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# AUSTROBAILEYA

A Journal of Plant Systematics

Queensland Herbarium

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Department of
Environment and
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(*continued*)

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**Notes**

# Notes on Tiliaceae in Australia, 2. A revision of the simple-haired species of the genus *Corchorus* L.

**D. A. Halford**

**Summary**

Halford, D.A. (1995). Notes on Tiliaceae in Australia, 2. A revision of the simple-haired species of the genus *Corchorus* L. *Austrobaileya* 4(3): 297–320. The simple-haired species of the genus *Corchorus* are revised for Australia. A generic description of *Corchorus* is given based on Australian material. Thirteen species are recognised, *C. aestuans* L., *C. capsularis* L., *C. cunninghamii* F. Muell., *C. fascicularis* Lam., *C. hygrophilus* Benth., *C. macropetalus* (F. Muell.) Domin, *C. macropterus* G.J. Leach & Cheek, *C. olitorius* L., *C. pascuorum* Domin, *C. reynoldsiae* Halford, *C. thozetii* Halford, *C. tridens* L. and *C. trilocularis* L. Distributional maps and illustrations are provided for all 13 species. Lectotypes are selected for *C. cunninghamii* F. Muell., *C. pascuorum* Domin, *C. tridens* L. and *Triumfetta macropetalus* F. Muell.

Keywords: *Corchorus* - simple-haired - Australia; *Corchorus cunninghamii, Corchorus macropetalus, Corchorus pascuorum, Corchorus reynoldsiae, Corchorus thozetii, Corchorus tridens.*

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## Introduction

This paper is the second in a series examining the family Tiliaceae in Australia and is concerned with the genus *Corchorus* L. Halford (1993) presented a key to the genera of Tiliaceae in Australia. *Corchorus* is distinguished from the other genera in the family in Australia by having free sepals which do not have an appendage on the abaxial surface, petals without a prominent gland near base, capsular fruit which lack spines or bristles and two to many ovules per loculus.

*Corchorus* was originally described by Linnaeus (1753) and included four species (*C. siliquosus*, *C. olitorius*, *C. capsularis* and *C. hirsutus*). Since that date many additional species have been described by various authors. Estimates of the number of species in the genus vary from approximately 40 (Mabberley 1989) to 100 (Wild 1984). The species are widely distributed in the tropical and warm temperate regions of the world, with most of the diversity centered in Africa and Australia. Two of the species (*C. capsularis* and *C. olitorius*) are grown in India and Bangladesh, and to a minor extent elsewhere for the commercial jute fibre.

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The first Australian conspectus of *Corchorus* was made by Hooker (1859) when he listed four species (*C. olitorius*, *C. fascicularis*, *C. tridens* and *C. acutangulus* (= *C. aestuans*)) as occurring there. Mueller (1862) described five new endemic species from northern Australia. The following year Bentham (1863) published the first volume of Flora Australiensis where he recognised 13 species of which nine were considered endemic. There, he described four new species and two new varieties. In the following 50 years several other species were described from Australia (Mueller 1872, 1887, 1892, Tate 1898). The most extensive treatment of *Corchorus* in Australia to the present is that of Domin (1927, 1928) in which he listed 17 species, including three new species, five new varieties and two of Bentham's varieties which were raised to species rank. More recently, Cheek and Leach (1992) described a new species from the Northern Territory and Rye (1993) described a new species from the Pilbara region of Western Australia. A number of regional flora treatments have examined parts of the genus in Australia (Mitchell 1981, Stanley and Ross 1986, Rye 1992).

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The genus *Nettoa* was described by Baillon (1866) and consisted of a single species *N. crozophorifolia,* based on material collected from north west Western Australia by one of the botanists on Baudin's 1800–1804 expedition. Burret (1934) did not accept this as a separate genus and transferred the species to *Corchorus*. Burret also described another species (*C. pachyphyllus*) from north-western Australia. Ewart and Petrie (1926) described the genus *Scorpia* to include a single species, *S. simplicifolia*, and placed it in the family Leguminosae. *S. simplicifolia* is conspecific with the earlier named *Corchorus vermicularis* F. Muell., so *Scorpia* is here synonymised with *Corchorus*.

The subgeneric classifications of the genus by De Candolle (1824) and Endlicher (1840) were found to have several shortcomings when applied to the species recognised in this work so no attempt has been made to develop an updated subgeneric classification here. However, for practical reasons, the genus has been divided here into two informal groups, one for species with stellate hairs present on the stem and leaves and one for those with only simple hairs present on the stem and leaves. In this paper, I intend to cover the species of *Corchorus* with only simple hairs on their stems and leaves. This group includes thirteen species, two of which are new. The more numerous stellate-haired species will be covered in a forthcoming paper.

The present study involved examination of herbarium specimens together with field work in Queensland, Northern Territory and Kimberley Region of Western Australia. Flowering and fruiting times are based solely on information from herbarium specimens. Unless otherwise stated, the species dealt with in this paper are not considered to be rare or endangered. The conservation codings for the rare and threatened species follow Briggs and Leigh (1988) or Thomas and McDonald (1989).

## Taxonomy

**Corchorus** L., Sp. Pl. 529 (1753); Gen. Pl. 5th edn, 234 (1754). **Type:** *C. olitorius* L. (lecto).

*Nettoa* Baill., Adansonia 6: 238–242 t. 7 (1866). **Type:** *Nettoa crozophorifolia* Baill.

*Scorpia* Ewart & A.H.K. Petrie, Proc. Roy. Soc. Victoria 38: 169 fig. 2 (1926), **synon. nov. Type:** *Scorpia simplicifolia* Ewart & A.H.K. Petrie (= *Corchorus vermicularis* F. Muell.).

***Derivation of Name*:** named from the Greek, *korkhoros*, an ancient name of uncertain origin for some herbaceous pot plant, perhaps *C. olitorius*.

Annual or perennial shrubs, subshrubs or herbs, with simple, stellate or stellate-dendritic hairs. Leaves alternate or spirally arranged, simple, serrate to dentate, occasionally with the basal teeth prolonged into long setaceous points. Stipules small, sometimes turgid proximally, caducous. Inflorescences lateral or leaf-opposed, bracteate, shortly pedunculate, of 1-to several-flowered umbellate or racemose cymes. Flowers bisexual. Sepals 4 or 5, free, sometimes cucullate distally, often apiculate or caudate at apex. Petals 4 or 5, yellow, usually shortly unguiculate. Androgynophore usually present, with an inconspicuous glandular patch at the base of each petal, and apex produced into a fleshy, annular to cup-like disc, glabrous or rarely densely hairy. Stamens 4 to many, free; filaments terete, glabrous; anthers dorsifixed. Ovary 2-to 10-locular; ovules 2 to many per loculus; style terete, glabrous; stigma minutely lobed or toothed, fimbriate. Fruit a loculicidal or septicidal capsule, 2-to 10-valved, cylindrical to subglobose, glabrous or hairy, straight, curved or twisted, smooth or verrucose, with valves sometimes with transverse septa adaxially; seeds several per loculus.

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### Key to the simple-haired species of *Corchorus* in Australia

1. Sepals 4 ..... **2**
   Sepals 5 ..... **5**

2. Capsule obovoid to broadly obovoid or broadly ellipsoid, 7–25 mm long, 7–10 mm diameter, with apex truncate to rounded ..... **3**
   Capsule narrowly ellipsoidal, 10–35 mm long, 3–6 mm wide, with apex obtuse, acute or somewhat rostrate ..... **4**

3. Sepals 7–9 mm long; fruit erect or reflexed when mature, rugose. QLD ..... **10. C. hygrophilus**
   Sepals 10–12 mm long; fruit ascending to erect, verrucose. QLD ..... **11. C. reynoldsiae**

4. Sepals 6–7 mm long; fruit narrowly trigonous-ellipsoid or rarely tetragonous-ellipsoid, 10–17 mm long, 3–5 mm diameter, with 3 or 4 narrow longitudinal ribs. QLD ..... **8. C. thozetii**
   Sepals 7–11 mm long; fruit narrowly ellipsoid, 15–35 mm long, 4–6 mm diameter, without ribs. QLD, NSW ..... **7. C. cunninghamii**

5. Fruit with 4 to 8 prominent longitudinal wings ..... **6**
   Fruit either smooth, verrucose, rugose or ribbed, without prominent longitudinal wings ..... **7**

6. Fruit with 3 or 4 bifid horns at apex; sepals < 5 mm long; stamens < 30. WA, NT, QLD ..... **3. C. aestuans**
   Fruit with a black obtuse mucro at apex; sepals > 6 mm long; stamens > 30. NT ..... **9. C. macropterus**

7. Fruit depressed globose to ovoid-globose or obloid-cylindrical, > 7 mm diameter ..... **8**
   Fruit cylindrical, < 6 mm diameter ..... **10**

8. Sepals < 5 mm long; stamens < 30; fruit depressed globose, 10-valved. WA, NT ..... **1. C. capsularis**
   Sepals > 6 mm long; stamens > 50; fruit ovoid-globose or obloid-cylindrical, 3-to 9-valved ..... **9**

9. Fruit ovoid-globose, 3-to 5-valved, covered with fleshy appendages 2.0–4.0 mm long, each terminated by a single setaceous hair. WA, NT ..... **12. C. macropetalus**
   Fruit obloid-cylindrical, 6-to 9-valved, verrucose. NT, QLD ..... **13. C. pascuorum**

10. Stems erect; plants up to 2 m high; fruit 3–6 mm diameter, 5-or 6-valved. WA,NT, QLD, NSW ..... **2. C. olitorius**
    Stems procumbent; plants up to 60 cm high; fruit 1.5–3 mm diameter, 3-valved ..... **11**

11. Valves with transverse septa between seeds; stamens mostly 20 to 30; sepals 4.0–6.0 mm long. WA, NT, QLD ..... **4. C. trilocularis**
    Valves without conspicuous septa between seeds; stamens < 15; sepals 1.0–3.5 mm long ..... **12**

12. Fruit 25–35 mm long, glabrous or with scattered scabrous hairs, with 3 spreading bifid horns at apex; stamens 9 – 11. NT, QLD ..... **5. C. tridens**
    Fruit 10–20 mm long, glabrous or sparsely to densely pubescent, without bifid horns at apex but sometimes terminated by 3 minute teeth; stamens 4 – 7. WA, NT, QLD ..... **6. C. fascicularis**

**1. Corchorus capsularis** L., Sp. Pl. 529 (1753). **Type:** Icones, Plate 261 (lecto: BM-HERM, photo at BRI, fide Robyns & Meijer (1991, p.420)).

Erect subligneous herb to 1.5 m; branchlets glabrous, terete. Leaves narrowly ovate or narrowly elliptic, 5.0–14.0 cm long, 1.0–6.0 cm wide, glabrous above, minutely papillose below; base rounded; apex acuminate; margin serrate or crenate-serrate, with a pair of basal teeth prolonged into setaceous points up to 10 mm long; petiole 5–30 mm long, glabrous apart from a line of short reflexed simple hairs on the adaxial surface. Stipules narrowly linear-ovate, 5–10 mm long, glabrous; apex subulate. Inflorescences lateral, solitary at nodes, 2- or 3-flowered; peduncles 1–2 mm long; pedicels 0.5–1.5 mm long; bracts linear-ovate, c. 1.0 mm long. Buds depressed globose, c. 2.0 mm diameter, shortly apiculate. Sepals 5, narrowly linear-obovate, 3.0–4.0 mm long, 1.0–1.5 mm wide, glabrous, cucullate; apex apiculate; apiculum c. 0.5 mm long. Petals 5, obovate, 4.0–4.5 mm long, c. 2.5 mm wide; claw c. 1.0 mm long, glabrous or with scattered hairs on margin. Androgynophore c. 0.1 mm long; annulus c. 0.5 mm long, crenate. Stamens 20–25; filaments 2.5–3.0 mm long. Ovary obovoid, c. 1.0 mm diameter, sparsely setulose, 10-celled with 10 ovules per cell; style stout, 1.0–1.5 mm long; stigma 5-toothed. Fruiting pedicel ascending to erect; fruit depressed globose, 10–15 mm diameter, longitudinally sulcate, coarsely verrucose, glabrous, 10-valvate; apex impressed; valves without marked transverse septa adaxially. Seeds numerous, ± rhomboid or ± obovoid, c. 2.0 mm long, dark brown. **Fig. 1 F–H.** Chromosome number 2n = 14 & 28 (Goldblatt 1981).

***Selected specimens*: Western Australia.** GARDNER DISTRICT: 9.6 km WSW of Mount Waterloo, Jun 1987, *Kenneally* 10421 *& Hyland* (PERTH). **Northern Territory.** DARWIN AND GULF DISTRICT: Finniss River floodplain, Mar 1990, *Cowie* 1005 *& Wilson* (DNA); Fogg Dam area, c. 40 miles [64 km] SE of Darwin, May 1959, *Chippendale* 6186 (BRI, CANB, DNA, MEL, PERTH); Scott Creek area, Apr 1980, *Rankin* 2305 (BRI); Apple Tree Point, Kapalga, May 1982, *Wightman* 27 (DNA); West Alligator/Wildman Rivers floodplain, Apr 1990, *Clark* 2343 (DNA); c. 45 km WNW of Jabiru, Mar 1981, *Craven & Whitbread* 7704 (CANB, DNA, MEL); Arnhem Land, Milingimbi, Balma, Apr 1988, *Wightman* 4350 (DNA); Arafura Swamp, at old Arafura Homestead, May 1990, *Cowie* 1282 (DNA); McKeddies Billabong, Reynolds River, Apr 1981, *Dunlop* 5931 *& Craven* (BRI, CANB, DNA, NSW, MEL); North Daly River floodplain, Mar 1990, *Clark* 1976 (DNA); Tipperary Station, Sulls Run Creek, May 1990, *Leach* 2857 *& Cowie* (DNA); c. 26 miles [40 km] NNW of El Sharana Mine, Feb 1973, *Lazarides* 7847 (BRI, NSW).

***Distribution and habitat*:** *Corchorus capsularis* is considered to be originally a native of southern China (Purseglove 1968) which has become widespread in Asia through its cultivation as a fibre crop. In Australia it occurs sporadically in the "top end" of the Northern Territory and in the Kimberley, Western Australia **(Map 1)**. Most collections of this species in Australia have been made only in the last 20 years. However, it was first collected by Holtze in 1890 at Port Darwin. Holtze (1892) considered this species to be "truly indigenous in North Australia" although it has also escaped from cultivation. It grows in moist clay or loam soils on floodplains, swamp margins or estuarine flats in grasslands, forests or woodlands.

***Phenology*:** Flowers recorded from February to May; fruits recorded from March to July and November.

**2. Corchorus olitorius** L., Sp. Pl. 529 (1753). **Type:** cultivated specimen, Herb. Cliff. 209 (lecto: BM n.v., photocopy BRI), *fide* Wild (1963)).

*Corchorus olitorius* var. *australiensis* Domin, Biblioth. Bot. 89: 380 (1927 '1926'). **Type:** Northern Australia: Van Diemens Gulf, May 1818, *A. Cunningham* 296 (holo: K!).

Erect subligneous herb up to 2 m; branchlets glabrous, somewhat angular or sulcate when young. Leaves narrowly ovate to ovate, 3.0–12.0 cm long, (1.0)2.0–5.0 cm wide, glabrous above, glabrous or with scattered short, simple hairs below; base rounded; apex acute to acuminate; margin serrate, usually with a pair of basal teeth prolonged into setaceous points, up to 15 mm long; petiole (5)15–35(60) mm long, glabrous apart from a line of short ascending simple hairs on adaxial surface. Stipules setaceous 7–12 mm long, glabrous. Inflorescences leaf-opposed, solitary at the nodes, 1-to 3-flowered; peduncles very short, up to 1 mm long; pedicels

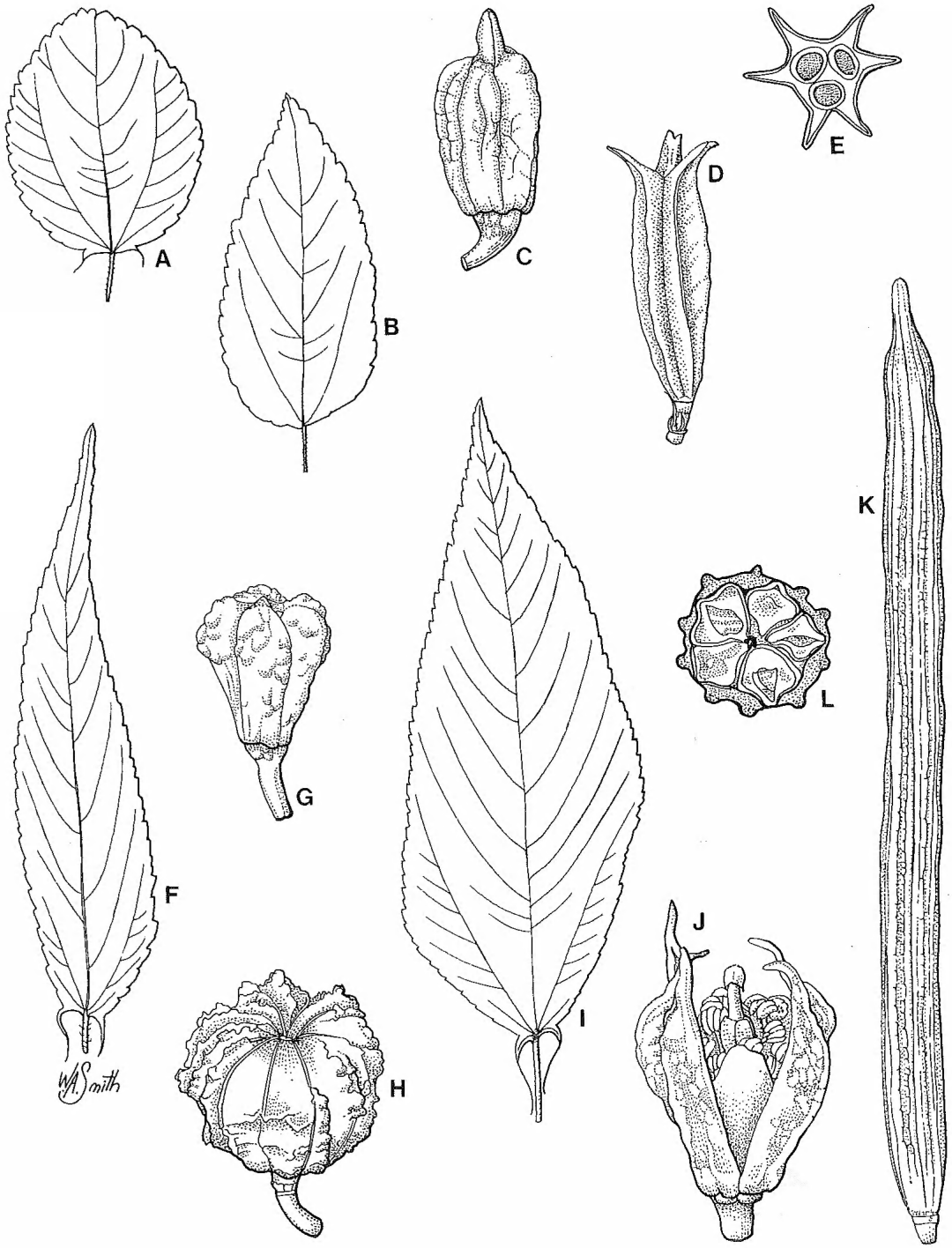



**Fig.1.** A–E. *C. aestuans*: A & B. leaf × 1. C. bud × 12. D. fruit x 2. E. transverse section of fruit × 4. F–H. *C. capsularis*: F. leaf × 1. G. bud × 8. H. fruit × 3. I–L. *C olitorius*: I. leaf × 1. J. bud partially open × 8. K. fruit × 2. L. transverse section of fruit × 4. A, Gunness AG1995; B,C, Lazarides 7165; D,E, Halford Q921; F,H, Dunlop 5931 & Craven; G, Cuadra A1095; I, Bean 2909; J, Corbet [AQ 86728]; K,L, Thorne 20688. (All BRI).

2 mm long; bracts narrowly linear-ovate, 1.5–3.0 mm long. Buds obovoid, 1.5–2.5 mm diameter, apiculate. Sepals 5, narrowly linear-obovate, 6.0–8.0 mm long, 2.0 mm wide, glabrous outside, pubescent inside near base; apex caudate, up to 1.0 mm long. Petals 5, narrowly obovate, 6.0–7.0 mm long, c. 2.0 mm wide; claw c. 1.0 mm long, minutely ciliate on margin. Androgynophore 0.2–0.5 mm long; annulus, c. 0.2 mm long. Stamens 30–50; filaments 3.0–4.0 mm long. Ovary cylindrical, 5-or 6-sulcate, 3.0–3.5 mm long, c. 1.0 mm diameter, covered with minute stiff ascending hairs, 5-or 6-celled with 36–42 ovules per cell; style stout, 1.0–2.0 mm long; stigma lobed, fimbriate. Fruiting pedicel erect; fruit somewhat appressed to stem, cylindrical, 30–80 mm long, 3–6 mm diameter, straight, longitudinally 10-to 12-ribbed, glabrous, 5-or 6-valvate; apex straight, undivided, acuminate, 5–10 mm long; valves transversely septate adaxially. Seeds numerous, ± rhomboid, c. 2.0 mm long, somewhat rugose, matt black. **Fig. 1 I–L.** Chromosome number 2n = 14 (Bhatt 1976).

***Selected specimens*: Western Australia.** Gardner District: 1 km E of Long Spring, Mar 1989, *Keighery* 10743 (PERTH); Kimberley Research Station, Kununurra, Mar 1963, *Lazarides* 6730 (CANB, DNA, PERTH); Kununurra, Mar 1972; *Black* 14c (PERTH). Fitzgerald District: Yamerra Gap, Napier Ranger, May 1983, *Fryxell & Craven* 3938 (CANB, MEL, PERTH); Fitzroy River Valley, May 1962, *Royce* 6930 (PERTH). **Northern Territory.** Darwin and Gulf Region: Tipperary Station, Bulls Run Creek, May 1990, *Leach* 2870 *& Cowie* (BRI); Station Springs, Mountain Valley Station, Feb 1963, *Swinbourne* 676 (DNA, MEL); O.T. Station, May 1947, *Blake* 17653 (BRI, CANB). Victoria River Region: north side of Wickham River, Apr 1965, *Walter* VD3 (DNA). Barkly Tablelands Region: No 18 Bore, Mungabroom Station, Aug 1987, *Strong* 1026 (DNA); 3 miles [5 km] SE Rockhampton Downs Homestead, Mar 1959, *Chippendale* 5404 (DNA). **Queensland.** Burke District: Adel's Grove, via Camooweal, Feb 1946, *de Lestang* [AQ 86726] (BRI); Boogan Lagoon, Apr 1974, *Jacobs* 1279 (BRI, CANB). North Kennedy District: Giru, Mar 1933, *White* 8947 (BRI). Mitchell District: Thomson River flood system, 800 m SW of "Waterloo" Homestead, Mar 1989, *Emmott* 269 (BRI). Port Curtis District: Biloela, Mar 1955, *Wood* [AQ 86737] (BRI). Warrego District: Warrego River crossing, 'Gerah Plains', May 1977, *Purdie* 646E (BRI). Moreton District: Esk, Mar 1971, *Harris* [AQ 86684] (BRI); Agricultural College, Lawes, Apr 1955, *Machell* [AQ 86678] (BRI); "Bilarabyn" Veresdale via Beaudesert, Mar 1965, *Williams* B99 (BRI). **New South Wales.** North Coast District: Dourigans Gap, Kyogle, Jul 1971, *Ptolomy* [NSW 262063] (NSW), Kyogle district, May 1960, *Vane* [NSW 262065] (NSW).

***Distribution and habitat*:** *Corchorus olitorius* is naturalised pantropically but considered to be originally a native of Indo-Malesian region (Robyns & Meijer 1991). From early Australian records it appears that the first introduction of this species occurred prior to European settlement of the east coast. In Australia, it occurs sporadically across northern Australia from the Kimberley, Western Australia, through central Northern Territory to the east coast of Queensland and southward to northern New South Wales (**Map 2**). It grows mostly in heavy clay soils in grasslands, riverine forests and on swamp margins. It is also recorded along irrigation channels and in cultivated fields.

***Phenology*:** Flowers recorded from February to August; fruits recorded from March to August.

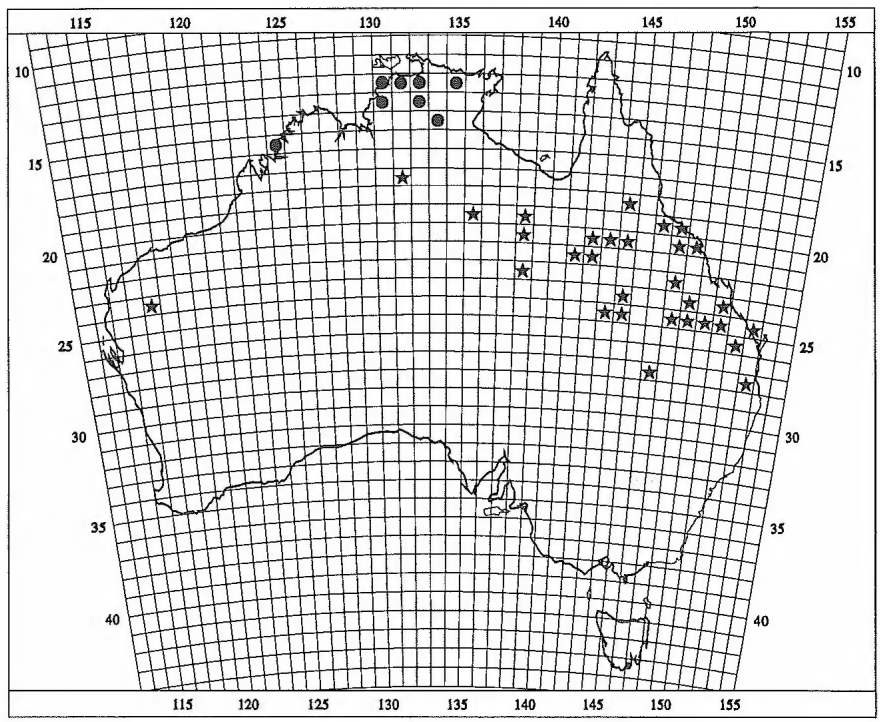
***Notes*:** *C. olitorius* has been cultivated throughout the world as a fibre crop and in the east Mediterranean region for its leaves as a food crop (Purseglove 1968). Everist (1974) reports that the seeds of this species are toxic to stock.

**3. Corchorus aestuans** L., Syst. Nat. edn 10, 1079 (1759). **Type:** Jamaica, *P. Browne*; [LINN 691.4] (lecto: LINN n.v., IDC 177–12. 356: I 3 (691.4) (BRI), *fide* Fawcett & Rendle (1926)).

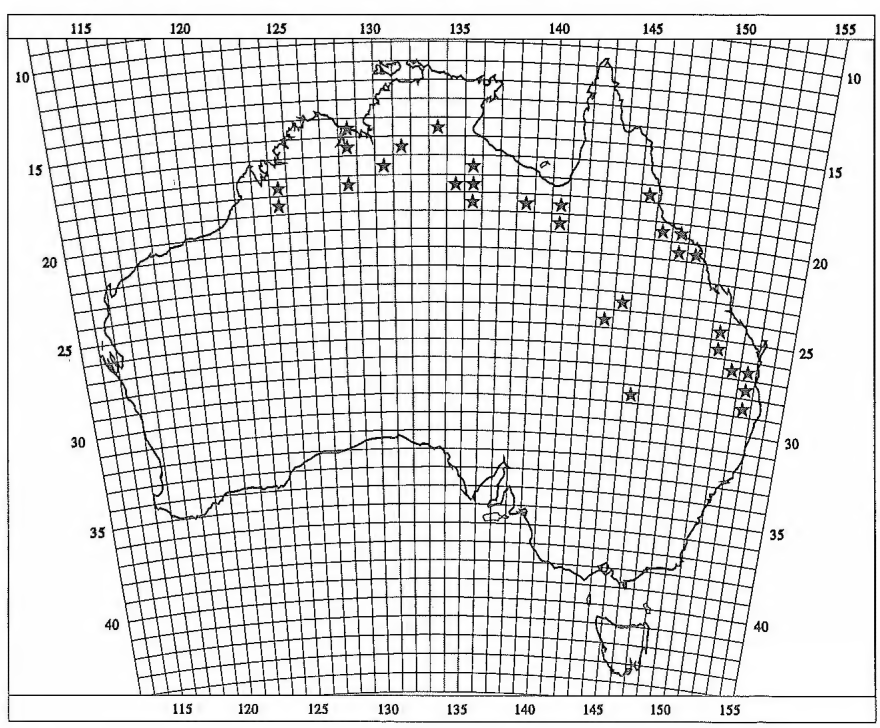
*Corchorus acutangulus* Lam., Encycl. 2: 104 (1786), *C. acutangulus* Lam. var. *acutangulus*, Domin, Biblioth. Bot. 89: 381 (1927 '1926). **Type:** Pluk. Tab. 44, f.1 (1691) (syn); India, *Sonnerat* s.n. (? P) (syn).

*Corchorus acutangulus* var. *brachycarpus* Domin, Biblioth. Bot. 89: 381 (1927 '1926'). **Type:** Port Darwin, 7 Dec 1871, *F. Schultz* 847 (holo: K!).

