonstrably polyphyletic based on data from DNA sequences and morphological differences in leaf venation and aspects of the flower (Csizmadi 2006). For example, cladograms

based on maximum likelihood and parsimony analyses of DNA sequence data grouped species of *Rhodomyrtus* that possess brochidodromous venation into a clade distinct from the species having acrodromous venation, which were in a second clade (Csizmadi 2006). The work of Csizmadi (2006) included two or more representative species of the putatively related genera *Octamyrtus* Diels, *Archirhodomyrtus* (Nied.) Burret, *Decaspermum* J.R.Forst. & G.Forst., *Pilidiostigma* Burret, and an undescribed new genus from New Caledonia (Snow 2004). Representatives from each of these genera were present in at least one of the two clades comprised largely of species of *Rhodomyrtus*. Neither of the new species described here of *Rhodomyrtus* were sampled by Csizmadi (2006), but on the basis of leaf venation and certain aspects of floral morphology, they probably would fall out with other species in the brochidodromous clade.

## Key to species of *Rhodomyrtus* outside of Australia

**1** Leaf venation acrodromous (trinerved) . . . 2
Leaf venation brochidodromous (pinnate) . . . 7

**2** Calyx lobes narrowly triangular . . . **R.** sp. nov. Csizmadi & N.Snow ined.
Calyx lobes ovate or broadly semicircular . . . 3

**3** Abaxial leaf surface densely ferruginous villous . . . 4
Abaxial leaf surface glabrous or pubescent, lacking ferruginous hairs . . . 6

**4** Mature fruits ellipsoidal . . . 5
Mature fruits globular . . . **R. montana**

**5** Abaxial leaf surface moderately to densely villous . . . **R. lanata**
Abaxial leaf surface sparsely villous . . . **R. novoguineensis**

**6** Mature leaves glabrous abaxially . . . **R. salomonenesis**
Mature leaves tomentose abaxially . . . **R. tomentosa**

**7** Leaves narrowly elliptic to elliptic . . . 8
Leaves ovate, broadly elliptic or obovate . . . 10

**8** Branchlets, developing leaves, abaxial leaf midvein, and hypanthium woolly-tomentose (hairs bright white) . . . **R. pinnatinervis**
Branchlets, developing leaves, abaxial leaf midvein, and hypanthium sericeous or sericeous-tomentose (hairs dull white or somewhat yellowish) . . . 9

**9** Internodes of flowering branchlets 2–7 mm long, without longitudinal channels . . . **R. kaweaensis**
Internodes of flowering branchlets 12–22 mm long, bearing two longitudinal channels on each side . . . **R. mengenensis**

**10** Hypanthium smooth in flower . . . 11
Hypanthium ribbed or rugulose in flower . . . 12

**11** Mature fruit globular; stigma peltate; leaf apex acute or occasionally acuminate; style glandular . . . **R. pinnatinervis**
Mature fruit cylindrical; stigma capitate; leaf apex acuminate; style eglandular . . . **R. surigaoensis**

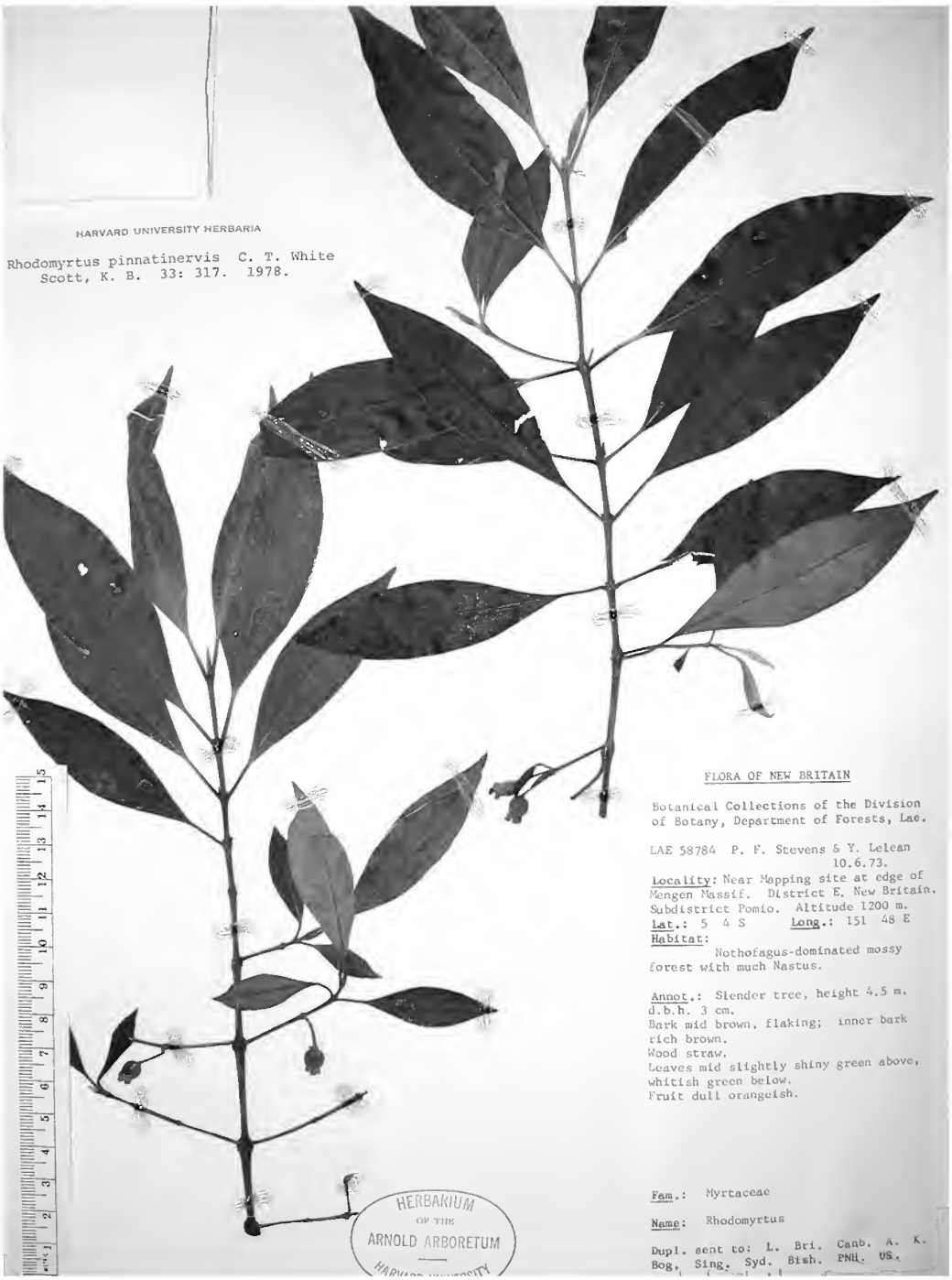


**Fig. 7.** Holotype specimen of ***Rhodomyrtus mengenensis*** (*P.F.Stevens & Y.Lelean LAE 58784* [A]).

**12** Locules 1 or 2 . . . . . 13
Locules 3 or more . . . . . 14

**13** Locules 1; placentation parietal; stigma peltate . . . . . **R. macrocarpa**
Locules 2; placentation axile; stigma capitate . . . . . **R. elegans**

**14** Leaves oblong or elliptic; inflorescence a simple cyme to a raceme; one row of ovules per locule . . . . . **R. locellata**
Leaves obovate, leaf apex rounded . . . . . **R. obovata**

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Based on the two new species reported here, and revisionary work in progress for species from New Caledonian (Snow in prep.), it now appears that *Gossia* consists of approximately 45 species (Snow *et al.* 2003; Snow 2005). This figure exceeds a recent previous estimate of 35 species (Snow 2000a) and suggests that *Gossia* may be the most species-rich genus of berry-fruited genera traditionally placed in subtribe Myrtineae in Australasia (Snow 2000a; see Landrum & Kawasaki (1997) for estimates of species richness among neotropical berry-fruited genera). The two species described here bring to six the number of species of *Gossia* known from the island of New Guinea (**Table 1**). Based on current knowledge it appears that eastern Australia and New Caledonia each have 20 species of *Gossia* (Snow *et al.* 2003, in prep.). None of the species are shared between Australia and New Caledonia, although *G. floribunda* occurs in both Australia and New Guinea (**Table 1**). Vanuatu and the Solomon Islands each have a single species of *Gossia* (**Table 1**; Snow *et al.* 2003, Snow 2005, in prep.). The geographical distrubution of *Gossia* now can be stated with some certainty as occupying the Eastern Australian, New Caledonian, Malesian, and Fijian floristic provinces of Takhtajan (1986), which provides the necessary context to include *Gossia* in more general biogeographical studies in this geologically complex region.

The two new species of *Gossia* described here join others in Myrtaceae also described from the 1936–37 Archbold Expeditions, including the following taxa newly described by White (1942, 1951): the genera *Basisperma* and *Eucalyptopsis*; the species *Mearnsia* [= *Metrosideros*] *scandens*, *Octamyrtus lanceolatus*, *Rhodomyrtus obovata*, *Rhodamnia propinqua*, *Tristania ferruginea*; and the variety *Melaleuca cunninghamii* Schauer var. *glabra*.

In light of a species from Papua New Guinea soon to be described (Csizmadi 2006) and the two new species described herein, the 20 species of *Rhodomyrtus* presently recognized is double that of a recent estimate (Snow 2000a). As mentioned above, however, *Rhodomyrtus* is demonstrably polyphyletic (Csizmadi 2006) and likely will need to be partitioned into two genera. Of the 20 species of *Rhodomyrtus sensu lato*, eleven occur on the island of New Guinea (**Table 1**), although *R. macrocarpa* Benth. has its main distribution in Australia (Scott 1978a; Guymer 1991). Species restricted to areas other than the island of New Guinea are *R. locellata* (Guillaumin) Burret of New Caledonia and *R. tomentosa* (Aiton) Hassk. of southern Asia and much of Malesia. In addition, *R. salomonensis* (C.T.White) A.J.Scott has its main distribution over much of the Solomon Islands (Scott 1978a), with its northeastern-most occurrence being on the island of Bougainville, Papua New Guinea. *Rhodomyrtus* thus occurs in the Indian, Indochinese, Malesian, Northeast Australian, and New Caledonian floristic regions of Takhtajan (1986).

Several berry-fruited species of Myrtaceae occur in northern Australia and southern Papua New Guinea. These include *Gossia floribunda* (A.J.Scott) N.Snow & Guymer (Snow *et al.* 2003), *Rhodomyrtus macrocarpa*, *Rhodamnia spongiosa* (F.M.Bailey) Domin & C.T.White (Snow in press), and *Pilidiostigma papuanum* (Lauterb.) A.J.Scott (Snow 2004). Their occurrence in both countries mirrors a pattern found in other genera (e.g., Brass 1938; Snow 2000b, in press) and likely is explained by southern New Guinea being geologically

**Table 1: Geographical distribution of species of *Gossia* and *Rhodomyrtus* occurring outside of Australia and their associated floristic regions following Takhtajan (1986).**

| Species and authors | Countries (islands in parentheses) | Floristic region |
|---|---|---|
| *Gossia aneityensis* (Guillaumin) N.Snow | Vanuatu (Aneityum) | Fijian |
| *Gossia eugenioides* (A.J.Scott) N.Snow | Indonesia (Papua) | Malesian |
| *Gossia floribunda* (A.J.Scott) N.Snow & Guymer | Australia, Papua New Guinea | Northeast Australian, Malesian |
| *Gossia kaweaensis* N.Snow | Papua New Guinea | Malesian |
| *Gossia longipetiolata* N.Snow | Papua New Guinea | Malesian |
| *Gossia mengenensis* N.Snow | Papua New Guinea | Malesian |
| *Gossia randiana* (Merr. & L.M.Perry) N.Snow | Papua New Guinea | Malesian |
| *Gossia salomonensis* (A.J.Scott) N.Snow | Solomon Islands (Gizon) | Malesian |
| *Gossia scottiana* N.Snow | Papua New Guinea | Malesian |
| *Gossia versteeghii* (Merr. & L.M.Perry) N.Snow | Indonesia (Papua) | Malesian |
| *Rhodomyrtus elegans* (Blume) A.J.Scott | Indonesia (Papua, Moluccas), Papua New Guinea | Malesian |
| *Rhodomyrtus lanata* Guymer | Papua New Guinea | Malesian |
| *Rhodomyrtus locellata* (Guillaumin) Burret | New Caledonia | New Caledonian |
| *Rhodomyrtus* sp. nov. J.Csizmadi & N.Snow ined. | Papua New Guinea | Malesian |
| *Rhodomyrtus macrocarpa* Benth. | Australia, Papua New Guinea, Indonesia (Moluccas) | Australia, Malesian |
| *Rhodomyrtus montana* Guymer | Papua New Guinea | Malesian |
| *Rhodomyrtus novoguineensis* Diels | Indonesia (Moluccas), Papua New Guinea, (East New Britain, Papua) | Malesian |
| *Rhodomyrtus obovata* C.T.White | Papua New Guinea (Papua) | Malesian |
| *Rhodomyrtus pinnatinervis* C.T.White | Papua New Guinea (Papua), Indonesia (Papua) | Malesian |
| *Rhodomyrtus salomonensis* (C.T.White) A.J.Scott | Papua New Guinea, Solomon Islands | Malesian |
| *Rhodomyrtus suriagoensis* Elmer | Philipppines (Mindanao) | Malesian |
| *Rhodomyrtus tomentosa* (Aiton) Hassk. | Southern Asia | Indochinese, Malesian |


**Fig. 8.** Close up of young fruits of holotype specimen of ***Rhodomyrtus mengenensis*** (*P.F.Stevens & Y.Lelean LAE 58784* [A]).

a part of the Australian continent with the Torres Strait becoming dry during the last glacial period (BMR Palaeogeographic Group 1990).

It is nothing new to restate the obvious fact that New Guinea and neighboring areas remain biologically among the least explored and poorly known areas on the planet. Reflecting our limited knowledge of the region is the remarkable fact that specimens collected seventy years ago by Leonard Brass during the 1936–37 Archbold Expedition to New Guinea are only now understood to represent species new to science (i.e., *Gossia scottiana* and *G. longipetiolata*). Further details of that particular Archbold Expedition are provided by Brass (1938) and Rand & Brass (1940). Given its tropical location, high levels of biodiversity and endemism, and relatively low levels of general plant collecting in many areas, additional collecting from New Guinea should remain a high priority. To help expand our knowledge of plant biodiversity the author will gladly accept fertile specimens of berry-fruited Myrtaceae as gifts for determination from this poorly known region.

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# Chromosome records for four species of *Pellaea* section *Platyloma* (J.Sm.) Hook. & Baker (Adiantaceae) from Australia

**G. Kokubugata, P.D. Bostock & Paul I. Forster**


## Summary

Kokubugata, G., Bostock, P.D. & Forster, P.I. (2006). Chromosome records for four species of *Pellaea* section *Platyloma* (J.Sm.) Hook. & Baker (Adiantaceae) from Australia. *Austrobaileya* 7(2): 341–345. Somatic chromosomes (2n) from nine populations of all four currently recognised Australian *Pellaea* species, *P. falcata*, *P. nana*, *P. paradoxa* and *P. calidirupium*, were observed by the standard aceto-orcein staining method. *Pellaea falcata*, *P. nana* and *P. paradoxa* respectively showed a chromosome number of $2n = 58$ (2x; x = 29). One of two populations of *P. calidirupium* showed a chromosome number of $2n = 87$ (3x) with the other showing $2n = 116$ (4x). The diploid counts obtained for *P. falcata* and the triploid result for *P. calidirupium* differ from previously published reports, which were based on New Zealand collections.


Key Words: *Pellaea calidirupium, Pellaea falcata, Pellaea nana, Pellaea paradoxa*, chromosomes, polyploidy, Australian flora, New Zealand flora

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## Introduction

*Pellaea* Link is a genus of at least 35 species with the majority in the southwestern United States and Mexico, but with scattered taxa also occurring in South America, Africa, India, Malesia, Australia and the western Pacific (Tryon *et al.* 1990). Four sections have been recognized, *viz.* sect. *Pellaea* with *c.* 16 species in America and one in Africa, sect. *Ormopteris* (J.Sm.) R.M. & A.F.Tryon with six species in South America, sect. *Holcochlaena* Hook. & Baker with ten species from Africa to India and Sri Lanka, and sect. *Platyloma* (J.Sm.) Hook. & Baker, presently with five species, from India and Sri Lanka to Australia, New Zealand and New Caledonia (Tryon 1990; Bostock 1998).

*Pellaea* sect. *Platyloma* presents some difficulties taxonomically. Until recently this section comprised only three species, *P. falcata*, *P. paradoxa* and *P. rotundifolia*, the last endemic to New Zealand. Field surveys and laboratory analysis (Brownsey & Lovis 1990; Garrett 1992, 1995; Bostock 1998) have resulted in the publication of a new species, initially considered a New Zealand endemic but later accepted for Australia (*P. calidirupium*), the raising of a variety to specific status (*P. falcata* var. *nana* to *P. nana*) and speculation as to whether further 'cryptic' species might be present (Bostock 1998).

Two haploid chromosome numbers have been determined in the genus, $n$ = 29 (Britton 1953; Brownlie 1954, 1957; Knobloch & Britton 1963; Lovis 1977; Tryon & Tryon 1982; Benham & Schaack 1988; Brownsey & Lovis 1990; Gastony 1990; Lin *et al.* 1990; Tryon *et al.* 1990; Bostock 1998; Tindale & Roy 2002) and $n$ = 30 (Manton & Sledge 1954; Kato *et al.* 1992; Manickam & Irudayaraj 1998). In Australia and New Zealand, thus far, counts of $n$ = 29 (2x), $n$ = 31 (2x + 2) and 58 (4x) at meiotic metaphase I have been recorded for taxa in sect. *Platyloma* (Brownlie 1954, 1957; Brownsey & Lovis 1990; Bostock 1998; Tindale & Roy 2002). Apomixis has been noted in the genus (Tryon & Britton 1958; Tryon 1968, 1972) but has not yet been proven for sect. *Platyloma*. Some forms of *Pellaea* recorded from Australia are strongly suggestive of hybrid origin but again this has not been proven (Bostock pers. obs.). Regardless of taxonomic problems,

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cytotaxonomic determinations of species in sect. *Platyloma* are few in Australia and although taxa distributed in New South Wales and Queensland were included by Tindale & Roy (2002), populations found in the latter have been poorly investigated.

The present study aims to investigate the somatic chromosomes of Australian *Pellaea* species as a contribution to cytotaxonomic knowledge of the genus, and to compare chromosome numbers of *P. calidirupium* and *P. falcata* from Australian populations with those reported for the same taxon from New Zealand localities.

## Materials and methods

The taxonomic treatment of *Pellaea* in the present study follows Bostock (1998). Nine populations of the four species of *Pellaea* currently recognised in Australia were used as materials in the present study (**Table 1**, **Fig. 1**). Voucher specimens are deposited in the Queensland Herbarium (BRI).