Procumbent, ascending or sometimes erect subligneous herb up to 60 (100) cm high; branchlets terete with a sparse to moderately dense indumentum; hairs hyaline simple of two types; type 1 hairs straight stiff ascending, up to 1 mm long, spread over the whole surface; type 2 hairs curly, up to 0.5 mm long, mostly confined to one side of branchlet. Leaves




**Map 1.** Distribution of *Corchorus* spp. *C. capsularis* ● , *C. trilocularis* ★ .




**Map 2.** Distribution of *Corchorus olitorius* ★.

narrowly ovate to ovate or elliptic to rotund, 2.0–9.0 cm long, 1.0–4.0 cm wide, covered with scattered strigose hairs above and below; base rounded or slightly cordate; apex acute or obtuse; margin serrate-crenate, sometimes with a pair of basal teeth prolonged into setaceous points, up to 3 mm long; petiole 5–20 mm long, hairy with scattered strigose hairs over whole surface and a line of short curly simple hairs on the adaxial surface. Stipules narrowly triangular, 4–8 mm long, glabrous or with strigose hairs on margin; apex subulate. Inflorescences lateral, solitary at nodes, 1-to 3-flowered; peduncles 1 mm long; pedicels up to 2 mm long; bracts setaceous, 2.0–5.0 mm long. Buds obovoid, 1.0–2.0 mm diameter, shortly apiculate. Sepals 5, linear, 3.0–3.5 mm long, 1.0–1.5 mm wide, cucullate, glabrous, smooth or verrucose outside; apex apiculate; apiculum c. 0.5 mm long. Petals 5, narrowly obovate, 3.0–4.0 mm long, c. 1.5 mm wide; claw 0.2–0.5 mm long, ciliolate on margin. Androgynophore very short or obsolete; annulus c. 0.2 mm long, undulate. Stamens 9–14; filaments 1.0–2.0 mm long. Ovary cylindrical, ribbed, 1.0–1.5 mm long, c. 0.7 mm diameter, ribbed, silky pubescent, 3-or 4-celled with 16–22 ovules per cell; style stout, c. 1.0 mm long; stigma fimbriate. Fruiting pedicel erect; fruit tri- or tetragonous-cylindrical, 13–30 mm long, 3–7 mm diameter (including wings), straight, 6-or 8-winged, glabrous, 3-or 4-valvate; apex with 3 or 4 bifid horns, 4–5 mm long; valves without transverse septa adaxially. Seeds numerous, rhomboid-cylindric, c. 1.5 mm long, dull brown to black. **Fig. 1 A–E.**

***Selected specimens*: Western Australia.** Gardner District: 13 km S of Kalumburu, King Edward River, Mar 1989, *Keighery* 10672 (PERTH); 8 km SE of new Wyndham Post Office, Apr 1977, *George* 14548 (CANB, PERTH); junction Neville Creek and Calder River, Eastern Walcott Inlet, May 1983, *Kenneally* 8705 (PERTH). Fitzgerald District: creek entering inlet of Talbot Bay, 23 km SE of Cockatoo Island, Apr 1983, *Fryxell & Craven* 3887 (CANB, MEL, PERTH). Dampier District: Munkajarra, 20 km S of Derby, Apr 1983, *Fryxell* 3847 (CANB, MEL, PERTH). **Northern Territory.** Darwin and Gulf Region: Esplanade, Darwin, Jun 1964, *Nelson* 1088 (AD, BRI, DNA); Nightcliff, Darwin, Apr 1948, *Specht* 169 (AD, BRI, CANB, MEL); near Cahill's Crossing, c. 4 miles [6 km] SSE of Cannon Hill, Mar 1973, *Lazarides* 8019 (BRI, CANB, DNA, NSW); c. 35 km W of Jabiru, Mar 1981, *Craven & Whitbread* 7695 (CANB, DNA, MEL); Cooinda area, Mar 1982, *Dunlop* 6306 *& Taylor* (DNA); Hempel Bay, Groote Eylandt, in the Gulf of Carpentaria, May 1948, *Specht* 340 (AD, BRI, CANB, MEL); South Bay, Bickerton Island, in the Gulf of Carpentaria, Jun 1948, *Specht* 535 (AD, BRI, CANB, MEL, NSW); McArthur River near Borroloola, May 1974, *Pullen* 9296 (CANB, DNA, NSW). Victoria River Region: Timber Creek, Apr 1990, *Evans* 3078 (CANB, DNA). **Queensland.** Burke District: Normanton, May 1935, *Blake* 8938 (BRI); 119 km SSW of Normanton of road to Cloncurry, Jun 1991, *Halford* Q473 (BRI, DNA, MEL). Cook District: west bank of Marrett River, Princess Charlotte Bay, *Elsol & Stanley* 605 (BRI); 3.4 km N of Spear Creek on the Development Road, 11.3 km N of the Palmer River Crossing, Mar 1987, *Clarkson* 6701 & *McDonald* (BRI, MEL); site 11/17, 50 yards E of Cobra Creek between Tinaroo Falls and Malone road turnoff on Cairns road, near Mareeba, Feb 1962, *Webb & Tracey* 5876 (BRI). North Kennedy District: Conoonbah, near Townsville, Mar 1933, *White* 8822 (BRI).

***Distribution and habitat*:** *Corchorus aestuans* is a pantropical species which is considered to be originally a native of Latin America (Robyns & Meijer 1991). From early Australian records it appears that the first introduction of this species occurred prior to European settlement of the east coast. *C. aestuans* presently occurs in northern Australia from the Kimberley, Western Australia, through the "top end" of the Northern Territory to north-eastern Queensland (**Map 5**). It grows in a variety of habitats, mostly on clay or sandy soils on floodplains, swamp margins or coastal flats in forests, woodlands or grasslands. It is also recorded as a weed of urban gardens.

***Phenology*:** Flowers recorded in January to July and October; fruits recorded in February to August, October and November.

***Notes*:** This species exhibits variability in a number of morphological features. The most common habit is procumbent to weakly ascending (e.g. *Specht* 535). However, there are some erect forms (e.g. *Craven & Whitbread* 7695). There is also variation in leaf shape and size. Some of this variation can be accounted for by habitat differences. In shady, well-watered habitats, the plants are generally larger and more luxuriant. Variation also occurs in the size of the fruit and size of the wings on the fruit.

4. **Corchorus trilocularis** L., Mant. 1: 77 (1767). **Type:** Herb. LINN. 691.2 (lecto: LINN n.v., IDC 177–12. 356: I. 1 (691.2) (BRI), *fide* Ghafoor (1974)).

*Corchorus rigidiusculus* Domin, Biblioth. Bot. 89: 381 (1927 '1926'). **Type:** Queensland. apud flumen Flinders River prope opp. Hughenden, Feb 1910, *K. Domin* [PR 529084] (holo: PR!).

Procumbent to ascending subligneous herb, up to 40 cm high; branchlets terete, glabrous or sparsely covered with two types of simple hairs; type 1 hairs weakly ascending straight, up to 1 mm long, generally spread over the whole surface; type 2 hairs curly, up to 0.5 mm long, mostly confined to one side of branchlet. Leaves ovate to narrowly ovate, narrowly oblong or rarely rotund, 2.0–5.5 cm long, 0.7–2.5 cm wide, glabrous or with scattered short to long stiff ascending hairs on veins and margin; base obtuse or broadly cuneate; apex obtuse or acute; margin crenate-serrate, usually with a pair of basal teeth prolonged into setaceous points, up to 5 mm long; petiole 3–15 mm long, hairy with scattered straight simple hairs over whole surface and a line of short curly simple hairs on the adaxial surface. Stipules setaceous, 3–7 mm long, with a few simple hairs. Inflorescences leaf-opposed, solitary at nodes, 1-to 3-flowered; peduncles and pedicels very short, up to 1 mm long; bracts setaceous, 1.0–3.0 mm long. Buds ellipsoidal, 2.0–3.0 mm diameter, shortly apiculate. Sepals 5, linear, 4.0–6.0 mm long, c. 1.0 mm wide, sparsely to moderately covered with short straight hairs outside, puberulous inside near base; apex apiculate; apiculum up to 0.5 mm long. Petals 5, obovate, 4.0–6.0 mm long, 2.0–3.0 mm wide; claw c. 0.7 mm long, minutely ciliate on margin. Androgynophore c. 0.2 mm long; annulus c. 0.2 mm long, sometimes with undulate margin. Stamens 20–30; filaments c. 3.0 mm long. Ovary trigonous-cylindrical, 2.0–3.0 mm long, c. 1.0 mm diameter, pubescent, 3-celled with 30 ovules per cell; style stout, 1.0–2.0 mm long; stigma fimbriate. Fruiting pedicel erect; fruit cylindrical, 25–70 mm long, 2–3 mm diameter, straight or slightly curved, scabrous, sparsely covered with stiff short simple and stellate hairs, 3-valvate; apex straight, undivided, acuminate, 2–4 mm long; valves partially transversely septate adaxially. Seeds numerous, ± rhomboid, 1.0–1.5 mm long, matt dark brown to black. **Fig. 2 A–D.** Chromosome number 2n = 14 (Rao & Datta 1953, Datta *et al.* 1966).

***Selected specimens*: Western Australia.** Ashburton District: Amelia Station, Jun 1978, *Mitchell* 576 (PERTH). **Northern Territory.** Victoria River Region: 10 miles [16 km] NNE of Wavehill Station, Jul 1959, *Lazarides* 6277 (CANB); 15.1 miles [24.3 km] NE Wave Hill Homestead, Apr 1959, *Chippendale* 5780 (DNA, MEL, NSW). Barkly Tablelands Region: Govt. Reserve No 7, South Barkly, Jan 1975, *Pavlov* M353 (DNA). **Queensland.** Burke District: 67 km WNW of Mt Isa, 6 km N of Mingera Creek, Apr 1989, *Harris* 286 (BRI); 25 miles [40 km] NNE of Camooweal, May 1948, *Perry* 968 (BRI, CANB, DNA). North Kennedy District: Kennedy Highway, 40 km N of Lynd Junction, Mar 1988, *Champion* 336 (BRI); top of Peak - Bogie Range, Sep 1950, *Smith* 4552 (BRI). Gregory North District: Frensham Station, near Kynuna, May 1936, *Blake* 11476 (BRI). Mitchell District: "Noonbah", on Noonbah Lake, 160 km SW of Longreach, May 1990, *Emmott* 393 (BRI). Leichhardt District: Tanderra, (Nardoo) about 45 miles [72 km] SW of Springsure, Feb 1960, *Johnson* 1304 (BRI); Orion Downs, Jun 1951, *Everist* 4350 (BRI, CANB); Minerva, Mar 1935, *Blake* 7917 (BRI, CANB). Maranoa District: Elmina Station, Mar 1947, *Everist* 2949 (BRI). Burnett District: Brain Pastures Station near Gayndah, Apr 1984, *Neldner & Paton* 1390 (BRI). Wide Bay District: near city centre, Bundaberg, Mar 1980, *Stanley* 879 (BRI). Moreton District: Kalbar, S of Ipswich, Sep 1935, *Smith* [AQ 86789] (BRI).

***Distribution and habitat*:** *C. trilocularis* is widespread in Africa, tropical Asia and Australia; probably originally a native of tropical Africa and tropical Asia. It appears from the early records of this species in Australia that it was introduced into the country with the European settlement of the east coast. In Australia it occurs in southern, central and north-western Queensland, with isolated occurrences in central Northern Territory, and with a disjunct population in the Pilbara region, Western Australia (**Map 1**). It grows mostly in clay soils in grasslands and woodlands. It is occasionally recorded as a weed of cultivation.

***Phenology*:** Flowers recorded from January to June and September; fruits recorded from January to November.

***Notes*:** The fruits of *C. trilocularis* and *C. tridens* are often distorted and twisted due to insect damage. *C. trilocularis* is sometimes confused with *C. tridens*. The distinguishing features of these two species are discussed under *C. tridens*.

**5. Corchorus tridens** L., Mant. 2: 566 (1771), *C. tridens* L. var. *tridens*, Domin, Biblioth. Bot. 89: 380 (1927 '1926'). **Type:** Burm.

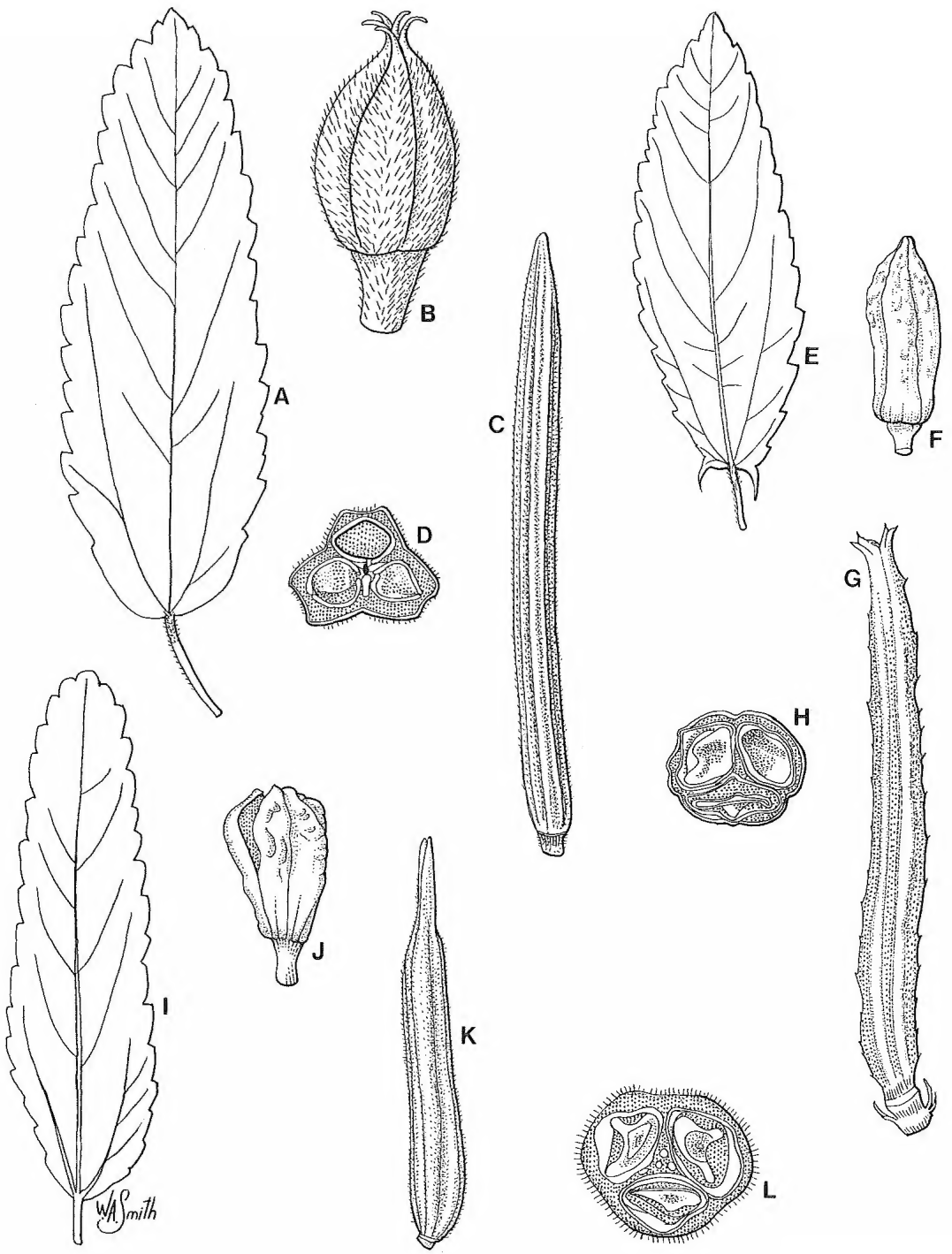



**Fig.2.** A–D. *C. trilocularis*: A. leaf × 1.5. B. bud × 8. C. fruit × 2. D. transverse section of fruit × 6. E–H. *C. tridens*: E. leaf × 3. F. bud × 8. G. fruit × 4. H. transverse section of fruit × 12. I–L. *C. fascicularis*: I. leaf × 3. J. bud × 16. K. fruit × 4. L. transverse section of fruit × 12. A, Emmott 393; B, Everist 4350; C,D, Blake 11476; E,F, Pollock [AQ 86780]; G,H, Russell-Smith 7718A & Lucas; I–L, Pullen 8913. (All BRI).

f., Fl. Indica 123, t. 37 fig. 2 (1768) (lecto: here designated).

*Corchorus tridens* var. *euryphyllus* Domin, Biblioth. Bot. 89: 381 (1927 '1926'). **Type:** North Coast Islands, *R. Brown* s.n., Iter Australiense 1802–05 No 5182 (holo: K!).

Procumbent subligneous herb up to 60 cm high; branchlets terete, glabrous or with scattered short rigid simple hairs. Leaves narrowly elliptic or narrowly ovate, 3.0–5.0 cm long, 0.7–2.0 cm wide, glabrous or sparsely covered along veins with short ascending, stiff simple hairs; base obtuse or rounded; apex acute or obtuse; margin serrate-crenate, sometimes with a pair of basal teeth prolonged into setaceous points, up to 3 mm long; petiole 4–13 mm long, hairy with scattered hairs over whole surface and a line of short curved simple hairs on the adaxial surface. Stipules setaceous, 2–4 mm long, glabrous. Inflorescences leaf-opposed, solitary at nodes, 2-to 4-flowered; peduncles very short, up to 1 mm long; pedicels 0.5 mm long; bracts subulate, c. 1.0 mm long. Buds narrowly obovoid, 1.0–2.0 mm diameter. Sepals 5, narrowly linear-obovate, 2.5–3.5 mm long, 0.5-1.0 mm wide, glabrous; apex acute. Petals 5, narrowly obovate, 3.0–3.5 mm long, 1.0–1.5 mm wide; claw very short, minutely ciliate on margin. Androgynophore c. 0.2 mm long; annulus c. 0.1 mm long. Stamens 9–11; filaments 1.0–2.0 mm long. Ovary trigonous-cylindrical, ribbed, 1.5–2.5 mm long, c. 0.5 mm diameter, strigillose, 3-celled with 20 ovules per cell; style stout, c. 1.0 mm long; stigma fimbriate. Fruiting pedicel spreading to erect; fruit cylindrical, 25–35 mm long, 1.5–2.0 mm diameter, straight or slightly curved, somewhat longitudinally ribbed, glabrous or with scattered scabrous hairs, 3-valvate; apex attenuate, 1–3 mm long, terminated by 3 bifid horns, up to 1 mm long; valves without transverse septa adaxially. Seeds numerous, ± rhomboid-cylindric, 1.0–1.5 mm long, matt, dark brown to black. **Fig. 2E–H.** Chromosome number 2n = 14 & 28 (Fedorov 1974, Goldblatt 1981).

***Selected specimens*: Western Australia.** Gardner District: 9.9 km N of Long Spring, Mar 1989, *Keighery* 10721 (PERTH); Kununurra, Feb 1964, *Richards* 24 (CANB, PERTH). Dampier District: 5 km N of Van Emmerick Range, May 1988, *Cranfield* 6706 (CANB, PERTH); Windjana Gorge, Apr 1988, *Cranfield* 6356 (PERTH). Hall District: Bungle Bungle N.P., Osmond Creek, W of Osmond Yard, Jun 1989, *Menkhorst* 395 (DNA, PERTH). Canning District: Rudall River N.P., Little Sandy Desert, Apr 1979, *Mitchell* 845 (DNA). **Northern Territory.** Darwin and Gulf Region: Elsey Falls, E of Mataranka, Apr 1956, *Burbidge* 5065 (CANB). Victoria River Region: 10 km N of Coomarie Spring, Tanami Desert, Mar 1981, *Latz* 8586 (DNA); 32 miles [51 km] NE [of] Inverway, May 1989, *Chippendale* 5935 (DNA). Barkly Tablelands Region: No 20 Bore, Brunchilly Station, Jun 1984, *Strong* 351 (DNA). Central Northern Region: Gosse River, Murchison Range, Apr 1983, *Latz* 9685 (DNA). Central Southern Region: Tobermoray Station, Field River, May 1972, *Dunlop* 2584 (DNA). **Queensland.** Burke District: Adel's Grove, via Camooweal, Mar 1946, *de Lestang* 227 (BRI); Hughenden, undated, *Francis* [AQ 86766] (BRI); Sussex Park, Hughenden, Jun 1934, *Blake* 6230 (BRI); Granada, about 50 miles [80 km] N of Cloncurry, Apr 1954, *Everist* 5217 (BRI, DNA). Cook District: Newcastle Range, Apr 1907, *Blackman* 17 (BRI). Gregory North District: Tick Hill, 44 km E of Dajarra, 14 km N of the Monument, Apr 1990, *Harris* 515 (BRI). North Kennedy District: Ayr, SE of Townsville, undated, *Michael* 1705 (BRI).

***Distribution and habitat*:** *C. tridens* is widespread in Africa, Asia and Australia. From early Australian records it appears that this species was present prior to European settlement of the east coast. In Australia it occurs across northern parts of the continent from the Pilbara, Western Australia, through central Northern Territory to north-eastern Queensland (**Map 3**). It grows on clay or sandy soils, in woodlands, shrublands or grasslands, usually on floodplains, coastal flats or on the edge of salt pans.

***Phenology*:** Flowers recorded from January to June; fruits recorded from February to August.

***Notes*:** *C. tridens* may be confused with *C. trilocularis* but is distinguishable from that by its having short, bifid, divaricate horns at the apex of the fruit and having only simple hairs on the fruit. *C. trilocularis* lacks horns on the fruit and has branched hairs as well as simple hairs on the fruit.

***Typification*:** Wild (1984) noted that there are no specimens in LINN that could be Linnaeus' original material and that the two plates citied by him (Pluk. phyt. t.127 f.4 (1692) and Burm. ind. 123 t.37 f.2 (1768)) are the elements that have to be considered in the typification of *C. tridens*. Dr C. Jarvis (pers. comm.) informs

me that he also has been unable to find any original material of *C. tridens*. Wild presented a good case for Burman's figure to be a satisfactory element for lectotypification of *C. tridens* L., but he did not take the final step and nominate it as lectotype. Robyns and Meijer (1991) dismissed Burman's figure as a possible type by inferring that it does not match Linnaeus' description and identified it as *C. trilocularis* L. I have examined the plates in question and agree with Wild that the Linnaean description clearly relates to Burman's figure and that the figure does not match the description of *C. trilocularis* L. as suggested by Robyns and Meijer. Burman's figure is here, therefore, selected as the lectotype of *C. tridens* L.

**6. Corchorus fascicularis** Lam., Encycl. 2: 104–105 (1786). **Type:** East Indies, *Sonnerat*, (?P) n.v.

Procumbent subligneous herb up to 20 cm high; branchlets terete, glabrous or sparsely covered with weak simple hairs. Leaves narrowly oblong to oblong or narrowly ovate, 1.0–4.5 cm long, 0.5–1.0 cm wide, glabrous; base and apex rounded to obtuse; margin crenate; petiole 2–5 mm long, glabrous except for a line of short curly simple hairs on the adaxial surface. Stipules narrowly ovate, 1–3 mm long. Inflorescences leaf-opposed, solitary at nodes, 2-to 4-flowered; peduncles and pedicels very short, c. 0.5 mm long; bracts subulate, up to 1.0 mm long. Buds obovoid, c. 1.0 mm diameter. Sepals 5, linear, 1.0–2.0 mm long, c. 0.5 mm wide; glabrous; apex acute. Petals 1 to 5, narrowly obovate, 1.0–2.0 mm long, c. 0.5 mm wide; claw obsolete or very short < 0.1 mm long, glabrous. Androgynophore obsolete; annulus present. Stamens 4–7; filaments c. 1.0 mm long. Ovary trigonous-cylindrical, c. 1.0 mm long, c. 0.5 mm diameter, puberulous, 3-celled with 12–14 ovules per celled; style stout, 0.1–0.5 mm long; stigma fimbriate. Fruiting pedicel erect or spreading; fruit cylindrical 10–20 mm long, 2 mm diameter, straight or slightly curved, smooth, glabrous or sparsely to densely pubescent, 3-valvate; apex straight, acuminate, 2–3 mm long, sometimes terminated by 3 very short teeth, c. 0.2 mm long; valves without conspicuous transverse septa adaxially. Seeds numerous, ± compressed rhomboid-cylindric or compressed obovoid, 1.0–2.0 mm long, dark brown. **Fig. 2 I–L.** Chromosome number 2n = 14 (Rao & Datta 1953, Datta *et al.* 1966).

***Selected specimens*: Western Australia.** Dampier District: 3 km SE of Brooking Gorge, Apr 1988, *Cranfield* 6432 (CANB, PERTH); Fitzroy Crossing, May 1927, *Ewart* [PERTH 1532774] (PERTH). **Northern Territory.** Darwin and Gulf Region: Daly River subcoastal area, Apr 1964 *Muspratt* R514 (BRI, DNA); O.T. Station, May 1947, *Blake* 17651 (BRI). Barkly Tablelands Region: Newcastle Waters, Apr 1959, *Chippendale* 5840 (BRI, DNA); Kilgour Gorge, tributary W of gorge, Mallapunyah Springs Station, May 1984, *Halford* 84594 (DNA). **Queensland.** Burke District: upper Alexandra River (Landsborough River), along the Donors Hill - Burketown road near Talawanta Station, Apr 1974, *Pullen* 8913 (BRI, CANB, DNA, NSW); Wondoola - Iffley area, Apr 1953, *Brown* [AQ 86666] (BRI); Canobie Homestead, about 160 km NNE of Cloncurry, Apr 1954, *Everist* 5298 (BRI); Glengalla: 63 miles [101 km] N of Maxwelton, Jun 1947, *Everist* 3038 (BRI).

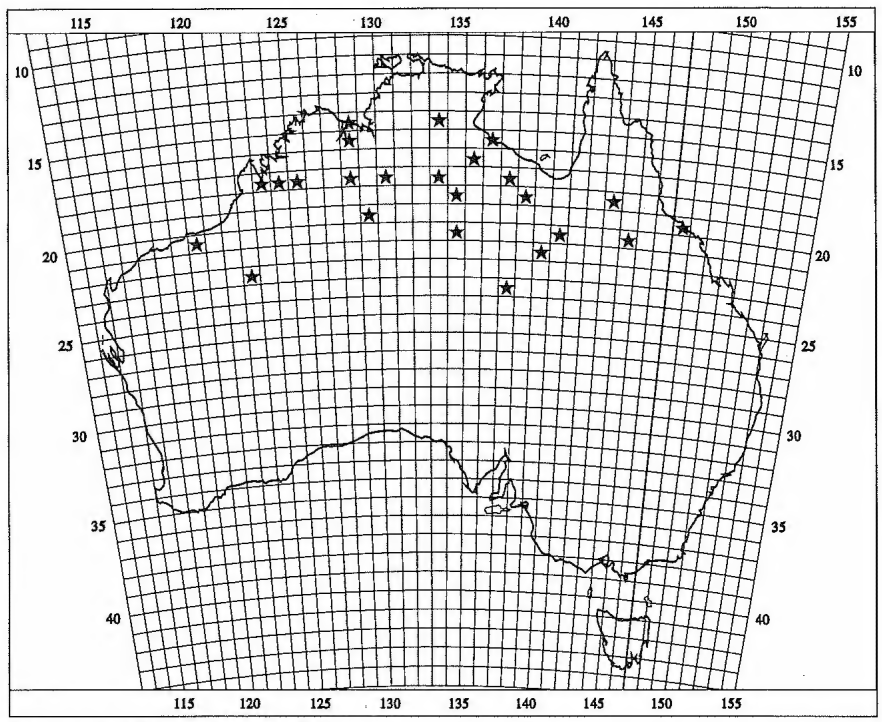
***Distribution and habitat*:** *Corchorus fascicularis* occurs in tropical Africa to Burma and Australia. From early Australian records it appears that this species was present prior to European settlement of the east coast. In Australia it occurs sporadically across the north of the continent from Fitzroy Crossing, Western Australia, central Northern Territory from Victoria River to the McArthur River and in north-western Queensland from near Burketown to Richmond (**Map 4**). It grows in mostly clay through rarely sandy soils on plains and river flats.

***Phenology*:** Flowers recorded in April; fruits recorded from May to July.

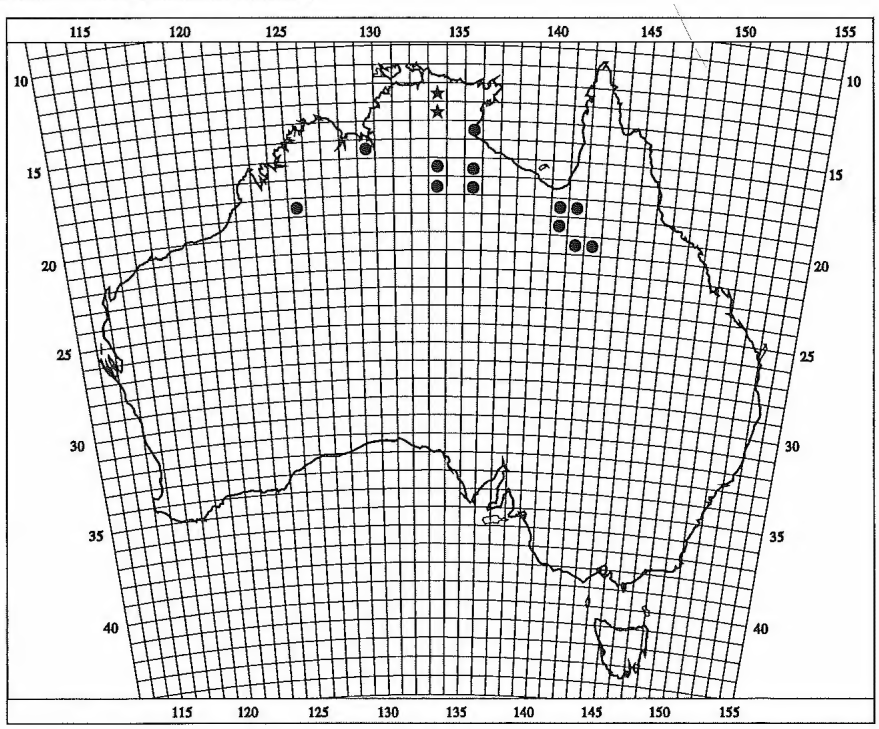
***Notes*:** *C. fascicularis* occasionally has three very small teeth at the apex of the fruit which could lead to it being confused with *C. tridens*. However, it can be distinguished from that by its soft spreading hairs on the fruit and the attenuate apex of the fruit compared to the stiff scabrous hairs and the somewhat truncate apex of the fruit of *C. tridens*.

**7. Corchorus cunninghamii** F. Muell., Fragm. 3: 8 (1862). **Type:** Moreton Bay, *Stuart* [MEL 1599420] (lecto, designated here: MEL).

Ascending subshrub to 1.5 m high; branchlets often reddish, terete, glabrous or with scattered




**Map 3.** Distribution of *Corchorus tridens* ★.




**Map 4.** Distribution of *Corchorus* spp. *C. fascicularis* ●, *C. macropterus* ★.

minute curved simple hairs. Leaves narrowly ovate to ovate or elliptic-ovate, 5.0–15.0 cm long, 1.5–5.0 cm wide, glabrous or sparsely pubescent on both surfaces; base rounded; apex acute to acuminate; margin irregularly serrate; petiole 10–20 mm long, glabrous apart from a line of short curly simple hairs on the adaxial surface. Stipules ovate, turgid proximally, c. 1 mm long, red, glabrous, with a single nectariferous pore on abaxial surface; apex acuminate. Inflorescences leaf-opposed, solitary at nodes, 2-to 7-flowered; peduncles 2–7(17) mm long; pedicels 5–12(20) mm long; bracts ovate, c. 1.0 mm long. Buds pyriform, 3.0–4.0 mm diameter. Sepals 4, narrowly obovate, 7.0–11.0 mm long, 1.5–2.5 mm wide, glabrous or sparsely pubescent outside, pubescent on margin near base; apex acute to acuminate. Petals 4, narrowly obovate, 9.0–11.0 mm long, 3.0–5.0 mm wide; claw 0.5–1.0 mm long, minutely ciliate on margin. Androgynophore c. 0.7 mm long; annulus c. 0.2 mm long. Stamens 60–80; filaments 4.0–7.0 mm long. Ovary ellipsoid, weakly 3-or 4-ribbed, 1.5–3.0 mm long, c. 1.0 mm diameter, glabrous, 3-or 4-celled with 18–22 ovules per cell; style slender, 2.5–6.0 mm long; stigma minutely toothed. Fruiting pedicel ascending to erect; fruit narrowly ellipsoid, 15–35 mm long, 4–6 mm diameter, straight or slightly curved, smooth, glabrous, dehiscing by longitudinal valves along the length of the capsule (apex of capsule not splitting), 3-or 4-valvate; base attenuate; apex acute to somewhat rostrate; valves without transverse septa adaxially. Seeds 2–22 per capsule, irregularly obovoid or ± rhomboid, 2.0–3.0 mm long, matt brown to black. **Fig. 3 A–D.**

***Selected specimens*: Queensland.** MORETON DISTRICT: Ithaca Creek, undated, *F.M. Bailey* [AQ 86654] (BRI); Enoggera, Nov 1887, *F.M. Bailey* [AQ 86648] (BRI); 3 Mile Scrub, Enoggera Creek, Jul 1874, *F.M. Bailey* [AQ 86649] (BRI); Peachey's Scrub, Nov 1887, *Simmonds Herb.* [AQ 86651] (BRI); Peachey's Scrub, Nov 1887, *Shirley* [AQ 86650] (BRI); Pullenvale, SW of Brisbane, Dec 1983, *Jessup* 580 (BRI); Mt Cotton, May 1932, *White* 8413 (BRI); upper Ormeau, 20 km SW of Beenleigh, Mar 1990, *Bird & Orford* 300 (BRI, MEL); Cliff Barron's Road, Upper Ormeau, Feb 1989, *Thompson & Leiper* [AQ 455967] (BRI). **New South Wales.** NORTH COAST DISTRICT: Toonimbar [Toonumbar] Range, near Kyogle, Mar 1944, *White* 12509 (BRI); Bexhill, Mar 1891, W.B. 181 (MEL).

***Distribution and habitat*:** *C. cunninghamii* is endemic to Australia. It occurs in south east Queensland and north east New South Wales (**Map 5**). It grows in the narrow ecotone between eucalypt forests and Araucarian microphyll vine forests on shallow soils that are stony and well drained on hilly terrain. *C. cunninghamii* no longer occurs in a number of the localities close to Brisbane where it was previously known from for example Peachey's Scrub, Ithaca Creek and 3 Mile Scrub, Enoggera Creek, and is considered to be endangered in the wild.

***Phenology*:** *C. cunninghamii* has been recorded to flower and fruit throughout the year. However, the peak flowering period is from November to May.

***Conservation status*:** *C. cunninghamii* has a conservation coding of 3E according to Thomas and McDonald (1989) and E by ANZECC (1993). *Corchorus cunninghamii* is listed as endangered on the schedule of plant species declared as "protected wildlife" under the regulations of the Queensland Nature Conservation Act 1992.

***Notes*:** It is clear from Mueller's protologue ("Fructus juvenilis fusiformi-ellopsoideus, maturus nondum cognitus") that he saw only immature fruit of this species. However, this is sufficient to clearly identify the species that he had in mind. Examination of original material at MEL and K revealed that only one specimen (Moreton Bay, Stuart [MEL 1599420]) has fruit and this fruit is immature. Sheet MEL 1599420 is here selected as lectotype of Mueller's *C. cunninghamii*. The specimen from Burnett and Dawson River collected by F. Mueller (MEL 223667), lacks fruit but is clearly not of this species. It is more appropriately placed under *C. hygrophilus*.

*C. cunninghamii* is unique amongst the Australian *Corchorus* taxa in that its capsules split along longitudinal lines, with the apex of the fruit remaining intact, as opposed to the rest of the species in which the fruits split from the apex downwards.

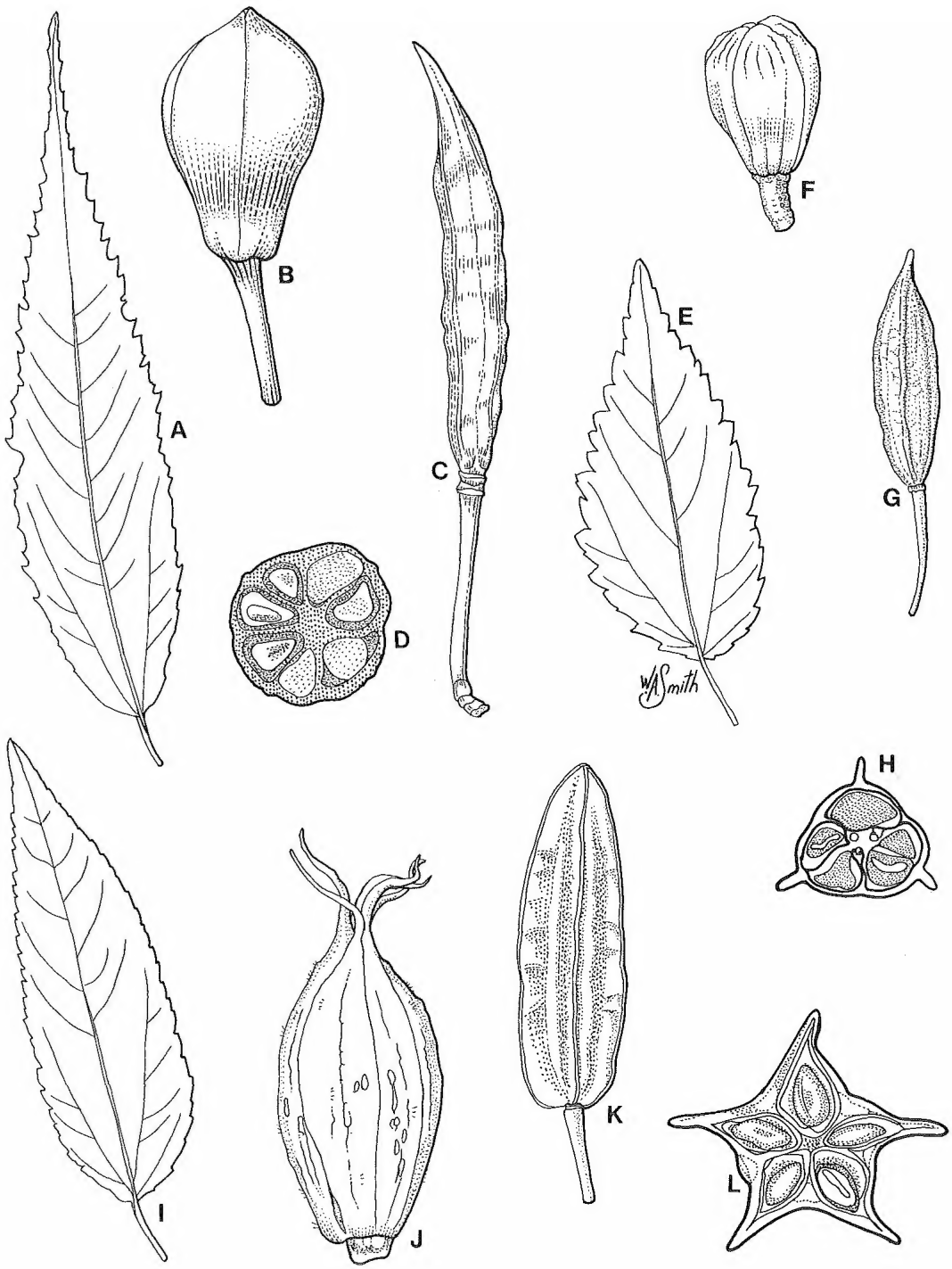



**Fig.3.** A–D. *C. cunninghamii*: A. leaf × 1. B. bud × 5. C. fruit × 2. D. transverse section of fruit × 5. E–H. *C. thozetii*: E. leaf × 1. F. bud × 5. G. fruit × 2. H. transverse section of fruit × 5. I–L. *C. macropterus*: I. leaf × 1. J. bud × 5. K. fruit × 2. L. transverse section of fruit × 5. A–D, Halford Q1717(BRI); E, Thozet 490 (MEL 1599036) (MEL); F, O'Shanesy 1126 (MEL); G. Thozet 490 (MEL 1599037) (MEL); I–L, Craven & Wightman 8316 (BRI).

**8. Corchorus thozetii** Halford, **sp. nov.** valde similis *C. cunninghamii* sed capsulis brevioribus (10.0–17.0 mm longis contra capsulas 15.0–35.0 mm longas) angularibusque costis 3 vel 4 angustis longitudinalibus contra capsulas rotundatas laevesque distinguitur. **Typus:** Queensland, Port Curtis District. Rockhampton, *Thozet* 490 (holo: MEL (MEL 1599036); iso: MEL (MEL 1599037)).

Ascending (?)perennial subshrub to 60 cm high, general appearance green; branchlets terete, glabrous. Leaves narrowly ovate to ovate, 5.0–7.0 cm long, 1.5–3.0 cm wide, glabrous; base rounded; apex acute to acuminate; margin serrate; petiole 10–20 mm long, glabrous apart from a line of short curly simple hairs on the adaxial surface. Stipules ovate, turgid proximally, 2–3 mm long, glabrous, with a single nectariferous pore on abaxial surface; apex acuminate. Inflorescences leaf-opposed, solitary at nodes, 4-or 5-flowered; peduncles 2–3 mm long; pedicels 2–3 mm long; bracts narrowly ovate, c. 1.0 mm long. Buds pyriform, 3.0–4.0 mm diameter. Sepals 4, linear-obovate, 6.0–6.5 mm long, 1.5–2.0 mm wide, mostly glabrous except a few hairs on margin near base; apex acute. Petals 4, narrowly obovate, 6.0–6.5 mm long, c. 3.0 mm wide; claw c. 0.6 mm long, minutely ciliate on margin. Androgynophore c. 0.2 mm long; annulus c. 0.2 mm long. Stamens 50–60; filaments 4.0–5.0 mm long. Ovary trigonous-ellipsoid, 1.3–1.5 mm long, c. 0.8 mm diameter, 3-or 4- sulcate, glabrous, 3- or rarely 4-celled with 12–14 ovules per cell; style slender, c. 1.5 mm long; stigma minutely toothed. Fruiting pedicel ascending to erect; fruit narrowly trigonous-ellipsoid rarely tetragonous-ellipsoid, 10–17 mm long, 3–5 mm wide, smooth, 3-or 4-ribbed, smooth, glabrous, 3-or 4-valvate; base obtuse; apex obtuse to somewhat rostrate; valves without transverse septa adaxially. Seeds numerous, ± rhomboid-cylindric or irregularly obovoid, 1.5–2.5 mm long, matt brown to black. **Fig. 3 E–H.**

***Additional specimen examined*: Queensland.** Port Curtis District: near Rockhampton, Aug 1869, *O'Shanesy* 1126 (MEL).

***Distribution and habitat*:** *C. thozetii* is endemic to Australia. As the species is known from only two specimens collected last century, the locality records for *C. thozetii* are vague. It is known only from somewhere near Rockhampton in the central east coast of Queensland (**Map 5**), where it was noted by the collector O'Shanesy to occur in Brigalow scrub.

***Phenology*:** The single collection of flowering and fruiting material seen was made in August.

***Conservation status*:** This species has not been collected during the last 100 years. There has apparently been no systematic search made of possible localities to look for it. A conservation coding of presumed extinct (X) is appropriate.

***Etymology*:** This species is named in honour of Mr A. Thozet (1826–1878) who was an avid botanical collector in Central Queensland.

*Notes*: *C. thozetii* closely resembles *C. cunninghamii* but can be distinguished from that by its shorter (10.0–17.0 mm long compared with 15.0–35.0 mm long) trigonous- or tetragonous-ellipsoid fruit with 3 or 4 narrow longitudinal ribs compared with the narrowly ellipsoid fruit without longitudinal ribs of *C. cunninghamii*.

**9. Corchorus macropterus** G.J. Leach & Cheek, Kew Bull. 47(3): 513 (1992). **Type:** Australia, Northern Territory. Darwin and Gulf Region: Arnhem Land, 10 km S of Oenpelli, 12°23'S 133°10'E, 24 May 1988, *A.A. Munir* 5838 (holo: n.v; iso: K n.v. (photo at BRI).

Erect shrub 1–2 m tall; branchlets terete, glabrous or sparsely covered with minute, erect, simple hairs. Leaves narrowly ovate or narrowly elliptic to elliptic, 4.0–13.0 cm long, 1.0–5.0 cm wide, glabrous; base rounded; apex acuminate; margin serrate; petiole 6–28 mm long, glabrous apart from a line of short, erect simple hairs on adaxial surface. Stipules ovate, turgid proximally, 3–5 mm long, glabrous, with a single nectariferous transverse groove on abaxial surface; apex subulate. Inflorescences axillary or leaf-opposed, solitary at nodes, 1-to 4-flowered; peduncles up to 1 mm long; pedicels 3–4 mm long; bracts narrowly ovate, 2.0–5.0 mm

long. Buds broadly ovoid, 4.0–5.0 mm diameter, with 5 spreading caudae at apex, up to 5 mm long. Sepals 5, narrowly elliptic to elliptic, 8.0–18.0 mm long, 2.0–3.5 mm wide, indumentum outside absent or sometimes sparsely covered with minute simple and stellate hairs, inside a few minute simple hairs near base; apex caudate, 2.0–5.0 mm long. Petals 5, obovate to circular, 7.0–11.0 mm long, 5.0–8.0 mm wide; claw c. 1.0 mm long, ciliate on margin. Androgynophore 0.3–0.4 mm long; annulus c. 0.2 mm long. Stamens 140–200, filaments 2.0–6.0 mm long. Ovary conical to ellipsoid, very strongly 5-winged, 2.0–3.0 mm long, 1.0–1.5 mm diameter, glabrous, 5-celled with 20–24 ovules per cell; style terete, c. 4.0 mm long; stigma fimbriate. Fruiting pedicel erect; fruit ellipsoid, 20–40 mm long, 8–15 mm diameter, straight, longitudinally 4-or 5-winged, smooth, glabrous, dehiscing only at apex, 4- or 5-valvate; apex obtuse, with a black obtuse mucro, c. 0.5 mm long; valves without transverse septa adaxially. Seeds 8 to 15 per cell, ± rhomboid-cylindric to discoid, 1.0–2.0 mm long, matt or shiny brown to black. **Fig. 3 I–L.**

*Additional specimens examined*: **Northern Territory.** DARWIN AND GULF DISTRICT: Oenpelli, May 1981, *Bonney* (DNA); 6 km from Oenpelli on Springs Rd, Jun 1981, *Bonney* (DNA); beside the road to East Alligator River, Jul 1986, *Gartrell & Brennan* UNSW19754 (CANB); Mt Gilruth, Mar 1984, *Craven & Wightman* 8316 (BRI).

***Distribution and habitat***: *C. macropterus* is endemic to Australia. It is known only from Arnhem Land, Northern Territory **(Map 4)**. It grows on sandy soil near creeks flowing between sandstone cliffs and on swampy alluvium on sandstone plateaus on rainforest margins and amongst tall grasses.

***Phenology***: Flowers recorded in March, May to July; fruits recorded from March, May and June.

***Notes***: *C. macropterus* is a very distinctive species because of its prominent 5-winged fruit. *C. aestuans* is the only other species of *Corchorus* in Australia with prominent wings on the fruit. *C. macropterus* is easily distinguished from *C. aestuans* by having larger flowers, fruits and leaves. *C. macropterus* is more closely allied to *C. cunninghamii*, *C. thozetii* and *C. hygrophilus* from Queensland but differs from them in having sepals with long awns, shortly obovate to circular petals, 140–200 stamens and strongly 5-winged fruit.

**10. Corchorus hygrophilus** A. Cunn. ex Benth., Fl. Austral. 1: 276 (1863). **Type:** [Queensland. NORTH KENNEDY DISTRICT:] Cleveland Bay, June 1819, *A. Cunningham* 200 (holo: K!).

Ascending subshrub to 50 cm high; branchlets terete, glabrous or sparsely covered with minute simple hyaline hairs or sometimes minute glandular papillose hairs. Leaves narrowly ovate to broadly ovate, 8.0–12.0 cm long, 2.0–7.0 cm wide, glabrous or with scattered minute simple hairs on both surfaces; base rounded; apex acute to acuminate; margin serrate; petiole 10–20 mm long, glabrous apart from a line of short curly simple hairs on the adaxial surface. Stipules ovate, turgid proximally, 3–4 mm long, glabrous, with a single nectariferous pore on abaxial surface; apex subulate. Inflorescences leaf-opposed, solitary at nodes, 6- to 8-flowered; peduncles 3–5 mm long; pedicels 3–4 mm long; bracts ovate, c. 1.0 mm long. Buds pyriform, 3.0–4.0 mm diameter. Sepals 4, narrowly obovate, 7.0–9.0 mm long, 2.0–3.0 mm wide, glabrous except for ciliolate margin near base; apex acute. Petals 4, obovate, 6.0–8.0 mm long, 3.0–4.0 mm wide; claw 1.0–1.5 mm long, minutely ciliate on margin. Androgynophore 0.4–0.5 mm long; annulus up to 0.3 mm long. Stamens 55–80; filaments 4.0–6.0 mm long. Ovary subglobose, 0.8–1.0 mm diameter, minutely papillose, 4-celled with 6–10 ovules per cell; style slender, 6.0–7.0 mm long; stigma minutely toothed. Fruiting pedicel erect or reflexed; fruit broadly ellipsoid, 7–12 mm long, 5–7 mm diameter, rugose, glabrous, 4-valvate; base and apex rounded; valves without transverse septa adaxially. Seeds numerous, ± rhomboid-cylindric or discoid, 2.0–3.0 mm long, matt dark brown to black. **Fig. 4 I.**

*Selected specimens*: **Queensland.** NORTH KENNEDY DISTRICT: Cape Cleveland N.P., Feb 1992, *Forster* PIF9656 & *Bean* (BRI, MEL, QRS); Mount Abbot, 50 km W of Bowen, May 1992, *Bean* 4496 (BRI). PORT CURTIS DISTRICT: 1 km E of Fitzroy Caves N.P., Gomersalls Block, Jun 1989, *Forster* PIF5096 & *Tucker* (BRI); Mt Larcom, 5 km NW of Yarwun, 25 Jan 1994, *Forster* PIF14643 (BRI,

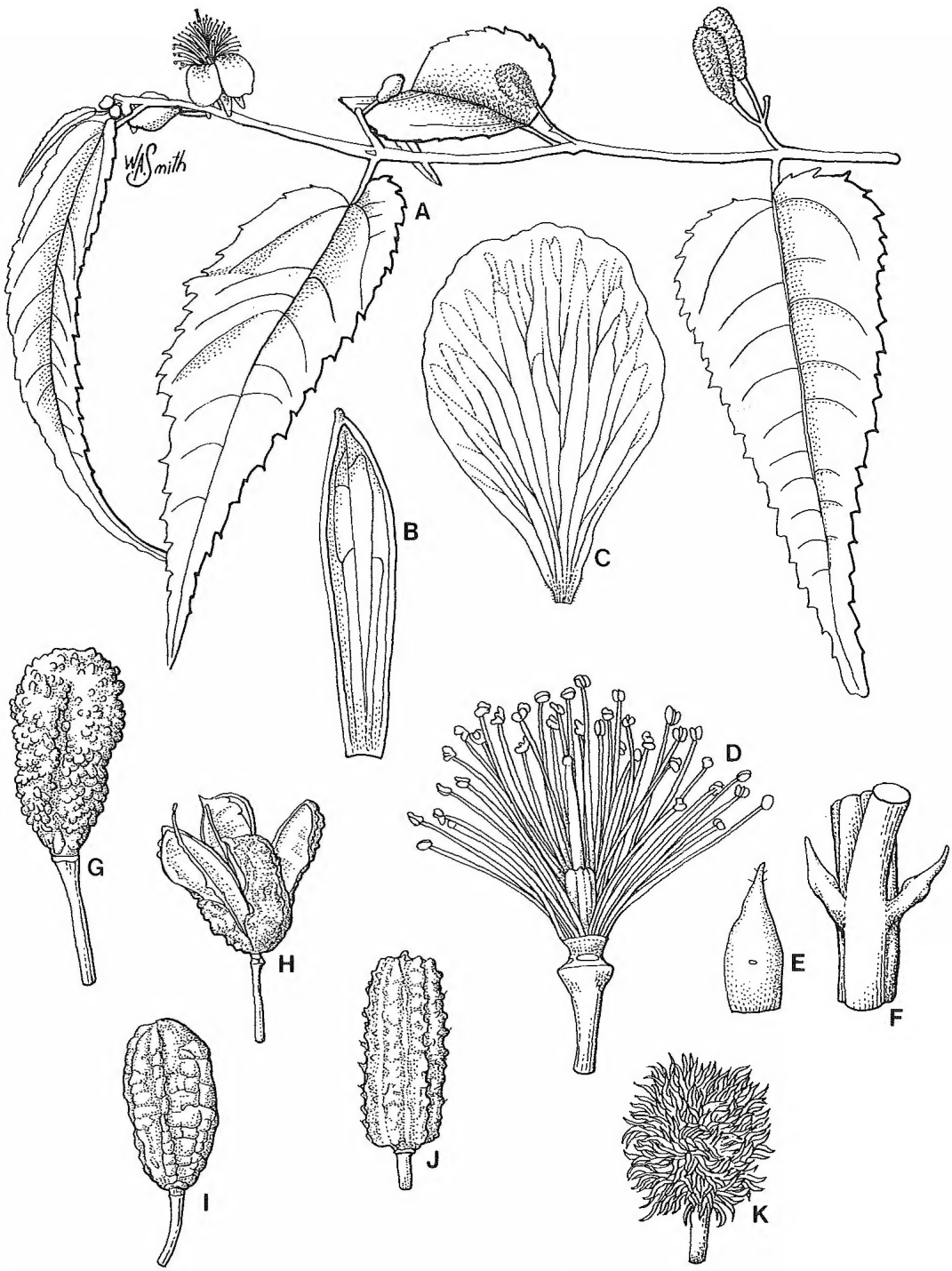



**Fig.4.** A–H. *C. reynoldsiae*: A. branchlet with flower and fruit × 0.6. B. sepal × 4. C. petal × 4. D. androgynophore with stamens and ovary × 4. E. abaxial view of stipule × 8. F. portion of branchlet with stipules and petiole base × 4. G. fruit × 2. H. fruit dehisced × 2. I. *C. hygrophilus*: fruit × 2. J. *C. pascuorum*: fruit × 1. K. *C. macropetalus*: fruit × 1. A–H, Halford Q2071; I, Forster & Tucker PIF5096; J, Everist 3001; K, Mitchell 2627. (All BRI).

MEL). BURNETT DISTRICT: Eidsvold, undated, *Bancroft* [AQ 86672] (BRI).

***Distribution and habitat*:** *C. hygrophilus* is endemic to Australia. It occurs sporadically in the coastal and subcoastal areas along the east coast of Queensland from Townsville south to near Eidsvold **(Map 6)**. It grows on vine forest margins or in sclerophyll forests near vine forests, on soils derived from granite or limestone.

***Phenology*:** Flowers recorded in January, February and May; fruits recorded in February, May, June and August.

***Notes*:** *C. hygrophilus* is closely related to *C. reynoldsiae*, *C. thozetii* and *C. cunninghamii* but differs from them in its small broadly ellipsoid fruit with a rugose surface.

**11. Corchorus reynoldsiae** Halford **sp. nov.** valde affinis *C. hygrophilo* sed sepalis majoribus (10.0–12.0 mm longis et 3.5–4.0 mm latis contra sepala 7.0–9.0 mm longa et 2.0–3.0 mm lata) capsulis obovoideis vel late obovoideis non late ellipsoideis et verrucosis non rugosis distinguitur. **Typus:** Queensland. LEICHHARDT DISTRICT: Carnarvon Gorge N.P., 700 m along main track from Information Centre, 25°03'S, 148°13'E, 19 March 1994, *D. Halford & C. Hohnen* Q2071 (holo: BRI; iso; CANB, DNA, K, MEL).

*Corchorus* sp. (Moolyamba C.T. White 11313), Halford (1994).

Ascending subshrub to 70 cm high; branchlets terete, glabrous or with a scattered covering of minute reddish simple glandular hairs sometimes present on new shoots. Leaves narrowly ovate, 6.0–12.0 cm long, 1.5–4.0 cm wide, glabrous above and below except for scattered minute reddish glandular hairs on lower surface of young leaves; base rounded; apex attenuate; margin serrate; petiole 10–20 mm long, glabrous apart from a line of short curly simple hairs on the adaxial surface. Stipules narrowly ovate, turgid proximally, 2–3 mm long, glabrous, with a single nectariferous pore on abaxial surface; apex attenuate. Inflorescences leaf-opposed, solitary at nodes, 5- to 7-flowered; peduncles 3–10 mm long; pedicels 4–10 mm long; bracts narrowly ovate, 1.0–2.0 mm long. Buds pyriform, 3.0–4.0 mm diameter. Sepals 4, narrowly obovate, 10.0–12.0 mm long, 3.5–4.0 mm wide, glabrous; apex acute. Petals 4, obovate to broadly obovate, c. 10.0 mm long, c. 8.0 mm wide; claw c. 0.8 mm long, minutely ciliate on margin. Androgynophore c. 0.5 mm long; annulus c. 0.3 mm long. Stamens 80–100; filaments 5.0–6.0 mm long. Ovary tetragonous-cylindrical, c. 3.0 mm long, c. 0.5 mm diameter, verrucose, 4-celled with 20 ovules per cell; style slender, 8.0–9.0 mm long; stigma minutely toothed. Fruiting pedicel ascending to erect; fruit obovoid to broadly obovoid, 12–15 mm long, 8–9 mm diameter, longitudinally 4-sulcate, verrucose, glabrous, 4-valvate; apex rounded to truncate; valves without transverse septa adaxially. Seeds numerous, ± obovoid or rhomboid-cylindric, 2.0–3.0 mm long, matt brown to black. **Fig. 4 A–H.**

***Additional specimens examined*: Queensland.** LEICHHARDT DISTRICT: Carnarvon Creek Gorge, 70 miles [113 km] NW of Injune, May 1962, *Johnson* 2414 (BRI); Carnarvon Creek, Sep 1940, *White* 11319 (BRI); Moolyamba Gorge, Sep 1940, *White* 11313 (BRI); Injune-Rolleston road, 86 km N of Injune, Mar 1994, *Halford & Hohnen* Q2159 (BRI).

***Distribution and habitat*:** *C. reynoldsiae* is endemic to Australia. It is confined to the Carnarvon Range area of the central highlands, Queensland from Carnarvon Gorge south to Moolyember Gorge and east to the Injune - Rolleston road **(Map 6)**. It occurs on sandy soils in eucalypt forests along creeks and on the lower parts of talus slopes.

***Phenology*:** Flowers recorded in March; fruits recorded in September, March and May

***Notes*:** *C. reynoldsiae* is closely related to *C. hygrophilus* but can be distinguished by its larger sepals (10.0–12.0 mm long compared with 7–9 mm long) and obovoid to broadly obovoid fruits with a verrucose surface compared with broadly ellipsoid fruits with a rugose surface.

***Conservation status*:** Although *C. reynoldsiae* has a restricted distribution it is not considered endangered. It appears to be an opportunistic species that colonises disturbed soil. A conservation code of 2RC is thus appropriate.

***Etymology*:** This species is named in honour of Ms Sally Reynolds, Principal Botanist at the Queensland Herbarium, who recognised this as a distinct taxon many years ago.

**12. Corchorus macropetalus** (F. Muell.) Domin, Biblioth. Bot. 89: 379 (1927 '1926'); *Triumfetta macropetala* F. Muell., Fragm. 3: 8 (1862). *Corchorus echinatus* Benth., Fl. Austral. 1: 276 (1863), nom. illeg. **Type:** Sturt's Creek, Feb 1856, *F. Mueller* [MEL 223673] (lecto, here designated: MEL; isolecto: K n.v., photo at BRI).

Erect subligneous herb to 60 cm high; branchlets terete, glabrous except for minute hairs on young shoots. Leaves narrowly elliptic-ovate to elliptic-ovate, 3.0–10.0 cm long, 1.0–3.5 cm wide, glabrous; base rounded; apex obtuse; margin serrate, sometimes with basal teeth prolonged into setaceous points, up to 3 mm long; petiole 7–25 mm long, glabrous except for a line of short reflexed simple hairs on the adaxial surface. Stipules broadly ovate, turgid proximally, 4–7 mm long, glabrous, with two transverse nectariferous grooves on abaxial surface; apex subulate. Inflorescences leaf-opposed, solitary at nodes, 2-or 3-flowered; peduncles 2–7 mm long; pedicels 6–10 mm long; bracts linear-subulate, 4.0–6.0 mm long; Buds spheroidal, 7.0–9.0 mm diameter. Sepals 5, linear-obovate, 10.0–12.0 mm long, 3.0–4.0 mm wide, glabrous; apex acute. Petals 5, obovate to broadly obovate, 10.0–12.0 mm long, 7.0–9.0 mm wide; claw c. 1.0 mm long, minutely ciliate on margin. Androgynophore 0.3–0.5 mm long; annulus c. 0.2 mm long. Stamens 130–170; filaments 5.0–7.0 mm long. Ovary globose, 1.0–2.0 mm diameter, setose, 3-to 7-celled with 8–12 ovules per cell; style slender, 6.0–7.0 mm long; stigma minutely toothed. Fruiting pedicel erect; fruit ovoid-globose, 10–17 mm long, 10–15 mm diameter, covered with fleshy appendages, 3- to 5-valvate, base and apex rounded to truncate; appendages attenuate, 2–4 mm long, terminated by a single erect setaceous hair; valves without transverse septa adaxially. Seeds numerous, ovoid, 4.0–5.0 mm long, black. **Fig. 4 K.**

***Additional specimens examined*: Western Australia.** GARDNER DISTRICT: deserted seeds block on Weaber Plains road 14 km N of Kununurra, July 1992, *Mitchell* 2856 (BRI, PERTH); Kimberley Research Station, Kununurra, Mar 1963, *Lazarides* 6745 (CANB); vicinity of Kimberley Research Station near Kununurra, Olivera Farm, 1969, *Mackenzie* 690429–1 (CANB); cotton fields, Kununurra, May 1967, *Scrymgeour* 1726 (PERTH); Behn River at Argyle Station homestead, May 1944, *Gardner* 7228 (PERTH). **Northern Territory.** VICTORIA RIVER REGION: 1 mile [1.6 km] N of Inverway H.S., Mar 1960, *Walter* [DNA 6687] (DNA); 10 miles [16 km] NNE of Wavehill Station, Jul 1959, *Lazarides* 6276 (CANB, PERTH).