Root tips were collected and pretreated in 2 mM 8-hydroxi-quinoline at 20° for 4 hours after which they were fixed in acetic ethanol (1:3) at 4° for at least 2 hours. Fixed root tips were macerated in a mixture of 1N hydrochloride and 45% acetic acid at 60° for 15 seconds and stained in 2% aceto-orcein on slide glasses at 20° for 6 hours. After being squashed with 45 % acetic acid, the chromosome numbers at mitotic metaphase ($2n$) were counted for each population.

## Results and discussion

### (1) *Pellaea falcata* (R.Br.) Fée

The three populations of *Pellaea falcata* investigated showed a chromosome number of $2n = 58$ (2x; x = 29) at mitotic metaphase (**Fig. 1A–C**). The diploid counts recorded in this study agree with those of Tindale & Roy (2002) based on accessions collected from two localities in New South Wales. Previously, Brownlie (1961) and Brownsey & Lovis (1990) reported that a New Zealand population of *P. falcata* showed $n = 58$ at meiotic metaphase I, and was therefore tetraploid (4x). Based on the available cytological data for this species, there appears to be at least two polyploid series (2x and 4x) in *P. falcata*, with the tetraploids occurring in New Zealand and the diploids in Australia.

### (2) *Pellaea nana* (Hook.) Bostock

The populations of *P. nana* investigated both had a chromosome number of $2n = 58$ (2x) at mitotic metaphase (**Fig. 1D & E**). A tetraploid cytotype (4x) distributed in northeast Queensland (Tindale & Roy 2002) and an aneuploid cytotype (2x + 1), which is considered as being of hybid origin in Queensland (I. Manton in Tindale, 1972), were previously reported for this species.

This species was recently raised from a variety of *P. falcata* to specific rank and is considered an endemic Australian species. It is morphologically closest to *P. falcata* (Bostock 1998). In the present study, there is not enough data to reveal the cytotaxonomic relationship of the two species, but it is quite plain that they not only share morphological similarities but also diploid and tetraploid cytotypes.

### (3) *Pellaea paradoxa* (P.Br.) Hook.

The two populations of *P. paradoxa* investigated showed a chromosome number of $2n = 58$ (2x) at mitotic metaphase (**Fig. 1F & G**). The chromosome numbers counted in the present study was consistent with Bostock (1998) reporting a diploid cytotype ($n = 29$; 2x) for Queensland material, and Tindale & Roy (2002) reporting a diploid cytotype ($2n = 58$; 2x) for material collected in New South Wales. Moreover, Tindale & Roy (2002) also reported a tetraploid cytotype ($2n = 116$) from New South Wales material. The present study shows that *P. paradoxa* has multiple polyploid cytotypes (two at least), similar to the other three *Pellaea* species investigated here.

### (4) *Pellaea calidirupium* Brownsey & Lovis

Two Australian populations of *P. calidirupium* were examined in the present investigation. One population showed a chromosome number of $2n = 116$ (4x; **Fig. 1H**) and the other showed $2n = 87$ (3x; **Fig. 1I**). The chromosome number of $2n = 116$ (4x) of the former agrees with that of the tetraploid cytotype ($n = 58$) in New Zealand reported by Brownsey & Lovis (1990). On the other hand, the triploid count

**Table 1. Chromosome counts for four species of *Pellaea* species together with the localities of collection and voucher details (NSW = New South Wales; Qld = Queensland)**

| Species | Voucher | Location | 2*n* |
|---|---|---|---|
| *P. falcata* | *P.D.Bostock 358* | Hell Hole Creek, *c.* 34 km ENE of Warwick, Qld | 58 |
| | *J.Bruhl s.n.* | cultivated Armidale, ex Gosford, NSW | 58 |
| | *P.D.Bostock 2005 & G.Kokubugata* | Broken Head, NSW | 58 |
| *P. nana* | *P.D.Bostock 794A et al.* | Swan Creek, *c.* 29 km ENE of Warwick, Qld | 58 |
| | *P.D.Bostock 2001 & G.Kokubugata* | Mt. Maroon, 25 km SSE of Boonah, Qld | 58 |
| *P. paradoxa* | *P.D.Bostock 2002 & G.Kokubugata* | East Kipper Creek, 16 km WSW of Esk, Qld | 58 |
| | *P.D.Bostock 2004 & G.Kokubugata* | Mt. Tamborine, *c.* 55 km SSE of Brisbane, Qld | 58 |
| *P. calidirupium* | *P.I.Forster PIF11602 et al.* | Wilgavale near Texas, Qld | 116 |
| | *P.I.Forster PIF12688 & P.Machin* | Sundown National Park, *c.* 45 km SW of Stanthorpe, Qld | 87 |

detected in the present study is a new cytotype for the genus in Australia. Previously Tindale & Roy (2002) reported a diploid cytotype (*n* = *c.* 29; 2x), and the present results indicate that three polyploid series (2x, 3x and 4x) occur in the species.

Some Australian collections of *Pellaea* have been considered to be of hybrid origin, this opinion being based on comparative frond morphology (Bostock 1998 & pers. obs.). Previously two triploid species of *Pellaea*, from sections other than sect. *Platyloma*, have been reported to be of hybrid origin (Manton & Sledge 1954; Tryon & Britton 1958).

Morphologically *P. calidirupium* in Australia has the appearance of an intermediate between *P. falcata* and *P. paradoxa*, both of which occur sympatrically with *P. calidirupium* in some northern parts of its range. Aborted spores indicative of hybrid origin have not been recorded for *P. calidirupium*, at least in Australia. However, Brownsey & Lovis (*op. cit.*) noted that the New Zealand distribution of *P. rotundifolia* is contiguous with *P. calidirupium* in some places, and they mention, without further discussion, that 'in some areas, hybrids may be found'. Further investigation is necessary to determine whether the triploid cytotype of *P. calidirupium* is sterile or is able to reproduce by apomixis.

**Acknowledgements**

We are grateful to Dr. P.J.Brownsey (Museum of New Zealand Te Papa Tongarewa) for valuable comments and Dr G.Guymer (Queensland Herbarium), for inviting the first author to undertake scientific research at the Herbarium in 2000. Also, we thank Mr W.K.Harris (Queensland Herbarium), for arranging essential microscopy equipment, and Mr. R.Pattison for supplying some plant specimens for the present study.

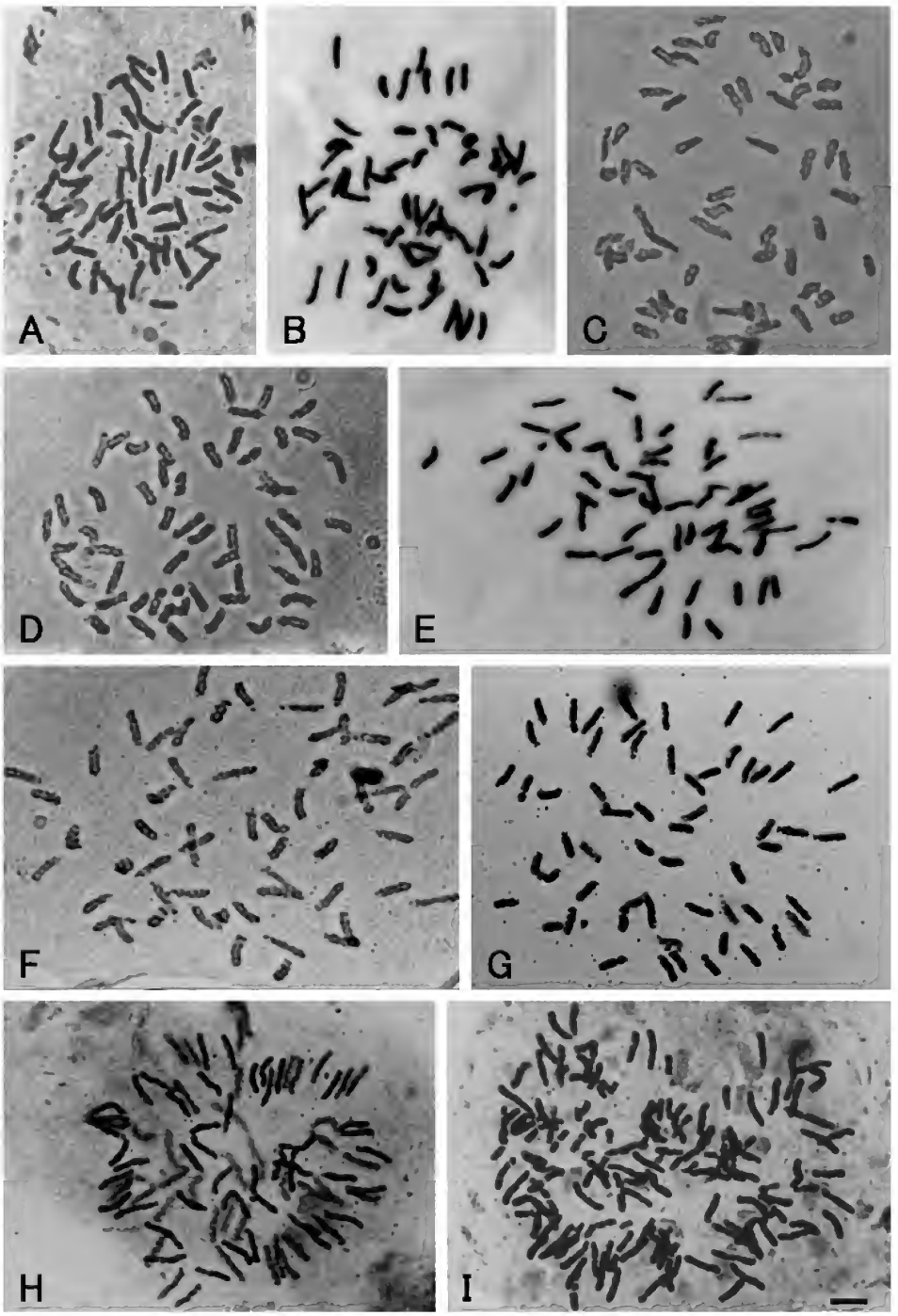


**Fig. 1.** Chromosomes at mitotic metaphase in nine Australian populations of *Pellaea*. A. *P. falcata* (*Bostock 358*; $2n = 58$). B. *P. falcata* (*Bruhl s. n.*; $2n = 58$). C. *P. falcata* (*Bostock 2005 & Kokubugata*; $2n = 58$). D. *P. nana* (*Bostock 794A et al.*; $2n = 58$). E. *P. nana* (*Bostock 2001 & Kokubugata*; $2n = 58$). F. *P. paradoxa* (*Bostock 2002 & Kokubugata*; $2n = 58$). G. *P. paradoxa* (*Bostock 2002 & Kokubugata*; $2n = 58$). H. *P. calidirupium* (*Forster PIF11602 et al.*; $2n = 116$). I. *P. calidirupium (Forster PIF12688 & Machin*; $2n = 87$). Bar represents 10 µm.

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# Notes on *Acacia* Mill. (Leguminosae: *Mimosoideae*), chiefly from Queensland, 5.

**Les Pedley**

**Summary**

Pedley, L. (2006). Notes on *Acacia* Mill. (Leguminosae: *Mimosoideae*), chiefly from Queensland, 5. *Austrobaileya* 7(2): 347–356. *Acacia argentina*, *A. burrana*, *A. lumholtzii*, *A. rubricaulis* and *A. webbii* are described as new. Notes on their taxonomic affinities, habitats and geographical distributions are given and illustrations provided. *Acacia tindaleae* Pedley is treated as a synonym of *A. conferta* A.Cunn. ex Benth. and *A. mariae* is described for *A. tindaleae* as usually understood (for example, in *Flora of Australia*). *Acacia microcybe* Pedley is a *nomen novum* for the illegitimate name *A. microcephala* Pedley. A lectotype is chosen for *A. leptostachya* Benth.

Key Words: Leguminosae, Mimosaceae, *Mimosoideae*, *Acacia argentina*, *Acacia burrana*, *Acacia leptostachya*, *Acacia lumholtzii*, *Acacia mariae*, *Acacia microcephala*, *Acacia microcybe*, *Acacia rubricaulis*, *Acacia tindaleae*, *Acacia webbii*, new species, Australian flora, Queensland flora, taxonomy, nomenclature

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## Introduction

The molecular and serological studies of Murphy *et al.* (2005) and Brain (1987, 1990) respectively indicate that the relationships among Australian species of *Acacia* are complex and need further study. Consequently there is no entirely satisfactory infrageneric classification. Species considered here, however, are referred to sections recognised by Pedley (1978). A slightly modified version of this classification was adopted for the *Flora of Australia* (Orchard & Wilson 2001).

Previously published papers in this series are Pedley (1964a, 1964b, 1969, 1974).

## Taxonomy

**Phyllodes uninerved; heads not in racemes** [*Acacia* sect. *Phyllodineae* DC.[1], in part].

**Acacia conferta** A.Cunn ex Benth., *London J. Bot.* 1: 345 (1842).

*Acacia tindaleae* Pedley, *Austrobaileya* 1: 248 (1980); *Racosperma tindaleae* (Pedley) Pedley, *Austrobaileya* 2: 356 (1987); **syn. nov.**

In his account of *Acacia tindaleae*, Maslin (in Orchard & Wilson 2001) noted that the description applied to plants from New South Wales and to *G. Russell 78/102* from near the type locality in Queensland. He added: "Other Qld specimens from the type locality (including the type itself) ... are unusual in having some characters approaching those of *A. conferta* ...". The type and two other specimens from near the type locality (*B.O'Keefe s.n.* AQ348651 and *G.Russell 78/102*, both BRI) represent a minor variant of *A. conferta* A.Cunn. ex Benth. characterised by the ± spreading hairs of its phyllodes and its flowers slightly larger than is usual for the species. It does not warrant formal taxonomic recognition. Consequently the name *Acacia tindaleae* is treated as a synonym of *A. conferta.* The plants from New South Wales, to which the name is usually applied, represent a distinct species. It is described below as *A. mariae*.

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[1] At the 17th International Botanical Congress in Vienna in 2005 the name *Acacia* was conserved with *A. penninervis* Sieber ex DC. as type (see McNeill *et al.* 2005). It has been added to Appendix IIIA of the International Code of Botanical Nomenclature, but its conservation should be considered only provisional until the entire "Vienna Code" is adopted at the 18th International Botanical Congress in Melbourne in 2011. On its adoption *Acacia* sect. *Phyllodineae*, since it includes the type of the conserved *Acacia*, becomes *Acacia* sect. *Acacia*. For the time being, *Acacia nilotica* (L.) Del. is accepted here as the type of *Acacia* and the *status quo* is maintained.

**Acacia mariae** Pedley, **species nov.** affinis *A. conferta* A.Cunn. ex Benth. a qua ramulis pedunculisque pubescentibus pilis densis implexis ± adpressis, phyllodiis pilis longiusculis persistentibus adpressis tenuibus debilibus modice obtectis, capitulis amplioribus, petalis longioribus (2–2.2 mm vice plerumque usque 1.5 mm) differt. **Typus:** New South Wales. Pilliga, August 1977, *J.Simmons s.n.* (holo: BRI [AQ264814]; iso (*n.v.*): A, CANB, K, MEL, MO, NSW).

*Acacia tindaleae* auct. non Pedley; Maslin, *Fl. Australia* 11A: 347 (2001), *pro parte majore* (incl. *t.* 33 A–C, but excl. type and specimen from Queensland cited).

***Etymology*:** The species is named in honour of Dr Mary Tindale who has made significant contributions to the systematics of Australian acacias and ferns. It is regrettable that the name *Acacia tindaleae* has been relegated to the synonymy of *A. conferta*.

**Leaves not phyllodinous; heads in axillary racemes**
[*Acacia* sect. *Botrycephalae*(Benth.) Taub.].

**Acacia argentina** Pedley, **species nov.** affinis *A. chinchillensi* Tindale autem foliolis grandioribus, racemis capitulorum brevioribus et plerumque calycibus plus profunde divisis differt. **Typus:** Queensland. Leichhardt District: "Jarwood" Station, 25°19′S 150°01′E, 25 September 1996, *P.I.Forster PIF19673* (holo: BRI; iso: AD, CANB, K, MEL, NSW).

*Acacia* sp. (Gwambagwine *F.Carter* 2) (Holland & Pedley 2002: 114).

Shrub to 4 m tall; branchlets ± terete, glaucous, sparse to moderately dense indumentum of spreading hairs 0.3–0.5 mm long, hairs extending to leaf axes; stipules absent; young tips silvery grey tinged with yellow. Leaves grey-green; axis (pulvinus, petiole and rachis included) 8–24 mm long, a poorly defined gland between or slightly below lowest pair of pinnae, and another between most distal pair, petiole (pulvinus 1.5–2 mm long included) 4–8 mm long, 2 or 3 pairs of pinnae, their axes 13–20 mm long, each with 6–9 pairs of leaflets, a small gland occasionally between most distal pair; leaflets oblong, rounded at base and tip, 6–9 mm long, 1.4–2.8 mm wide, (2.5–) 3–4.5 (–5) times longer than wide, rather thick, midrib obscure beneath, ciliolate with long hairs; petiolule *c.* 0.5 mm long. Heads (described as yellow) of 20–24 flowers, *c.* 5 mm diameter, in axillary racemes with up to 8 branches, axis to 4.5 cm long, peduncle 5–12 mm long, branches 3–5 mm long, subtended by bract *c.* 1 mm long. Flowers 5-merous; calyx obconical, somewhat angular, 0.6–0.7 mm long, lobes obtuse, ciliate, slightly inrolled, *c.* 0.2 mm long, tube usually with white spreading hairs on angles and a few long adpressed hairs on faces; corolla 1.5–1.6 mm long, lobed to about the middle, the lobes indistinctly uninerved in lower half; stamens *c.* 3 mm long; ovary with dense hyaline hairs, erect at its apex. Pods seen only immature (possibly 6 to 8 weeks to maturity) linear, to *c.* 6 cm long, hirsute. Seeds not seen. **Fig. 1.**

***Additional specimens examined*: Queensland.** Leichhardt District: Ruined Castle Creek catchment, Gwambagwine, 25°13′S, 149°27′E, Jul 1995, *Carter FC2* (BRI); Precipice N.P., Catchment of Precipice Creek, 25°19′S, 150°01′E, Sep 1996, *Forster PIF19740 et al.* (BRI, MEL); Gwambagwine, Ruined Castle Creek catchment, 25°12′S, 149°27′E, Sep 1996, *Forster PIF19649 et. al.* (BRI, MEL, NSW).

***Distribution and habitat*:** *Acacia argentina* is confined to the sandstone areas in the upper catchment areas of creeks draining into the Dawson River north of Taroom. Associated trees are *Corymbia bunites*, *C. watsoniana* subsp. *watsoniana*, *Eucalyptus fibrosa* subsp. *fibrosa*, *Angophora leiocarpa* and *Lysicarpus angusifolius*.

***Notes*:** *Acacia argentina* differs from *A. chinchillensis* in its considerably wider leaflets, usually taller stature and more deeply divided calyx.

***Etymology*:** The specific epithet is derived from Latin *argentum* (silver) with the suffix -*ina*, indicating resemblance; a reference to the appearance of its foliage.