***Distribution and habitat*:** *C. macropetalus* is endemic to Australia. It occurs from Kununurra, in the east Kimberley, Western Australia, to the Victoria River region, Northern Territory (**Map 6**). It grows in dark cracking clay soils in mixed grasslands or rarely on stony sandstone soils. It is also recorded in areas under cultivation and along irrigation channels.

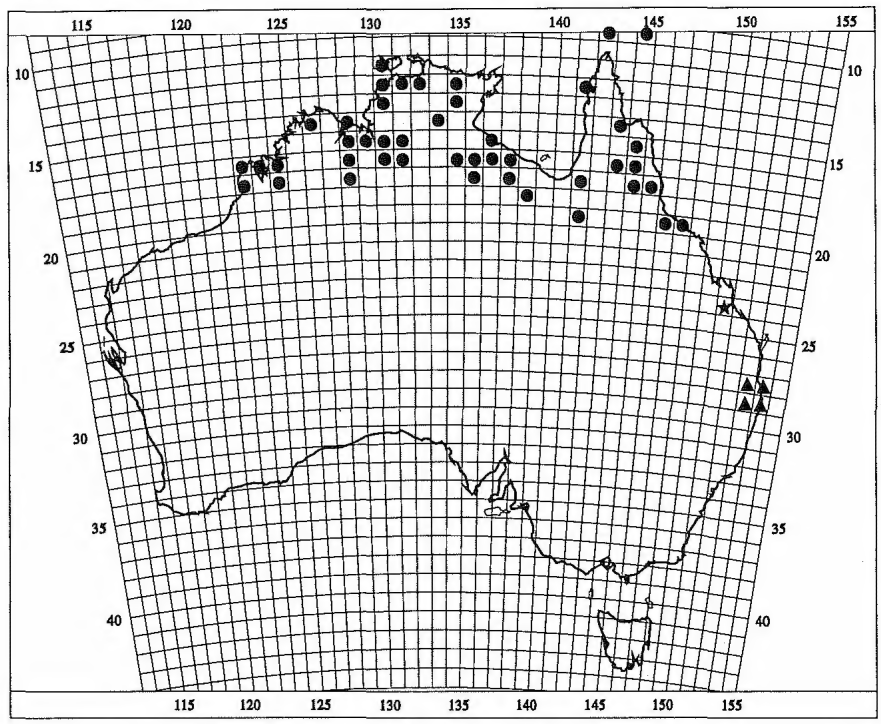
***Phenology*:** Flowers and fruits recorded in March, May and July

***Notes*:** *C. macropetalus* is closely related to *C. pascuorum* but is easily distinguished from that by its 3- to 5-valved ovoid-globose fruit covered with fleshy appendages which are 2–4 mm long and terminated by a single setaceous hair. *C. pascuorum* has 6- to 9-valved, obloid-cylindrical fruit with a verrucose surface.

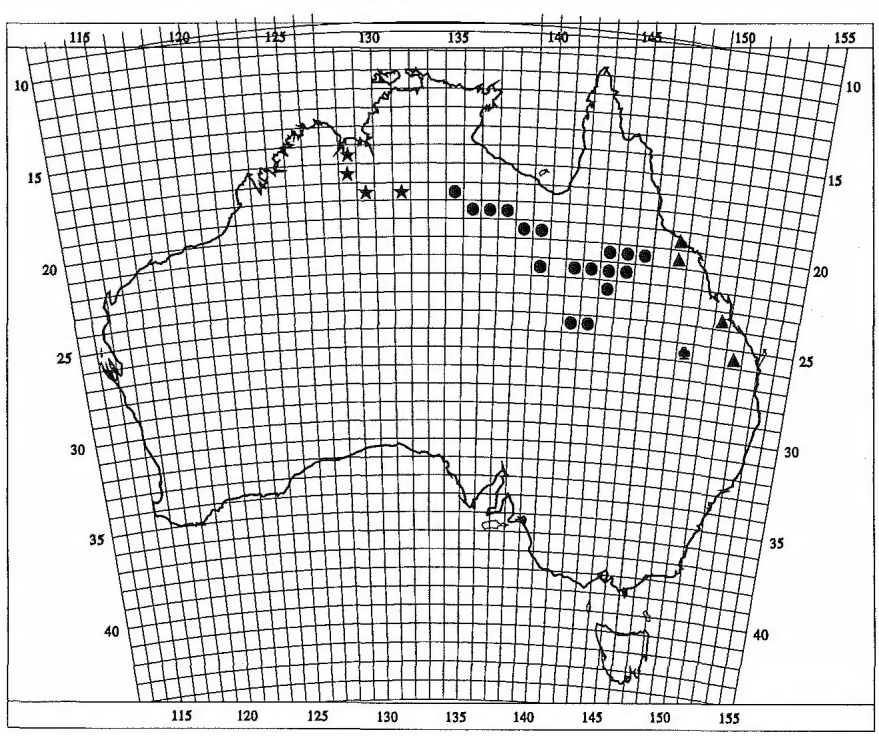
***Typification*:** Of the two sheets of original material available (MEL 223674 & MEL 223673), MEL 223673 is here chosen as lectotype because it has both flowers and fruits attached and agrees with the protologue.

**13. Corchorus pascuorum** Domin, Biblioth. Bot. 89: 379 (1927 '1926'). **Type:** Queensland. BURKE DISTRICT: between Hughenden and Cloncurry, Feb 1910, *K. Domin* [PR 6474] (lecto, here designated: PR; isolecto: PR [PR 6473]).

Erect subligneous herb to 60 cm high; branchlets terete, glabrous or sparsely covered with minute, simple hairs. Leaves narrowly oblong-obovate or narrowly ovate, 4.0–12.0 cm long, 1.0–4.0 cm wide, glabrous; base rounded to truncate or slightly cordate; apex acute; margin serrate, sometimes with a pair of basal teeth prolonged into setaceous points, up to 2 mm long; petiole 10–20 mm long, glabrous apart from a line of short curved simple hairs on adaxial surface. Stipules ovate, turgid proximally, 3–4 mm long,




**Map 5.** Distribution of *Corchorus* spp. *C. aestuans* ● , *C. thozetii* ★ , *C. cunninghamii* ▲ .




**Map 6.** Distribution of *Corchorus* spp. *C. macropetalus* ★ , *C. pascuorum* ● , *C. hygrophilus* ▲, *C. reynoldsiae* ♠ .

glabrous, with two nectariferous pits on abaxial surface; apex subulate. Inflorescences leaf-opposed, solitary at nodes, 1- to 5-flowered; peduncles 2–3 mm long; pedicels 10–15 mm long; bracts narrowly ovate, 3.0–5.0 mm long. Buds spheroidal, 7.0–10.0 mm diameter. Sepals 5, obovate, 9.0–12.0 mm long, 3.0–4.0 mm wide, glabrous; apex acute. Petals 5, broadly obovate, 12.0–13.0 mm long, 8.0–10.0 mm wide; claw c. 1.0 mm long, ciliate on margin. Androgynophore obsolete or nearly so; annulus very short, margin undulate. Stamens 80–110; filaments 3.0–7.0 mm long. Ovary subglobose, 1.5–2.0 mm diameter, setose, 6- to 9-celled with 6–8 ovules per cell; style slender, 5.0–8.0 mm long; stigma fimbriate. Fruiting pedicel erect; fruit obloid-cylindrical, 13–25 mm long, 8–10 mm diameter, verrucose, glabrous, 6-to 9-valvate, truncate at base; apex truncate with short blunt point; valves without transverse septa adaxially. Seeds numerous, ± rhomboid-cylindric, c. 4.0 mm long, rugose, dull black. **Fig. 4 J.** Chromosome number 2n = 28 (Roy 1962).

***Selected specimens*: Northern Territory.** Barkly Tablelands Region: 25 miles [40 km] SE [of] Elliott, date not recorded, *Byrnes* 2042 (DNA); 55.4 miles [89.1 km], Eva Downs-Helen Springs, Jun 1947, *Perry* 95 (CANB); SW of Burnette Downs, dry bed of Lake Sylvester, May 1947, *Blake* 17835 (BRI); 3 miles [4.8 km] W [of] Crows Nest bore, Burnette Downs, Mar 1956, *Chippendale* 1953 (BRI, CANB, DNA, MEL); Alexandria Station, 15 km NW of Homestead, Mar 1981, *Henshall* 3521 (DNA). **Queensland.** Burke District: Flinders River, Aug 1916, *White* [AQ 86749] (BRI); Essex Downs, Jun 1936, *Blake* 11671 (BRI); 60 miles [97 km] NW of Maxwelton, on "Sutherland" property, Mar 1964, *Entwistle* 6 (BRI); "Sutherland", 45 miles [72 km] NW of Maxwelton, Jan 1966, *Pedley* 1937 (BRI); 38 miles [c. 61 km] W of Hughenden, Jun 1947, *Everist* 3001 (BRI); Toorak, Jun 1958, *Sillar* [AQ 86745] (BRI); about half way between McKinlay and Kynuna, Feb 1937, *Everist & Smith* 226 (BRI); Gilliat River, Burke and Wills Roadhouse-Julia Creek Road, Jul 1990, *Williams* 90033 (BRI). Gregory North District: Wyora Station, 80 km N of Winton, Feb 1986, *O'Sullivan* 6 (BRI); Dagworth, near Kynuna, Jun 1958, *Skerman* [AQ 86742] (BRI); 30 km NW of Winton, Mar 1988, *Cheffins* 337 (BRI); Elderslie, W of Winton, Nov 1935, *Blake* 10020 (BRI, CANB); 20 km SW of Davenport Station, May 1977, *Schmid* AS374 (BRI).

***Distribution and habitat*:** *C. pascuorum* is endemic to Australia. It occurs from Newcastle Waters, Northern Territory across the Barkly Tablelands to Hughenden, Queensland in the east, and south to Monkira Station on the Diamantina River floodplains, Queensland (**Map 6**). It grows on dark cracking clay soils in grasslands or herblands.

***Phenology*:** Flowers recorded from February to August; fruits from January to August and November.

***Notes*:** *C. pascuorum* is most closely related to *C. macropetalus*. The distinguishing features of these two species are discussed under *C. macropetalus*.

***Typification*:** At Prague there are two sheets of original Domin material (PR 6474 & PR 6473). Important and easily recognisable diagnostic characters are found in the fruit of *Corchorus*. For this reason the material on sheet PR 6474 is selected here as the lectotype because it has mature fruit and agrees with the original description.

## Acknowledgements

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# Revision of *Rubus* subgenus *Micranthobatus* (Fritsch) Kalkman (Rosaceae) in Australia

**A.R. Bean**

**Summary**

Bean, A.R. (1995). Revision of *Rubus* subgenus *Micranthobatus* (Fritsch) Kalkman (Rosaceae) in Australia. *Austrobaileya* 4(3): 321–328. *Rubus* subg. *Micranthobatus* is revised for Australia. Two species are recognised; *R. moorei* F.Muell. and the new species *R. nebulosus* A.R.Bean. Both species are described, illustrated and their distributions mapped. A key to the species is provided.

Key words: *Rubus*-Australia, *Rubus nebulosus*, *Rubus moorei*, Rosaceae.

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## Introduction

*Rubus* L. is a worldwide genus with many hundreds of species. In Australia, there are just nine indigenous species belonging to this genus.

The last comprehensive treatment of Australian *Rubus* species was that of Bentham (1864). The only recent account of any *Rubus* species in Australia is that of Amor & Miles (1974) who provided an account of, and key to, the naturalised species of *Rubus* subg. *Rubus* occurring in Victoria. However, recent treatments are available for areas north of Australia. The New Guinea species of *Rubus* were revised by Royen (1969) and *Rubus* species occurring throughout Malesia have since been revised (Zandee & Kalkman 1981; Kalkman 1984; Kalkman 1987).

The indigenous Australian *Rubus* species belong to four subgenera, three of which (*R.* subg. *Idaeobatus* (Focke) Focke, *R.* subg. *Malachobatus* (Focke) Focke and *R.* subg. *Dalibarda* (L.) Focke) were established by Focke (1910) in the first part of his world-wide monograph of the genus *Rubus*. The fourth, *R.* subg. *Micranthobatus*, was treated by Focke as a section of *Rubus*, but this was later raised to subgeneric rank by Kalkman (1987). He recognised about 12 species as belonging to it. These species occur in Madagascar, north-east India, Borneo, Philippines, Celebes, New Guinea, Australia and New Zealand.

Australian members of *R.* subg. *Micranthobatus* are distinguishable from other Australian *Rubus* species by their long, trailing stems which often carry them into tree canopies, palmate foliage, dioecious habit and axillary inflorescences.

There are two taxa in Australia belonging to this subgenus, but only one (*R. moorei* F.Muell.) has hitherto been named at species level. The other taxon, described here as *R. nebulosus*, was named by White (1942) as *R. moorei* f. *glabra*. He recognized the distinctiveness of this taxon, but was confused by so-called 'intermediate forms', and labelled some specimens at BRI as such. These specimens represent juvenile forms of *R. moorei* which in its young stage has larger, sparsely hairy leaves. Kalkman (1987) recognised that there were two distinct taxa belonging to this subgenus in Australia, but was inclined to include 'f. *glabra*' (i.e. *R. nebulosus*) within *R. royenii* from New Guinea. Several characters separate *R. nebulosus* from both *R. moorei* and *R. royenii* and hence it is described here at species level.

This paper is the first of a series in which it is intended to revise Australian members of the genus *Rubus*.

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## Taxonomy

**Rubus** subg. **Micranthobatus** (Fritsch) Kalkman, Blumea 32: 324 (1987); *Rubus* sect. *Micranthobatus* Fritsch, Oesterr. Bot. Z. 36: 259 (1886).

Lectotype: *Rubus moorei* F.Muell., fide Kalkman (1987).

12 species in the world, 2 endemic in Australia.

### Key to the Australian species of *Rubus* subg. *Micranthobatus*

1. Undersides of leaflets densely hairy throughout; margins with 5–7 teeth/cm; stipules present; carpels not glandular; aggregate fruits with 16–30 hairy carpids ..... **R. moorei**

   Undersides of leaflets glabrous except for domatia and hairs along veins; margins with 3–5 teeth/cm; stipules absent; carpels glandular; aggregate fruits with 35–65 glabrous carpids ..... **R. nebulosus**

**1. Rubus moorei** F.Muell., Trans. Phil. Inst. Vict. 2: 67 (1857); *R. moorei* F.Muell. var. *moorei*, Domin, Repert. Spec. Nov. Regni Veg. 12: 133 (1913); *R. moorei* var. *typica* Domin, Biblioth. Bot. 89: 174 (1928), nom. inval.; *R. moorei* F.Muell. f. *moorei*, C.T.White, Proc. Roy. Soc. Queensland 53: 215 (1942); *R. moorei* f. *sericea* C.T.White, Proc. Roy. Soc. Queensland 53: 215 (1942), nom. inval. **Type:** New South Wales. North Coast: Clarence River, *C. Moore* (holo: MEL [MEL31333]; iso: K [photo BRI]).

*Rubus moorei* var. *leichhardtianus* Domin, Repert. Spec. Nov. Regni Veg. 12: 133 (1913). **Type**: [Queensland]. From the creek brush near Mr Archer's station, [Sep 1843], *Leichhardt* s.n. (iso: MEL [MEL 31338]; K [photo BRI]).

*Rubus moorei* var. *tryonii* Shirley, Proc. Roy. Soc. Queensland 31: 26 (1920) ('tryoni'). **Type:** Queensland. Moreton District: National Park, Macpherson Range, Dec 1916–Jan 1917, *J. Shirley*, n.v.

***Illustrations*:** K.A.W. Williams, Native Pl. Queensl. 3: 275 (1987); D.L. Jones & B. Gray, Climbing Pl. in Austral. (1988: 332) - photograph of fruiting specimen only.

Dioecious climbing vine to 15 m long or high. New growth and mature stems densely hairy, with numerous curved prickles 1–1.5 mm long; glands absent. Leaves petiolate, palmate, 5-foliolate, rarely 3- or 4-foliolate; stipules present, linear, 10–16 × 0.8–1 mm, sparsely hairy, attached in pairs 4–5 mm above base of petiole. Petioles 3.5–6.5 cm long, with numerous curved prickles. Petiolule of terminal leaflet 2.2–3.7 cm long, with numerous curved prickles; petiolule of lowest two leaflets 0.3–0.7 cm, with prickles rare or absent. Petioles and petiolules with fine appressed hairs, eglandular, terete. Laminae ovate with length/breadth ratio 1.6–1.9, chartaceous, upper surface sparsely hairy, particularly on major veins, glabrescent; lower surface densely covered by simple, rusty coloured hairs; venation penninerved, with 9–11 pairs of lateral veins unbranched or sometimes branching towards margin; midrib and lateral veins strongly impressed above, prominently raised below; apex acute; base obtuse; margins irregularly dentate, with 5–7 teeth per cm; teeth 1–1.5 mm long; terminal leaflet 4.5–7.6 × 2.5–4.1 cm; lateral leaflets slightly smaller. Inflorescences 1–3 in the axils of leaves, racemose, with numerous sterile bracts at base; racemes 4–7(10) cm long, with up to 15 flowers; rachis and pedicels densely hairy, with small curved prickles; pedicels 7–26 mm long; bracts 1 per pedicel, ovate, 4–7.5 × 2–3 mm, cymbiform, with apex acute; bracteoles 2, towards base of pedicel, not opposite, 4.5–5 × 1.5 mm, with apex acute; bracts and bracteoles persistent, with dense appressed hairs outside,

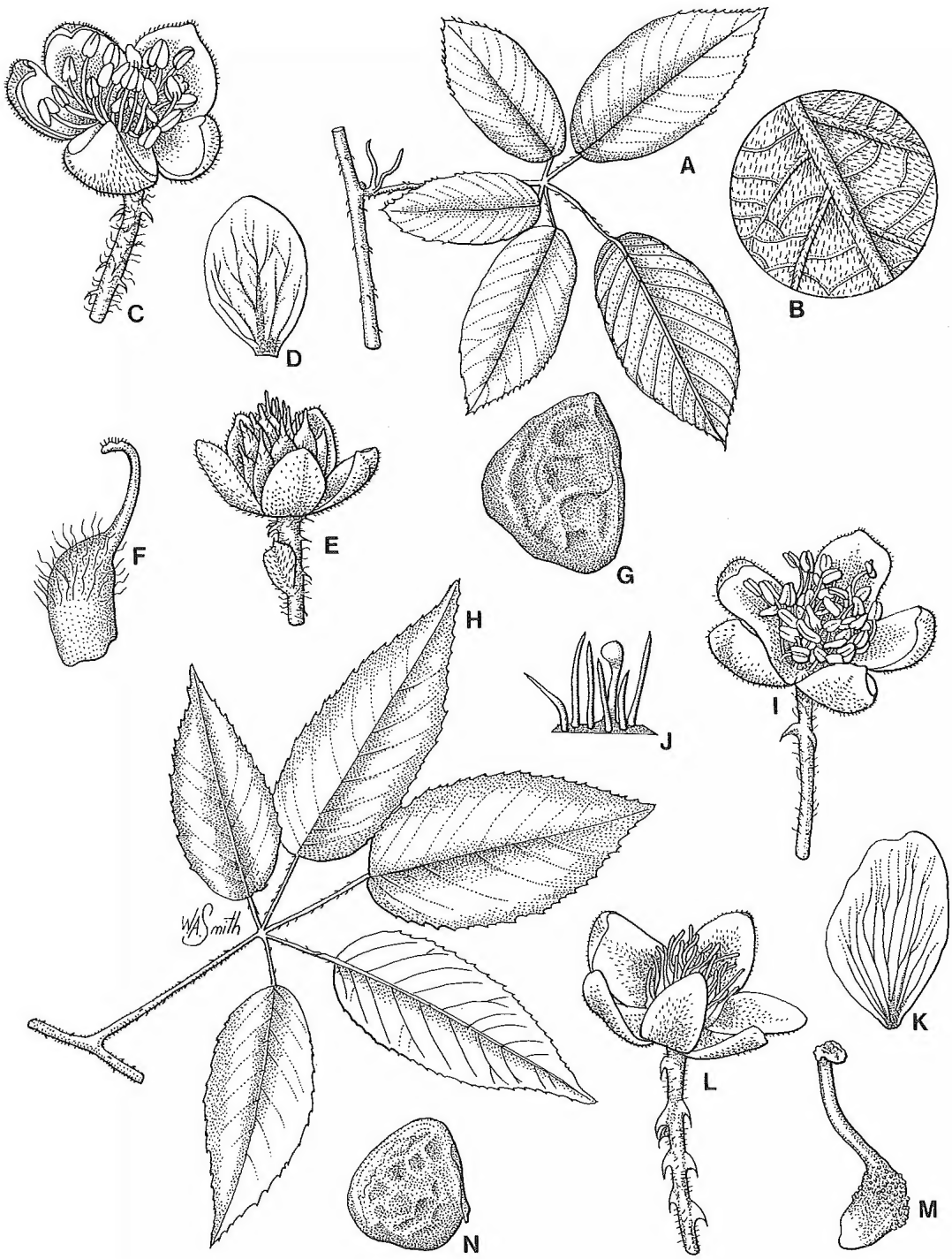



**Fig. 1.** A–G. *Rubus moorei* A. leaf and stem × 0.6. B. underside of leaflet × 3. C. male flower with petals removed ×3. D. petal × 3. E. female flower × 3. F. carpel × 12. G. endocarpid × 6. H–N *Rubus nebulosus* H. leaf and stem × 0.6. I. male flower with petals removed × 3. J. simple and glandular hairs on sepal × 4. K. petal × 3. L. female flower × 3. M. carpel × 12. N. endocarpid × 6. A–B, *Bean* 2693 (BRI); C–D, Anon., Lismore, 1907 (MEL); E–F, *Groyther* s.n. (BRI); G, *Bean* 1314 (BRI); H, *Bean* 7186 (BRI); I–K, *Beckler* s.n. (MEL); L–M, *Fletcher* s.n. (NSW); N, *Constable* s.n. (NSW).

sparsely hairy or glabrous inside, eglandular. Flowers functionally unisexual. Female flowers bearing staminal vestigia, male flowers bearing hairy rudimentary carpels. Hypanthium shallowly campanulate, 3.5–4 mm across, densely hairy outside, usually with curved prickles. Sepals 5, persistent, ovate, 3.5–6 × 3–4.5 mm, with apex obtuse, and margins entire, hairy on both surfaces, outer surface sometimes with prickles; petals 5, not persistent, white, elliptical, 8–9 × 4.5–5 mm, gradually tapering at base, very narrow at point of attachment, with apex obtuse, and margins entire, glabrous except for sparse hairs near base, venation prominent. Stamens 40–50, glabrous, in 2 or 3 whorls, evenly distributed; filaments terete, 2.5–3.5 mm long; anthers c. 1.5 mm long, dorsifixed, versatile, bilocular. Carpels c. 40, densely hairy, eglandular. Styles terete, c. 1 mm long, glabrous or sparsely hairy; stigma spathulate, papillose, set at an oblique angle to style. Aggregate fruit fleshy, black when ripe, to 18 × 17 mm when fresh, to 14 × 12 mm when dry, consisting of 16–30 hairy carpids. Endocarpids biconvex, deltate in outline, c. 4.5 mm long, c. 3.5 mm wide, c. 2 mm thick, surface with numerous shallow depressions, and with rounded or obscure dorsal wing; hilum lateral. **Fig. 1, A–G.**

***Selected specimens*: Queensland.** WIDE BAY DISTRICT: Peters Logging Area, Conondale Ranges, 26°41'S 152°34'E, Nov 1990, *Bean* 2693 (BRI,L,MEL); Blackall Range, Sep 1918, *White* s.n. (BRI); Mary Cairncross Park, Maleny, Apr 1993, *Bean* 6020 (BRI). MORETON DISTRICT: from the creekbrush, Mr Archer's [station], Sep 1843, *Leichhardt* s.n. (MEL); Candle Mountain, May 1918, *White* s.n. (BRI); Tallebudgera, 1902, *Groyther* s.n. (BRI); O'Reillys Guest House, Lamington Plateau, Jan 1990, *Bean* 1314 (BRI,L,LAE,QRS); sources of the Tweed and Logan rivers, 1895, *Collins & Taylor* s.n. (MEL); Beechmont, Sep 1920, *White* 6180 (MEL); Springbrook, Repeater Station road, Dec 1993, *Bean* 7183 (BRI,MEL); Qld/NSW border, Levers Plateau, Oct 1993, *Grimshaw* G86 (BRI). **New South Wales.** NORTH COAST: Tweed Range, Mebbin S.F., 7 mls [11 km] SW of Tyalgum, Jun 1957, *Johnson & Constable* s.n. (NSW); Sheepstation Creek, Wiangaree SF, NE of Kyogle, Dec 1972, *Williams* s.n. (NE); Wiangaree State Forest, Jan 1981, *Bird* s.n. (BRI); summit of Mt Nardi, NE of Nimbin, Sep 1994, *Bean* 7934 (BRI,K,NSW); near Lismore, Sep 1926, *Cheel* s.n. (NSW); Lismore, Nov 1906, *Rothwell* s.n. (NSW); Booyong Flora reserve, ENE of Lismore, Sep 1994, *Bean* 7911 (BRI,MEL,NSW); Byron Creek, Booyong, Jun 1957, *Johnson & Constable* s.n. (NSW).

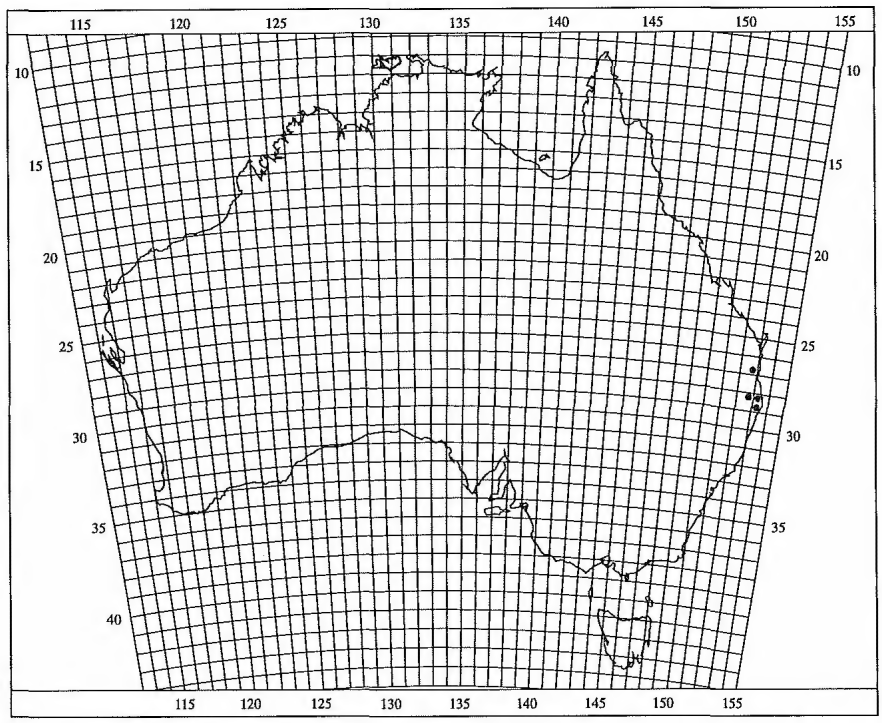
***Distribution and habitat*:** *Rubus moorei* has a restricted distribution in eastern Australia, with two areas of occurrence; one being about 100km north of Brisbane (the Conondale Range and Blackall Range), and the other being from Lamington National Park, Queensland, to the Lismore area in northern New South Wales (**Map 1**). The type locality is recorded as 'Clarence River' but no other collections I have seen have ever been made from within the catchment of the Clarence River. *R. moorei* grows in subtropical to warm-temperate notophyll rainforest or on rainforest margins, associated with species such as *Duboisia myoporoides* R.Br., *Stenocarpus sinuatus* Endl., *Castanospora alphandii* (F.Muell.) F.Muell. and *Quintinia verdonii* F.Muell., in areas where the annual rainfall exceeds about 1800 mm. It most commonly occurs at altitudes above 500 metres but around Lismore, it descends almost to sea-level.

***Phenology*:** Flowers have been recorded from September to January; fruits from October to January.

***Affinities*:** *R. moorei* is somewhat similar to *R. novoguineensis* Merr. & Perry, but differs from that by its persistent stipules, and flowers with glabrous stamens and eglandular carpels. The similar *R. australis* G.Forst. and other New Zealand *Rubus* species have glabrate leaves, paniculate inflorescences and smaller, yellow fruits. *R. moorei* differs from *R. nebulosus* by the presence of stipules; its broader, densely hairy leaflets, with acute apex and greater number of marginal teeth; mostly shorter racemes, larger endocarpids and eglandular carpels.

***Typification*:** No type specimen for *Rubus moorei* var. *tryonii* Shirley can be found at BRI, MEL, or NSW. However, because the brief diagnosis does not indicate that the leaves are glabrous or glabrescent, I believe this name to be synonymous with *R. moorei*.

***Conservation Status*:** Although *R. moorei* is now very rare on the Blackall Range and is not common in the Conondale Range, it is common and well conserved in Lamington National Park in Queensland and Nightcap National Park in New South Wales. Hence no conservation coding is recommended.




**Map 1.** Distribution of *Rubus moorei.*

**2. Rubus nebulosus** A.R.Bean **sp. nov.** affinis *R. royenii* var. *royenii* a quo folioliis angustioribus, praesentia domatiorum, petalis multis majoribus et numero staminum stylorumque in quoque flore majore differt. **Typus:** New South Wales. North Coast: Coramba, November 1912, *Boorman* s.n. (holo: BRI; iso: NSW).

*Rubus moorei* f. *glabra* C.T.White, Proc. Roy. Soc. Queensland 53: 215 (1942). **Type:** New South Wales. North Coast: Dorrigo State Forest, 4 October 1930, *C.T. White* 7542 (holo: BRI).

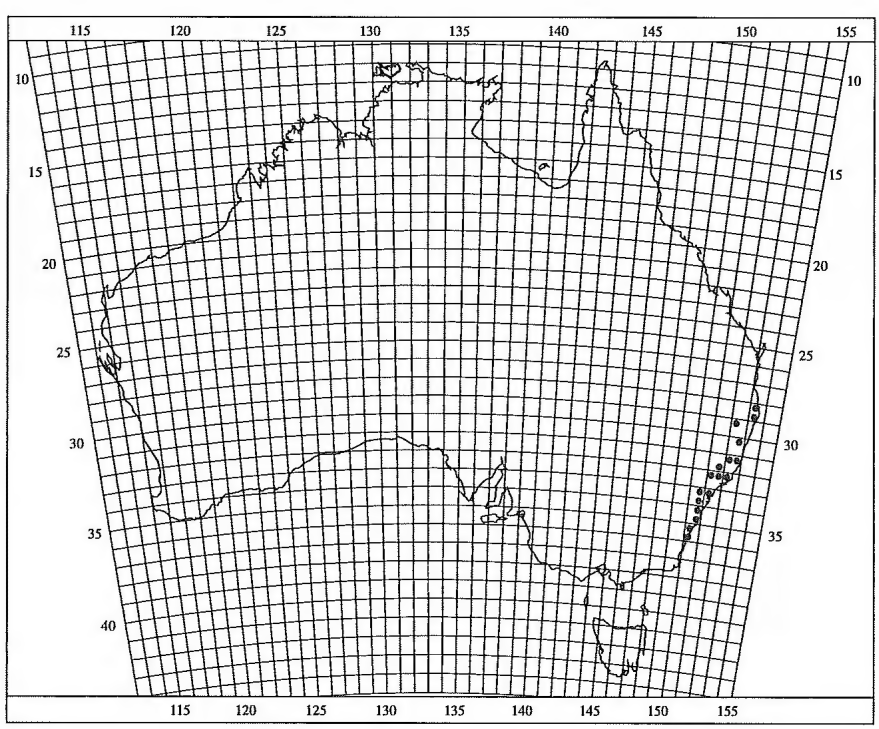
*Rubus* sp. A, Harden (ed.), Flora of New South Wales, 1: 533 (1990).

***Illustrations*:** D.L. Jones & B. Gray, Climbing Pl. in Austral. (1988: 332) - photograph of flowering specimen only, as *Rubus moorei*; N. & H. Nicholson, Austral. Rainforest Pl. IV (1994: 61), as *Rubus* sp. A.

Dioecious climbing vine to 15 m long or high. New growth with sparse, simple, appressed, pale yellow hairs. Mature stems glabrous, with numerous curved prickles 1–1.8 mm long; glands absent. Leaves petiolate, palmate, usually 5-foliolate, rarely 4- or 6- foliolate; stipules absent. Petioles 4.5–8.5 cm long, terete or flattened near base, with numerous curved prickles. Petiolule of terminal leaflet 3.0–5.7 cm long, terete, with numerous curved prickles; petiolule of lowest two leaflets 0.7–1.2 cm, terete, prickles rare or absent. Petioles and petiolules sparsely hairy, eglandular. Laminae ovate to elliptical, with length/breadth ratio 2.1–2.9, chartaceous, glabrous throughout except for midrib and major veins, and hairy domatia in major vein angles on lower surface; venation penninerved, with 10–13 pairs of lateral veins branching towards margin; midrib only impressed above; midrib and major veins prominent below; apex acuminate; base obtuse or slightly cordate, margins irregularly dentate, with 3–5 teeth per cm; teeth 1–1.5 mm long; terminal leaflets 6.3–11.5 × 2.6–5.3 cm; lateral leaflets somewhat smaller. Inflorescences 1 or 2 in the axils of leaves, racemose, with numerous sterile bracts at base; racemes 5–12 cm long,

with up to 12 flowers; rachis and pedicels densely hairy, with small curved prickles, with numerous stalked glands or rarely glands absent; pedicels 9–23 mm long; bracts 1 per pedicel, ovate, 5.5–6 × 2–3 mm, cymbiform, with apex acute; bracteoles 2, towards base of pedicel, not opposite, 3–5 × 0.6–0.8 mm, apex acute; bracts and bracteoles persistent, with dense appressed hairs on both surfaces, with stalked glands or rarely glands absent. Flowers functionally unisexual. Female flowers bearing staminal vestigia, male flowers bearing glabrous rudimentary carpels. Hypanthium shallowly campanulate, c. 4 mm across, densely hairy outside, usually with curved prickles. Sepals 5, persistent, ovate, 3.5–4 × 3–3.5 mm, with apex obtuse, and margins entire, hairy on both surfaces; petals 5, not persistent, white, elliptical, 9–12 × 5–7 mm, gradually tapering at base, very narrow at point of attachment, with apex obtuse, and margins entire, glabrous except for sparse hairs near base, with venation prominent. Stamens 45–60, glabrous, in 2 or 3 whorls, more or less evenly distributed; filaments terete, 2.5–3 mm long; anthers c. 1.5 mm long; dorsifixed, versatile, bilocular. Carpels 60–80, glabrous or with sparse erect hairs, and with numerous sessile or shortly stalked glands. Styles 2.0–2.5 mm long, glabrous; stigma spathulate, papillose, set at an oblique angle to style. Aggregate fruit fleshy, red to black when ripe, of unknown size when fresh, up to 11 × 9 mm when dry, consisting of 35–65 glabrous carpids. Endocarpids biconvex, circular in outline, c. 3.2 mm in diameter, c. 1.5 mm thick, surface with numerous deep depressions, and with a rudimentary annular wing; hilum lateral. **Fig. 1, H–N.**

***Selected specimens*: Queensland.** MORETON DISTRICT: Springbrook, Repeater Station road, Dec 1993, *Bean* 7186 (BRI,MEL,NSW); Springbrook, Macpherson Range, Jan 1916, *White* s.n. (BRI); near O'Reilleys Guest House, Lamington Plateau, Jan 1990, *Bean* 1313 (BRI). **New South Wales.** NORTH COAST: summit of Mt Nardi, NE of Nimbin, Oct 1994, *Bean* 7960 (BRI,K,L,MEL,MO,NSW); Brummies Lookout, SE of Tyalgum, Jul 1993, *Bean* 6218 (BRI); Tungun road, Whian Whian S.F., N of Lismore, Sep 1994, *Bean* 7926 (BRI); Gibraltar Range, 42 mls [67 km] NE of Glen Innes, Nov 1970, *Williams* s.n. (NE); about 6 mls [10 km] along Douglas R. Road about 48 mls [77km] W of Wingham, Oct 1951, *Garden* s.n. (NSW); Tinebank Preserve, Mt Boss SF, c. 32 km NNW of Wauchope, Nov




**Map 2.** Distribution of *Rubus nebulosus*.

1980, *Coveny* 10856 (K n.v.,NSW); Myall River SF, 5 mls [8 km] W of Bulahdelah, Oct 1956, *Constable* s.n. (NSW). NORTHERN TABLELANDS: Carters Brush Trail, W base of Mt Paterson, Barrington Tops NP, May 1986, *Rodd* 5533 *et al.* (NSW); N part of Carabeen Walking track, Werrikimbee N.P., Oct 1991, *Hosking* 398 (NSW). CENTRAL COAST: Gosford, Nov 1897, *Boorman* s.n. (NSW); Brisbane Water, s.d., *Moore* s.n. (MEL); Otford, Oct 1897, *Camfield* s.n. (NSW); Minnamurra Falls Reserve, 3 mls [5 km] W of Jamberoo, Feb 1959, *Constable* s.n. (NSW); Whispering Gallery, 5 km SE of Albion Park, Nov 1977, *Coveny* 9777 (NSW). CENTRAL TABLELANDS: Robertson Nature Reserve, May 1978, *Coveny* 10176 & Griffiths (NSW); Burrawang, Nov 1888, *Fletcher* s.n. (NSW). SOUTH COAST: Milton, Dec 1902, *Cambage* s.n. (NSW); 1.5 km W of Termeil, 35°29'S 150°19'E, Nov 1988, *Telford* 10749 (BISH n.v.,CBG n.v.,MEL); Pebbly Beach, between Kioloa and Durras Water, Sep 1960, *Johnson & Constable* s.n. (NSW).

***Distribution and habitat*:** *Rubus nebulosus* has a broad distribution mainly in New South Wales. It extends from Springbrook and Lamington National Park in the extreme south-east of Queensland to near Batemans Bay on the south coast of New South Wales (**Map 2**). *R. nebulosus* grows in subtropical or warm-temperate notophyll rainforest or tall eucalypt forest adjacent to rainforest, in high rainfall areas near the coast. Commonly associated species include *Caldcluvia paniculosa* (F.Muell.) Hoogland, *Doryphora sassafras* Endl., *Ceratopetalum apetalum* D.Don and *Cyathea leichhardtiana* (F.Muell.) Copel. In the northern parts of its range, it is confined to altitudes above c. 500 metres, but further south it approaches sea-level.

***Phenology*:** Flowers have been recorded from August to January; fruits from November to February.

***Affinities*:** *R. nebulosus* is perhaps closest to *R. royenii* Kalkman var. *royenii*, a New Guinea taxon, but differs by its narrower leaflets, presence of domatia, 1 or 2 inflorescences per leaf axil (2–5 for *R. royenii* var. *royenii*), much larger petals, and the greater number of stamens and styles per flower.

***Note*:** While *R. nebulosus* and *R. moorei* sometimes grow in close proximity to each other, hybrids between the species are not known. Field observations are that *R. moorei* flowers about one month earlier than associated plants of *R. nebulosus*.

***Conservation Status*:** Although *R. nebulosus* is rare in Queensland, it is widespread in New South Wales and present in several conservation reserves. Hence no conservation coding is recommended.

***Etymology*:** The specific epithet is derived from Latin *nebulosus*, meaning misty, in reference to the habitat occupied by this species, which is often enshrouded in cloud and mist.

## Excluded Name

*Rubus australis* G.Forst., Fl. ins. austr. p. 40 (1786).

*R. australis* was recorded for Australia without reference by Gray (1856), and the name subsequently duly included by Chapman (1991). However, this record is clearly erroneous as *R. australis* is considered endemic to New Zealand, and the name is thus not applicable in Australia.

## Acknowledgements

I am grateful to the Directors of NSW, NE and MEL for the loan of specimens and/or access to their collections, to Laurie Jessup for finding and photographing types while Australian Botanical Liason Officer at Kew, Peter Bostock for the Latin diagnosis, Will Smith for the illustrations, and Gordon Guymer for helpful comments on a draft of this paper.

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# *Sankowskya*, a new genus of Euphorbiaceae (Dissiliariinae) from the Australian Wet Tropics

**Paul I. Forster**

**Summary**

Forster, Paul I. (1995). *Sankowskya*, a new genus of Euphorbiaceae (Dissiliariinae) from the Australian Wet Tropics. *Austrobaileya* 4(3): 329–335. *Sankowskya*, a new genus of subtribe Dissiliariinae in the Euphorbiaceae is described. The genus is monotypic with the highly endangered *S. stipularis* sp. nov. endemic to the 'Wet Tropics' of north-east Queensland. *Sankowskya* is compared to other genera in the Dissiliarinae and a key to genera in the subtribe is provided.

Key words: Euphorbiaceae; *Sankowskya* - Australia; *Sankowskya stipularis*.

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## Introduction

In 1989, Garry Sankowsky of Tolga in north-east Queensland discovered and collected material of a species of Euphorbiaceae from the Rex Range estate between Julatten and Mossman in the 'Wet Tropics' of north-east Queensland. Specimens of this plant were filed in herbaria at Atherton and Brisbane as an undescribed species of *Dissiliaria* and have been referred to as such in a number of publications (Thomas & McDonald 1989; Werren 1992; Christophel & Hyland 1993; Hyland & Whiffin 1993; Forster 1994).

This species does not belong in *Dissiliaria* as there are some important differences in floral and seed morphology that preclude its inclusion in that genus. The new species clearly belongs to the Euphorbiaceae subfamily Oldfieldioideae, tribe Caletieae, subtribe Dissiliariinae (sensu Webster 1994), the members of which are found in Australia, Malesia and Melanesia. It is not referable to any of the other genera presently included in the subtribe (**Table 1**). The species is unique in the Dissiliariinae in its large and conspicuous stipules and female flowers with 3 sepals and strongly rugose-papillose styles. It is perhaps most closely allied to the New Caledonian *Longetia* Baill. as it shares the characteristic of smooth pollen as found in that genus (McPherson & Tirel 1987; Punt 1987), but differs most noticeably from that genus in the very large and conspicuous stipules, the female flowers with 3 sepals and linear in outline styles, and the hairy receptacle of the male flower. In this paper, a new genus, *Sankowskya* is established to accomodate this species, here named *S. stipularis*.

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## Materials and Methods

This account of *S. stipularis* is primarily based on herbarium holdings at BRI and QRS, there being no specimens to my knowledge currently held in other Australian herbaria, and field observations and collections by the author.

### *Terminology*

Indumentum cover is described using the terminology of Hewson (1988), except that 'scattered' is preferred to 'isolated'.

Rainforest typology follows Webb (1978). The 'Wet Tropics' is defined as that part of north-eastern Queensland that encompasses the 'hot, humid vine forests' from near Cooktown in the north to Paluma in the south (Webb & Tracey 1981; Barlow & Hyland 1988).

## Taxonomy

**Sankowskya** P.I. Forst., **gen. nov.** (Euphorbiaceae: Dissiliariinae). Arbor parva, monoecia, sempervirens.

Indumentum trichomatum simplicium multi-cellularium. Stipulae lineari-usque oblongi-lanceolatae, magnae et conspicuae, demum deciduae. Folia opposita, petiolata, margine crenato, elobata, penninervia. Inflorescentiae axillares, cymosae, bracteatae, plerumque monoeciae. Flores feminei pedicellati; sepala 3, imbricata; petala nulla; discus nullus; ovarium 3-loculatum, loculis biovulatis; styli 3, lineari, adaxialiter valde papillosi-rugosi, erecti, liberi. Flores masculini pedicellati; sepala 2 + 2, imbricata; petala nulla; discus nullus; receptaculum convexum; stamina 12-15, filamentis filiformibus; anthera thecis distinctis, oblongis longitudinaliter dehiscentibus; pollinis grana laevia; pistillodia nulla. Fructus capsulares, 3-loculati, ovoidei, dehiscentes; semina obloidea, caruncula praesenti. Genus unicum in sub-tribe Dissiliariinis propter stipulas magnas conspicuas, flores femineos sepalis 3 et stylis valde papillosi-rugosis.

**Typus:** *Sankowskya stipularis* P.I. Forst.

Small trees, monoecious, evergreen, perennial; stems and foliage without conspicuous latex. Indumentum of simple, never glandular, multicellular trichomes, stinging hairs absent. Stipules linear-lanceolate to lanceolate-oblong, large and conspicuous, deciduous. Leaves opposite, petiolate; lamina elobate, penninerved with margins crenate, eglandular. Inflorescences axillary, racemose, solitary, uni- or bisexual with the female flowers towards the apex, and flowers in bracteate clusters. Female flowers pedicellate; sepals 3, imbricate; petals absent; disk absent; pistillodes absent; ovary 3-locular with loculi biovulate; styles 3, linear in outline, strongly papillose-rugose on upper surface, erect, free. Male flowers pedicellate; sepals 2+2, imbricate; petals absent; disk absent; receptacle convex; stamens 12-15 with filaments filiform; anthers dorsifixed, bilobate with thecae oblong and longitudinally dehiscent; pistillodes absent; pollen smooth. Fruit capsular, trilocular, ovoid, smooth, dehiscent; seeds globose; testa crustaceous; albumen fleshy; caruncle rounded, entire, non-arilloid.

Unique in the Dissiliariinae because of the large and conspicuous stipules and the female flowers with 3 sepals and strongly rugose-papillose styles.

A monotypic genus endemic to Australia.

***Etymology***: Named for Garry Sankowsky of Tolga, an avid plantsman, discoverer and collector of this plant and many others new to science.

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**Key to genera of subtribe Dissiliariinae**

1. Plants dioecious ..... 2
   Plants monoecious ..... 4

2. Male flowers without pistillodes; seeds semi-elliptic in outline, laterally compressed ..... **Dissiliaria** F.Muell. ex Baill.
   Male flowers with pistillodes; seeds globose or ovoid, not laterally compressed ..... 3

3. Styles linear in outline; fruit subglobose, strongly tricoccous with style remnants widely separated ..... **Choriceras** Baill.
   Styles cordate-ovate in outline; fruit globose, style remnants in close proximity ..... 4

4. Ovary 3 or 4-locular; seeds with arilloid caruncle ..... **Austrobuxus** Miq.
   Ovary 2-locular; seeds ecarunculate ..... **Canaca** Guillaumin

5. Stipules very large and conspicuous (> 8 mm long); female flowers with 3 sepals; receptacle in male flower glabrous ..... **Sankowskya** P.I.Forst.
   Stipules small and inconspicuous (< 8 mm long) or absent; female flowers with 2+2 or 3+3 sepals; receptacle in male flower hairy ..... **6**

6. All flowers with glandular disk; styles linear in outline; stamens > 45; pollen spiny ..... **Whyanbeelia** Airy Shaw & B.Hyland
   All flowers without glandular disk; styles cordate-ovate in outline;stamens < 45; pollen smooth ..... **Longetia** Baill. ex Muell.Arg.

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**Sankowskya stipularis** P.I.Forst., **sp. nov.** Arbor usque 15 m alta. Indumentum incolor usque flavum. Truncus rectus sine striis vel anteridibus, usque 10 cm diam.; cortex laevis, non notabilis, pagina incisa pallidi-roseola. Ramuli plus minusve rotundati, trichomatibus sparsis, glabrescentes. Stipulae 9-35 mm longae, 1–4.4 mm latae, glabrae. Folia ubi novella rubra usque roseola, ubi matura atrovirentia atrovirentia plus minusve concolora; petiolus 4–6 mm longus, c. 1 mm diam., glaber vel trichomatibus sparsis caducis; lamina lanceolata usque elliptica, 50–180 mm longa, 15–65 mm lata, coriacea, margine leniter crenato dentibus 23–30 in quoque latere; venis abaxialiter prominens et adaxialiter obscura, venis utroque costae 7–10, venis secundariis reticulatis; apex breviter acuminatus usque longi-acuminatus; basis cordata vel obtusa vel leniter auriculata. Inflorescentiae femineae 1- vel 2-florae in foliorum axillis distalibus; pedunculus obsoletus; bracteae triangulares, c. 1 mm longae, 0.7 mm latae. Flores feminei pedicello 3–8 mm longo et 1 mm diam. glabro vel trichomatibus sparsis; sepala lanceolata, 1.5–3 mm longa, 1–1.6 mm lata, glabra; ovaria 1.1–1.3 mm diam., trichomatibus densis; styli 8–10 mm longi, 0.5–1 mm lati, base vix connati, erecti, distaliter valde papillosi-rugosis et trichomatibus simplicibus sparsis. Inflorescentiae masculinae in foliorum axillis distalibus, ad femineas vel discretae, singulares vel geminae in quoque axe, glomeratae florum multorum; pedunculus plus minusve obsoletus; bracteae ovati-triangulares, 0.6–1.5 mm longae, 0.3–1 mm latae, trichomatibus sparsis. Flores masculini pedicello 3–6 mm longo et 0.2–0.5 mm diam., glabro; sepala obovata usque ovata, 1.3–2.2 mm longa et lata, glabra; filamenta 1–1.5 mm longa; antherae 0.7–1.3 mm longae, c. 0.8 mm latae. Fructus pedicello 8–9 mm longo, capsularis, 9–12 mm longus, 10–11 mm diam., stylorum basibus persistentibus et distaliter leviter liberis; semina c. 8 mm longa, 5 mm lata, 2.5–3 mm profunda, laevia, pallidi-brunnea, caruncula c. 1 mm diam. **Typus: Queensland.** Cook District: Devil Devil Creek road, Rex Range estate, 16°33'S, 145°23'E, 14 Dec 1993, *P.I. Forster* 14473 (holo: BRI [3 sheets + spirit]; iso: A, K, L, MEL, QRS distribuendi).

*Dissiliaria* sp. RFK/25730 (Christophel & Hyland 1993: 102g; Hyland & Whiffin 1993, 2: 132).

*Dissiliaria* sp. (Rex Range G.Sankkowsky 1075); Forster (1994:110).

***Illustration*:** Christophel & Hyland (1993: 102g).

Small tree to 15 m high. Indumentum colourless to yellowish. Trunk straight with no fluting or buttressing, diameter at breast height up to 10 cm; bark smooth, nondescript, white; blaze pale-pink. Branchlets ± rounded, with scattered to sparse trichomes, glabrescent. Stipules linear-lanceolate or rarely lanceolate-oblong, 9–35 mm long, 1–4.4 mm wide, glabrous. Leaves bright red to pink when expanding, dark green and ± concolorous when mature; petioles 4–6 mm long, c. 1 mm diameter, glabrous or with scattered trichomes, glabrescent; laminas lanceolate to elliptic, 50–180 mm long, 15–65 mm wide, coriaceous, with margins weakly

**Table 1.** Comparison of morphological characters for genera in the subtribe Dissiliariinae. Abbreviations: *Aust.* (= *Austrobuxus*), *Cana.* (= *Canaca*), *Chor.* (= *Choriceras*), *Diss.* (= *Dissiliaria*), *Long.* (= *Longetia*), *Sank.* (= *Sankowskya*), *Whya* (= *Whyanbeelia*).

| | *Aust.* | *Cana.* | *Chor.* | *Diss.* | *Long.* | *Sank.* | *Whya.* |
|---|---|---|---|---|---|---|---|
| **1.** plant sexuality dioecious (D) monoecious (M) | D | D | D | D | M | M | M |
| **2.** stipules absent (A) small (S) large (L) | AS | A | S | SL | A | L | A |
| *Female Flowers* | | | | | | | |
| **3.** sepal no. | 2+2, 3+3 | 2+2 | 3+3 | 3+3 | 3+3 | 3 | 3+3 |
| **4.** glandular disk present (+)absent (-) | + or - | ? | - | + | - | - | + |
| **5.** styles cordate-ovate (+) linear (-) | + | + | - | - | + | - | - |
| **6.** fruit shape globose (G) subglobose (S) ovoid (O) | G | G | S | G | G | O | G |
| **7.** seed globose to ovoid (-) laterally compressed (+) | - | - | - | + | - | - | + |
| **8.** caruncle present (+) absent (-) arilloid(*) entire (#) | +* | - | - | +# | +# | +# | +# |
| *Male flowers* | | | | | | | |
| **9.** sepal no. | 4–6 | 4 | 4–6 | 4–6 | 6 | 4 | 6 |
| **10.** receptacle glabrous (G) hairy (H) | G or H | H | H | H | H | G | H |
| **11.** glandular disk present (+)absent (-) | - | - | - | - | - | - | + |
| **12.** stamens | 8–27 | 18–26 | 4–6 | 15–20 | 9–17 | 12–15 | 50–55 |
| **13.** anthers globose (G) oblong (O) | O | O | G | O | O | O | O |
| **14.** pollen spiny (+) smooth (-) | + | + | - | + | - | - | + |
| **15.** pistillodes present (+) absent (-) | - | - | + | - | + | - | - |

crenate with 23 to 30 small teeth per side of midrib; venation obscure above and prominent below, composed of 7 to 10 lateral veins per side of the midrib and with interlateral veins reticulate; tip short to long acuminate; base cordate, weakly auriculate or obtuse. Inflorescences uni- or bisexual. Female inflorescences with 1 or 2 flowers in distal axils; peduncles obsolete; bracts triangular, c. 1 mm long and 0.7 mm wide. Female flowers with pedicels 3–8 mm long and c. 1 mm diameter, glabrous or with scattered trichomes; sepals lanceolate, 1.5–3 mm long, 1–1.6 mm wide, glabrous; ovaries 1.1–1.3 mm diameter, with dense trichomes; styles 8–10 mm long, 0.5–1 mm wide, barely connate at base, held erect, with upper parts strongly rugose-papillose and with scattered simple hairs. Male inflorescences in distal axils, either in close proximity to female inflorescences or by themselves, single or often paired in each axil, each inflorescence composed of a glomerule of many flowers; peduncles ± obsolete; bracts ovate-triangular, 0.6–1.5 mm long, 0.3–1 mm wide, with scattered trichomes. Male flowers with pedicels 3–6 mm long, 0.2–0.5 mm diameter, glabrous; sepals obovate to ovate, 1.3–2.2 mm long, 1.3–2.2 mm wide, glabrous; stamens 12–15; filaments 1–1.5 mm long; anthers 0.7–1.3 mm long, c. 0.8 mm wide. Fruit with pedicels 8–9 mm long, capsular, 9–12 mm long, 10–11 mm diameter, with bases of styles which become slightly divergent distally persisting; seeds c. 8 mm long, 5 mm wide, 2.5–3 mm deep, smooth, pale brown and with a caruncle c. 1 mm diameter. **Fig. 1.**

***Specimens examined*: Queensland.** Cook District: [all from type locality] Jun 1989, *Sankowsky* 901 (QRS), Jul 1989, *Sankowsky* 1008 (QRS), Jul 1989, *Sankowsky* 1075 (BRI), Dec 1989, *Hyland* 13894 (QRS), Dec 1989, *Hyland* 13893 (BRI, QRS), Jan 1990, *Hyland* 13933 (QRS), Jan 1990, *Sankowsky* 1027 (BRI, QRS), Jul 1991, *Sankowsky* 1227 & *Sankowsky* (BRI), Mar 1991, *Sankowsky* 1249 & *Sankowsky* (BRI, DNA, QRS), Jul 1993, *Forster* 13673 *et al.* (BRI, MEL, QRS).

***Distribution and habitat*:** *Sankowskya stipularis* is known only from private land near Rex Range on the road between Julatten and Mossman in north-eastern Queensland. Plants grow in evergreen mesophyll vineforest in swampy conditions in association with other moisture requiring plants such as *Licuala ramsayi* (F.Muell.) Domin.

***Notes*:** Either this species, another species of *Sankowskya* or a species of *Longetia* may once have been more widespread in Australia in previous times, as fossil pollen of the 'Longetia' type has been recovered from Tertiary deposits in southern New South Wales (Martin 1974).

***Phenology*:** Flowers and fruits are borne throughout the year, but flowering is probably more prolific from November to January.

***Conservation status*:** The known population of this restricted endemic is seriously endangered due to residential development of the Rex Range locality. A management plan is urgently required for this species and interventionist action has been recommended (Werren 1992). A conservation coding of 2E is recommended (cf. Briggs & Leigh 1988; Thomas & McDonald 1989; Forster 1994).

***Etymology*:** The specific epithet is derived from the Latin *stipularis* (pertaining to stipules) and alludes to the very large stipules of this plant when compared to those of most other Australian Euphorbiaceae.

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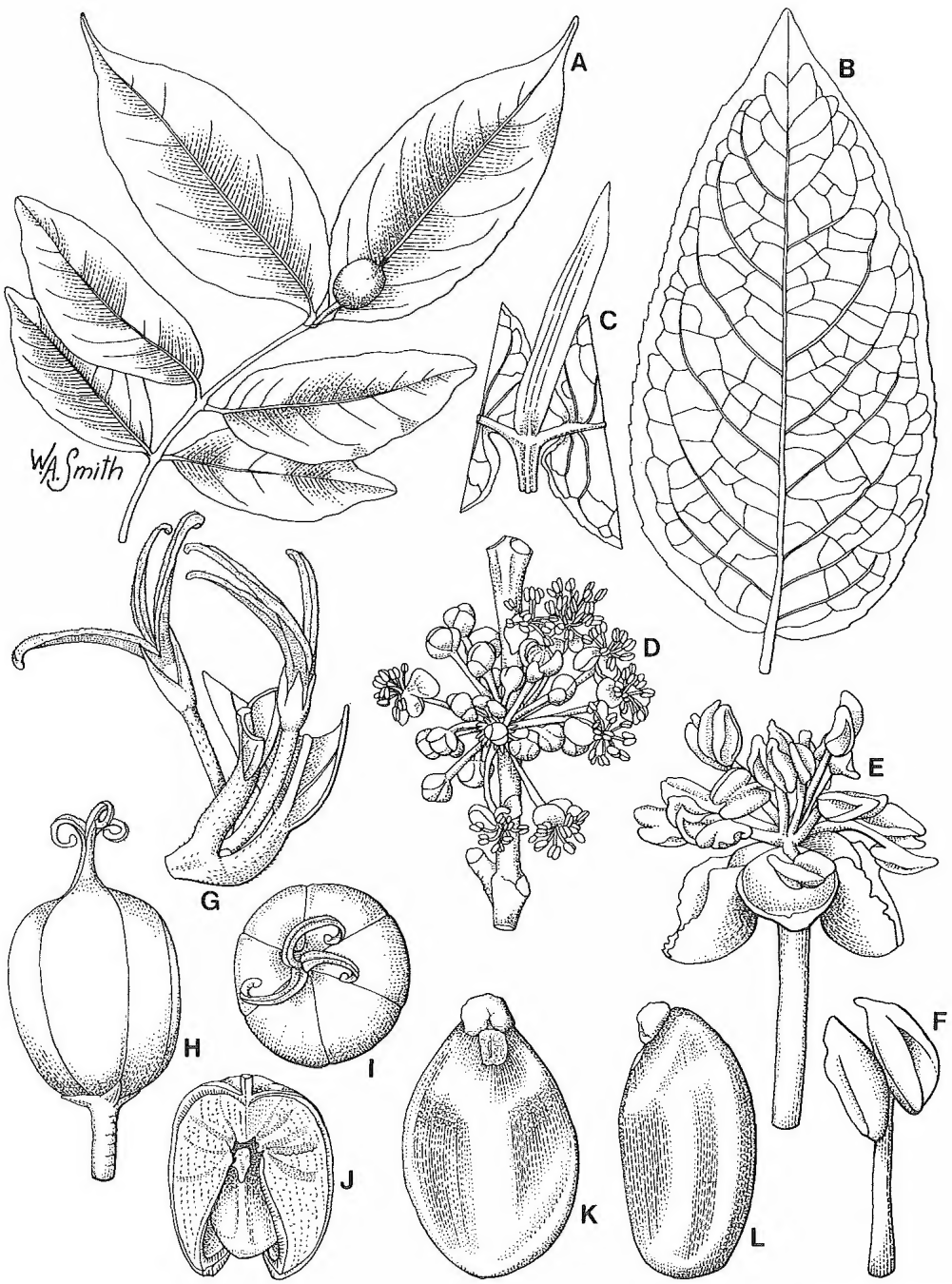


**Fig. 1.** *Sankowskya stipularis*. A. fruiting branchlet × 0.5. B. adaxial leaf surface showing venation × 0.8. C. base of leaf pair with interfoliar stipule × 1. D. male only inflorescence × 2. E. male flower × 4. F. stamen × 18. G. female only inflorescence × 2. H. lateral view of fruit × 2. I. apical view of fruit × 2. J. single bivalved coccus of fruit × 2. K. seed, adaxial view × 4. L. seed, lateral view × 4. A, H, I from Forster 13673 (BRI); B from Hyland 13893 (BRI); C from Sankowsky 1075 (BRI); D, E, F from Forster 14473 (BRI); J, K, L from Hyland 13933 (QRS). Del. W. Smith.