**Phyllodes plurinerved; flowers in heads**
[*Acacia* sect. *Plurinerves* (Benth.) Maiden & Betche]

**Acacia burrana** Pedley, **species nov.** affinis *A. simsii* A.Cunn. ex Benth. autem phyllodiis saepe minus elongatis crassis nervatione obscura ornatis, et praecipue leguminis valvis valde tholutis super semina alternatim

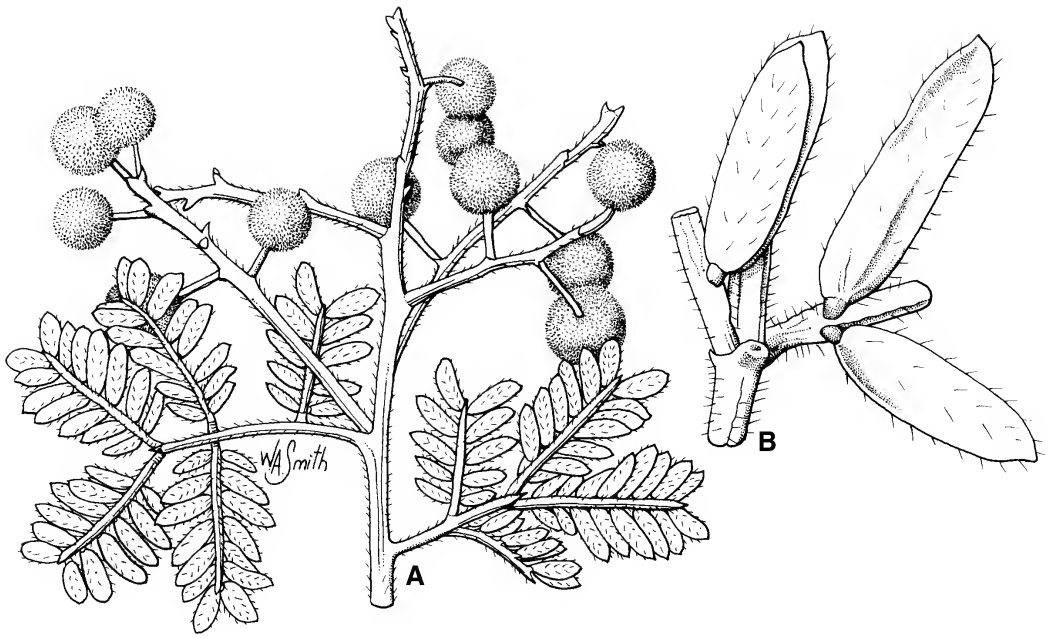


**Fig. 1.** ***Acacia argentina.*** A. twig with leaves (underside) and inflorescences ×2. B. part of leaf with proximal parts of pinnae and jugal gland ×8. A from *Carter FC2* (BRI); B from *Forster PIF19649 et al.* (BRI). Del. W. Smith.

in superficiebus ambabus differt. **Typus:** Queensland. North Kennedy District: 25 km W of Pentland on Great Dividing Range (area known locally as Burra Range), 20°14′E, 145°14′S, 23 July 1975, *A.D. Chapman 1310* (holo: BRI; iso (*n.v.*): CANB, DNA, K, L, US).

*Acacia* sp. (Burra Range P. Jobson 467) (Holland & Pedley 2002: 114).

Shrub to 5 m tall; branchlets slender, angular, dark reddish brown, occasionally lenticellular; stipules minute (less than 0.5 mm long). Phyllodes straight or slightly curved, narrowly elliptic to narrowly ovate, usually obtuse at tip with a short sometimes oblique mucro, (3.5–) 4–7.5 cm long, (2.5–) 4–7 (–9) mm wide, 6.5–14 (–15.5) times longer than wide, glabrous, thick, nervature obscure, 3–7 longitudinal nerves with occasional anastomoses visible, marginal nerves yellowish; gland small, usually not projecting from margin, 3–10 (rarely 13) mm from base, occasionally a second gland *c.* 20 mm from base, rarely glands absent; pulvinus 1–2 mm long, transversely wrinkled, contrasting with lamina. Heads (described as dark yellow) of 20–30 flowers, *c.* 5 mm diameter, peduncles 7–10 mm long, glabrous, arranged in pairs or several pairs in upper axils, one head maturing before the other of the pair, basal bract 0.5–1 mm long, occasionally the paired heads in axillary racemes, axis 1.5–2.5 mm long. Flowers 5-merous; bracteoles peltate, stipe slender, *c.* 0.4 mm long, head *c.* 0.3 mm diameter, calyx divided to the base into lobes 0.7–0.9 mm long, linear, slightly expanded at tip, fringed with hyaline hairs; corolla *c.* 1.5 mm long, divided to about the middle, glabrous, lobes with distinct midribs; stamens *c.* 3 mm long; ovary glabrous. Pods straight, linear, glabrous and slightly pruinose, the valves strongly domed over the seeds alternately on each side, the convexity extending to the marginal nerve, with a depression on the valve opposite the convexity, slightly constricted between the seeds, to 9 cm long with up to 10 seeds, 5–6 mm wide, the isthmuses 3–4 mm wide. Seeds longitudinal, obloid, 3.2–4 mm long, 2.8–3.2 mm wide, 2–2.5 mm thick, black, not markedly shiny; funicle expanded into a keeled leaf-like aril on one side of seed, *c.* 1.5 mm wide; pleurogram thick, closed or slightly open; areole concolorous with rest of surface. **Fig. 2**.

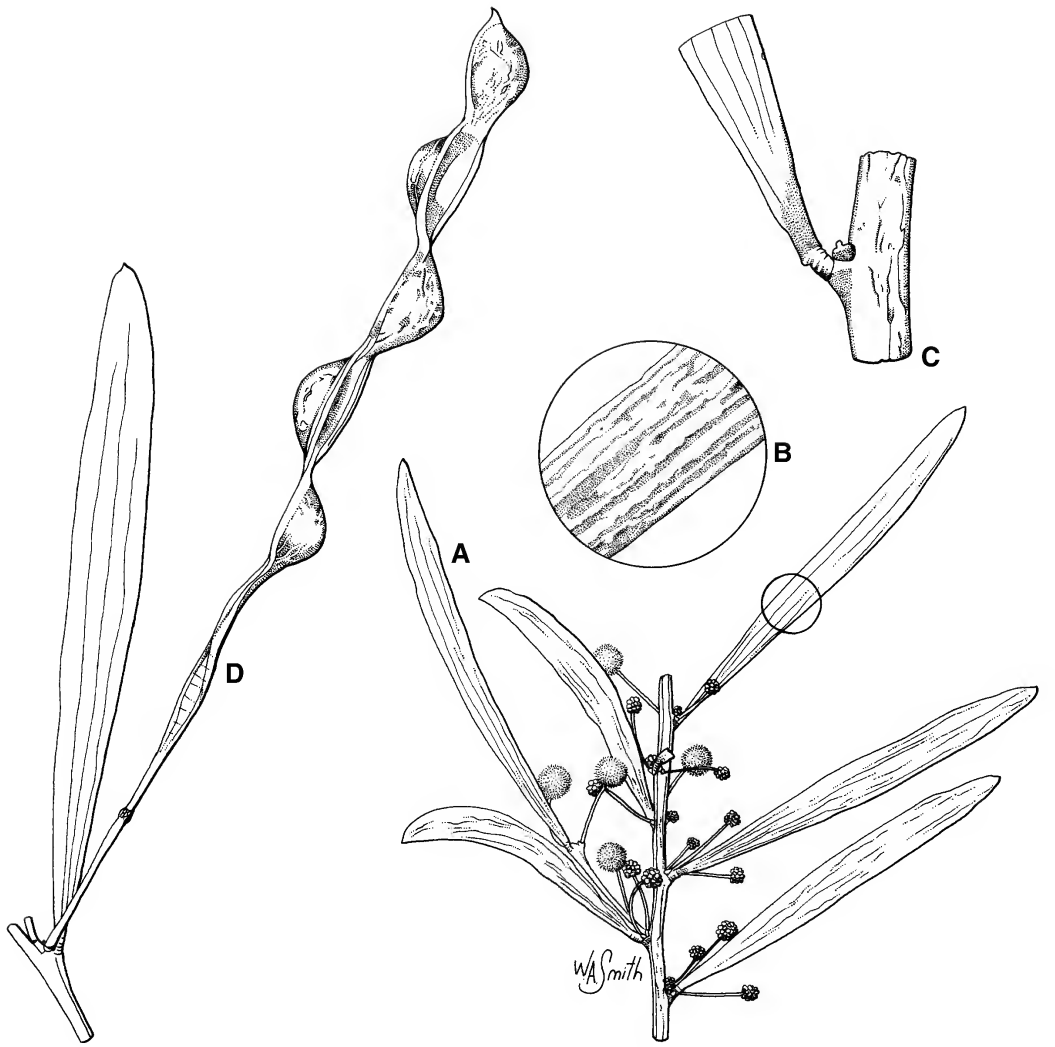


**Fig. 2.** ***Acacia burrana.*** A. twig with phyllodes and inflorescences × 1. B. portion of phyllode × 4). C. proximal end of phyllode × 4. D. pod on axillary peduncle × 1.5. A–C from *Jobson 467* (BRI); D from *Fletcher 8* (BRI); Del. W.Smith.

***Additional selected specimens*: Queensland.** Burke District: "Warang" Holding, White Mountains, 22°29′S, 144°48′E, Jul 1988, *Fell DF1307A et al.* (BRI). Cook District: Fishermans Waterhole, Walsh River, 17°03′S, 144°36′E, Jun 2005, *McDonald KRM4290 et al.* (BRI). North Kennedy District: 12 km WSW of Mt Stewart, W of Charters Towers, 25°05′S, 146°16′E, Sep 1994, *Cumming 13327* (BRI); Mt Garnet aerodrome, 17°41′S, 145°09′E, Apr 2005, *Forster PIF30644 et al.* (BRI, DNA, K, MEL); Burra Range lookout, 20°43′S, 145°13′E, Mar 1989, *Jobson 467* (BRI; also *n.v.* CANB, HO, MEL); head of Archer Creek, S.F.R. 754, W of Ravenshoe, 18°36′S, 146°26′E, Jul 2004, *McDonald KRM2942 et al.* (BRI); White Mountains N.P., Jul 1999, *Simmons 3929 et al.* (BRI); 7.5 km W of "Windsor" homestead, 20°18′S, 146°02′E, Aug 1992, *Thompson CHA234 et al.* (BRI). Mitchell District: near Red Gorge, White Mountains N.P., 20°30′S, 144°56′E, Jun 1992, *Bean 4585* (BRI; also *n.v.* AD, MEL). South Kennedy District: Cudmore N.P., 22°50′S, 146°20′E, Sep 2000, *Fletcher 8* (BRI).

***Distribution and habitat*:** *Acacia burrana* occurs in the Petford–Herberton–Mt Garnet area and the Great Dividing and Lolworth Ranges at the headwaters of the Cape River and Torrens Creek, with an isolated occurrence some 300 km to the south in the Cudmore National Park. It occurs at above 500 m altitude on shallow sandy soils often derived from sandstone, reported in association with

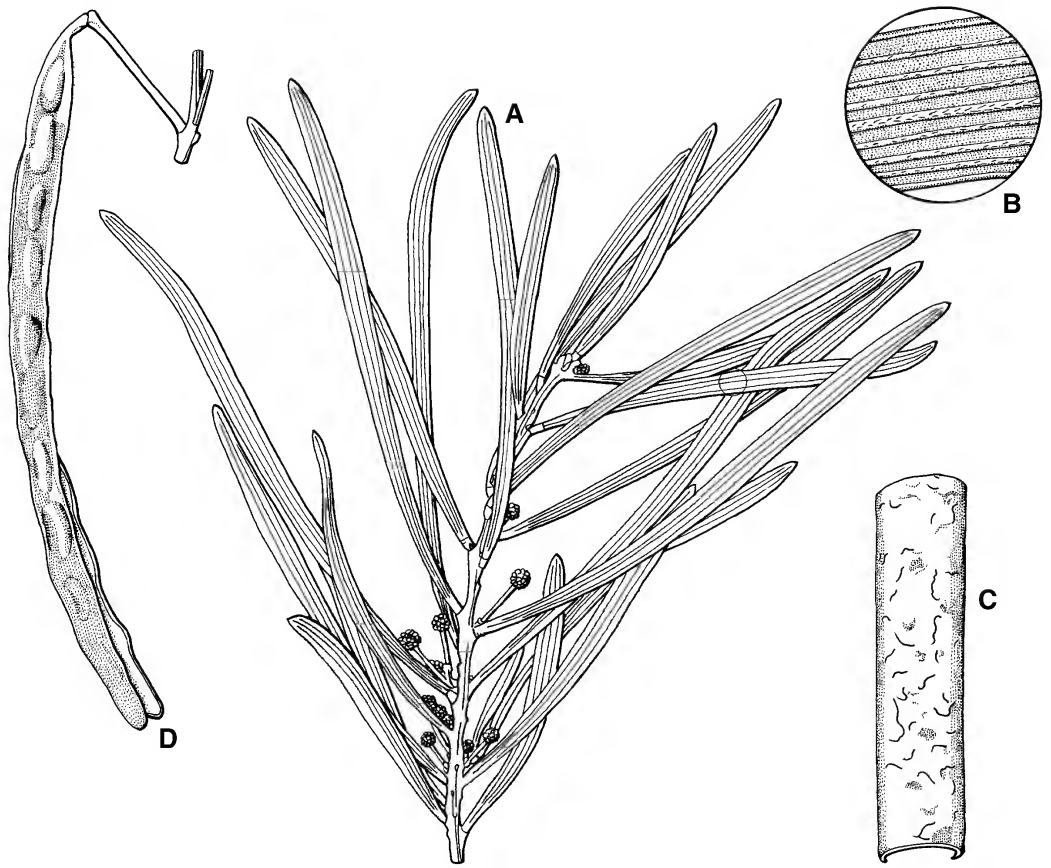


**Fig. 3.** ***Acacia lumholtzii.*** A. twig with phyllodes and inflorescences ×0.8. B. portion of phyllode ×6. C. stem showing unusual pale bark ×1.5. D. pod ×0.8. A–C from *Fell DF1704* (BRI); D from *Cumming 13813* (BRI). Del. W. Smith.

*Corymbia trachyphloia* or *Acacia shirleyi* and occasionally at lower elevations on sandy creek banks.

***Notes*:** *Acacia burrana* is closely related to *A. simsii*, but differs most conspicuously in having pods strongly domed over the seeds alternately on each side. Its phyllodes are also thicker with obscure nervature and the basal gland more remote from the pulvinus. Few flowering specimens have been seen.

***Etymology*:** The specific epithet is an adjective referring to the Burra Range, the local name for part of the Great Dividing Range where the plant is found. Burra is a railway siding in the area.

**Acacia lumholtzii** Pedley, **species nov.** affinis *A. simsii* A.Cunn. ex Benth. a qua cortice eburnea, ramulis dense pubescentibus, phyllodiis apicem ramulorum versus congestis, nervis phyllodiorum longitudinalibus prominentibus pubescentibus, leguminibus plus longioribus angustioribusque super semina vix elevates, seminibus oblongis in ambitu longioribus differt. **Typus:** Queensland. North Kennedy District: Bishop Peak, *c.* 16 km SSE of Cardwell, 18°28′S, 146°07′E, 29 August 2001, *P.Williams TH4578 & J.Kemp* (holo: BRI).

*Acacia* sp. (Mt Leach Range D.G.Fell+ DF1704) (Holland & Pedley 2002: 114).

Shrub to 4 m tall; bark cream coloured with numerous pustules; branchlets ribbed below insertion of phyllodes, densely, loosely adpressed pubescent, hairs dark brown; young tips dark brown; stipules deltoid, *c.* 0.8 mm long, pubescent, persistent. Phyllodes crowded at end of branches, ascending, linear, straight or slightly incurved, 10–11.5

cm long, 3.3–4 mm wide, 25–33 times longer than wide, nerve-like margins, usually 7 widely spaced longitudinal nerves with occasional anastomoses, midrib a little more prominent than the rest, hairs adpressed, confined to nerves when phyllode mature, apical mucro short, blunt, deciduous; single gland inconspicuous, 2.5–8 mm from base; pulvinus *c.* 2 mm long, adpressed pubescent. Heads of 25–30 flowers, 4–5 mm diameter, in axillary centrifugal racemes, axis to 4 mm long, distal head maturing much before the others, peduncles to 12 mm long, subtended by persistent, concave-ovate bracts; axis and peduncles densely loosely adpressed pubescent, hairs brown; bracteole spathulate, the tip slightly oblique. Flowers 5-merous; calyx obconical, *c.* 1 mm long with oblong incurved obtuse lobes *c.* 0.4 mm long, tube slightly angular, lobes with dense tangled ± adpressed hairs, indumentum extending to distal part of tube; corolla *c.* 1.5 mm long, lobed to about level of calyx, lobes coriaceous without ribs; stamens *c.* 3 mm long; ovary pubescent. Pods linear, to 130 mm long, 3.5–4 mm wide, valves cartilaginous, brown with paler thickened margins, scattered adpressed hairs. Seeds arranged longitudinally, oblong in outline, *c.* 5 mm long and 2 mm wide, black; areole large, rectangular; pleurogram open; aril clavate, creamy. **Fig. 3.**

***Additional specimens examined*** **(both BRI): Queensland**. North Kennedy District: Bishop Peak, Cardwell Range, 18°28′S, 46°07′E, Oct 1995, *Cumming 13813*; Mt Leach Range, *c.* 26 km S of Cardwell, 18°28′S, 146°08′E, Feb 1989, *Fell DF1704 et al.*

***Distribution and habitat*****:** *Acacia lumholtzii* is restricted to Bishop Peak (alt. 866 m) in the south-eastern part of Girrigun N.P., south of Cardwell, where it occurs on granite, on rock pavements and cliffs near the summit.

***Notes*****:** The nervature of the phyllodes places *Acacia lumholtzii* in the "Oligoneura group" of species of *Racosperma* as circumscribed by Pedley (1987), though the structure of its inflorescence is unusual in the group. In the key to species published there it comes to the couplet *R. ramiflorum/R. simsii*; however, it is rather isolated in the group. The brown hairs that envelope the developing phyllodes and inflorescences, the prominent nerves of the phyllodes, and the remarkably long pods set it apart from all other species.

***Etymology*****:** The species is named to commemorate Carl Lumholtz (1851–1922) a Norwegian zoologist and ethnologist. In the 1880's he lived for several years among aboriginal people in north-eastern Queensland. He was based on the Herbert River within sight of the type locality of *A. lumholtzii*, though he never visited the area, being more interested in catching the tree-kangaroo *Dendrolagus lumholtzi*. His book, rather luridly titled "Among Cannibals", is an interesting account of colonial Queensland in the second half of the nineteenth century.

**Acacia microcybe** Pedley, **nom. nov.**

*Acacia microcephala* Pedley, *Austrobaileya* 1: 193 (1978) *nom. illeg.* neque A.Richard (1846) neque Macfadyen (1837); *Racosperma microcephalum*(Pedley)Pedley,*Austrobaileya* 2: 352 (1987). **Type:** Queensland. Mitchell District: "Corinda", *c.* 80 miles [130 km] N of Aramac, June 1949, *S.L. Everist 3869* (holo: BRI; iso: NSW ).

***Etymology*****:** The specific epithet is derived from Greek *mikros*, 'small' and *kybe*, 'head'. There appears to be no adjectival form of the latter; consequently the epithet should be regarded as a noun in apposition with the generic name.

**Acacia webbii** Pedley, **species nov.** quoad formam nervationemque phyllodiorum et structuram inflorescentiarum leguminum seminumque *Acacia oraria* F.Muell. similis autem phyllodiis amplioribus in interdum longioribus pedunculis vectis et furfure in ramulis phyllodiisque carenti et praecipue trichomatibus in pagina phyllodum minutis (sub lente × 20 necessaria) rubribrunneis resinosis et inflorescentiis crescentibus resina velatis differt. **Typus:** Queensland. Cook District: St George River, 3 km N of Fairlight–Palmerville road, 15°45′S, 144°02′E, 23 April 1980, *J.R.Clarkson 3258* (holo: BRI; iso (*n.v.*): K, MO, MEL, PERTH, QRS).

Single-stemmed shrub or small tree to 6m tall; branchlets slender, dark brown, angular, glabrous, somewhat resinous. Phyllodes usually dimidiate and straight or sometimes

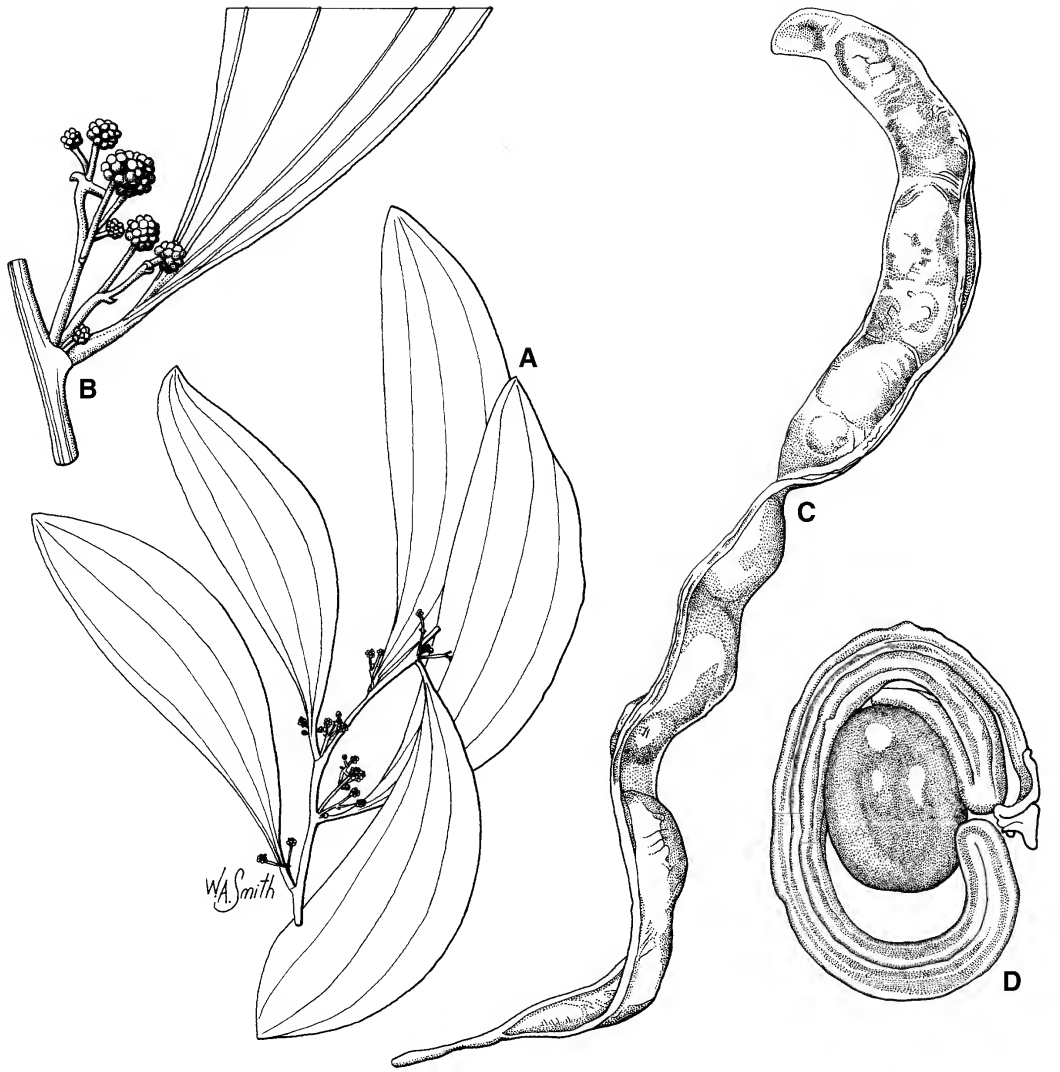


**Fig. 4.** ***Acacia webbii.*** A. twig with phyllodes and inflorescences × 0.6. B. proximal part of phyllode with inflorescence in axil × 2. C. pod × 1. D. seed with encircling funicle/aril × 5. A & B from *Clarkson 3258* (BRI). C & D from *Webb & Tracey 11134* (BRI). Del. W. Smith.

obovate, slightly incurved, 8–11 cm long, 16–35 mm wide, (3–) 3.5–5.5 times longer than wide; three longitudinal nerves prominent, free to base; secondary nerves fine, intricately anastomosing, tips of young phyllodes dark; phyllode surface with moderately dense minute (× 20 magnification necessary) red-brown resinous trichomes; tip blunt; gland basal, usually inconspicuous; pulvinus 2–4 mm long. Flowers (described by collectors as "cream") in heads of 20–30 flowers arranged in racemes with 1–7 branches in upper axils; axis to 30 mm long; branches, each subtended by small bract, 4–8 mm long at anthesis, occasionally growing out into a leafy shoot; bracteoles oblong, as long as calyx, distal part thick with scattered red-glandular hairs. Flowers 5-merous; calyx 0.8–0.9 mm long, divided to about the middle, tube membranous, lobes thickened with sparse red-glandular hairs, midrib obscure; corolla 1.5–1.7 mm long, glabrous, lobes *c.* 0.5 mm long, thickened, strongly reflexed at anthesis; stamens *c.* 3.5 mm long; ovary glabrous. Pods *c.* 12 cm long

and 1 cm wide, dark brown, yellow thickened margins, loosely coiled; valves coriaceous. Seeds (only two examined) ± obovate in outline, *c.* 5 × 3.5 mm, *c.* 2 mm thick, dark brown, not particularly shiny; funicle/aril orange, folded back on itself encircling seed; areole large, oblong; pleurogram fine, open, slightly darker than rest of seed. **Fig. 4.**

***Additional specimens examined*** **(all BRI): Queensland.** Cook District: East Palmer River immediately east of confluence with Cherry Tree Creek, 28 km SSE of Jowalbinna, 15°58'S, 144°23'E, Aug 2003, *Fox IDF2300* (also *n.v.* MBA); Granite Creek, *c.* 16°10′S, 144°25′E, Jun 1975, *Hyland 8278* (ex QRS); 2 km W of Spion Kop, 22 km S of "Yarraden", 14°30′S, 143°17'E, Jun 2005, *Wannan 4014 et al.* (also *n.v.* CANB, NSW); Palmer River, [probably 16°10′S, 144°45′E], Nov 1969, *Webb & Tracey s.n.* [AQ377877]; Annan River crossing on Mareeba–Cooktown road, 15°41′S, 145°12′E, Jan 1973, *Webb & Tracey 11124*; Palmer River crossing on Mareeba–Cooktown road, Oct 1973, *Webb & Tracey 11134.*

***Distribution and habitat*****:** *Acacia webbii* is restricted to a small area of north-eastern Queensland between 14.30° and 17° S latitude. It occurs in the sandy beds (usually granitic) of seasonally dry streams and is often periodically submerged by flood waters

***Notes*****:** *Acacia webbii* is closely related to *A. oraria* F.Muell. differing most conspicuously in lacking the grey scurf that covers the phyllodes, branchlets and inflorescence rachises of that species. Its phyllodes are also somewhat larger, widest above the middle with minute resin-dots on the surface. When well developed the inflorescences are branched, as in *A. leptoloba* Pedley.

***Etymology*****:** The species is named in honour of Dr L.J (Len) Webb (1920-) whose classification of rainforests has profoundly influenced the study of these complex communities in Australia.

**Phyllodes plurinerved; flowers in spikes** [*Acacia* sect. *Juliflorae* (Benth.) Maiden & Betche]

**Acacia leptostachya** Benth., *Fl. Austral.* 2: 406 (1864); *Racosperma leptostachyum* (Benth.) Pedley, *Austrobaileya* 2: 351 (1987). **Type:** Port Denison, *Fitzalan* (lecto [here designated]: K; iso: MEL, NSW).

*Acacia argentea* Maiden, *Proc. Roy. Soc. Queensland* 30: 41 (1918). **Type:** Cook District: Almaden, August 1913, *R.H.Cambage 3893* (iso: BRI).

***Notes*****:** Detailed studies have shown that some widespread variable species, e.g. *Acacia aulacocarpa* A.Cunn. ex Benth. (McDonald & Maslin 2000), *A. cowleana* Tate (McDonald & Maslin 1997) and *A. tumida* F.Muell. ex Benth. (McDonald 2003), consist of a number of closely related but distinct taxa. *Acacia leptostachya* may be a species complex of the same sort. A variant with wide pods and transverse seeds, apparently confined to soils derived from serpentinite in east-central Queensland, certainly warrants recognition taxonomically. Further study could well reveal other variants of significance. As part of such a study, the status of *A. capillosa* Pedley (as suggested by Maslin in Orchard & Wilson 2001) should be re-assessed.

Since Bentham cited four syntypes in the protologue of *Acacia leptostachya*, lectotypification to fix the application of the species name is desirable before the species is formally fragmented. The specimen chosen is representative of the species over a large part of its range, as is the type of *Acacia argentea* Maiden.

**Acacia rubricaulis** Pedley, **species nov.** quoad nervos secundarios late separatos *A. leptocarpa* A.Cunn. ex Benth. similis autem ramulis atrorubris crassis valde angulatis, plerumque in sicco politis, rhachidibus spicarum conspicue pruinosis, floribus fortiter constructis, petalis calycibus multo longioribus, et proprie leguminibus brevibus oblongis differt. **Typus:** Queensland. Cook District: Logan Jack Creek, 11°12′S, 142°45′E, 2 August 1987, *H.Gitay HG109* (holo: BRI).

*Acacia* sp. (Harmer Creek J.R.Clarkson+ 9133) (Holland & Pedley 2002: 114).

Shrub to 6 m tall; branchlets strongly angled, often appearing polished when dry, dark red, stout, glabrous; stipules deltoid, *c.* 0.5 mm long, deciduous; young tips and distal ends of developing phyllodes dark reddish brown. Phyllodes ovate or elliptic, straight, dimidiate or slightly falcate, 13.5–19 cm long, 22–42 mm wide, (4.3–) 5–6.6 times longer than wide,


**Fig. 5.** ***Acacia rubricaulis***. A. twig with phyllodes and inflorescences × 0.4. B. portion of phyllode × 1. C. portion of spike; flowers with stamens and styles removed × 3. D. pod × 1. A–C from *Gitay 109* (BRI); D from *Clarkson 9133* (BRI). Del. W. Smith.

glabrous, three longitudinal nerves more prominent than the rest, free to the base or running together in the middle of the phyllode (similar to those of *A. polystachya*), secondary longitudinal nerves fine, widely spaced, 1–1.5 mm apart, some anastomoses; gland basal or up to 5 mm from the base, usually inconspicuous, orifice small; pulvinus 5–12 mm long, dark red, polished. Flowers in spikes in pairs in the upper axils; spikes 40–65 mm long, sparsely flowered, rachis conspicuously pruinose, peduncles 0–5 mm long, glabrous, subtended by deciduous concave bract *c.* 1.5 mm long. Flowers 5-merous, perianth parts rather leathery; calyx cylindrical, pruinose, without veins, 0.5–0.6 mm long, sinuolately lobed, lobes *c.* 0.1 mm long; corolla 2.2–2.4 mm long, *c.* 4 times longer than the calyx, lobed to about the level of the calyx, lobes spreading widely at anthesis, glabrous, obscurely uninerved; stamens rather short, *c.* 2.5 mm long; ovary densely pubescent. Pods (immature) flat, oblong, to 5 cm long, *c.* 8 mm wide, with up to 6 seeds; valves glabrous, only obscurely nerved. Seeds (extremely immature) longitudinal, funicle thickened, folded twice, forming aril beneath seed. **Fig. 5.**

***Additional specimens examined*: Queensland**. Cook District: S of Harmer Creek, 37 km E of "Nixon" homestead, 11°57′S, 142°55′E, Oct 1991, *Clarkson 9133 & Neldner* (BRI, MBA, PERTH); 10 km N of mouth of Olive River, 12°04′S, 143°05′E, Apr 1993, *Clarkson 9913 & Neldner* (BRI, K, PERTH); 4 km W of Rocky River

mouth, 37.4 km ENE of Coen, 13°46′S, 143°29′E, Aug 1993, *Fell DGF3478 et al.* (BRI, MBA); Round Point, Shelburne Bay, 11°54′S, 143°06′E, Nov 1985, *Gunness AG1923* (BRI); between Rocky River and Massey Creek, 13°40′S, 143°25′E, Sep 1973, *Stocker 1073* (BRI; ex QRS).

***Distribution and habitat*:** *Acacia rubricaulis* is restricted to the eastern coast of Cape York Peninsula between about 11° and 14° S where it occurs in sand on dune fields, degraded sand-dunes and creek banks. It has been recorded once from the margin of rainforest.

***Notes*:** *Acacia rubricaulis* is a distinctive plant with obscure relationships. In WATTLE (Maslin 2001) it keys to a group of species including *Acacia crassa* Pedley, *A. cowleana* Tate and *A. lamprocarpa* O.Schwarz, but its widely spaced secondary nerves (an attribute not used in the key), point to a relationship with *A. leptocarpa*. The stout, red, strongly angular, polished branchlets, pruinose spike-rachis, thick perianth parts and short oblong pods clearly distinguish it from all other species. Its pods resemble those of an undescribed species, *Acacia* sp. (Castletower N.Gibson TOI345), which; however, has close parallel nerves similar to those of *A. julifera* Benth.

***Etymology*:** The epithet is derived from Latin *rubri-* (red) and *caulis* (stem). Stout red branchlets are characteristic of the species.

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# *Gynochthodes oresbia* Halford & A.J.Ford (Rubiaceae), a new and cryptic species from north-east Queensland

**A.J. Ford[1] & D.A. Halford[2]**


## Summary

Ford, A.J. & Halford, D.A. (2006). *Gynochthodes oresbia* Halford & A.J.Ford (Rubiaceae), a new and cryptic species from north-east Queensland. *Austrobaileya* 7(2): 357–364. *Gynochthodes oresbia* Halford & A.J.Ford is described, illustrated and distinguished from other Australian species. Notes on habitat, distribution, and conservation status are provided. An identification key to the species of *Gynochthodes* in Australia is presented.


Key Words: Rubiaceae, *Gynochthodes oresbia*, new species, taxonomy, Australian flora, Queensland flora, identification key

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## Introduction

*Gynochthodes* Blume is a genus of approximately 18 species (IPNI 2006) distributed from south-east Asia to the Pacific (Mabberley 1997). Blume (1826) in the original publication of the generic name used the spelling '*Gynochtodes*'. However, Blume (1828) in a footnote deliberately changed the spelling of several generic names from his earlier 1826 work. One of the changes he made was '*Gynochtodes*' to '*Gynochthodes*'. According to Skog (1985) and Brummitt & Taylor (1990) Blume noted "in the discussion accompanying the list of 'corrected' names that some of the earlier (1826) spellings were wrong". Halford (2004) was unaware of Blume's later correction of the spelling of the generic name *Gynochtodes* and had agreed with Smith (1988) that "there appears to be no justification for such a change". Other recent authors (e.g. Johansson 1988; Robbrecht 1988; Igersheim & Robbrecht 1993) have maintained the original spelling as does the electronic version of *Index Nominum Genericorum* (ING 2006). However, we believe that Blume's change in spelling of '*Gynochtodes*' to '*Gynochthodes*' should be considered a formal and legal correction of the spelling of the generic name, acceptable under *Art.60.1* of the *International Code of Botanical Nomenclature* (Greuter *et al.* 2000).

Currently two endemic species of *Gynochthodes* (*G. australiensis* J.T.Johanss. and *G. sessilis* Halford) are recorded for Australia (Johansson 1988; Halford 2004). The genus is included in tribe *Morindeae* Miq. (Johansson 1987; Robbrecht 1988; Igersheim & Robbrecht 1993; Bremer & Manen 2000) and is closely related to *Morinda* L., *Caelospermum* Blume and *Pogonolobus* F.Muell. (Bremer & Manen 2000), all of which are found in, but not endemic to, Australia. *Gynochthodes* can be distinguished from *Morinda*, *Caelospermum* and *Pogonolobus* in Australia by the following combination of characters: axillary inflorescences, usually non-united flowers, corolla lobes with dense indumentum on the adaxial surface, lack of domatia in lateral vein axils of leaves and leaves drying black. The generic limits of the above *Morindeae* are currently being assessed and revised (S.Razafimandimbison 2005, pers. comm.).

Discussions between the two current authors about various taxa within the family Rubiaceae in Queensland led to the examination of material that was represented in the Queensland Herbarium (BRI) and Australian National Herbarium (QRS) under the ubiquitous and poorly documented genus

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*Morinda*. At the time the species described here as *Gynochthodes oresbia* was known from remarkably few fertile specimens, yet was well collected geographically. Its superficial vegetative resemblance to other species of *Morinda* has led in the past to it being referred to as an undescribed species in that genus (Forster & Halford 2002; Hyland *et al.* 2003). Critical examination of these few fertile specimens revealed that it was a new and undescribed species of *Gynochthodes*.

## Materials and methods

The study is based upon the examination of herbarium material from BRI and QRS combined with field observations by the first author. All specimens cited have been seen by one or both authors.

Measurements of the floral parts and fruits of *G. oresbia* are based on material preserved in 70% ethanol. Common abbreviations in the specimen citations are: E.P. (Experimental Plot), L.A. (Logging Area), N.P.R. (National Park Reserve), S.F.R. (State Forest Reserve) and T.R. (Timber Reserve).

The abbreviation RE in the distribution and habitat notes refers to Regional Ecosystem, descriptions of which can be viewed at www.epa.qld.gov.au/projects/redd/landzone.cgi?bioregion=7.

Extent of occurrence estimates were derived from the validation of original collection localities. These data points were loaded into ESRI ArcView 3.2 and the draw polygon feature was used to calculate the area between the points. The area of occupation estimates were principally derived from a digital Regional Ecosystem map supplemented by the first author's knowledge of vegetation types and habitats within the Wet Tropics bioregion (hereafter referred to as the Wet Tropics) (Environment Australia 2005).