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# A Revision of *Syncarpia* Ten. (Myrtaceae)

**A.R. Bean**

**Summary**

Bean, A.R. (1995). A Revision of *Syncarpia* Ten. (Myrtaceae). *Austrobaileya* 4(3): 337–344. The endemic Australian genus *Syncarpia* is revised, resulting in the recognition of four taxa, namely *S. glomulifera* (Sm.) Nied. subsp. *glomulifera*, *S. glomulifera* subsp. *glabra* (Benth.) A.R.Bean comb. et stat. nov., *S. hillii* F.M.Bailey, and *S. verecunda* A.R.Bean sp. nov. Each species is described and a distribution map provided for it. *S. verecunda* is illustrated. A key to the species is presented.

Keywords: Myrtaceae, *Syncarpia*, *Syncarpia verecunda*, *Syncarpia glomulifera* subsp. *glabra*.

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## Introduction

*Syncarpia* Ten. is a small genus in the family Myrtaceae, subfamily Leptospermoideae. It is characterised within the family by its inflorescences comprising seven flowers fused at their bases, free stamens in continuous whorls, capsular fruits and leaves in pseudo-whorls of four.

*Syncarpia* was placed in the *Metrosideros* alliance and *Lophostemon* suballiance by Briggs and Johnson (1979). It is closely related to *Lophostemon* Schott and *Welchiodendron* Peter G.Wilson & J.T.Waterh. These three genera are alike in the arrangement of oil ducts in the petiole (Welch 1923), opposite juvenile phyllotaxis and the predominant occurrence of obvolute cotyledons in the embryo (Wilson & Waterhouse 1982). Both *Syncarpia* and *Lophostemon* have capsular fruits and can have leaves in pseudo-whorls, but the flowers of *Lophostemon* are not fused, and its stamens are grouped into five fascicles.

*Syncarpia* is endemic to eastern Australia. Its species are trees prized for their timber, especially because of its resistance to marine borers (Boland et al., 1984).

*Syncarpia glomulifera* (Sm.) Nied., the most widespread and first discovered species of the genus, has had a somewhat complex nomenclatural history.

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Soon after the first European settlement of Australia at Port Jackson (now Sydney) in 1788, specimens of plants growing in the area were sent to England to be grown and classified. One of these, a tall tree soon to be called "Turpentine" by the colonists, was named *Metrosideros glomulifera* by the eminent botanist J.E. Smith in 1797. The same species was named *Tristania albens* by A. P. De Candolle in 1828. In 1839, Italian botanist, Michele Tenore decided to erect a new genus, *Syncarpia*, for the Turpentine tree, which he named *Syncarpia laurifolia*. Two years later, Nees von Esenbeck created the genus *Kamptzia*, based on De Candolle's species, which he named *Kamptzia albens*. Bentham (1867) took up the name *Syncarpia laurifolia* for this species, and placed *Kamptzia albens* in synonymy. It was not until 1893 that the combination *Syncarpia glomulifera* was made, by Niedenzu, for the Turpentine.

Bailey (1885) described a second species in this genus, which he called *S. hillii*, based on specimens he received from Fraser Island in Queensland.

The third species belonging to this genus, described in this paper as *S. verecunda*, has been recognised as a distinct taxon in the Queensland Herbarium for some years, although some specimens of it were determined as *S. hillii*.

*Syncarpia* species are cultivated outside Australia. For example, Ashton (1981) reports

both *S. glomulifera* and *S. hillii* in cultivation in Sri Lanka, and *S. glomulifera* is cultivated in Fiji according to Smith (1985).

## Taxonomy

**Syncarpia** Ten., Ind. Sem. Hort. Bot. Neap. 12 (1839); *Metrosideros* sect. *Syncarpia* (Ten.) Baill., Hist. pl. 6: 365–6 (1877); *Metrosideros* sect. *Sarcynpia* Baill., Hist. pl. 6: 365–6 (1877), nom. illeg.; *Nania* sect. *Syncarpia* (Ten.) Kuntze in Post & Kuntze, Lex. gen. phan. 382 (1904). **Type:** *Syncarpia laurifolia* Ten. (= *S. glomulifera* (Sm.) Nied.).

*Kamptzia* Nees, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 18: 9 (1841); Metrosideros sect. *Kamptzia* (Nees) Baill., Hist. pl. 6: 365–6 (1877). **Type:** *Kamptzia albens* (DC.) Nees.

***Derivation of name*:** from the Greek *syn*, together and *karpos*, fruit, in reference to the fused capsules found in all species.

Trees, rarely shrubby, up to 60m high, straight-trunked, with primary branching angle at or near 90 degrees to trunk; bark fibrous, deeply furrowed, grey on surface, brown below. Branchlets and petioles exuding a red resin when cut. Cotyledons elliptical. Seedlings with lignotubers. Seedling stems hairy; cotyledons elliptical; seedling leaves opposite, ovate to elliptical, hairy. Adult leaves opposite but forming pseudo-whorls of 4 leaves near the ends of branchlets, hairy or glabrous, venation penninerved, reticulate, oil glands present. Branchlets with terminal buds covered by scales; scales deciduous after expansion of new shoots. Inflorescences comprising axillary, 7-flowered (or fewer by abortion) dichasia, flowers sessile and connate at base. Bracts 2 per inflorescence, almost completely enclosing the very young inflorescence, persistent, becoming partially fused to the base of the compound fruit. Calyx lobes 4 or 5, small and broad, persistent. Petals 4 or 5, orbicular, white, caducous. Stamens numerous, in 2(3) whorls on the staminophore, free; filaments terete, white; anthers versatile, dorsifixed, dehiscing by longitudinal slits, connective gland terminal, much smaller than anthers. Ovary inferior, 3-locular, rarely 4-locular; placenta small, ellipsoidal, basal; ovules >30 per loculus, lateral to ascending; style filiform, glabrous; stigma small. Fruit capsular, fruiting hypanthia connate forming a woody, compound fruit. Valve margins pubescent. Seeds straight or slightly curved, narrowly-cuneate, angular, brown, minutely reticulate; hilum terminal. Trichomes, when present on leaves, stems and inflorescences; simple, non-glandular, appressed or spreading.

3 species all endemic to Australia.

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### Key to species of Syncarpia

1. Petioles 14–31 mm long; flowering hypanthia glabrous ..... **2**
   Petioles 7–14 mm long; flowering hypanthia sericeus ..... **S. glomulifera**

2. Coppice growth hairy; floral bracts 2–3 × 3–4 mm; intramarginal vein well developed; petals glabrous on abaxial surface ..... **S. hillii**
   Coppice growth glabrous; floral bracts 3–4 × 1.5–2.5 mm; intramarginal vein absent, petals hairy on abaxial surface ..... **S. verecunda**

**1. Syncarpia glomulifera** (Sm.) Nied., in Engl. & Prantl, Nat. Pflanzenfam. III.(7): 88 (1893); *Metrosideros glomulifera* Sm., Trans. Linn. Soc. London 3: 269 (1797); *Nania glomulifera* (Sm.) Kuntze, Revis. gen. pl. 1: 242 (1891). **Type:** New South Wales. Port Jackson, in 1791, *D. Burton* s.n. (holo: LINN n.v., microfiche BRI!)

*Tristania albens* DC., Prodr. 3: 210 (1828); *Kamptzia albens* (DC.) Nees, Nov. Actorum Caes. Leop.-Carol. Nat. Cur. 18: 9 (1841). **Type:** 'Caet. ign. v.s. folium a cl. Otto missum' (holo: G-DC n.v., microfiche BRI!).

*Syncarpia laurifolia* Ten., Index Seminum in Horto Botanico Neapolitano Collectorum (1839). **Type:** culta in horto Regio Neapolitano (holo: NAP n.v., photo at BRI!).

***Illustrations*:** Clemson, Honey and Pollen Flora p. 112 (1985); Williams, Native Pl. Queensl. 2: 277 (1984); Boland et al., Forest Trees of Austral. 4th ed., p. 575 (1984).

Tree varying in height from 3m on very exposed mountain sites to 60m in fertile well-watered valleys. Bark stringy, persistent and furrowed, grey outside, brown below. Seedlings with cotyledons 4–4.5 × 7 mm; seedling leaves ovate, c. 37 × 20 mm, with apex acute and base cuneate, discolorous. Coppice leaves densely covered by short (<1 mm long) hairs; adult leaves ovate to narrowly-ovate, 5–10 × 1.8–4.0 cm, with apex acute or obtuse; upper surface dull green, glabrous; lower surface usually white-hairy; intramarginal vein absent or poorly developed; petioles 7–14 mm long, more or less terete. Foliar scales lanceolate, 4–11 × 1.5–3 mm, obtuse, sparsely hairy. Inflorescence pubescent; peduncles 14–32 mm long; bracts persistent, ovate, 3–4.5 × 2–2.5 mm, densely hairy, apex acute. Hypanthia smooth, hairy, cylindrical to ovoid, fused at their bases. Calyx lobes 4(5), persistent, triangular, 1.5–2.2 mm long, obtuse. Petals 5, ovate to orbicular, 2.5–3.5 × 2.5–3 mm, white, pubescent on both surfaces. Stamens numerous, inflexed in bud; filaments terete, 5-8 mm long; connective gland obscure. Style terete, not expanded, 5–9 mm long; stigma irregularly lobed. Surface of the ovary-top pubescent; ovary 3(4)-locular, with numerous ovules per loculus. Compound fruit globose to depressed-globose, 8–13 × 10–20 mm; seeds 1.5-2.5 mm long.

***Flowering period*:** Flowering occurs between September and December.

***Note*:** Bentham (1867) records 6–10 flowers per inflorescence for this species. While 6-flowered inflorescences can be found (where one flower of the inflorescence has not developed), I have been unable to find any inflorescences bearing more than 7 flowers. It is possible that a 10-flowered cluster could result if two adjacent 7-flowered inflorescences were fused.

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Two subspecies are recognisable as follows:

Leaves and branchlets glabrous; fruiting hypanthia glabrescent ..... subsp. **glabra**
Leaves and branchlets hairy; fruiting hypanthia remaining hairy ..... subsp. **glomulifera**

**Syncarpia glomulifera** subsp. **glabra** (Benth.) A.R.Bean **comb. et stat. nov.**

*Syncarpia laurifolia* var. *glabra* Benth., Fl. Austral. 3: 266 (1867); *Metrosideros glomulifera* var. *glabra* (Benth.) C.Moore & Betche, Handb. Fl. New South Wales (1893); *Syncarpia procera* var. *glabra* (Benth.) Domin, Biblioth. Bot. 89: 472 (1928). **Type:** New South Wales. NORTH COAST: Hastings River, *Dr Beckler* (holo: MEL!; iso: K n.v., photo at BRI!).

Leaf abaxial surface and stems glabrous on juvenile and mature plants; fruiting hypanthia glabrescent.

***Specimens examined*: New South Wales.** NORTH COAST: Middle Brother SF, north-east of Taree, Apr 1994, *Bean* 7647 (BRI,NSW); Flat Rock Lookout, Lansdowne SF, Dec 1991, *Stockard* s.n. (NSW); Newbys Lookout, Lansdowne SF, Apr 1994, *Bean* 7653 (BRI, MEL,NSW); Upper Williams River, Aug 1935, *Rodway* s.n. (NSW).

***Distribution and habitat*:** This subspecies is confined to the coastal hills of north-eastern

New South Wales, from about Kempsey to Bulahdelah (**Map 2**). It occurs as a minor component of open forest or tall open forest usually dominated by *Eucalyptus pilularis* Sm. In this region, *S. glomulifera* subsp. *glomulifera* is apparently absent.

***Conservation status*:** *S. glomulifera* subsp. *glabra* is quite common over its range and is not currently under threat.

**Syncarpia glomulifera** subsp. **glomulifera**

Leaf abaxial surface and stems hairy on juvenile and mature plants; hairs persisting on fruiting hypanthia.

***Selected specimens*: Queensland.** Cook District: Shiptons Flat, Sep 1948, *Brass* 20195 (BRI); 13.3 km from Bloomfield Mission road on China Camp road, Aug 1986, *Hill* 1973 et al. (BRI,NSW). North Kennedy District: Diddleluma Creek, west of the Ravenshoe-Kaban road, Oct 1980, *Clarkson* 2668 (BRI,K,QRS); Saddle Mtn, Bowling Green Bay NP, south of Townsville, Aug 1991, *Bean* 3627 (BRI,L,MEL,NSW); Mt Bohle, 37 km SW of Charters Towers, Sep 1991, *Thompson* 257 & *Dillewaard* (BRI,CANB,NSW). Port Curtis District: Maryvale, between Byfield and Yeppoon, Sep 1931, *White* 8189 (BRI). Leichhardt District: Blackdown Tableland, Nov 1973, *Williams* 354 (BRI); Carnarvon NP, 60 mls [97 km] W of N from Injune, Jun 1965, *Trapnell & Williams* 104 (BRI). Wide Bay District: S of Haylocks road, Toolara SF near Gympie, Sep 1993, *Bean* 6486 (BRI). Moreton District: Jorl Court, S of Buderim, Mar 1993, *Bean* 5825 (BRI); Shipstern Range, Lamington NP, Dec 1943, *Blake* 15376 (BRI). **New South Wales.** North Coast: Kooyong, between Ardilly and Tullymorgan, Feb 1985, *Forbes* 2808 (BRI,MEL,MO,NSW); Diamond Head, S of Port Macquarie, Feb 1969, *Blaxell* 195 (NSW). Central Coast: Kurrajong at junction of Bells Line of Road and road to 'Spring Grove', Sep 1985, *Coveny* 12136 & *Makinson* (A,CANB, K,L,NSW); Beecroft, Sydney, Sep 1972, *Lebler* s.n. (BRI); Wheeney Creek, Wollemi NP, Oct 1991, *Coveny* 15874 & *Hind* (BRI,CBG, K,L,MEL). Central Tablelands: east end of Mt Solitary, 5 mls [8 km] S of Katoomba, Nov 1960, *Constable* s.n. (NSW). South Coast: Huskisson, Jervis Bay, Oct 1928, *Rodway* s.n. (NSW); Ulladulla, Oct 1957, *McGillivray* 661 (NSW).

***Distribution and habitat*:** *S. glomulifera* subsp. *glomulifera* has a large latitudinal range along the east coast of Australia, from just south of Cooktown in Queensland to Batemans Bay in New South Wales. The distribution is not continuous, with the most notable disjunction being between Shoalwater Bay (near Rockhampton) and Mt Elliot (near Townsville). (**Map 2**). This subspecies typically occurs as a component of tall eucalypt forest, often on the edge of rainforest, in association with species such as *Eucalyptus citriodora* Hook., *E. intermedia* R.T.Baker, *Casuarina torulosa* Aiton and *C. littoralis* Salisb. However, it will tolerate shallow, infertile soils and may be found on mountains as a small tree or shrub, with associated species such as stunted specimens of *Eucalyptus carnea* R.T.Baker and *E. exserta* F.Muell.

***Conservation status*:** A widespread and common taxon.

**2. Syncarpia verecunda** A.R.Bean **sp. nov.** affinis *S. glomuliferae* a qua florum hypanthiis glabris, petiolis longioribus, bracteis grandioribus, sepalis brevioribus differt. **Typus:** Queensland. Moreton District: Mt Maroon, SW of Rathdowney, 3 October 1993, *A.R. Bean* 6656 (holo: BRI; iso: CANB,K,MEL).

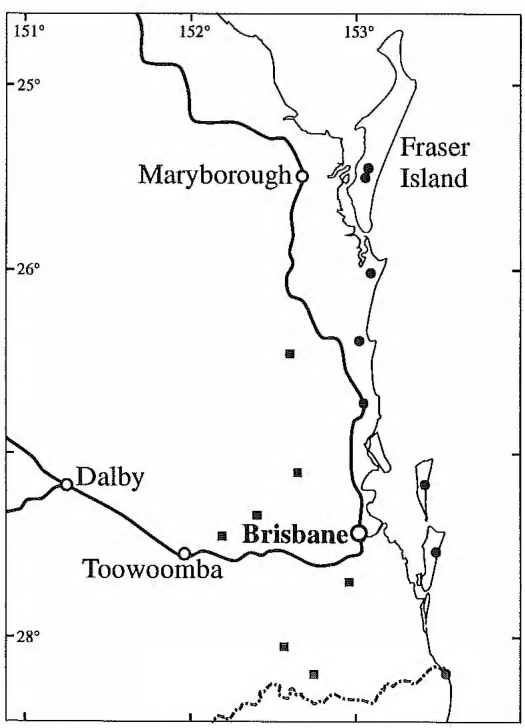
*Syncarpia* sp. (Ravensbourne J.A. Gresty 2053) in Henderson (1994)

Tree 10–25 m high. Bark fibrous or stringy, persistent and furrowed, grey outside, brown below. Seedlings with cotyledons 3.5–4.5 × 6–8 mm; seedling leaves ovate, 33–38 × 15–19 mm, apex acute to obtuse, base cuneate, discolorous. Coppice leaves glabrous, except for margins of very young leaves; adult leaves ovate, 7–10.5 × 2.8–4.6 cm, apex acute or acuminate, base cuneate, glabrous, discolorous; intramarginal vein absent; petioles 14–25 mm long, more or less terete. Foliar scales lanceolate, up to 22 × 4 mm, acuminate, glabrous. Inflorescence glabrous; peduncles 14–33 mm long; bracts persistent, ovate, 3–4 × 1.5–2.5 mm, glabrous, apex acute. Hypanthia smooth, glabrous, more or less cylindrical, fused at their bases. Calyx lobes 4, persistent, triangular, 1–1.5 mm long, acute, margins ciliate. Petals 4–5, rather irregularly arranged around rim of hypanthium, orbicular, 3–3.5 × 2.5–3 mm, with simple appressed hairs on both surfaces, margins ciliate, dendritic venation visible. Stamens very numerous, fully inflexed in bud; filaments terete, 5–8 mm long; connective gland terminal, inconspicuous. Style terete, 8–9 mm long; stigma slightly expanded, of smooth

appearance. Surface of the ovary-top glabrous, ovary 3-locular, with numerous ovules per loculus. Compound fruit globose to depressed-globose, 12–13 × 16–20 mm; seeds 1.5–3 mm long. **Fig. 1.**

***Specimens examined*: Queensland.** WIDE BAY DISTRICT: Ryans Creek road, west of Imbil, Apr 1993, *Bean* 5977 (BRI,K,L,MEL,NSW,QRS). MORETON DISTRICT: Dianas Bath area, 9km E of Somerset Dam, Oct 1993, *Forster* PIF 14049 & *Leiper* (BRI,MEL,NSW); Ravensbourne NP, Oct 1959, *Gresty* 2053 (BRI); northern slopes of Mt Maroon, May 1990, *Bean* 1603 (BRI,NSW); Mt Greville, 15.6 km SW of Boonah, Aug 1973, *Durrington* 739 & *Sharpe* (BRI); foot of Mt Barney, Mar 1936, *Michael* 2275 (BRI); Mt Ernest, SW of Rathdowney, Apr 1993, *Bean* 6026 (BRI,K,MEL).

***Distribution and habitat*:** *S. verecunda* has a rather restricted distribution in south-eastern Queensland, from west of Imbil to within a few kilometres of the New South Wales border at Mt Ernest, and is most common on the mountain peaks around Boonah. (**Map 1**). It inhabits hills and mountains composed of acid volcanic rocks. Soils are sandy, and often shallow. Associated species include *Eucalyptus acmenoides* Schauer,




**Map 1.** Distribution of *Syncarpia hillii* ● and *S. verecunda* ■.

*E. propinqua* H.Deane & Maiden and *E. dura* L.A.S.Johnson & K.D.Hill. *S. verecunda* and *S. glomulifera* subsp. *glomulifera* are allopatric, with *S. verecunda* occurring in the more westerly (inland) areas.

***Flowering period*:** Flowering occurs in October-November.

***Affinities*:** *S. verecunda* differs from *S. hillii* by its leaves which lack an intramarginal vein, glabrous coppice growth (hairy in *S. hillii*), petals hairy on both surfaces (adaxial surface only is hairy in *S. hillii*), bracts 3–4 × 1.5–2.5 mm (2–3 × 3–4 mm in *S. hillii*), and its mostly smaller leaves and fruits.

*S. verecunda* differs from *S. glomulifera* by its glabrous floral hypanthia, petioles 14–25 mm long (7–14 mm for *S. glomulifera*), foliar scales up to 22 × 4 mm (up to 11 × 3 mm for *S. glomulifera*) and calyx lobes 1–1.5 mm long (1.5–2.2 mm long for *S. glomulifera*).

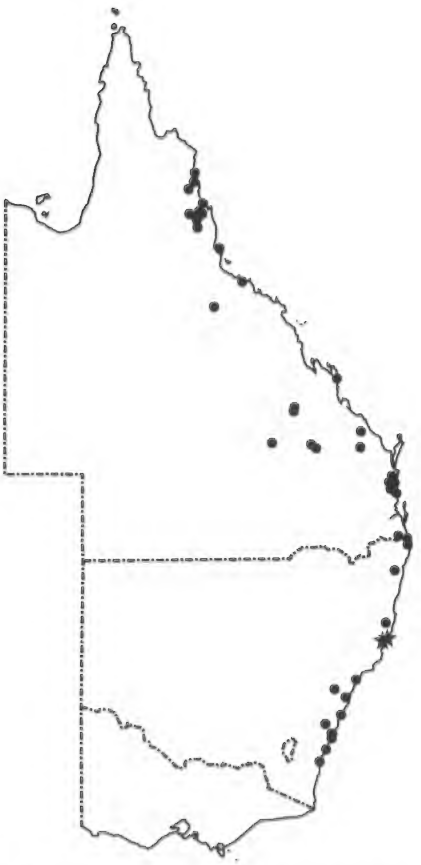
***Conservation status*:** This species, though of restricted distribution, is well conserved in a number of National Parks.

***Etymology*:** The epithet is derived from the Latin *verecundus*, shy or modest, an allusion to the species being hidden in, or obscured by the more widespread *S. glomulifera*.

**3. Syncarpia hillii** F.M.Bailey, Proc. Roy. Soc. Queensland 1: 86 (1885). **Type:** Queensland. WIDE BAY DISTRICT: Fraser Island, before 1884, *W. Hill* s.n. [AQ 278678] (holo: BRI, 4 sheets).

***Illustration*:** Williams, Native Pl. Queensl. 2: 277 (1984).

Tree 15–50 m high. Bark fibrous or stringy, persistent and furrowed, grey outside, brown underneath. Seedlings with cotyledons 4–4.5 × 6.5–7 mm; seedling leaves ovate, c. 40 × 20 mm, apex acute, base cuneate, discolorous. Coppice leaves and stems densely hairy, with spreading hairs up to 1.5 mm long; adult leaves ovate, 9-16 × 3.5–7.5 cm, apex acute or acuminate, base mostly cuneate, occasionally obtuse, glabrous, discolorous; intramarginal vein present and usually well developed; petioles 13–31 mm long,



**Map 2.** Distribution of *Syncarpia glomulifera* subsp. *glomulifera* ● and *S. glomulifera* subsp. *glabra* ★.

angular. Foliar scales lanceolate, c. 24 × 6 mm, acuminate, margins ciliate, otherwise glabrous. Inflorescence glabrous; peduncles 11–25 mm long; bracts persistent, deltoid, 2–3 × 3–4 mm, glabrous, acute. Hypanthia smooth, glabrous, more or less cylindrical, fused at their bases. Calyx lobes 4, persistent, obtuse, c. 1.2 × 2.2 mm, glabrous, margins ciliate. Petals 4–5, orbicular, 3.5–4 × 3.5–4 mm, adaxial surface hairy, abaxial surface glabrous; margins entire. Stamens very numerous, fully inflexed in bud; filaments 8–10 mm long, connective gland obscure. Style terete, up to 12 mm long; stigma slightly expanded. Surface of the ovary-top glabrous, ovary 3(4) locular, with numerous ovules per loculus. Compound fruit globose to depressed-globose, 14–16 × 19–21 mm; seeds 3–3.5 mm long.

***Specimens examined*: Queensland.** WIDE BAY DISTRICT: Fraser Island, May 1921, *White* s.n. (BRI,NSW); Fraser Island, Oct 1921, *White* 1195 (BRI); Fraser Island, Oct 1930, *Hubbard* 4589 (BRI); Lake Allom, Fraser Is., Aug 1986, *Wallace* 126/86 (NSW); Aqua Rd, 8 km SW of Poyungan Forestry Camp, Fraser Is., Aug 1986, *Briggs* 8010 (NSW); Kingfisher Bay resort, Fraser Island, Nov 1994, *Bean* 8102 (BRI,MEL,NSW); Broutha Waterhole, Cooloola NP, Sep 1993, *Bean* 6419 (BRI,K,MEL); Environmental Park 2 km west of Tewantin, Dec 1988, *Sharpe* 4844 & *Bean* (BRI). MORETON DISTRICT: Jorl Court, S of Buderim, Mar 1993, *Bean* 5820 (BRI,K,MEL,NSW); east of Mt Campbell, Moreton Is., Jan 1976, *Palmer* s.n. (BRI); east of Mt Tempest, Moreton Is., Mar 1987, *Sandercoe* 3107 & *Adair* (BRI); 0.6 km E of Blue Lagoon outfall, [North] Stradbroke Is., Jun 1983, *Carey* s.n. (BRI). **New South Wales.** NORTH COAST: Tweed Heads, Dec 1940, *White* 11383 (BRI,NSW).

***Distribution and habitat*:** *S. hillii* is widespread and common on the southern half of Fraser Island. It is also found, in lesser numbers, southwards along the coast and on coastal islands, at least as far as North Stradbroke Island. There is also a record of the species from Tweed Heads in far north eastern New South Wales. Although trees have not been relocated there recently, there is no reason to doubt the validity of the record (**Map 1**). *S. hillii* grows in tall open forest or on rainforest margins, in deep sandy soils of quarternary origin. It occasionally grows in association with *S. glomulifera* subsp. *glomulifera* (i.e. at Tewantin and Buderim), but hybrids between the two taxa have not been observed.

***Flowering period*:** Flowers have been recorded in November and December.

***Conservation status*:** This species was allocated the code 3RC by Thomas and McDonald (1989). Although some populations are small and threatened, the main population on Fraser Island is now protected under World Heritage legislation. It is therefore recommended that *S. hillii* be no longer listed as a rare or threatened plant.

## Dubious name

*Syncarpia procera* (Salisb.) Domin, Biblioth. Bot. 89: 472 (1928); *Metrosideros procera* Salisb., Prodr. 351 (1796). Type: "juxta Port Jackson, David Burton". Salisbury's species descriptions were based on cultivated juvenile plants. No specimen of *M. procera* is known to exist, and the author's brief diagnosis is inadequate for identification of the taxon concerned.

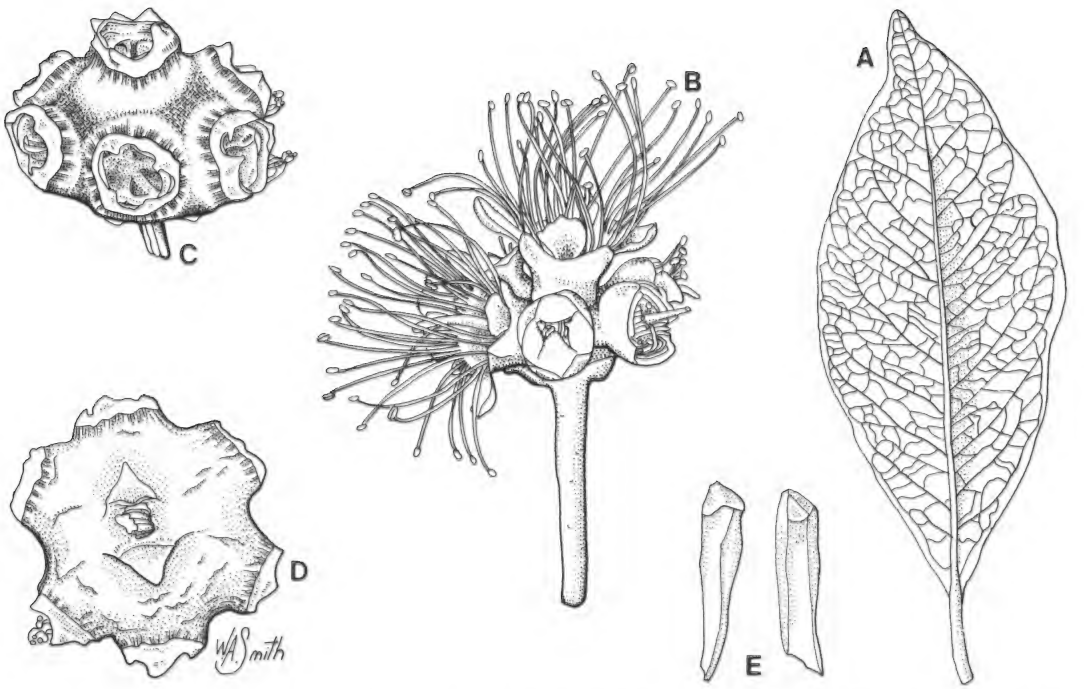



**Fig. 1.** *Syncarpia verecunda* A. adult leaf × 1. B. inflorescence at anthesis × 2. C. compound fruit, lateral view × 2. D. compound fruit, from below × 1. E. seeds × 10. A, Bean 6656; B, Bean 6156; D,C,E, Bean 6026 (BRI).

## Excluded names

*Syncarpia leptopetala* F.Muell., Fragm. 1: 79 (1859) = *Choricarpia leptopetala* (F.Muell.) Domin.

*Syncarpia subargentea* C.T.White, Bot. Bull. 21: 8, t.3 (1919) = *Choricarpia subargentea* (C.T.White) L.A.S.Johnson, fide Johnson (1962).