## Taxonomy

***Gynochthodes oresbia*** Halford & A.J.Ford, **species nov.** arcte affinis *G. australiensi* et *G. sessili*. A *G. australiensi* apice foliorum longe acuminato (acumine 5–8 mm longo) comparate illo *G. australiensis* quae obtusus usque breve acuminatus acumine ≤ 3 mm longo, et filamentis staminalis 2.7–3.1 mm longis in vicem 1.2–2.5 mm longis et inflorescentiis laxis differt. A *G. sessili* floribus fructibusque pedicellatis non sessilis et inflorescentiis laxis axe primario inflorescentiae 10–40 mm longo (in vicem illo *G. sessilis* 1 mm longo) et calycibus glabris non pilis adornis differt. Quoad inflorescentiam laxam *G. oresbia* etiam *G. epiphyticam* simulat sed domatia carens et in foliis maturis venis primariis lateralibus sub angulo 65–75° (vice 40–50°) a costa divergentibus differt. **Typus:** Queensland. Cook District: State Forest Reserve 194, Western [Herberton Range State Forest, south-west of Atherton], 30 December 2002, *B. Gray 8390* (holo: BRI [2 sheets + spirit]; iso: QRS [10 sheets to be distributed + spirit]).

*Morinda* sp. (Mt Finnigan L.J.Webb+ 12114) (Forster & Halford 2002).

*Morinda* sp. (Black Leaves BG 1677) (Hyland *et al.* 2003).

*Gynochtodes* sp. (Lamb Range) (Cooper & Cooper 2004: 442).

***Illustration*:** Cooper & Cooper (2004: 442), as *Gynochtodes* sp. (Lamb Range).

Shrub (when juvenile and before stems twine) or woody canopy vine with stems to 10 cm diameter at base, not fluted, lenticellate. Bark fissured to tessellated or nondescript. Branchlets green when fresh, turning black on drying; young branchlets terete when fresh, longitudinally striated when dried, smooth, glabrous; older branchlets woody becoming irregularly lenticellate with age. Axillary buds enclosed by cataphylls, occasionally cataphylls conspicuous at basal nodes of axillary shoots. Stipules interpetiolar, shortly sheathing, with short triangular lobes, 1.2–2.1 mm long, shortly acuminate, glabrous except for minute hairs (< 0.2 mm long) on margin, fragmenting or splitting as node thickens, moderately persistent. Leaves decussate, petiolate, discolorous, usually drying black, glabrous; petiole 5–13 mm long, channelled adaxially; lamina elliptic to narrow elliptic-obovate, 6.1–9.6 cm long, 2.1–4.3 cm wide, coriaceous, dark green to metallic dark green adaxially when fresh; base attenuate to narrowly cuneate-obtuse; apex usually

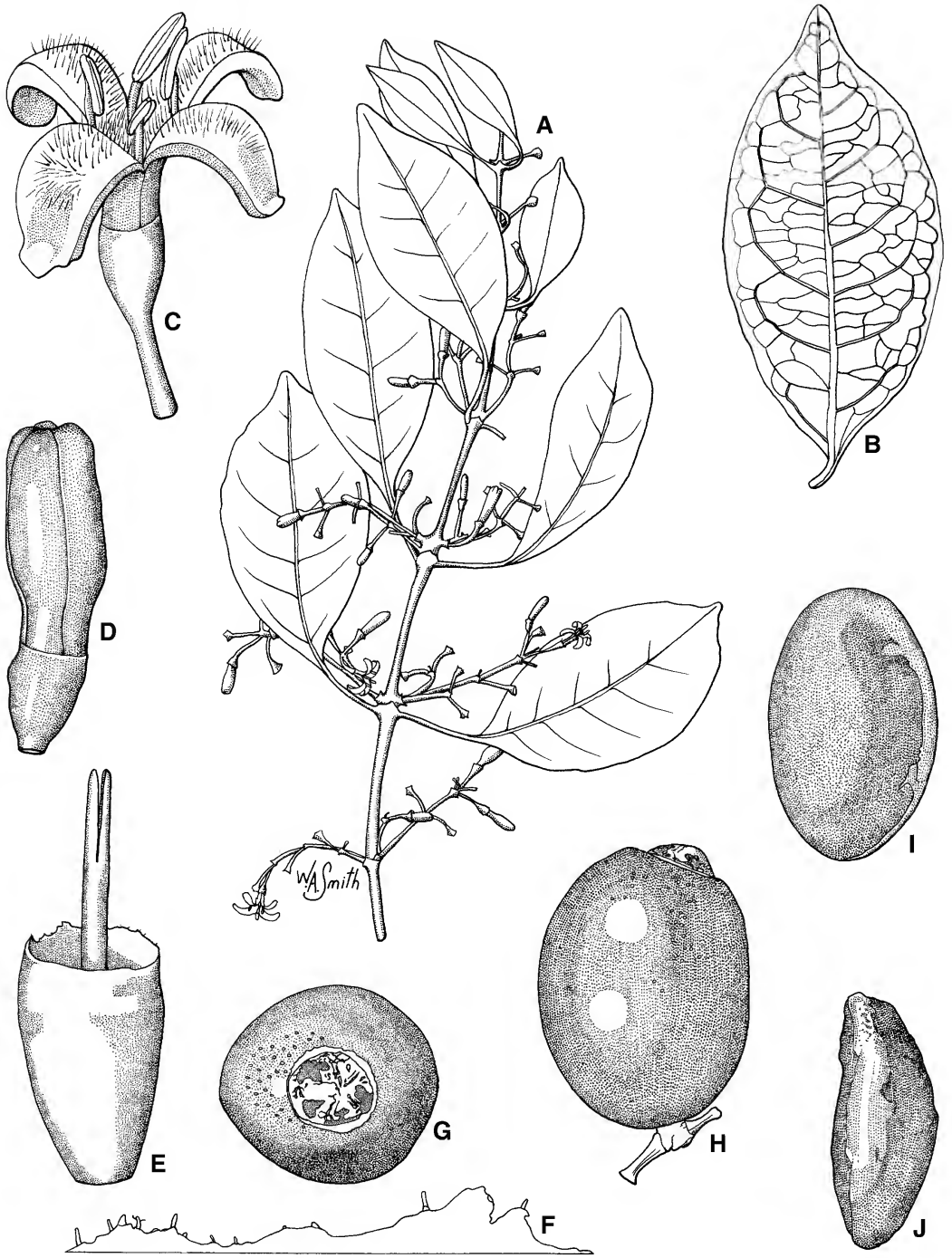
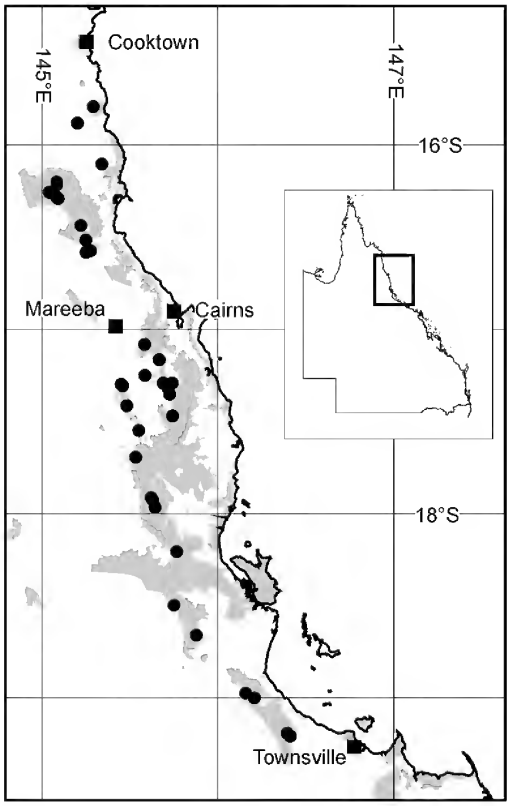



**Fig. 1.** ***Gynochthodes oresbia.*** A. branchlet with inflorescences × 0.8. B. abaxial surface of leaf showing venation × 1. C. flower at anthesis × 4. D. flower bud × 4. E. calyx (including hypanthium) and style at anthesis × 8. F. calyx rim with hairs × 50. G. adaxial view of fruit × 3. H. lateral view of fruit × 3. I. adaxial view of pyrene × 5. J. lateral view of pyrene × 5. A–F from *Gray 8390* (BRI); G–J from *Gray 1667* (BRI). Del. W. Smith.

acuminate with acumen 5–8 mm long; margins entire; venation brochidodromous, midrib slightly raised on both surfaces when fresh and also when dry; primary lateral veins 5–8 on each side of midrib, at 65–75° to the midrib; intramarginal and intralateral veins very slightly raised on both surfaces when fresh, more strongly raised on both surfaces when dry but not conspicuous; intralateral veins reticulate; domatia absent. Inflorescences usually axillary, rarely ramiflorous or appearing terminal, paniculiform, umbelliform cymes, or often raceme-like, with occasionally lateral branches of the first node on primary axis with dichasial triads, lateral branches of subsequent nodes on primary axis monads and ultimate node with dichasial triad or 4-flowered umbelliform cyme, (3–) 5–7(–10) flowered; peduncle 2–3.6 mm long; primary axis 10–40 mm long; bracts *c.* 1 mm long, persistent, similar in appearance to the stipules. Flowers epigynous, fragrant, bisexual (?), 4–6-merous, *c.* 15 mm long and 10 mm diameter; pedicels 3–6 mm long, not elongating after anthesis. Calyx (including hypanthium) cup-shaped, *c.* 2.5 × 2.5 mm, green or creamy white (*Gray 8390*, *Jensen 1411 & McKenna*); tube *c.* 1.1 mm long, glabrous on both surfaces; margin erose and with sparse minute hairs. Corolla cream to white when fresh, turning black when dry or preserved, glabrous abaxially except for minute hairs distally; corolla tube ± cylindrical, 1.8–2.3 mm long, fenestrated by short longitudinal splits in lower half; corolla lobes reflexed at anthesis, 4 or 5 (rarely 6), narrowly elliptic to lanceolate-elliptic, 6–7.5 mm long, 2–2.8 mm wide, densely villose with hairs to 1.5 mm long usually for the proximal two thirds to four fifths adaxially, ± cucullate at apex. Stamens 4 or 5 (rarely 6), exserted, inserted on corolla at lobe sinuses; filaments terete, 2.7–3.1 mm long, glabrous; anthers oblong, bilocular, 2.5–3.3 mm long, dorsifixed, point of attachment in lower third, dehiscing ± laterally. Ovary *c.* 2.1 mm high, bilocular; ovules 2 in each locule, slightly domed, *c.* 0.5 mm long, glabrous; style glabrous, *c.* 1.9 mm long, longitudinally furrowed; stigma bifid, *c.* 2.1 mm long. Fruit a drupe, globose to ellipsoid, 11–15 mm long, 9–12 mm diameter, glabrous, smooth, black (?), 1–4 seeded (usually 2 or 3); seeds 2 or 3-faced, 5.5–6.5 mm long, 2–3 mm wide, enclosed in a bony pyrene slightly larger than the seed; testa colour unknown; embryo *c.* 3 mm × 0.4 mm. **Fig. 1.**

***Additional selected specimens (from 34 examined)*: Queensland.** Cook District: T.R. 165, track to Mt Misery, tributary of East Normanby River, site 77, Nov 2002, *Ford 3724 & Holmes* (BRI, QRS); S.F.R 144, Agapetes L.A., Apr 1980, *Gray 1677*[2] (BRI, QRS); Mt Windsor, S.F.R 144 E.P./30, Jul 1976, *Unwin 34* (QRS); S.F.R. 144, Fantail L.A., Mt Windsor Tableland, Mar 1981, *Unwin 831* (QRS); T.R. 165, McDowall Range, *c.* 500m NE of tower, site 93, Jun 2003, *Ford 3995 et al.* (BRI, QRS); S.F.R. 143, North Mary L.A., Feb 1975, *Hyland 8006*[3] (QRS); S.F.R. 607, Emerald L.A., Aug 1980, *Gray 20146V* (QRS); EP 3, SFR 607, Emerald L.A., Oct 1981, *Sanderson 1823* (QRS); Tinaroo Range, May 1972, *Crome 445*[2] (QRS); Lamb Range, NE of Atherton, 9.6 km from Tinaroo-Danbulla road via Robson Creek road, May 1972, *Wrigley 398*[2] *& Telford* (BRI); S.F.R. 194, Barron, Scrubby L.A., Jul 1998, *Hyland 21281V* (BRI, QRS); S.F.R. 194, E.P. 38, Jan 1978, *Risley 276* (QRS); Westcott road, Topaz, Jan 2006, *Cooper 1942*[3] *& Cooper* (BRI, QRS); S of Butcher Creek Gadgarra S.F., S.F. 310, Jun 1995, *Hunter 3914* (BRI); N.P.R. 904, Wooroonooran, *c.* 700 m S of Towalla Mine, above Coolamon Creek, site 33, Oct 2001, *Ford 3034 et al.* (BRI, QRS); Kenny road, off Millaa Millaa – Malanda road, Jan 2005, *Jensen 1411*[1] *& McKenna* (BRI); E.P. 29, S.F.R. 650, Mt Fisher, Jan 1976, *Sanderson 850* (QRS). North Kennedy District: S.F.R. 251, Koolmoon L.A., 1.5km S of Coochimbeerum road off Tully Falls road, site 74, Nov 2002, *Ford 3697 & Holmes* (BRI, QRS); E.P. 19, Burgoo L.A., Garrawalt, Jul 1975, *Sanderson 650* (QRS); S.F.R. 458, off Old Mill road, west of Abergowrie, site 91, May 2003, *Ford 3934 et al.* (BRI, QRS); S.F.R. 268, Bluewater Forestry Area, Paluma Range, site 38, Nov 2001, *Ford 3080 & Holmes* (BRI, QRS). (fertile specimens indicated with a superscript numeral after the collectors number, [1] = flowering specimen, [2] = fruiting specimen, [3] = post anthesis specimen)

***Distribution and habitat*:** *Gynochthodes oresbia* is endemic to the Wet Tropics bioregion in north-eastern Queensland, where it is currently known to occur from the Cooktown area (Mt Finnigan and Mt Misery) to the Paluma Range (west of Townsville) (**Map 1**). It inhabits predominantly the wetter and more mountainous notophyll vine-forests/ rainforests on soils derived from rhyolite, granite, fine grained metasediments (including mudstone and conglomerate) and basalt. However it is more commonly encountered on granitic and rhyolitic substrates, with occurrences on basalt and metasediments being rare. In addition, a specimen has also been recorded as occurring in open forest (*Hunter 3914*) on soils derived from metasediments. Similar observations from




**Map 1.** Distribution of *Gynochthodes oresbia* ●. Shaded area on map indicates nature conservation reserves (National Parks, Forest Reserves and Conservation Parks).

this habitat have been made by the first author in Dinden National Park on granitic substrates. Common canopy species that grow in association with *G. oresbia* include: *Balanops australiana* F.Muell., *Beilschmiedia collina* B.Hyland, *B. recurva* B.Hyland, *Cardwellia sublimis* F.Muell., *Canarium australasicum* F.Muell., *Cryptocarya corrugata* C.T.White & W.D.Francis, *Elaeocarpus elliffii* B.Hyland & Coode, *E. foveolatus* F.Muell., *Flindersia bourjotiana* F.Muell., *Flindersia pimenteliana* F.Muell., *Halfordia kendack* (Montrouz.) Guillaumin and *Syzygium endophloium* B.Hyland. Common small trees and shrubs throughout most of its range include: *Apodytes brachystylis* F.Muell., *Bobea myrtoides* (F.Muell.) Valeton, *Bubbia semecarpoides* (F.Muell.) B.L.Burtt, *Chionanthus axillaris* R.Br., *Pilidiostigma tetramerum* L.S.Sm., *Pittosporum rubiginosum* A.Cunn., *Polyscias australiana* (F.Muell.) Philipson and *Psychotria sp.* (Danbulla S.T.Blake 15262). Altitudinal range, from existing specimens, is 590–1200 m.

*Gynochthodes oresbia* has been collected or reliably reported in the following RE's: 7.8.2 (rarely), 7.8.4 (rarely); 7.11.12 (rarely), 7.11.29 (rarely), 7.11.31 (rarely); 7.12.16 (commonly), 7.12.19 (commonly), 7.12.26 (rarely), 7.12.48 (occasionally), and 7.12.50 (occasionally).

***Phenology*:** Flowers have been recorded from December and February; fruits have been recorded in April and May.

***Notes***: The only flowering collections of *Gynochthodes oresbia* (*Gray 8390* and *Jensen 1411 & McKenna*) seen by the authors are tentatively interpreted as having bisexual flowers. This is in contrast to Halford (2004) who suspected the flowers examined of *G. sessilis* were possibly unisexual, as they "lacked a well developed style and stigma" even though "the ovaries are well developed with what appears to be functional ovules". The above flowering specimens of *G. oresbia* both had a well developed style with large bifid stigmas and large ovules. However, the style and stigmas were not exserted, as would normally be expected with a bisexual Rubiaceae flower. This uncertainty about the reproductive strategy within *Gynochthodes* is not new. Backer and Bakhuizen van den Brink (1965) suggest that the flowers of *G. coriacea* Blume are "seemingly" and "probably bisexual", yet they also acknowledge that the flowers are unisexual "according to Boerlage", whilst Johansson (1988) reports that the flowers of *G. australiensis* were "hermaphrodite or unisexual". Further flowering material is therefore required to assess the reproductive strategies within *G. oresbia.*

The flowers of *Gynochthodes oresbia* have been recorded as strongly fragrant (*Jensen 1411 & McKenna*) or perfumed (*Gray 8390*) at anthesis. Juvenile leaves of *G. oresbia* are similar to adult leaves, but slightly larger. The dimensions of leaves in the above description refer to adult leaves only. Leaves are bluish-green above when fresh (*Ford 3934 et al.*).

*Gynochthodes oresbia* is a large and woody vine that grows high into the rainforest

canopy (hence its cryptic (concealed) form to most human collectors) and has been rarely collected with its growth form as "vine" clearly recorded. It is more usual to see this species as a sterile, stiff and languid shrub in the understory. The closely related *G. sessilis* is often seen in a similar state but rarely becomes quite as shrub-like as *G. oresbia.*

***Affinities:*** *Gynochthodes oresbia* is similar to *G. australiensis* from the Northern Territory and North Queensland, and *G. sessilis* from Queensland. A comparison of diagnostic differences between the three Australian species is provided in **Table 1**. Also, although *G. oresbia* and *G. sessilis* occur in close geographic proximity to each other in the Wet Tropics bioregion they inhabit very different rainforest communities and currently have non-overlapping elevations and distributions, with *G. oresbia* recorded for 590–1200 m and *G. sessilis* recorded from sea level to 520 m.

Sterile (and juvenile) dried material of *Gynochthodes oresbia* can be distinguished from *G. sessilis* by careful examination of the midrib on the abaxial surface. For *G. oresbia* the midrib is longitudinally striated, whereas *G. sessilis* has a somewhat pustular or 'lumpy' appearance. Both *G. oresbia* and *G. australiensis* have longitudinally striated midribs, and can be distinguished on the basis of the leaf apex and secondary venation.

*Gynochthodes oresbia* resembles *G. epiphytica* (Rechinger) A.C.Sm. & S.P.Darwin from Fiji, Samoa, Tonga and nearby islands, in its inflorescence, but differs by its lack of domatia and by its primary lateral venation on mature leaves arising at 65–75° from the midrib (compared with 40–50° for *G. epiphytica*).