*Syncarpia subargentea* var. *latifolia* C.T.White, Qld Dept. of Ag. & Stock, Botany Bulletin 21: 8 (1919) = *Choricarpia subargentea* (C.T.White) L.A.S.Johnson, fide Johnson (1962).

*Syncarpia vertholenii* Teijsm. & Binn., Nat. Tijdschr. Ned. Ind. 2: 307 (1855) = *Metrosideros vera* Roxb., fide Merrill (1917).

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# *Cycas desolata* (Cycadaceae), a new species from north Queensland

**Paul I. Forster**

**Summary**

Forster, Paul I. (1995). *Cycas desolata* (Cycadaceae), a new species from north Queensland. *Austrobaileya* 4(3): 345–352. *Cycas desolata* sp. nov. is described and illustrated. Its affinities are discussed and notes are provided on its distribution, habitat and conservation status.

Key words: Cycadaceae, *Cycas desolata*

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## Introduction

The genus *Cycas* L. in Queensland has recently been reviewed by Hill (1992). His account provided a useful, although only initial, regional analysis of a complex genus which facilitates the management of these plants in the light of ever increasing collector pressure and rural development. All but two of the Queensland species of *Cycas* are considered as rare or threatened plants (Forster 1994). There continues to be indiscriminate poaching of populations of horticulturally desirable species such as *C. megacarpa* K.D.Hill, *C. ophiolitica* K.D.Hill, *C. platyphylla* K.D.Hill and *C. cairnsiana* F.Muell., while many populations of some species still suffer from uncontrolled land clearing for agriculture and grazing.

In late 1993, Dr Rod Fensham of BRI brought to my attention a previously unrecorded population of *Cycas* plants north-west of Charters Towers in northern Queensland. In Hill's (1992) key this material (2 fronds) keyed to *C. cairnsiana*. According to Hill, *C. cairnsiana* is known principally from two localities, neither of which is near Charters Towers, hence this new population was of considerable interest because of its supposed conservation significance.

Investigation of this population in early 1994 revealed that the plants differed in several ways from *C. cairnsiana* and also from *C. platyphylla*, another closely allied species. This plant is described here as a new species, *C. desolata*. Descriptive terminology follows Hill (1992) enabling comparison with his descriptions.

Accepted for publication 1 February 1995

## Taxonomy

**Cycas desolata** P.I.Forst., **sp. nov.** affinis *C. cairnsianae* F.Muell. a qua cataphyllis lineari-lanceolatis, petioli frondis base dentes breves carentes, frondis pinnis paucioribus (90–136) plus minusve rectis longioribus latioribusque (180–210 × 3.8–5 mm), microsporophyllo spina apicali breviore (3–4 mm longa); megasporophyllo lamina minore late triangulari (28–32 × 20–25 mm) et spina apicali breviore (5–15 mm longa) differt. **Typus:** Queensland. NORTH KENNEDY DISTRICT: North-west of Charters Towers, 27 Jan 1994, *P.I. Forster* 14671B [male] (holo: BRI [3 sheets + carpological material]).

Stem to 4 (rarely to 7) m tall, 15–25 cm diameter. Fronds 75–120 cm long, strongly keeled in section (opposing pinnae inserted at 30–50 degrees to the rhachis), with 90–136 pinnae; rhachis usually terminated by paired pinnae; petiole glabrous, 100–230 mm long; median pinnae at 40–50 degrees to the rhachis, 180–210 mm long, 3.8–5 mm wide, glabrous, glaucous, blue, flat in section, decurrent for 2–4 mm, narrowed to 2.8–4 mm at base (70–80% of

maximum width), 1–5 mm apart on rhachis; midrib slightly raised above, prominent below. New growth densely tomentose with ferruginous trichomes, glabrescent. Cataphylls linear-lanceolate, 30–45 mm long, 2–4 mm wide, densely orange-brown tomentose at base. Microsporangiate cones elongate-ovoid, 240–400 mm long, 80–95 mm diameter. Microsporophyll fertile zone 20–26 mm long, 5–13 mm wide; sterile zone 8–12 mm long; apical spine sharply antrorse, 3–4 mm long. Megasporophylls 130–240 mm long, loosely ferruginous-tomentose at base only, otherwise glaucous blue, with 2–6 (usually 4) ovules; lamina broadly triangular, 28–32 mm long, 20-25 mm wide, irregularly sinuate or barely dentate with poorly developed teeth; apical spine 5–15 mm long. Seeds ovoid, 35–39 mm long, 32–35 mm diameter, green becoming yellow-purple when ripe, strongly blue pruinose. **Figs 1–6.**

***Additional specimens examined*: Queensland.** NORTH KENNEDY DISTRICT: North-west of Charters Towers, May 1993, *Fensham* 1005 (BRI); ditto, Jan 1994, *Forster* 14671A, 14671C (BRI).

***Distribution and habitat*:** *C. desolata* is known from at least two populations of plants distributed sporadically over an area of c. 40 km$^2$ to the north-west of Charters Towers. Plants grow in woodland on shallow skeletal soil or on low rocky outcrops with *Eucalyptus erythrophloia* Blakely and an ironbark (either *E. crebra* F.Muell. or *E. xanthoclada* Brooker & A.R.Bean) dominant in the overstorey. At the time of my visit, the area was showing the effects of an extended period of drought, hence it was not possible to ascertain other taxa that would normally grow in association with *C. desolata.*

***Notes*:** *C. desolata* is closely allied to both *C. cairnsiana* and *C. platyphylla* but differs from both these species by a combination of characters (**Table 1**). Superficially, in terms of foliage coloration and pinnae margin morphology, it appears closest to *C. cairnsiana* and will key to that species in Hill's (1992) key. Both species have glaucous, light-blue to blue foliage, although the foliage of *C. cairnsiana* appears lighter in colour than that of *C. desolata.* *C. desolata* differs markedly from *C. cairnsiana* in the cataphylls linear-lanceolate, frond petiole lacking short teeth at the base, fewer pinnae on each frond (90–136), pinnae more or less straight and longer and broader (180–210 × 3.8–5 mm), microsporophyll with a shorter apical spine (3–4 mm long), megasporophyll lamina smaller and broadly triangular (28–32 × 20–25 mm) and with a shorter apical spine (5–15 mm).

The new species is unique in Australian species of *Cycas* with respect to the blue foliage, fronds without basal spines on the petiole, leaflet margins recurved, leaflet base gradually narrowing proximally, leaflets straight and relatively long (180–210 × 3.8–5 mm) and the small broadly triangular megasporophyll lamina.

*C. desolata* is a striking cycad because of the blue coloration of the foliage and the large size of some individuals. At the type locality I found one plant that exceeded 7 m in height (**Fig. 6**). Cycads of this height are rare in Queensland although *C. couttsiana* K.D.Hill is described as growing to 7 m and *C. megacarpa* to 6 m in height (Hill 1992). The male cones of *C. desolata* also appear to be unusually long when compared with those of other species from Queensland (data in Hill 1992), with maximum lengths of 20–25 cm given for *C. platyphylla*, *C. cairnsiana*, *C. angulata* R. Br., *C. couttsiana* and *C. brunnea* K.D.Hill. Some of these lengths may represent underestimations of cone size as I found cones up to 42 cm long on *C. platyphylla* at its type locality (Forster 14706B).

***Conservation status*:** *C. desolata* is a relatively common plant where it occurs as at least a thousand individuals were seen there by me. All presently known populations are on private land (Grazing Homestead Perpetual Lease) and are not under threat from the current landowner who wishes to remain anonymous and discourages visits by the public without permission. The exact locality for this species is thus not provided here in an attempt to restrict poaching of the population. *C. desolata* is an horticulturally attractive plant and because of potential threats to its existence from poaching together with the generally restricted distribution of the species, a conservation coding of 2V is recommended (cf. Briggs & Leigh 1988).

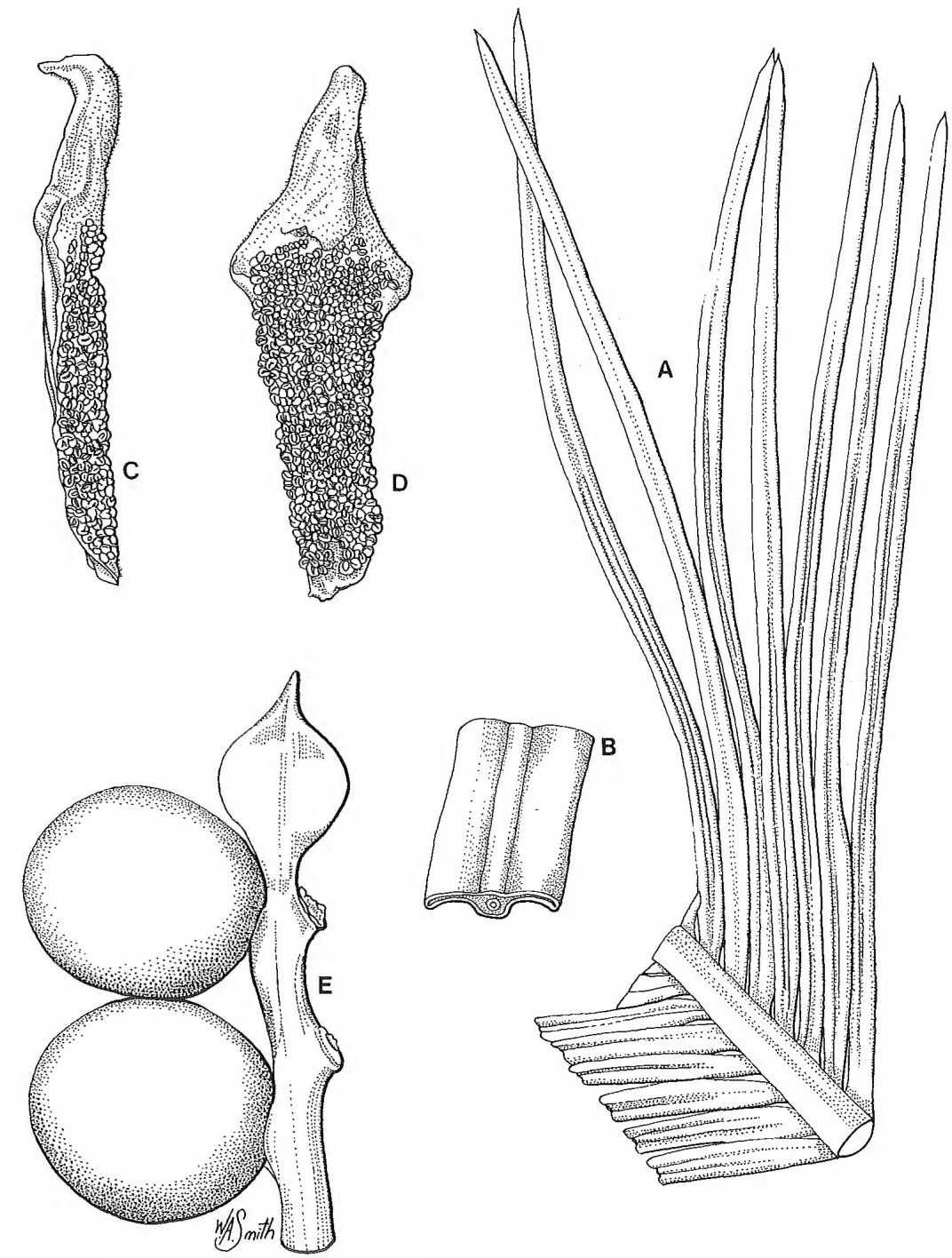


**Fig. 1.** *Cycas desolata*. A. part of frond × 0.8. B. section of pinnae × 4. C. lateral view of microsporophyll × 2. D. ventral view of microsporophyll × 2. E. megasporophyll × 0.8. A, B, E from *Forster* 14671A; C–D from *Forster* 14671B.

**Table 1. Comparison of morphological characters for *Cycas cairnsiana*, *C. desolata* and *C. platyphylla*.**

| Character | *C. cairnsiana* | *C. desolata* | *C. platyphylla* |
|---|---|---|---|
| frond colour | glaucous light-blue | glaucous blue | glaucous blue becoming grey-green |
| cataphylls | lanceolate | linear-lanceolate | lanceolate |
| indumentum on cataphylls | base only | base only | all over |
| short teeth at base of frond petiole present (+)absent (-) | + | - | + |
| pinnae number in frond | 180–280 | 90–136 | 120–260 |
| pinnae ± straight (+) or antrorse (-) | - | + | - |
| pinnae margins | recurved | recurved | + flat |
| median pinnae angle (degrees) to rhachis | 20–60 | 30–50 | 45–60 |
| median pinnae length × width (mm) | 80–180×2.0–3.0 | 180–210×3.8–5 | 90–170×4.0–6.0 |
| median pinnae base width (mm) (% of maximum width) | 2.0–3.0 (80–100) | 2.8–4 (70–80) | 3.0–4.0 (65–85) |
| microsporophyll sterile zone length (mm) | 12–15 | 8–12 | 7–10 |
| microsporophyll apical spine length (mm) | 6–9 | 3–4 | 6–9 |
| megasporophyll lamina length × width (mm) | 40–70×15–25 | 28–32×20–25 | 50–80×16–37 |
| teeth development on megasporophyll lamina | poor | poor | strong |
| megasporophyll lamina spine length (mm) | 15–20 | 5–15 | 20–25 |
| seed dimensions length × width (mm) | 36–42×30–37 | 35–39×32–35 | 30–40×27–38 |

**Fig. 2.** *Cycas desolata*. Habit of mature plant at type locality.

**Fig. 3.** *Cycas desolata* habitat.

**Fig. 4.** *Cycas desolata*. Megasporophylls. (*Forster* 14671A).

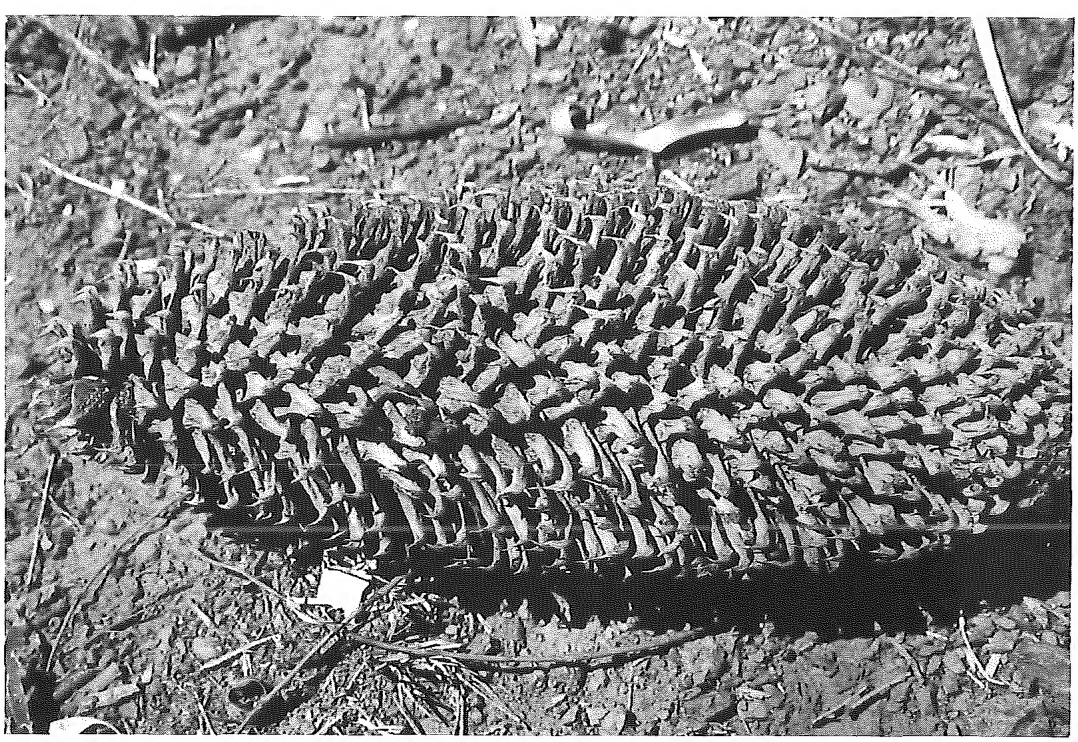

**Fig. 5.** *Cycas desolata*. Male cone. (*Forster* 14671B).

***Etymology*:** The specific epithet refers to the 'ruinous or desolate' nature of the habitat where this plant occurs.

## Acknowledgements

Thanks to Rod Fensham for drawing my attention to this plant, the owners of the property for access to the population, Paul Robins (BRI) for converting my slides to photographic prints, Will Smith (BRI) for Fig. 1, and Lyn Craven (CANB) for the Latin translation.

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**Fig. 6.** *Cycas desolata*. The tallest plant seen.

# Reinstatement and revision of *Triplarina* Raf. (Myrtaceae)

**A.R Bean**

**Summary**

Bean, A.R. (1995). Reinstatement and revision of *Triplarina* Raf. (Myrtaceae). *Austrobaileya* 4(3): 353–367. The endemic Australian genus *Triplarina* Raf. is reinstated for the species formerly known as *Baeckea camphorata* R.Br. ex Sims, and six allied species. These species form a coherent group, possessing several features which justify their excision from *Baeckea* L. The first available generic name is *Triplarina* Raf. The new combination *T. imbricata* (Sm.) A.R.Bean is made, and six new species and one new subspecies are described; *T. bancroftii, T. calophylla, T. nitchaga, T. nowraensis, T. paludosa, T. volcanica* and *T. volcanica* subsp. *borealis*. Illustrations and distribution maps are provided for all species. Keys are given to the genera comprising *Baeckea* sens. lat., and to the species of *Triplarina*.

Keywords: Myrtaceae; *Triplarina, Baeckea, Baeckea camphorata,Triplarina bancroftii, Triplarina calophylla, Triplarina imbricata, Triplarina nitchaga, Triplarina nowraensis, Triplarina paludosa, Triplarina volcanica, Triplarina volcanica* subsp. *borealis*.

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## Introduction

Under the broad circumscription established by Bentham (1867), *Baeckea* L. is a large genus of more than 100 species, mostly confined to Australia, and particularly Western Australia, with a few species in New Caledonia (Guillaumin 1948; Dawson 1992) and Malesia (Ridley 1922; Merrill 1928), and with one species, *B. frutescens* L., extending to southern China. It was this species upon which Linnaeus described the genus in 1753. Subsequently, and especially in the mid-1800's, about 20 genera were erected for various species of the *Baeckea* "complex" to accommodate the floral variation observed by botanists of the time. However these were all reduced by Bentham (1867) either to synonymy or sectional status; his scheme was then followed for over a century.

While many of the genera proposed for *Baeckea*-like plants are considered unwarranted, it is now clear that recognition of a single genus is equally unsatisfactory. Johnson & Briggs (1985) were the first to state that *Baeckea* is polyphyletic. Trudgen (1986) reinstated *Rinzia* Schauer, a genus confined to Western Australia, and then erected the genus *Ochrosperma* (Trudgen 1987). Studies undertaken by the present author suggest that five genera should be accepted for species of *Baeckea* sens. lat. occurring in eastern Australia, New Caledonia and Malesia. They are *Baeckea* L. sens. str., *Babingtonia* Lindl., *Ochrosperma* Trudgen, *Triplarina* Raf. and *Euryomyrtus* Schauer.

These five genera are characterised as follows:

*Baeckea* L. sens. str.

> calyx lobes simple; stamens 5-12, none opposite centre of petals; filaments straight; anthers versatile, dehiscing by long parallel slits; locules 2 (rarely 3); ovules 6-12 per loculus; seeds straight-sided, discoid to cuboid, angular, not arillate.

*Babingtonia* Lindl.

> calyx lobes often compound; stamens 3–15, none opposite centre of petals; filaments geniculate; anthers adnate to filaments, dehiscing by pores or short divergent slits; locules 3 (rarely 2, but not in the geographical area considered here); ovules 4–18 per loculus; seeds straight-sided, discoid to cuboid, angular, not arillate.

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*Euryomyrtus* Schauer

calyx lobes simple; stamens 3–13, some opposite centre of petals; filaments straight; anthers versatile, dehiscing by long parallel slits; locules 3; ovules 4–5 per loculus; seeds reniform, not angular, not arillate.

*Ochrosperma* Trudgen

calyx lobes simple; stamens 5–8, none opposite centre of petals; filaments straight; anthers versatile, dehiscing by long parallel slits; locules 3; ovules 2 per loculus; seeds reniform, not angular, arillate.

*Triplarina* Raf.

calyx lobes simple; stamens 14–18, none opposite centre of petals; filaments straight; anthers versatile, dehiscing by long parallel slits; locules 3; ovules 8–13 per loculus; seeds reniform, not angular, not arillate.

A key to these genera is presented in this paper in which the genus *Triplarina* is reinstated and revised. In future papers, I will deal with species belonging to the other genera mentioned above.

The name *Triplarina* has never been in general usage. For many years, the type species (then known as *Baeckea camphorata*) was the only known species which belongs under this genus. However, from about 1900 and especially in recent years, several more species conforming to the generic characteristics have been found, although none has been formally described until now. *Triplarina* was referred to as the "*B. camphorata*" taxon by Trudgen (1987).

## Taxonomic and Nomenclatural History

David Burton, in 1791, made the first known collection of a *Triplarina*, and his specimen became the type of *Leptospermum imbricatum* Sm. (Smith 1802). George Caley and Robert Brown collected the same taxon between 1800 and 1810, with Brown giving it the manuscript name *Baeckea camphorata*. Sims (1826) provided the original valid publication of *Baeckea camphorata*. Although he placed it in *Baeckea*, Sims thought it had "as good a right to rank with *Leptospermum*", because of the large number (15) of stamens. Twelve years later, Rafinesque (1838) erected the genus *Triplarina* based on *Baeckea camphorata*. His description was brief, but he stated that *Baeckea* differed from *Triplarina* by having 8–10 stamens, and that *Leptospermum* differed from the new genus by having 20 stamens and alternate foliage.

Schauer (1843) was seemingly unaware of Rafinesque's genus, because he (Schauer) erected the genus *Camphoromyrtus*, also based on *Baeckea camphorata*. Subsequent treatments by Mueller (1864) and Bentham (1867) did not mention *Triplarina*, even as a synonym, and it is possible they were also unaware of its publication.

Baillon, in 1862, founded the genus *Eremopyxis*, which he stated was based on *Baeckea camphorata*. Hence it is included here as a synonym of *Triplarina*. It should be noted, however, that the plant he describes would appear to be a species of *Thryptomene* Endl.

## Geography and Morphology

The genus *Triplarina* is endemic to Australia, confined to the states of Queensland and New South Wales, from Ravenshoe at latitude 18 °S to Nowra at latitude 35°S (**Map 1**). Most species occur within 80 km of the coast, with the exception of *T. paludosa* which grows on an elevated tableland about 180 kilometres inland.

Although the total geographical range of the genus is quite large, its members occur in very small and isolated populations, indicative of a relictual situation in which present-day taxa persist in small areas of remaining suitable habitat. The parent material is sandy acidic soils or skeletal slopes on sandstone, granite or rhyolite. *Triplarina* species occupy sheltered positions within their favoured habitat, such as shady southerly slopes, sandstone gorges, creekbanks, and the bases of granite outcrops which benefit from water runoff, indicating that they are not as drought tolerant as many other heathland plants.

No species occurs on the heathlands which are scattered along the coasts of New South Wales and Queensland on quaternary sands;


**Map 1.** Distribution of *Triplarina* spp. o.

instead, *Triplarina* species are found in hilly or mountainous terrain, sometimes in heathland, but usually in woodland or forest, overtopped by *Eucalyptus* spp. or other sclerophyll tree species.

While leaf size and shape varies within each species, vegetative characters are very useful for assisting in species determination, and some species can be distinguished on these characters alone. Floral morphology is fairly uniform, but diagnostic characters include calyx lobe shape, petal size, connective gland size, ovule number, stamen number and stipe length.

## Material and Methods

This study is based upon an examination of herbarium material from A, BM, BRI, K, MEL, NE, NSW and QRS, as well as LINN microfiche. Most species have been examined in the field to establish bark, habit and habitat, and to collect suitable floral material for later herbarium study. Measurements of leaves and fruits are based on dried herbarium specimens, and the leaves measured are those on flowering branches. Measurements of floral parts are based on material preserved in spirit, or reconstituted by boiling them in water. Species treatments are arranged in geographical order, from north to south.

## Taxonomy

### Key (for eastern Australia, New Caledonia and Malesia) to the genera comprising *Baeckea* s. lat.

1. Ovary and fruit 3-locular ..... **2**
   Ovary and fruit 2-locular ..... **Baeckea s.str.**

2. Anthers versatile, dehiscing by long parallel slits ..... **3**
   Anthers adnate, dehiscing by pores or short divergent slits ..... **Babingtonia**

3. Ovules and seeds D-shaped, angular ..... **Baeckea s.str.**
   Ovules and seeds reniform, not angular ..... **4**

4. Some stamens opposite centre of petals ..... **Euryomyrtus**
   No stamens opposite centre of petals ..... **5**

5. Ovules 2 per loculus, stamens 5–8 ..... **Ochrosperma**
   Ovules 8–13 per loculus, stamens 14–18 ..... **Triplarina**

**Triplarina** Raf., Sylva tellur. 104 (1838). **Type:** *Triplarina camphorata* (R.Br. ex Sims) Raf.

*Camphoromyrtus* Schauer, Linnaea 17: 237–42 (1843). **Type:** *Camphoromyrtus brownii* Schauer, nom. illeg. (= *Baeckea camphorata* R.Br. ex Sims).

*Eremopyxis* Baillon, Adansonia 2: 328–9 (1861–2). **Type:** *Eremopyxis camphorata* (R.Br. ex Sims) Baillon.

Shrubs 1–3 m high, all parts glabrous. Bark grey, scaly or fibrous, persistent. Branchlets more or less terete. Leaves opposite, decussate, exstipulate, microphyllous, glabrous, flat or margins recurved, oil glands obscure on adaxial surface, conspicuous on abaxial surface, scattered or mainly in two parallel rows; margins entire, intramarginal veins and midrib clearly visible or obscure, petioles 0.3–0.9 mm long. Inflorescence axillary, anthotelic, forming metaxydiads, metaxytriads or botryoids. Flowers actinomorphic, bisexual, 5-merous. Peduncles and stipes terete, bracts 2, persistent, apex obtuse; bracteoles 2, conduplicate, ovate, apex acute, caducous, leaving a prominent scar, marking the junction of stipe and peduncle. Enations numerous at junction of stipe and peduncle. Hypanthium obconical, campanulate or hemispherical, smooth or irregularly ribbed, especially when dry, adnate to ovary, and continuing above ovary summit. Calyx lobes persistent, deltoid, semiorbicular, orbicular or oblong; with a central longitudinal ridge, margins entire. Petals deciduous, white, orbicular or almost so, 1–2.5 mm wide, margins entire. Stamens 14–18, free, in a single whorl, shorter than petals. Filaments terete, slightly tapered towards the apex; anthers versatile, dorsifixed, bilocular, opening by longitudinal slits; connective gland globular, smaller than or as long as anthers. Ovary adnate to hypanthium, except for the distal one-third, inferior, 3-locular, ovules 8–13 per loculus, arranged in two or three longitudinal rows on a peltate placenta. Style simple, terete, 0.7–1.2 mm long, sunken into a pit; stigma capitate, papillose. Fruits capsular, loculicidal, chartaceous, crowned by persistent calyx lobes, mostly hemispherical, non-adnate section senescent, forming a distinct brown rim. Seeds rounded, reniform, tuberculate, not arillate, 0.5–0.8 mm long. Embryo with small cotyledons on a slender neck attached to a massive radicle.

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## Key to the species of *Triplarina*

1. Leaf apex obtuse or truncate ..... 2
   Leaf apex acute ..... 3

2. Leaves 2.3–3.3 mm wide ..... **T. volcanica** subsp. **volcanica**
   Leaves 1.0–2.0 mm wide ..... 4

3. Leaves oblanceolate, 1.0–1.5 mm wide ..... **T. nitchaga**
   Leaves linear, 0.6–1.0 mm wide ..... **T. paludosa**

4. Stipe length 0.1–0.4 mm ..... 5
   Stipe length 0.5–1.4 mm ..... 6

5. Leaf apex truncate, recurved; calyx lobes deltoid ..... **T. nowraensis**
   Leaf apex obtuse, flat; calyx lobes obtuse to semi-orbicular ..... **T. imbricata**

6. Calyx lobes oblong; hypanthium 1.7–2 mm long ..... **T. volcanica** subsp. **borealis**
   Calyx lobes deltoid, obtuse or semiorbicular; hypanthium 1.2–1.6 mm long ..... 7

7. Petals 1.9–2.7 mm long; stamens 14–15; calyx lobes 0.7–0.9 mm long, connective gland about half anther length ..... **T. calophylla**
   Petals 1.4–1.8 mm long; stamens 16–18; calyx lobes 0.4–0.5 mm long, connective gland about same length as anthers ..... **T. bancroftii**

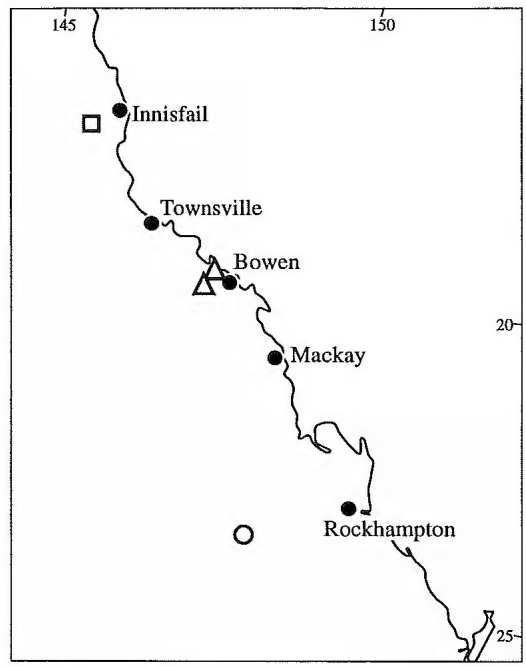
**1. Triplarina nitchaga** A.R.Bean **sp. nov.**, *Triplarinae paludosae* affinis, sed foliis brevioribus latioribusque, sepalis semi-orbicularibus vel deltoideis et hypanthio longiore differt. **Typus:** Queensland. North Kennedy District: Nitchaga Creek, near junction with George Creek, 25 km SSE of Ravenshoe, 3 October 1994, *M. Lockyer* 308 (holo: BRI; iso:A,CANB,K, MEL,NSW, distribuendi).