**Table 1. Morphological comparison between *G. oresbia*, *G. australiensis* and *G. sessilis***

| Characters | *G. oresbia* | *G. australiensis* | *G. sessilis* |
|---|---|---|---|
| Leaf apex | acuminate | obtuse to bluntly pointed | acuminate |
| Leaf acumen length | 5–8 mm | 1–3 mm | 5–10 mm |
| Secondary venation | inconspicuous, slightly raised | conspicuous, strongly raised | inconspicuous to conspicuous, slightly raised |
| Staminal filament length | 2.7–3.1 mm | 1.2–2.5 mm | 2–3 mm |
| Flowers/inflorescence | 3 to 10 | up to 30 | up to 12 |
| Arrangement of flowers | lax raceme-like, paniculiform or umbelliform cymes | congested paniculiform or cymose clusters | fasciculate clusters |
| Length of primary axis of inflorescence | 10–40 mm | 4–20 mm | < 1 mm |
| Corolla lobe length | 6–7.5 mm | 5.5–7 mm | 6–7 mm |
| Calyx size | *c.* 2.5 × 2.5 mm | 2–3 × 1.5–1.7 mm | *c.* 2 × 2 mm |
| Calyx indumentum | glabrous | glabrous | sparsely hairy |
| Pedicel length | 3–6 mm | 0.5–14 mm | absent |

***Conservation status*:** Most existing collections have been made within the World Heritage Area of the Wet Tropics. *Gynochthodes oresbia* has been collected in Wooroonooran, Dinden (formerly known as S.F.R. 607), Danbulla (formerly known as S.F.R. 185, in part), Maalan (formerly known as S.F.R. 650) and Girringun (formerly known as S.F.R. 458) National Parks and reported in the vast mountainous areas within the Daintree N.P. and the Paluma Range N.P. (A. Ford, pers. obs). It has a wide geographical range, with an extent of occurrence estimated to be 6,800 km$^2$ and an area of occupation estimated to be 3,560 km$^2$; hence, it is not considered at risk at this time.

***Etymology*:** The specific epithet is derived from the Greek adjective, *oresbios*, living on mountains and refers to the habitat of the species.

## Key to the species of *Gynochthodes* in Australia*

1 Flowers arranged in dense fasciculate clusters; calyx hairy; N Qld to CE Qld . . . . . **G. sessilis**
Flowers arranged in cymose to paniculate inflorescences; calyx glabrous . . . . . **2**

2 Leaf apex obtuse to bluntly pointed, acumen to 3 mm long; N.T. to N Qld . . . . . **G. australiensis**
Leaf apex acuminate, acumen 5–8 mm long; NE Qld . . . . . **G. oresbia**

* The above key excludes a probable undescribed species of *Gynochthodes* from the Northern Territory. It is currently only known from sterile and fruiting collections (Dale Dixon, 2005, pers. comm.). It differs from the other Australian species of *Gynochthodes* by having domatia.

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# New species of *Commersonia* J.R.Forst. & G.Forst. (Sterculiaceae) from Queensland

**G.P. Guymer**


## Summary

Guymer, G.P. (2006). New species of *Commersonia* J.R.Forst. & G.Forst. (Sterculiaceae) from Queensland. *Austrobaileya* 7(2): 365–372. The new species *Commersonia perkinsiana* Guymer, *C. inglewoodensis* Guymer and *C. macrostipulata* Guymer are described and illustrated, and a key to Queensland species of *Commersonia* subg. *Commersonia* is provided. Notes on distribution, habitat and conservation status are provided for the new species. The new combination *Commersonia procumbens* (Maiden & Betche) Guymer is made for *Rulingia procumbens* Maiden & Betche.


Key Words: Sterculiaceae, *Commersonia inglewoodensis*, *Commersonia macrostipulata*, *Commersonia perkinsiana*, *Commersonia procumbens*, new species, new combination, taxonomy, Australian flora, Queensland flora, identification key

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## Introduction

*Commersonia* J.R.Forst. & G.Forst. (including *Rulingia* R.Br.) is a genus of more than 60 species of trees or shrubs that occurs in SE Asia, Madagascar, Malesia, Melanesia and Australia (Guymer 2005; Wilkins & Whitlock 2005). The new species described in this paper are endemic to Queensland. Two of these species (*Commersonia inglewoodensis* and *C. perkinsiana*) have only recently been collected and identified and require conservation action.

## Materials and methods

The study is based upon the examination of herbarium material at BM, BRI, CANB, K, L, MEL, NSW and P, and field collections and observations by the author. The Herbarium acronyms follow Holmgren *et al.* (1990). All specimens cited have been seen by the author.

Measurements are sometimes abbreviated with × indicating length × width. Descriptions of the flowers were prepared from material preserved in spirit. Common abbreviations in the specimen descriptions and citations are dbh (diameter at breast height), L.A. (Logging Area), N.P. (National Park), S.F. (State Forest) and T.R. (Timber Reserve). Recommendations on the conservation status of species is based on the criteria of the IUCN (2001).

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Vegetation terminology for Queensland follows that of the *Vegetation Management Act 1999*, its associated regulations, and the regional ecosystem framework (www.epa.qld.gov.au/REDD). The abbreviation RE refers to regional ecosystem.

## Taxonomy

**Commersonia perkinsiana** Guymer, **species nov.** affinis *C. pedleyi* sed ab ea foliis marginibus serratis (in illa lobatis), inflorescentiis 3–4-floris non 7–10-floris, minoribus pedunculis (longitudine 1.8–2.5 mm non 4–5 mm) necnon pedicellis (longitudine 0.3–0.6 mm non 1–3(–9) mm) differt.

**Typus:** Queensland. Port Curtis District: Stockyard Point, Byfield Conservation Park, April 2005, *B.J.Plumb s.n.* (holo: BRI; iso: BRI).

Small erect shrubs, suckering from rhizomes, to 10 cm high; branchlets pubescent (trichomes 0.3–0.8 mm diameter), glabrescent. Leaves grey-green or slightly glaucous, white below; blades oblong-lanceolate or lanceolate, 2–4 × 0.6–1.1 cm; margins slightly serrate, teeth 5–11 pairs, to 0.7 mm long; bases cuneate or truncate; apices rounded or obtuse; pubescent above (stellate trichomes mid-dense, 0.3–0.7 mm diameter), velutinous below (stellate trichomes 0.3–0.9 mm diameter); 5-veined at

the base, lateral veins slightly impressed above, raised below, 7 or 8 pairs; petioles 2–5 mm long, stellate-pubescent. Stipules triangular, 2–3 × 0.2–0.3 mm, stellate-pubescent. Inflorescences 3 or 4-flowered, 8–10 mm long; peduncles 1.8–2.5 mm long, stellate-pubescent; bracts narrowly triangular, 1.6–2 × *c.* 0.1 mm, stellate-pubescent. Flowers 7–8.5 mm diameter, pale magenta; pedicels 0.3–0.6 mm long. Calyces 5–5.5 mm long, stellate-pubescent; lobes ovate, obtuse or acute, 2–3.5 × 3.4–3.8 mm. Petals 3-lobed, 3.4–4 mm long; central lobe ovate, obtuse, 2–2.5 × 0.5–0.8 mm; lateral lobes rounded, 0.8–0.9 × 0.8–0.9 mm. Staminal tube 1.5–1.8 mm long; central staminodes triangular, caudate, 2.8–3 mm long, 0.9–1 mm wide; lateral staminodes present or absent, corniculate, erect, smooth, 0.3–0.4 mm long, glabrous. Ovary ovoid, slightly 5-lobed, 1.3–1.4 mm long, 1–1.2 mm diameter; ovules 9 per loculus; styles free at base, coherent above, 0.8–0.9 mm long; stigmas free, clavate, 0.18–0.2 mm diameter. Capsules and seeds not known. **Fig. 1.**

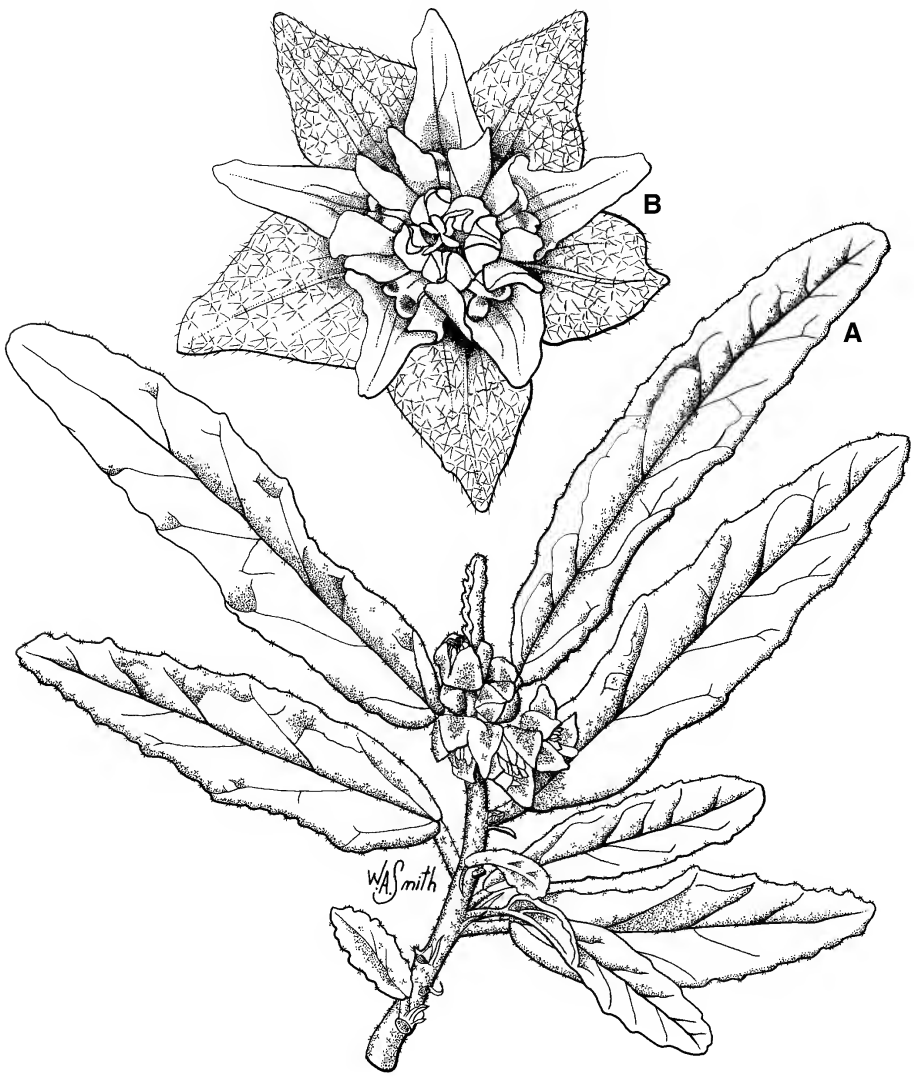


**Fig. 1.** ***Commersonia perkinsiana.*** A. flowering branchlet × 2. B. flower from above × 8. All from *Plumb s.n.* (BRI). Del. W. Smith.

***Additional specimen examined*: Queensland.** Port Curtis District. Stockyard Point, Byfield, 22°49′S, 150°48′E, Dec 1996, *Plumb JP29* (BRI).

***Distribution and habitat*:** *Commersonia perkinsiana* has only been recorded from one population at Stockyard Point, NE of Rockhampton, Queensland. It occurs in *Themeda triandra* dominated tussock grassland (RE 8.12.13; Batianoff & McDonald (1980) Map Unit 26) on an exposed headland on shallowly rocky soils derived from igneous rocks. Associated species include *Acacia julifera*, *A. juncifolia*, *Comesperma oblongatum*, *Chrysocephalum apiculatum*, *Dodonaea lanceolata* var. *subsessilifolia*, *Grevillea banksii*, *Hardenbergia violacea*, *Helichrysum lanuginosum* and *Xerochrysum bracteatum*.

***Phenology*:** Flowers have been recorded for April and December. Fruits and seeds are not known.

***Affinities*:** *Commersonia perkinsiana* is allied to *C. pedleyi* but differs from this species by its slightly serrate leaf margins (lobed in the latter), 3–4-flowered inflorescences (not 7–10-flowered), shorter peduncles (1.8–2.5 mm compared to 4–5 mm long) and pedicels (0.3–0.6 mm not 1–3(–9) mm long), and ovate central petal lobes 2–2.5 mm long (not linear-lanceolate and 2.7–4.5 mm long). The new species is also markedly geographically disjunct and occurs in different habitat to the earlier named species (Guymer 2005).

***Conservation status*:** The species is known only from a coastal headland at Stockyard Point in Byfield Conservation Park. Further survey work is required to determine the species' distribution, area of occupancy and number of populations. A conservation status of Data Deficient is recommended until further information is obtained.

***Etymology*:** The species is named for David Perkins (1945–2006) who spent all his working life furthering the conservation of Queensland's coastal environment and Marine Parks, in the Queensland Government departments of Fisheries, Co-ordinator General's, Marine Parks and Environmental Protection Agency.

**Commersonia macrostipulata** Guymer, **species nov.** affinis *C. bartramiae* sed ab ea stipulis ovatis vel ovati-lanceolatis, et foliis marginibus leviter serratis et tomento abaxiali subtiliter velutino differt.

**Typus:** Queensland. Cook District: Rex Range, bottom lookout, 2.6 km by road N of Nine Mile Store, Julatten–Mossman road, 19 November 2005, *D.Halford Q8843 & R.Jensen* (holo: BRI; iso: BRI, K, MEL, NSW).

*Commersonia* sp. (Kuranda K.Williams 211) (Guymer 2002)

Trees 5–10 m high, occasionally shrubs to 2 m high, rhizomatous, dbh to 20 cm; bark smooth, grey; branchlets stellate-pubescent (trichomes 0.15–0.3 mm diameter), glabrescent. Leaves green above, white below; blades ovate or ovate-lanceolate, 9–19 × (4–) 6–10 (–11) cm; margins slightly serrate, callosities or teeth 20–30 pairs, 0.1–0.5 (–1) mm long; bases cordate or truncate; apices acute or acuminate; sparsely pubescent to glabrescent above (stellate trichomes 0.1–0.3 mm diameter, and glandular trichomes to 0.1 mm long), except for along midrib and lateral veins, finely velutinous below (stellate trichomes 0.1–0.3 mm diameter); lateral veins 5–7, 5-veined from the base, first lateral vein (1.5–) 2–4 (–5.5) cm from base, midrib and lateral veins slightly impressed above, raised below, tertiary veins slightly raised above and below; petioles 8–22 mm long, stellate-pubescent. Stipules ovate or ovate-lanceolate, entire or serrate, caducous, 3.5–7.5 × 1.6–4 mm, teeth 2–4, stellate-puberulent. Inflorescences 2–8 cm long, 50–200-flowered; peduncles 5–19 mm long; axes stellate-pubescent; bracts narrowly triangular, caducous, 0.6–4 × 0.2–0.6 mm, stellate-pubescent. Flowers 5–6.5 mm diameter, cream to white; pedicels 3.5–5 mm long, stellate-puberulent. Calyces 3–3.5 mm long, puberulent; lobes triangular-ovate, 2–2.5 × 1.8–2.2 mm. Petals 3–3.2 mm long, puberulent except for apex, base and margins; central lobes linear, concave, erect, 2.3–2.7 × 0.35–0.45 mm; lateral lobes enclosing the stamen, rounded, 0.3–0.4 × 0.5–0.6 mm. Staminal tube 0.3–0.4 mm long; central staminodes triangular, 1.2–2 × 0.5–0.7 mm, pubescent outside, glabrous inside except at apex; lateral staminodes filiform, corniculate,

0.6–0.7 × 0.1–0.15 mm, pubescent. Ovary 5-lobed, with rudimentary bristles, 0.9–1.1 mm diameter, ovules 4 per loculus; styles free, coherent at apex, 0.22–0.3 mm long; stigmas connate at base, clavate, 0.08–0.1 mm diameter. Capsules 5-valved, globular or depressed-globular, 2–3 cm diameter, 1.8–2.8 cm high, with dense bristles 8–17 mm long, bristles stellate-pubescent (trichomes 0.4–0.7 mm diameter) with larger caducous stellate trichomes (0.6–1 mm diameter, 7–12-rayed) at apex. Seeds 2–4 per locule, ovoid or oblong-ovoid, smooth, 2.4–3 × 1.5–2 mm, black or dark brown, matt; strophiole 2–3 mm long, orange or yellow. **Fig. 2.**

***Additional specimens examined*: Queensland.** Cook District: 4 km W of Isabella Falls on Battle Camp road, Nov 1989, *Jessup, Guymer & Dillewaard GJD3019* (BRI); lower slopes of Mt Saunders, Aug 1984, *Scarth-Johnson 1589A* (BRI); top of Mt Hartley, T.R. 165, Jul 1995, *Forster PIF17315 & Figg* (BRI); 2 km along Creb Track from Ayton road, Dec 1989, *Jessup, Guymer & Dillewaard GJD3126* (BRI); Turpentine road, Cooper Creek catchment, Nov 1995, *Forster PIF18055, Jago & Spokes* (BRI, MEL, QRS); Palm road, off Cape Tribulation road, Oct 1997, *Jago 4525* (BRI, DNA); 18 miles [30 km] N of Mossman, Nov 1967, *Boyland 376* (BRI); Summit of NW Peak, Snapper Island, Sep 1928, *Tandy 504* (BM, BRI); T.R. 55, Dec 1975, *Irvine 1714* (BRI, QRS); S.F.R.72, Salisbury, Nov 1983, *Hyland 12863* (BRI, QRS); Rex Range, *c.* 9 km NE of Julatten, Nov 1996, *Jessup 874* (BRI); Rex Range, north of Julatten, Feb 2005, *Wannan 3865* (BRI, NSW); 500 m from Nine Mile Store towards Julatten, Nov 2005, *Halford Q8842 & Jensen* (BM, BRI, CANB); 2 km SE of The Pinnacle, Sep 1977, *Moriarty 2257* (BRI, QRS); 3 miles [5 km] from Kuranda, on highway to Cairns, Oct 1968, *Williams 211* (BRI); Mt Lumley, near Cairns, Sep 1978, *Jago 80* (BRI); Yarrabah, without date, *Michael 642* (BRI); S.F.R. 933, Apr 1968, *Hyland 1472RFK* (BRI, QRS). North Kennedy District: Tully River Station, Tully, Jun 1965, *Bailey s.n.* (BRI [AQ081469]).

***Distribution and habitat*:** *Commersonia macrostipulata* is endemic to north-east Queensland and is known from Isabella Falls, north of Cooktown, to Tully in the south, from near sea-level to 800 m. It occurs in a variety of rainforests from simple notophyll

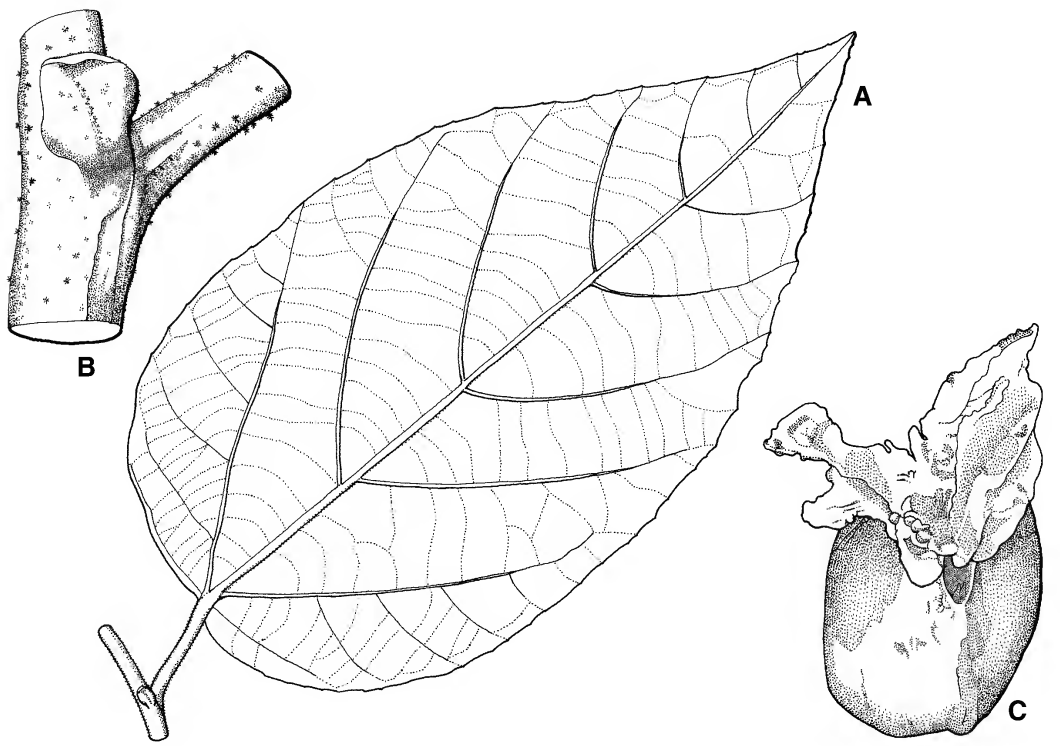


**Fig. 2.** ***Commersonia macrostipulata.*** A. twig × 0.8. B. stem node with stipule × 8. C. seed showing hilum and strophiole × 16. A from *Jessup, Guymer & Dillewaard GJD3019* (BRI); C from *Wannan 3865* (BRI). Del. W. Smith.

vine forest to complex mesophyll vine forest or on the margins of rainforest communities.

***Phenology*:** The species flowers from August to December and fruits have been collected from September to February and in July.

***Affinities*:** *Commersonia macrostipulata* is allied to *C. bartramia* but differs from this species by its ovate to ovate-lanceolate stipules, and leaves with shallowly serrate leaf margins and finely velutinous abaxial tomentum.

***Conservation status*:** The species has a distributional range of over 280 km and a number of populations occur in conservation areas. It is not considered to be at risk.

***Etymology*:** The epithet is derived from Latin *macro-* (large) and *stipulatus* (with stipules), referring to the conspicuous ovate to ovate-lanceolate stipules that characterise the species.

**Commersonia inglewoodensis** Guymer, **species nov.** affinis *C. procumbenti* sed ab ea inflorescentiis floribus paucioribus (3 adversum 9–15) minoribus (diametro 3–3.5 mm non 5–6.5 mm), brevioribus pedunculis (longitudine 0.3–1 mm adversum 1–2.5 mm) necnon pedicellis (longitudine 0.1–0.2 mm adversum 1–2 mm), et foliis minoribus (1.5–2.5 × 1.1–1.9 cm non 1.7–4 × 1.5–3.1 cm) differt. **Typus:** Queensland. DARLING DOWNS DISTRICT: 2.2 km W of Kooroongarra, Anderson's road, Bringalily State Forest, 26 February 2006, *D.A.Halford Q8965 & G.P.Guymer* (holo: BRI; iso: AD, BRI, CANB, DNA, K, L, MO, MEL, NE, NSW, PERTH *distribuendi*).

Prostrate spreading shrubs to 10 cm high, with trailing stems to 90 cm and a taproot, not rhizomatous. Branchlets pubescent (trichomes stellate, 0.1–0.3 mm diameter), glabrescent. Leaves green, paler below; blades broadly ovate to ovate, 1.5–2.5 × 1.1–1.9 cm; margins irregularly serrate, teeth 6–10 pairs, 0.2–1 mm long; bases cordate, oblique; apices obtuse or rounded; sparsely pubescent above (stellate trichomes 0.5–1.25 mm diameter), tomentose below (stellate trichomes 0.75–1.5 mm diameter); veins raised below, impressed above, lateral veins 3–5 pairs; petioles 2–7 mm long, stellate-pubescent. Stipules caducous, narrowly triangular, 1.6–1.9 × 0.5–0.6 mm, stellate-pubescent. Inflorescences 3-flowered triads, 1.5–3 mm long; peduncles 0.3–1 mm long; axes stellate-pubescent (trichomes 0.6–1.2 mm diameter); bracts linear-oblong, 0.8–1 × 0.15–0.2 mm. Flowers 3–3.5 mm diameter, white or cream; pedicels 0.1–0.2 mm long. Calyces 1.8–2.1 mm long, stellate-pubescent outside, pubescent inside (trichomes stellate & glandular); lobes ovate-acute, 1–1.2 × 1.2–1.4 mm. Petals 1.4–1.6 mm long; central lobes oblong, obtuse and slightly 2-lobed at apex, 0.8–0.9 × 0.2–0.35 mm; lateral lobes ovate, obtuse, 0.3–0.35 × 0.5–0.6 mm long. Staminal tube 0.3–0.4 mm long; central staminodes triangular, 0.5–0.6 × 0.3–0.35 mm; lateral staminodes absent or present and then only one, filiform, erect, smooth, 0.3–0.4 × *c.* 0.08 mm, glabrous. Ovary slightly 5-lobed, with rudimentary bristles, 0.6–0.8 mm diameter, ovules 3 or 4 per loculus; styles free, 0.2–0.3 mm long; stigmas coherent, clavate, 0.06–0.08 mm diameter. Capsules 5-(or 4)-valved, globular or depressed-globular, 6.5–8 mm diameter, 4.8–5.4 mm high, with moderately dense bristles 0.4–1 mm long along sutures, bristles shorter (0.05–0.3 mm long) on faces of capsule, bristles with stellate trichomes 0.2–0.5 mm diameter, with a larger apical stellate trichome (0.4–0.7 mm diameter, 20–30-rayed). Seeds 3 or 4 per locule, angular, sculptured, 1.5–2 × 1.1–1.6 mm, dark brown to black, matt; strophiole translucent, cristate, 0.6–1.5 × 0.3–1.5 mm, white. **Fig. 3.**

***Additional specimen examined*: Queensland.** DARLING DOWNS DISTRICT: Bringalily State Forest, Wondul Range, *c.* 17 km N of Inglewood, Nov 2003, *Halford Q8046 & Forster* (BRI).

***Distribution and habitat*:** *Commersonia inglewoodensis* is known from approximately 50 individual plants in State Forest 341, *c.* 17 km north of Inglewood, southern Queensland. It occurs on a forestry road in a shrubland community on natural scalds on deeply weathered sedimentary rocks. Characteristic genera in association include *Acacia*, *Boronia*, *Calytrix*, *Hakea*, *Babingtonia*, *Micomyrtus* and *Triodia* (RE 11.7.5). Apart from the single patch of plants observed, no further colonies were located in this shrubland community and the species may be a component of the adjoining *Eucalyptus crebra*, *Callitris*

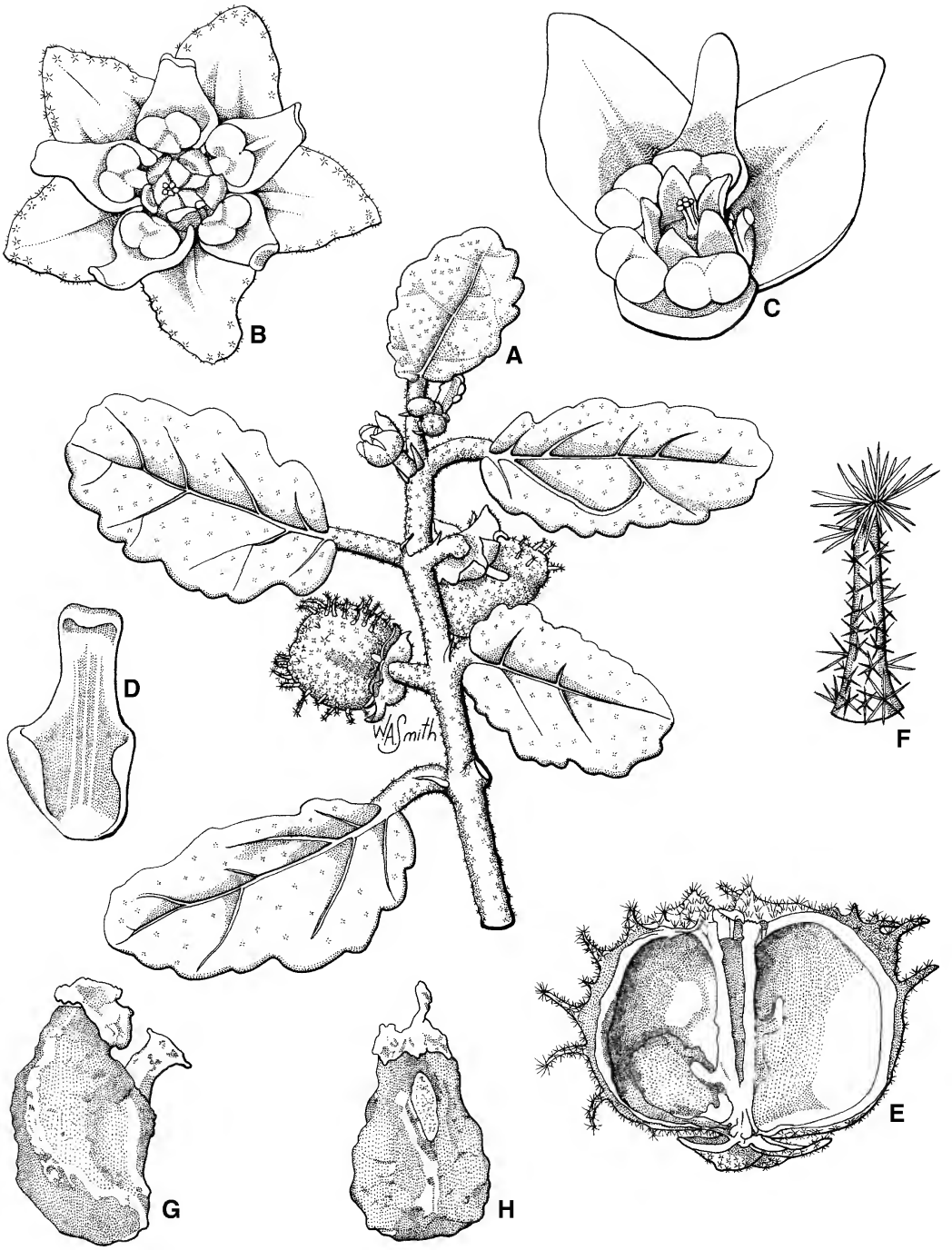


**Fig. 3.** ***Commersonia inglewoodensis.*** A. flowering & fruiting branchlet × 4. B. flower from above × 16. C. flower showing staminodes × 20. D. internal view of petal × 24. E. longitudinal section of capsule × 8. F. capsule bristle × 40. G. seed with funicle and strophiole × 16. H. seed showing hilum and strophiole × 16. All from *Halford Q8965 & Guymer* (BRI). Del. W. Smith.

*glaucophylla* and *Angophora leiocarpa* woodland or open forest (RE 11.5.1 & RE 11.5.4).

***Phenology*:** Flowers have been recorded for February, March and November; fruits have been collected in February and March.

***Affinities*:** *Commersonia inglewoodensis* is related to *C. procumbens* from the central western slopes of New South Wales but differs from this species in its 3-flowered inflorescences (in the latter 9–15-flowered), its smaller flowers (3–3.5 mm diameter versus 5–6.5 mm diameter), its shorter peduncles (0.3-1 mm long compared to 1–2.5 mm long) and pedicels (0.1–0.2 mm long not 1–2 mm long), and its smaller leaf blades (1.5–2.5 × 1.1–1.9 cm compared to 1.7–4 × 1.5–3.1 cm) and shorter petioles (2–7 mm long not 12–25 mm long).

***Conservation status*:** *Commersonia inglewoodensis* is conserved in State Forest 341 but its known area of occurrence (20 × 10 m) and its situation on a forestry road necessitates a conservation status of endangered using the IUCN (2001) criteria. The species has been searched for elsewhere within the State Forest; however, no further plants have been located.

***Etymology*:** The species epithet *inglewoodensis* is derived from the name of the township Inglewood in which district this species occurs.

**Commersonia procumbens** (Maiden & Betche) Guymer, **comb. nov.**; *Rulingia procumbens* Maiden & Betche, *Proc. Linn. Soc. New South Wales* 23: 18 (1898). **Type:** New South Wales. Near Dubbo, November 1887, *E. Betche s.n.* (holo: NSW, iso: K).

***Notes*:** With relegation of *Rulingia* to the synonymy of *Commersonia*, the above combination is necessary for this species from New South Wales that appears to be closely allied morphologically to *C. inglewoodensis.*

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**Key to Queensland species of *Commersonia* subgenus *Commersonia***

**1** Trees or tall shrubs (2–) 4–15 m high . . . . . 2
Shrubs, prostrate or erect to 1 m high . . . . . 3

**2** Stipules triangular or lanceolate, 2.5–8 × 0.5–0.9 mm. E Qld. . . . . **C. bartramia** *s.lat.*
Stipules ovate or ovate-lanceolate, 3.5–7.5 × 1.6–4 mm. Wet Tropics, NE Qld . . . . . **C. macrostipulata**

**3** Flowers bright yellow; erect shrubs 0.3–0.6 m high. Central Qld . . . **C. leichhardtii** *s.lat.*
Flowers red, pink or white; prostrate or erect shrubs. . . . . 4

**4** Flowers red; leaves broadly ovate to ovate-lanceolate, 3.5–7 × 1.5–5 cm. NE Qld . . . . . **C. reticulata**
Flowers white, pink or pale magenta; leaves ovate and < 2.6 cm long or lanceolate . . . . . 5

**5** Flowers 14–17 mm diameter. Springsure area, Central Qld . . . . . **C. johnsonii**
Flowers 3–8.5 mm diameter . . . . . 6

**6** Flowers 3–5.5 mm diameter, white or cream, buds sometimes tinged with pink . . . . . 7
Flowers 6–8.5 mm diameter, pink or pale magenta . . . . . 9

**7** Leaf margins with 5–7 rounded or obtuse lobes 1–10 mm long. Blackdown Tableland, Central subcoastal, Qld . . . . . **C. pearnii**
Leaf margins serrate with 4–7 pairs of teeth 0.5–4 mm long . . . . . 8

**8** Leaves broadly ovate to ovate, 1.5–2.5 × 1.1–1.9 cm; flowers 3–3.5 mm diameter; peduncles 0.3–1 mm long. S inland Qld . . . . . **C. inglewoodensis**
Leaves lanceolate, 1.5–11.5 × 0.4–1.6 cm; flowers 4.5–5.5 mm diameter; peduncles 3–8 mm long. SE Qld . . . . . **C. leiperi**

**9** Flowers pale magenta; leaf blades oblong-lanceolate to lanceolate, 2–4 × 0.6–1.1 cm, margins slightly serrate. Coast, central Qld . . . . . **C. perkinsiana**
Flowers with pink buds, opening with white petals tinged with pink; leaf blades linear-lanceolate to lanceolate, sometimes 3-lobed, 2–7 × 0.4–4 cm, margins with lobes 1–4 mm long. S inland Qld . . . . . **C. pedleyi**

## Acknowledgements

I would like to thank David Halford, Joel Plumb and Bruce Wannan for collecting material of the new species; Will Smith for the illustrations; Peter Bostock for assistance with the Latin diagnoses and the Directors and staff of BM, CANB, K, L, MEL, NSW and P for permission to examine specimens held in their institutions.

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## Short Communication

# Reduction of *Carex rhytidocarpa* Nelmes (Cyperaceae) to a synonym of *C. inversa* R.Br.

**R. Booth & D. Moore**

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*Carex inversa* R.Br. is widespread in Australia and New Zealand. In Queensland it occurs from Crediton in Central Queensland to as far west as Tregole National Park, and is also found in all other Australian states apart from the Northern Territory. It is a variable species, as seen from previous attempts to recognise varieties within it.

Brown (1810: 242) described *C. inversa* from specimens that he collected at Port Jackson. Boott (1867: 151–152) described *C. inversa* var. *major*, *C. inversa* var. *minor* and an unnamed variety from the Brisbane River. This latter 'variety' was erroneously referred to as *C. inversa* var. *perigynium* Boott by Chapman (1991: 615); however, the 'perigynium' is part of the latin description given by Boott (1867: 151) and not a formal name. Boott (1867) distinguished his var. *major* from *C. inversa sensu stricta* (his variety *minor*) by it being a more robust plant, and having a utricle with a longer beak. Kükenthal (1909) subsequently reduced var. *major* to a forma under *C. inversa*. Boeckeler (1875) described a further variety *C. inversa* var. *leichhardtii* based on material in MEL (Dowe 2005). No mention was made by any of these authors about the variability of rugosity in the utricles.

Bentham (1878) described *C. inversa* var. *major* citing specimens collected by Mueller and Wilcox and did not refer to Boott's or Boeckeler's varieties or the material that they cited; hence his publication of the name must be considered illegitimate. Clarke (1908) later raised *C. inversa* var. *major sensu* Bentham (1878) to species rank using the name *C. lophocarpa* and basing his species on the same specimens cited by Bentham.

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Nelmes (1942) described *Carex rhytidocarpa* from a specimen collected at Wandoan in Queensland. He distinguished it from *C. inversa* by the utricle being rugose between the nerves, but did not discuss the variability of the species as a whole. At the time he only published a tentative key to the species of *Carex*, using the available specimens at Kew, explaining "that it is not likely that a full account can be printed during the war".

Study of collections in the Queensland Herbarium indicate that individuals referred to by these names possess utricles that display a continuous character range from smooth to deeply rugose. Some specimens display a wide range of rugosity within individual inflorescences. The amount of rugosity between the nerves in the utricle, while not absent, is diminished in coastal districts and more obvious in inland areas, indicating clinal variation in this character. Therefore *Carex rhytidocarpa* should not be maintained as a taxon at any rank as it does not differ in any other character. It may be useful to study the genetics of this taxon in order to understand the observed variation. Wilson (1993) commented that *C. lophocarpa* is "possibly not separate from *C.inversa*", however an examination of specimens of *C. lophocarpa* held at BRI supports the retention of this species (see description and key below). The reduction of *C. rhytidocarpa* to the synonymy of *C. inversa* is formalised below.

**Carex inversa** R.Br., *Prodr. Fl. Nov. Holland.* 242 (1810); *Vignea inversa* (R.Br.) Soják, *Cas. Nár. Muz. Praze* 148: 195 (1979). **Type:** New South Wales. Sydney District (Port Jackson), near Hawkesbury & Parramatta, 1802–1805, *R. Brown Iter Australiense 6078* (holo: BM [photo!]).

*Carex inversa* var. *major* Boott, *Ill. Gen. Carex* 4: 151, t. 487 (1867); *Carex inversa* f. *major* (Boott) Kük., *Pflanzenr. (Engler)* 38: 189 (1909) [non *sensu* Bentham (1878: 438)]. **Type:** Western Australia. Swan River, *Drummond s.n.* (syn: *n.v.*); Victoria. Wanduc Vale, *Robertson s.n.* (syn: *n.v.*); Queensland. Dawson River, *Mueller s.n.* (syn: *n.v.*).

*Carex inversa* var. *minor* Boott, *Ill. Gen. Carex* 4: 151, t. 488 (1867). **Type:** New South Wales. Sydney District (Port Jackson), near Hawkesbury & Parramatta, 1802–1805, *R.Brown Iter Australiense 6078* (syn: BM [photo!]), *Sieber 453* (syn: *n.v.*); Tasmania. *Gunn s.n.* (syn: *n.v.*), *Archer s.n.* (syn: *n.v.*).

*Carex inversa* var. *leichhardtii* Boeckeler [as ß *Leichardtii*], *Linnaea* 39: 70 (1875) **Type:** Nova Holland. Paramatto, *Leichardt* [sic] *s.n.* (holo: MEL, *n.v.*).

*Carex inversa* f. *parvula* Kük., *Pflanzenr. (Engler)* 38: 189 (1909). **Type:** Neu-Süd-Wales. *Camfield s.n.* (syn: *n.v.*); Neuseeland. Whangaroa, *Petrie sub Cockayne 1642* (syn: *n.v.*).

*Carex rhytidocarpa* Nelmes, *Proc. Linn. Soc. London* 155: 282 (1944), **syn. nov. Type:** Queensland. Leichhardt District: Wandoan, *Hubbard 5004* (holo: K *n.v.*; iso: BRI)

Perennial with long-creeping rhizome, monoecious, glabrous. Culms tufted, erect, terete; 5–50 cm long, 0.5–1.5 mm diameter. Leaves more than half the length of the culm, erect, flat, 0.7–3 mm wide; sheath pale to mid-brown, with a membranous ligule. Involucral bracts foliaceous, erect, longer than inflorescence, 2–10 cm long. Inflorescence terminal, of 2–6 sessile spikes, 5–30 mm long, proximal spike sometimes distant. Spikes gynaecandrous, ovoid to globose, with 10–40 spikelets, 5–15 mm long, 4–12 mm wide. Spikelets 1-flowered, unisexual, clustered, brown to stramineous, 2.2–4.5 mm long, 1–2 mm wide; rachilla persistent, wingless. Glumes ovate, 2–4 mm long, 1–2 mm wide, glabrous, membranous, green-keeled with a straight mucro. Stamens 3; anthers linear, connective smooth. Style deciduous, 2-fid, glabrous. Utricle concave-convex, obovoid to ellipsoid to broadly ovoid, 2.2–4.5 mm long, 1–2.5 mm wide, pale green to yellow-brown, longitudinally nerved, transversely wrinkled to smooth between nerves; margins entire to hispid; beak 0.3–1.2 mm long, hispid, bifid. Nut biconvex, broadly obovoid or broadly ellipsoid to orbicular, 1.2–1.8 mm long, 1.2–1.8 mm wide, brown to dark brown, smooth, apex mucronulate, mucro 0.1–0.2 mm long.

***Distribution and habitat*:** Queensland, New South Wales, Victoria, South Australia, Tasmania and Western Australia. In Queensland the species has been recorded from South Kennedy, Leichhardt, Port Curtis, Burnett, Warrego, Maranoa, Darling Downs, and Moreton pastoral districts. Found in moist and dry areas in grassland and open forest.

**Carex lophocarpa** C.B.Clarke, *Bull. Misc. Info. Kew – Addit. Ser.* 8: 69 (1908) [as 'lophocarpus']. **Type:** [Queensland. Moreton District:] Brisbane River, *F.Mueller s.n.* (syn: *n.v.*); [New South Wales.] Clarence River, *Wilcox s.n.* (syn: *n.v.*).

*Carex inversa* var. *major* (R.Br.) Benth., *Fl. Austral.* 7: 438 (1878), *nom.illeg. et superfl.* non Boott (1867). **Type:** [Queensland. Moreton District:] Brisbane River, *F.Mueller s.n.* (syn: *n.v.*); New South Wales. Clarence River, *Wilcox s.n.* (syn: *n.v.*).

Perennial, with long-creeping rhizome, monoecious, glabrous. Culms tufted, erect, terete to trigonous; 40–100 cm long, 1.5–2.5 mm diameter. Leaves more than half the length of the culm, erect, flat, 2–5 mm wide; sheath pale to mid-brown, with a membranous ligule. Involucral bracts foliaceous, erect, longer than inflorescence, 4–17 cm long. Inflorescence terminal, of 2–6 sessile spikes, 20–50 mm long, proximal spike sometimes distant. Spikes gynaecandrous; ovoid, with 50–100 spikelets; 5–17 mm long, 3–9 mm wide. Spikelets 1-flowered, unisexual, clustered, 3–3.5 mm long, 1.5–2 mm wide, brown to stramineous; rachilla persistent, wingless. Glumes ovate to broadly ovate, 4–5.4 mm long, 2–3 mm wide, glabrous, membranous, keeled, with a straight mucro. Stamens 3; anthers linear, connective smooth. Style deciduous, 2-fid, glabrous. Utricle concave-convex, ovoid, 3–5 mm long, 1.5–1.8 mm wide, pale brown, longitudinally nerved, transversely wrinkled

between nerves; margins hispid; beak 1.5–2.5 mm long, hispid, bifid. Nut biconvex, ovoid to broad ovoid, 1.8–2.1 mm long, 1.4–1.8 mm wide, brown to dark brown, smooth, apex mucronulate, mucro 0.1–0.2 mm long.

***Distribution and habitat*:** Queensland and New South Wales. In the former it has been recorded from the Burnett, Darling Downs, and Moreton pastoral districts. It is found in damp places in forest and woodland.

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**Key to distinguish *Carex inversa* and *C. lophocarpa* in Queensland**

Culm 5–50 cm long, 0.5–1.5 mm diameter; lamina 0.7–3 mm wide; nuts broadly obovoid or broadly ellipsoid to orbicular,1.2–1.8 mm long, beak 0.3–1.2 mm long . . . . . **C. inversa**

Culm 40–100 cm long, 1.5–2.5 mm diameter; lamina 2–5 mm wide; nuts ovoid to broadly ovoid, 1.8–2.1 mm long, beak 1.5–2.5 mm long . . . . . **C. lophocarpa**

## Acknowledgement

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## Short Communication

# A new combination in *Alphitonia* Endl. (Rhamnaceae)

**A.R. Bean**

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The new combination *Alphitonia pomaderroides* (Fenzl) A.R.Bean is made based on *Ziziphus pomaderroides* Fenzl. The type specimen of *Z. pomaderroides* Fenzl (**Fig. 1**) is clearly referrable to the taxon currently called *Alphitonia obtusifolia* Braid. Therefore a new combination is required based on the earlier legitimate name that was overlooked by Braid (1925).

**Alphitonia pomaderroides** (Fenzl) A.R.Bean, **comb. nov.**

*Ziziphus pomaderroides* Fenzl, *Enum. Pl. (Endlicher)* 20 (1837). **Type:** Cape Van Diemen [Queensland, Mornington Island], December 1802, *F. Bauer s.n.* (holo: W, photo at BRI).

*Alphitonia obtusifolia* Braid, *Bull. Misc. Info. Kew* 182 (1925). **Type:** "North Coast" [Queensland, Sweer's Island], November 1802, *R. Brown s.n.* (holo: K), **syn. nov.**

***Additional selected specimens examined*: Queensland.** Cook District: 20 km NW of Mt Garnet on road to Lappa, Jan 1993, *Bean 5484 & Forster* (BRI, DNA, MEL); Mungana N.P., NW of Chillagoe, Jan 1993, *Bean 5584 & Forster* (BRI); 1.6 km from Rocky River crossing towards Chester River, Jul 1978, *Butler 271* (BRI, CANB, K, L); 8.2 km from Kennedy River on the Fairview to Kimba road, Apr 1980, *Clarkson 3185* (K, MO, QRS); Cape York, around tourist lodge, Nov 1984, *Clarkson 5672* (QRS); Cholmondelay Creek crossing, on Telegraph Line road, 11 km SW of Heathlands, Mar 1992, *Johnson 5137* (BRI, DNA, MEL, NSW); near granite gorge off Chewko road, near Mareeba, Apr 1990, *van der Werff 11509* (MO, QRS). Burke District: 6 km SW of Normanton, along the road to Magoura Station, Apr 1974, *Pullen 8847* (BRI, CANB); Sweers Island, 0.5 km S of Inscription Point, Nov 2002, *Thomas SW155 & Pedley* (BRI, DNA); Appel Channel, Mornington Island, Jun 1963, *Tindale & Aitken s.n.* (AD, BRI). **Northern Territory.** 7 km W of Borroloola, Jun 1977, *Must 1542* (BRI, CANB, DNA, K, L); Mt Young, Nathan River Station, Jan 1989, *Russell-Smith 6728 & Lucas* (BRI, DNA).

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***Distribution and habitat*:** *Alphitonia pomaderroides* is common in north Queensland, as far north as Heathlands on Cape York peninsula and south to near Croydon and Greenvale. It also occurs in the adjacent parts of the Northern Territory as far west as Nathan River Station. It inhabits eucalypt woodland on sandy to loamy soils. It is smaller than most other species in the genus, often flowering when less than 2 m high, but occasionally reaching 6 metres.

***Phenology*:** Flowers are recorded between January and May. Fruits are recorded between April and November.

***Affinities*:** *Alphitonia pomaderroides* is related to *A. excelsa* (Fenzl) Benth. The leaves of *A. pomaderroides* are broader, especially on young plants, and they frequently have a rusty tomentum, at least on the new growth, but often persisting on mature leaves. The apex of the leaves is frequently obtuse, but this can vary, and some plants may display a mixture of acute and obtuse leaves. The flowers and fruits are somewhat larger than in *A. excelsa*, but otherwise similar.

***Notes*:** Bentham (1863) noted *Ziziphus pomaderroides* and considered it a form of *Alphitonia excelsa* restricted to the Carpentaria islands.

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## Acknowledgement

Dr G.P.Guymer photographed the type of *Ziziphus pomaderroides* whilst Australian Botanical Liaison Officer.


**Fig. 1.** Holotype of *Ziziphus pomaderroides* Fenzl. at W.

## Short Communication

# *Jagera madida* P.I.Forst. (Sapindaceae), a new name and change of rank for *J. javanica* subsp. *australiana* Leenh.

**Paul I. Forster**

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*Jagera* Blume has been considered to comprise three species in Australia, namely *J. discolor* L.S.Sm. ex S.T.Reynolds, *J. javanica* (Blume) Blume ex Kalkman and *J. pseudorhus* (A.Rich.) Radlk. (Reynolds 1981, 1985). The Australian populations of the second listed species were identified firstly as *J. serrata* by Reynolds (1981) and secondly as *J. javanica* by Reynolds (1985), then subsequently renamed as *J. javanica* subsp. *australiana* by Leenhouts (1987). The two subspecies of *J. javanica* were clearly distinguished by Leenhouts (1987) on a combination of leaflet number (9–15-jugate versus 13–40-jugate), the absence or presence of crested petal scales and the degree of hairiness of the staminal filaments (densely hairy versus sparsely to rather densely hairy in the lower part only). The differences in leaflet number and the petal scale morphology are considered sufficient to justify elevating this taxon to specific rank. The Australian populations are significantly disjunct from those in New Guinea and further afield in Malesia. Furthermore there appear to be no examples of populations that exhibit intermediate morphology.

Keys to distinguish this taxon from the other species of *Jagera* in Australia, together with descriptions are provided in Reynolds (1981, 1985).

**Jagera madida** P.I.Forst., **nom. & stat. nov.**

*Jagera javanica* subsp. *australiana* Leenh., *Blumea* 32: 225 (1987). **Type:** Queensland. Cook District: State Forest Reserve 143, Little Mossman Logging Area, 6 June 1979, *B. Gray 1455* (holo: BRI; iso: L, QRS).

*Jagera javanica* auct., non (Blume) Blume ex Kalkman; Reynolds (1985: 67).

*Jagera serrata* auct., non (Roxb.) Radlk.; Reynolds (1981: 411).

***Etymology*:** The replacement name is derived from the Latin *madidus* (moist, wet, soaked) and alludes to the habitat of the species in moist, lowland rainforests in the Wet Tropics bioregion of north-east Queensland. Elevation of the subspecific epithet to species rank is inappropriate due to the presence of two other species in Australia.

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## Short Communication

# Nomenclatural notes on *Acacia* Mill. (Leguminosae – Mimosaceae), consequential to the conservation of its name

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At the XVII International Botanical Congress in Vienna in 2005 the name *Acacia* Mill. was conserved with *A. penninervis* Sieber ex DC. as type. (see McNeill *et* al. 2005). If the wide circumscription of *Acacia* is accepted in the sense of Bentham (1864, 1874) and most other subsequent authors (for example: Ross 1979; Neilsen 1992; Orchard & Wilson 2001), the conservation of its name will have little effect. One consequence, however, is that the names, though not the circumscriptions, of two of the three currently accepted subgenera will change. *Acacia* subgenus *Phyllodineae* (**Type:** *A. penninervis* Sieber ex DC.) becomes *Acacia* subgenus *Acacia* and the previous *Acacia* subgenus *Acacia* (**Type:** *A. nilotica* (L.) Del.) appears to have no name. The deficiency could be corrected in a few lines, but it would be premature to do so here. The conservation, which was approved by fewer than half the votes at the Nomenclature Session at Vienna (McNeill *op.cit.*) has not been well received by some parts of the botanical community; see, for example, Moll (2005). The imbroglio is not likely to be settled before the XVIII International Botanical Congress in 2011 when the International Code of Botanical Nomenclature (ICBN) as amended at the Vienna Congress (including *nomina conservanda*) will have to be accepted. Until then it would be prudent to preserve the status quo as far as possible. The synopsis of the genus *Racosperma* (Pedley 2003) should therefore be disregarded. However, the transfer of names of three taxa from *Racosperma* is necessary, and an explanatory note on another species is desirable. These matters are addressed below.

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**Acacia calligera** (Pedley) Pedley, **comb. nov.**

*Racosperma calligerum* Pedley, *Austrobaileya* 6 (3): 455 (2003).

**Acacia ligulata** var. **minor** (F.Muell.) Pedley, **comb. nov.**

*Acacia salicina* var. *minor* F.Muell., *J. Proc. Linn. Soc., Bot.* 3: 126 (1859); *Racosperma ligulatum* var. *minus* (F.Muell.) Pedley, *Austrobaileya* 3: 473 (2003).

**Acacia serpentinicola** (Maslin) Pedley, **comb. et stat. nov.**

*Acacia juncifolia* subsp. *serpentinicola* Maslin, *Nuytsia* 6: 47 (1994); *Racosperma serpentinicola* (Maslin) Pedley, *Austrobaileya* 6 (3): 486 (2003).

**Acacia eglandulosa** DC., *Prodr.* 2: 450 (1825).

*Acacia cyclops* A.Cunn. ex G.Don, *Gen. Hist.* 2: 404 (1832).

*Acacia mirbelii* Dehnh., *Rivista Napol.* 1: 168 (1839).

Cowan & Maslin (1999) considered it possible that *A. eglandulosa* and *A. cyclops* were conspecific. They left the resolution of the species they treated as *A. cyclops* to a future monographer. However, they had no doubt about the status of *A. mirbelii* Dehnh. Though they did not see type material, they decided that the name *A. mirbelii* 'surely refers to this species' that is *A. cyclops*. They considered the species to be 'well known, easily recognised, [and] widespread.' Clearly they did not want a name change. No monographer is likely to appear and such a one would hardly have the expertise of the two authors.

The species is easily recognised and without doubt *A. cyclops* and *A. eglandulosa* are the same species. It seems that the authors chose to disregard the priority provisions of the Code to preserve a name in common use. The whole issue of Names of Current Use (NCUs) was widely debated at and after the XV Botanical Conference at Tokyo. It became the subject of two proposals to amend the Code at the XVI Congress at Saint Louis (Greuter 1998) where it was rejected (Greuter *et al.* 2000: 114).

If the species has some economic or other importance, a proposal to conserve the name *A. cyclops* should be prepared.

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## Short Communication

# *Bryophyllum* × *houghtonii* (D.B.Ward) P.I.Forst., a new combination in Crassulaceae for the hybrid Mother of Millions

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The naturalised occurrence in Australia of the hybrid Mother of Millions (*Bryophyllum daigremontianum* (Raym.-Hamet & H.Perrier) A.Berger × *B.delagoense* (Eckl. & J.Zeyh.) Schinz) has been recognised for some time (Stanley 1983; Forster 1985, 1992, 1996; Hannan-Jones & Playford 2002; Hannan-Jones 2005 *et al.*) with the earliest herbarium collection at BRI from 1965. The taxon has now been formally named at species rank (Ward 2006), but the epithet is available only in *Kalanchoe*. As noted by Forster (1997), the genera *Bryophyllum* and *Kalanchoe* are easily distinguished on morphological grounds. To date limited molecular data supports the continued recognition of the two genera (Gehrig *et al.* 2001).

The necessary new combination for the nothospecies is made here.

**Bryophyllum × houghtonii** (D.B.Ward) P.I.Forst., **comb. nov.**

*Kalanchoe* × *houghtonii* D.B.Ward, *Cact. Succ. J. (U.S.)* 78(2): 94 (2006). **Type:** U.S.A., Florida, central Merritt Island, Brevard Co., 10 February 2000, *D.B. Ward 10700* (holo: FLAS; iso: FTG, NY, SD, US, USF [all *n.v.*])

*Bryophyllum daigremontianum* (Raym.-Hamet & H.Perrier) A.Berger × *B.delagoense* (Eckl. & J.Zeyh.) Schinz

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## Short Communication

# *Arthrochilus lavarackiana* (D.L.Jones) Lavarack, a new combination in Orchidaceae

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*Phoringopsis lavarackiana* D.L.Jones was recently described from material collected on Cape York Peninsula (Jones & Clements 2004). The genus *Phoringopsis* D.L.Jones & M.A.Clem. was described in 2002 (Jones *et al.* 2002) for certain species previously placed in *Arthrochilus* F.Muell. As this species was described after the description of the genus *Phoringopsis* it does not have a name in the genus *Arthrochilus*. The genus *Phoringopsis* has not been widely accepted as being distinct from *Arthrochilus* so a new combination is hereby provided within the earlier described genus.

**Arthrochilus lavarackiana** (D.L.Jones) Lavarack, **comb. nov.**

*Phoringopsis lavarackiana* D.L.Jones, *Orchadian* 14(8) Scientific Suppl.: xi (2004).

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