Shrub to 2.5 m high. Bark grey, scaly. Leaves oblanceolate, 3.8–5.5 mm long, 1.0–1.5 mm wide, concolorous, flat or concave above, oil glands in 2 rows, midrib and intramarginal veins not visible; apex acute; petioles 0.4–0.6 mm long. Inflorescence comprising 2 or 3 (rarely 4) flowers in each leaf axil, arising separately from a brachyblast. Peduncles 0.8–1.0 mm long, bracts 0.5–0.6 mm long; pedicels 0.6–1.4 mm long, bracteoles 0.8–1.3 mm long. Flowers 4.5–5 mm across. Hypanthium obconical, 1.5–1.9 mm long, smooth when fresh, angular and wrinkled when dry. Calyx lobes semi-orbicular to deltoid, c. 0.5 × 0.8–1 mm, with oil glands. Petals 1.5–2 mm across. Stamens 17–18; filaments c. 1.2 mm long, connective gland c. 0.75 times length of anthers. Ovules 10–13 per loculus in 2 rows. Style 0.8–1 mm long. Fruits hemispherical to obconical, 1.6–1.9 × 2.0–2.5 mm. Seeds brown, 0.5–0.6 mm long. **Fig. 2, P–T.**

***Specimens examined*: Queensland.** North Kennedy District: Ravenshoe, cultivated, ex Nitchaga Creek, Tully Falls road, Dec 1991, *Lockyer* s.n. (BRI); Nitchaga Creek, 6km S of Tully Falls, Dec 1993, *Forster* PIF 14475 & *Lockyer* (BRI,MEL,QRS); Arthurs Seat, 19 km WSW of Ravenshoe, Sep 1994, *Lockyer* 306 (BRI,MEL,NSW,QRS); Nitchaga Creek, near junction with George Creek, 25 km SSE of Ravenshoe, *Lockyer* 307 (BRI,MEL,NSW,QRS).

***Distribution and habitat*:** *T. nitchaga* is known from only two localities, both in the vicinity of Ravenshoe (**Map 2**). At the type locality, it grows on granite outcrops near a stream, in open forest dominated by *Syncarpia glomulifera* (Sm.) Nied. and *Eucalyptus resinifera* Sm. At Arthurs Seat, it grows on a rhyolite hillside and adjacent dry gully, in open forest dominated by *Eucalyptus citriodora* Hook., *E. abergiana* F.Muell. and *E. acmenoides* Schauer.

***Phenology*:** Flowers are recorded in September and October, and fruits are recorded in December.




**Map 2.** Distribution of *Triplarina nitchaga* □ *T.calophylla* △ and *T. paludosa* ○.

***Affinities*:** *T. nitchaga* is closest to *T. paludosa*, both narrow-leaved species. *T. nitchaga* differs by its leaves 1.0–1.2 mm wide (0.6–1.0 mm for *T. paludosa)*; leaves 3.8–5.0 mm long (4.0–6.5 mm for *T. paludosa*); hypanthium 1.5–1.9 mm long (1.3–1.4 mm long for *T. paludosa*); and semi-orbicular calyx lobes (orbicular for *T. paludosa*). It is notable in the genus for possessing a large number of ovules (up to 13 per loculus) and for the occasional presence of a botryoid inflorescence, which otherwise occurs only in *T. volcanica*.

***Conservation status*:** 2V according to the criteria of Briggs & Leigh (1988). Both populations are small, and neither is conserved.

The recommended conservation status for this species as defined by the Queensland Nature Conservation Act is vulnerable.

***Etymology*:** Nitchaga is the name of the creek along which the type specimen was collected.

**2. Triplarina calophylla** A.R.Bean **sp. nov.**, *Triplarinae imbricatae* affinis, sed foliis latioribus, petalis majoribus, pedicellis

longioribus et loculis ovulis 10 vel 11 differt. **Typus:** Queensland. NORTH KENNEDY DISTRICT: Mt Abbot, 50 km west of Bowen, 25 October 1992, *A.R. Bean* 5173 (holo: BRI; iso: AD,DNA,K, MEL,NSW, distribuendi).

Shrub 1.5–2 m high. Bark grey, finely fibrous, persistent. Leaves obovate, 2.6–4.8 mm long, 1.4–2.0 mm wide, concolorous, flat in cross-section, oil glands scattered abaxially, intramarginal veins present; apex obtuse, recurved; petioles 0.4–0.7 mm long. Inflorescence comprising 2 flowers in each leaf axil, arising separately from a brachyblast. Peduncle 1.0–1.2 mm long, bracts persistent, 0.5–0.6 mm long; stipes 0.6–0.8 mm long, bracteoles caducous, c. 0.9 mm long, apex acute. Flowers c. 6 mm across. Hypanthium obconical to campanulate, 1.2–1.6 mm long, smooth when fresh, irregularly ribbed when dry. Calyx lobes straight-sided, obtuse to semi-orbicular, 0.7–0.9 × 1.0–1.3 mm, with oil glands. Petals 1.9–2.7 × 1.7–2.5 mm, shortly clawed. Stamens 14–15; filaments 1.1–1.2 mm long, connective gland globular, c. 0.5 times length of anthers. Ovules 10–11 per loculus, in 2 rows. Style 0.6–0.9 mm long. Fruits hemispherical, 1.5–2.0 × 2.1–2.6 mm. Seeds brown, turgid, c. 0.5 mm long. **Fig. 2, K–O.**

***Specimens examined*: Queensland.** NORTH KENNEDY DISTRICT: Station Hill, Cape Upstart headland, c. 50 km SE of Ayr, Sep 1991, *Cumming* 11392 (BRI); Mount Abbot, 50 km W of Bowen, Jul 1992, *Bean* 4754 (BRI,DNA,K, MEL,PERTH).

***Distribution and habitat*:** *T. calophylla* has a restricted distribution in north Queensland, and is known only from Cape Upstart and Mt Abbot, both in the Bowen area (**Map 2**). It inhabits shrublands or woodlands on shallow sandy soils associated with granitic rocks. Associated species include *Bursaria tenuifolia* F.M.Bailey, *Lophostemon confertus* (R.Br.) Peter G.Wilson & J.T.Waterh., *Micraira subulifolia* F.Muell. and *Labichea nitida* Benth.

***Phenology*:** Flowers have been recorded in July and October. Fruits are recorded for July.

***Affinities*:** *T. calophylla* is close to *T. imbricata*, but differs in the leaves 1.4–2.0 mm wide (1.0–1.4 mm for *T. imbricata*); petals 1.9–2.7 mm long (1.5–1.7 mm for *T. imbricata*); stipes 0.6–0.8 mm long (0.1–0.4 mm for *T. imbricata*) and 10–11 ovules per loculus (8–9 for *T. imbricata*). From *T. bancroftii*, it differs by the petals 1.9–2.7 mm long (1.4–1.8 mm for *T. bancroftii*); calyx lobes 0.7–0.9 mm long (0.4–0.5 mm for *T. bancroftii*); stamens 14–15 (16–18 for *T. bancroftii*); and connective gland about half the length of the anthers (equal to or greater than anther length for *T. bancroftii*).

***Conservation status*:** 2R according to the criteria of Briggs & Leigh (1988). Populations on Mt Abbot are not conserved, and only about 1 000 plants exist there (Bean 1994). The collection from Cape Upstart was made just outside Cape Upstart National Park, and while it is probable that *T. calophylla* does extend into the National Park, this cannot be assumed. Its abundance at this site is unknown.

The recommended conservation status as defined by the Queensland Nature Conservation Act is rare.

***Etymology*:** From the Greek, *calo* (beautiful) and *phyllon* (leaf), in reference to the attractive foliage of the species.

**3. Triplarina paludosa** A.R.Bean **sp. nov.**, *Triplarinae imbricatae* affinis, sed foliis linearibus multo longioribus apice acuto, pedicellis longioribus et sepalis orbicularibus differt. **Typus:** Queensland. LEICHHARDT DISTRICT: Blackdown Tableland, 0.7 km N of Horseshoe Lookout, 15 November 1993, *A.R. Bean* 6932 (holo: BRI; iso: BISH,CANB,K,MEL,MO,NSW, distribuendi).

***Illustration*:** Pearson & Pearson, Plants of Central Queensland p.64 (1989), as *Baeckea* sp. 'Stony Creek Falls'.

Shrub 0.9–1.5 m high. Bark grey, finely fibrous, persistent. Leaves lanceolate to linear, 4.0–6.5 mm long, 0.6–1.0 mm wide, concolorous, concavo-convex in cross-section, oil glands in two distinct rows, midrib and intramarginal veins not visible; apex acute; petioles c. 0.5 mm long. Inflorescence comprising 2 flowers in each leaf axil, arising separately from a brachyblast. Peduncles 0.8–1 mm long, bracts

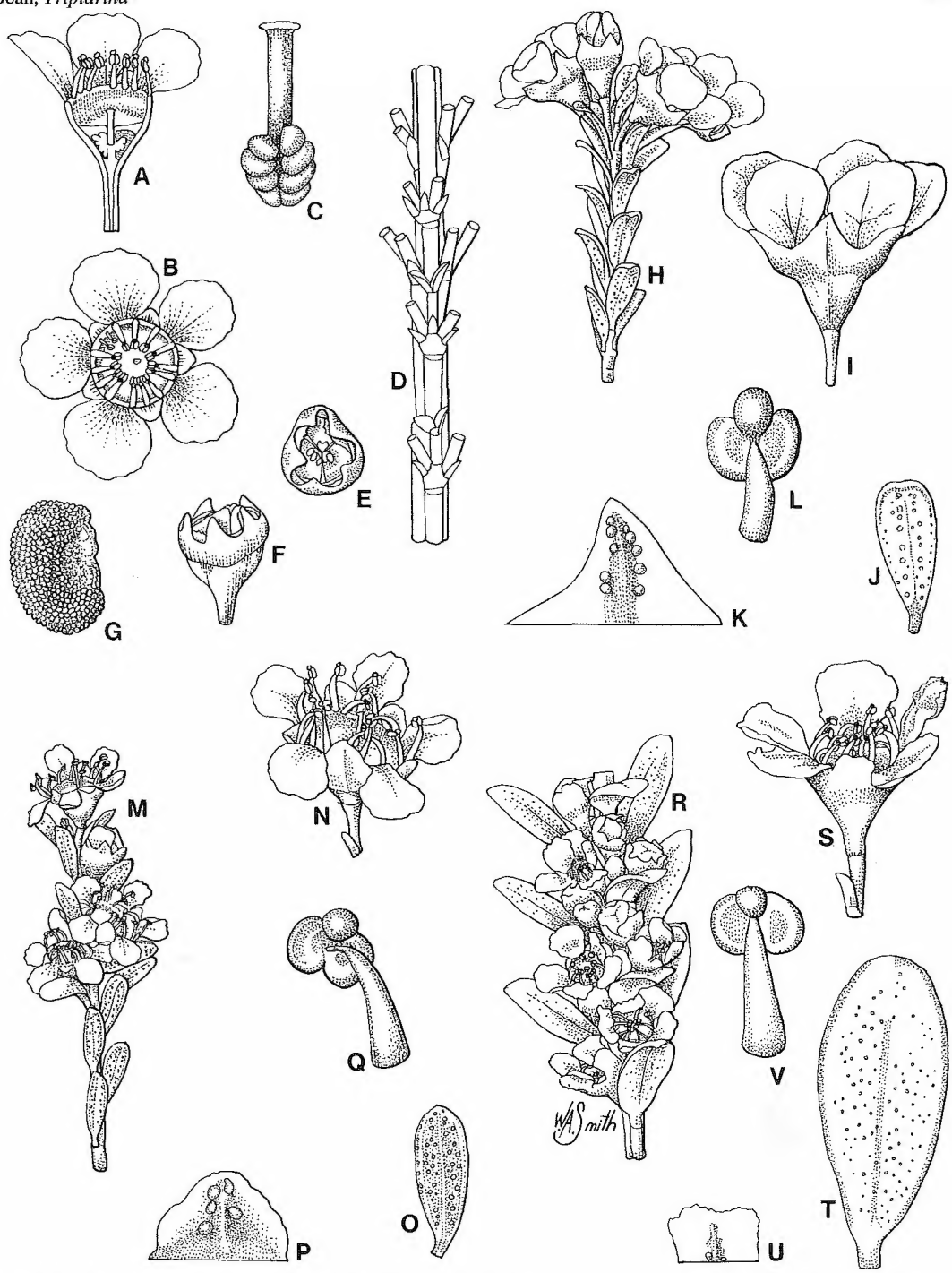



**Fig. 1.** *Triplarina*, general characteristics. A. half flower × 6. B. flower from above ×6. C. style and ovules × 20. D. stem showing bracts and peduncles × 4.5. E. dehisced fruit from above, showing undeveloped ovules × 6. F. fruit, oblique view × 6. G. seed × 32. *Triplarina nowraensis*. H. flowering branchlet × 3. I. flower × 3. J. leaf, lower surface × 6. K. calyx lobe × 18. L. stamen × 32. *Triplarina imbricata*. M. flowering branchlet × 3. N. flower × 6. O. leaf, lower surface × 6. P. calyx lobe × 18. Q. stamen × 32. *Triplarina volcanica* subsp. *volcanica*. R. flowering branchlet × 3. S. flower × 6. T. leaf, lower surface × 6. U. calyx lobe × 18. V. stamen × 32. A–D, *Bean* 7220; E–G, *Bean* 6967; H–L, *Rodway* H784; M–Q, *Caley* s.n.; R–V, *Bean* 7220.

c. 0.6 × 0.2 mm; stipes 1–1.2 mm long, bracteoles c. 0.9 mm long. Flowers 4.5–5 mm across. Hypanthium obconical, 1.3–1.4 mm long, very faintly 10-ribbed when fresh. Calyx lobes nearly orbicular, c. 0.6 × 0.7 mm, with oil glands. Petals c. 1.5 × 1.3–1.5 mm. Stamens 15–18; filaments c. 1.0 mm long, connective gland 0.75–1 times length of anthers. Ovules 8–11 per loculu in 2 rows. Style 0.9–1 mm long. Fruits hemispherical, c. 1.7 × 2.0 mm. Seeds pale brown, c. 0.6 mm long. **Fig. 2, F–J.**

*Specimens examined*: **Queensland.** LEICHHARDT DISTRICT: Blackdown Tableland, 12 mls [20km] SSE of Bluff, Sep 1959, *Johnson* 1122 (BRI); Blackdown Tableland, 1.5 km S of grid at entrance to SF, Sep 1973, *Hanger* 85 (BRI); Blackdown Tableland, c. 5 km W of Forestry camp, Sep 1973, *Hanger* 523 (BRI); beside Mimosa Creek, Blackdown Tableland, Nov 1973, *Williams* 342 (BRI); Spring Creek, Blackdown Tableland, Nov 1993, *Bean* 6946 (BRI,NSW).

***Distribution and habitat***: *T. paludosa* is endemic to the Blackdown Tableland, west of Rockhampton in central Queensland (**Map 2**). It grows near creekbanks and on soakage areas, in open forests or woodlands which may be dominated by *Eucalyptus sphaerocarpa* L.A.S.Johnson & Blaxell, *Eucalyptus bunites* Brooker & A.R.Bean, *Casuarina torulosa* Aiton or *Angophora leiocarpa* (G.J.Leach) K.R.Thiele & Ladiges. Associated shrub species include *Banksia oblongifolia* Cav., *Brachyloma daphnoides* (Sm.) Benth. and *Persoonia subtilis* P.H.Weston & L.A.S.Johnson.

***Phenology***: Flowers in November, fruits in November and December.

***Affinities***: *T. paludosa* differs from *T. imbricata* by its longer, linear leaves, longer stipes and orbicular calyx lobes. It is closest to *T. nitchaga*, but *T. paludosa* differs by its leaves 0.6–1.0 mm wide (1.0–1.2 mm for *T. nitchaga*), leaves 4.0–6.5 mm long (3.8–5.0 mm for *T. nitchaga*); hypanthium 1.3–1.4 mm long (1.5–1.9 mm for *T. nitchaga*); and nearly orbicular calyx lobes (semi-orbicular for *T. nitchaga*).

***Conservation status***: Not currently rare or threatened.

***Etymology***: From the Latin word *paludosus*, meaning marshy; in reference to the species' preference for moist, low-lying areas.

**4. Triplarina bancroftii** A.R.Bean **sp. nov.**, *Triplarinae calophyllae* affinis, sed staminibus numerosioribus, petalis sepalisque minoribus, foliis angustioribus et glandula connectivi majore differt. **Typus:** Queensland. BURNETT DISTRICT: Cania Gorge National Park, near "Dripping Rock", 17 November 1993, *A.R. Bean* 6966 (holo: BRI; iso: K,MEL,NSW, distribuendi)

Shrub 1.5–2.5 m high. Bark grey, scaly, persistent. Leaves obovate or elliptical, 3.3–6.2 mm long, 1.2–1.9 mm wide, concolorous, flat in cross-–section or margins recurved, oil glands obvious abaxially, scattered, midrib and intramarginal veins visible; apex obtuse or truncate, recurved; petioles 0.3–0.5 mm long. Inflorescence comprising 2 or 3 flowers in each leaf axil, arising separately from a brachyblast. Peduncles 0.8–1.4 mm long, bracts persistent, 0.6 × 0.3 mm; stipes 0.5–0.6 mm long, bracteoles caducous, not seen. Flowers 4.5–4.8 mm across. Hypanthium obconical, 1.4–1.6 mm long, faintly 10-–ribbed when fresh. Calyx lobes deltoid to semi-orbicular, 0.4–0.5 × 0.8–1.0 mm, with oil glands or glands absent, apex obtuse. Petals 1.4–1.8 × 1.6–1.9 mm, not clawed. Stamens 16–18; filaments 0.8–0.9 mm long, connective gland as long as, or slightly longer than anthers. Ovules 8–10 per loculus, in 2 or rarely 3 rows. Style 1–1.5 mm long. Fruits hemispherical, wrinkled or ribbed, 1.5–1.7 × 1.9–2.1 mm. Seeds brown, c. 0.5 mm long. **Fig. 2, A–E.**

*Specimens examined*: **Queensland.** BURNETT DISTRICT: Cania Gorge NP, about 24 km NW of Monto, Oct 1983, *Henderson* H2955, *Guymer & Dillewaard* (BRI); Cania Gorge NP, Nov 1993, *Bean* 6967 (BRI); Eidsvold, Dec 1913, *Bancroft* s.n. (A,BRI); "Melrose", 15 km W of Eidsvold, Aug 1990, *Bean* 2123 (BRI,NSW, PERTH).

***Distribution and habitat***: *T. bancroftii* has a limited distribution in south-eastern Queensland (**Map 3**). Two populations are known, 80 km apart. The species grows on shallow acidic, sandy soil in all cases, but the parent material may be either granite or sandstone. Associated species include *Lophostemon confertus*, *Lophostemon suaveolens* (Sol. ex Gaertn.) Peter G. Wilson & J.T.Waterh., *Eucalyptus trachyphloia*, *Leptospermum venustum* A.R.Bean and *Leptospermum neglectum* Joy Thomps.

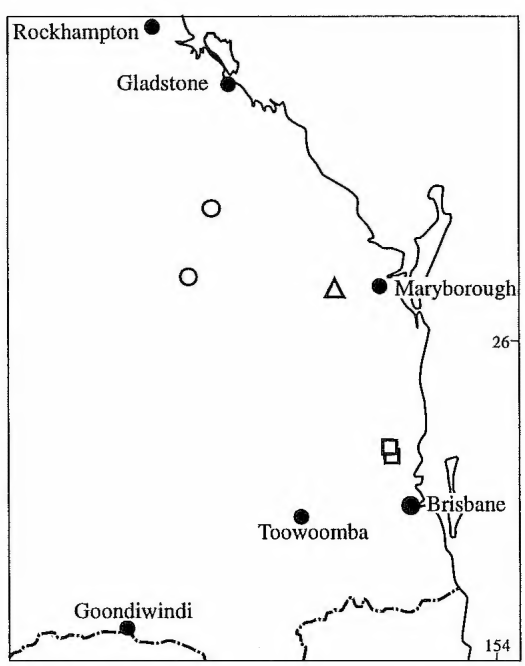
***Phenology***: Flowering is recorded for October and November.

***Affinities***: *T. bancroftii* closely resembles *T. calophylla*, but *T. bancroftii* differs by its 16–18 stamens (14–15 for *T. calophylla*); petals 1.4–1.8 mm long (1.9–2.7 mm for *T. calophylla*); calyx lobes 0.4–0.5 mm long (0.7–0.9 mm for *T. calophylla*); and connective gland equal to or longer than anthers (about half anther length for *T. calophylla*).

***Conservation status***: 2RC according to the criteria of Briggs & Leigh (1988). Neither of the populations is large, but the Cania Gorge population is conserved in a National Park.

The recommended conservation status for this species as defined by the Queensland Nature Conservation Act is rare.

***Etymology***: The specific epithet honours T.L. Bancroft (1860–1933), pioneer plant collector in Queensland, and the first person to collect this species.




**Map 3.** Distribution of *Triplarina bancroftii* ○, *T.volcanica* subsp.*volcanica* □ and *T.volcanica* subsp. *borealis* △.

**5. Triplarina volcanica** A.R.Bean **sp. nov.**, *Triplarinae imbricatae* affinis, sed foliis longioribus latioribusque, inflorescentia botryoidea, floribus majoribus et pedicellis longioribus differt. **Typus:** Queensland. MORETON DISTRICT: 2 km north-west of Mt Beerburrum, 29 March 1993, *A.R. Bean* 5888 (holo: BRI; iso: K,L,MEL, NSW, distribuendi).

*Baeckea* sp. 2, Stanley & Ross, Fl. S.E. Queensl. 2: 125 (1986).

*Baeckea* sp. (Mt Ngungun S.T.Blake 21216), in Henderson (1994).

Shrub 1–2.5 m high. Bark grey, finely fibrous or scaly, persistent. Leaves elliptical to obovate, 4.6–7.2 mm long, 1.5–3.3 mm wide, discolorous, flat in cross-section, oil glands scattered abaxially, intramarginal veins not visible; apex obtuse, not recurved; petioles 0.6–0.9 mm long. Inflorescence a botryoid or metaxytriad. Peduncles 1.4–1.5 mm long, bracts persistent, 0.4–1.1 mm long; stipes 0.6–0.7 mm long, bracteoles caducous, 1.0–1.3 × 0.6 mm. Flowers 5–6 mm across. Hypanthium obconical, 1.7–2.0 mm long, smooth or faintly ribbed when fresh. Calyx lobes oblong, 0.5 × 0.7–0.8 mm, with oil glands. Petals 1.8–2.0 × 1.7–2.0 mm. Stamens 14–16; filaments 0.9–1 mm long, connective gland c. 0.5 times length of anthers. Ovules 8–10 per loculus in 2 rows. Style 0.7–1.0 mm long. Fruits hemispherical, c. 1.5 × 2.2 mm. Seeds brown, c. 0.6 mm long. **Fig. 1, R–V.**

***Phenology***: Flowers and fruits have been recorded for most months of the year, and it appears to have the capacity to flower at any time of year (pers. obs.).

***Affinities***: *T. volcanica* can be distinguished from other members of the genus by its botryoidal inflorescence, in the terminology of Briggs & Johnson (1979), and its oblong calyx lobes.

***Etymology***: The specific epithet *volcanica* refers to the volcanic origin of the rock upon which this species is confined.

While the Glasshouse Mountains and the Mt Walsh populations are florally identical, they are easily distinguishable by their leaf width and bract length. These differences are not considered to be sufficient to accord them both species status, but subspecific rank is considered appropriate.

The two subspecies are recognisable as follows:

Leaves 2.3–3.3 mm wide, bracts 0.7–1.1 mm long ..... **T. volcanica** subsp. **volcanica**
Leaves 1.5–2.1 mm wide, bracts 0.4–0.6 mm long ..... **T. volcanica** subsp. **borealis**

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**5a. Triplarina volcanica** subsp. **borealis** A.R.Bean **subsp. nov.** A *T. volcanica* subspecie *volcanica* foliis angustioribus et bracteis brevioribus differt. **Typus:** Queensland. WIDE BAY DISTRICT: base of Biggenden Bluff, May 1931, White 7731 (holo: BRI; iso: A).

Leaves obovate to oblanceolate, 4.1–7.2 × 1.5–2.1 mm, floral bracts 0.4–0.6 mm long.

***Specimens examined*:** Queensland. WIDE BAY DISTRICT: Mt Walsh, 6.5 km S of Biggenden, May 1977, *Telford* 5339 & *Ellyard* (CBG,NSW, PERTH); Mt Walsh N.P. south of Biggenden, May 1994, *Bean* 7692 & *Forster* (BRI,CANB, MEL,NSW).

***Distribution and habitat*:** *T. volcanica* subsp. *borealis* has been collected only from Mt Walsh and Biggenden Bluff, near Biggenden (**Map 3**). It is also reported to occur on Mt Goonaneman NE of Biggenden (P. Young, pers. comm.). It grows in heathland communities, on skeletal soil. The parent material is granite. Associated species include *Eucalyptus gummifera* (Gaertn.) Hockr., *Leucopogon rupicola* C.T.White and *Kunzea flavescens* C.T.White & Francis.

***Conservation status*:** 2RC according to the criteria of Briggs & Leigh (1988). The conservation status for this subspecies as defined by the Queensland Nature Conservation Act is rare.

***Etymology*:** The subspecific epithet *borealis* is from the Latin word meaning northern and refers to the more northerly distribution of this subspecies.

**5b. Triplarina volcanica** A.R.Bean subsp. **volcanica**

Leaves obovate to elliptical, 5.4–7.0 × 2.3–3.3 mm, floral bracts 0.7–1.1 mm long.

***Selected specimens*:** **Queensland.** MORETON DISTRICT: Glasshouse Mts, Aug 1914, *White* s.n. (A); Coochin Hills, near rocky summit of east peak, Aug 1968, *Smith* 14037 (BRI,NSW); [Mt] Ngungun, on shoulder on SE spur, Aug 1968, *Smith* 14003 (BRI); Mt Ngungun, Mar 1960, *Blake* 21216 (BRI,NSW); Ngungun, Glasshouse Mtns, Jul 1930, *Hubbard* 3359 (A,BRI); halfway up north face of Mt Beerwah, Sep 1968, *Willis* s.n. (BRI,MEL); northern slopes of Mt Beerwah, Dec 1989, *Bean* 1253 (BRI); Wild Horse Mountain, NE of Beerburrum, Apr 1993, *Bean* 5917 (BRI); 2 km NW of Mt Beerburrum, Mar 1993, *Bean* 5884 (BRI, CANB,MEL,NSW); Mt Tunbubudla, Glasshouse Mts, Aug 1930, *Hubbard* 3613 (A); Mt Tunbubudla, west of Beerburrum, May 1993, *Bean* 6046 (BRI,NSW).

***Distribution and habitat*:** *T. volcanica* subsp. *volcanica* is endemic to the Glasshouse Mountains just north of Brisbane, and is known from most of the peaks (**Map 3**). It grows in heathland communities, on skeletal soil. The parent material is trachyte. Some commonly associated species are *Eucalyptus trachyphloia* F.Muell., *Calytrix tetragona* Labill., *Leptospermum microcarpum* Cheel and *Leptospermum luehmannii* F.M.Bailey.

***Notes*:** This is the most commonly collected taxon of *Triplarina*, and is the only taxon which has come into general cultivation as an ornamental shrub, usually with the misapplied name *Baeckea camphorata*. It has the largest leaves (in terms of surface area) of the genus.

***Conservation status*:** No conservation coding is assigned. Several populations are protected within National Park, and still others occur in State Forest where they are unlikely to be disturbed.

**6. Triplarina imbricata** (Sm.) A.R.Bean **comb. nov.**; *Leptospermum imbricatum* Sm., Trans. Linn. Soc. London 6: 300 (1802). **Type:** New South Wales. Port Jackson, 1791, *D. Burton* s.n. (holo: LINN, microfiche!; iso: BM!)

*Baeckea camphorata* R.Br. ex Sims, Bot. Mag. 53, t. 2694 (1826) **synon. nov.**; *Triplarina camphorata* (R.Br. ex Sims) Raf., Sylva tellur. 104 (1838); *Camphoromyrtus brownii* Schauer, nom. illeg., Linnaea 17: 240 (1843); *Eremopyxis*

*camphorata* (R.Br. ex Sims) Baillon, *Adansonia* 2: 329 (1861–2). **Type**: t. 2694, Bot. Mag. 53 (1826), excluding Fig. 1.5 (lecto: here designated).

Shrub up to 2.8 m high. Bark grey, scaly to subfibrous. Leaves narrowly obovate, 2.6–3.9 mm long, 1.0–1.4 mm wide, concolorous, flat in cross-section, oil glands scattered abaxially, with no line of glands around the leaf margin; midrib faintly visible, intramarginal vein not visible, apex obtuse, not recurved; petioles 0.4–0.6 mm long. Inflorescence consisting of 2 flowers in each leaf axil, arising separately from a brachyblast. Peduncles 0.8–1.5 mm long, bracts c. 0.5 mm long; stipes 0.1–0.4 mm long, bracteoles caducous, not seen, but leaving a prominent scar marking junction of stipe and peduncle. Flowers c. 4 mm across. Hypanthium obconical, 1.5–1.6 mm long, smooth. Calyx lobes obtuse to semiorbicular, 0.5–0.7 × 0.8–1 mm, with oil glands. Petals elliptical to orbicular, 1.5–1.7 × 1.3–1.7 mm. Stamens 14–17; filaments c. 0.6 mm long, connective gland c. 0.5 times length of anthers. Ovules 8–9 per loculus, in 2 rows. Style 1.1–1.8 mm long. Fruits hemispherical, c. 1.7 × 2.4 mm. Seeds brown, c. 0.5 mm long. **Fig. 1, M–Q.**

***Specimens examined*: New South Wales.** North Coast: Nymboida River, upstream from Nymboida, Oct 1978, Grieves s.n. (NSW); Nymboida River, near Bibiranga road, 11 km S of Nymboida, May 1994, Bean 7717 (BRI); The Battery, Little Nymboida R., 10 km N of Timmsvale, Dec 1990, Williams s.n. (NE). Central Coast: Parramatta, Nov 1801, Caley (BM); Parramatta, Feb 1803, Caley (BM); near Parramatta, Nov 1803, Brown (BM,BRI, K,NSW); Parramatta, Dec 1808, Caley (A); N.S.Wales, s.d., Gov. Phillip (K); Parramatta, s.d., Woolls (K).

***Distribution and habitat*:** *T. imbricata* has been collected from only two locations; Parramatta (near Sydney) and south of Nymboida (**Map 4**). At the Nymboida sites, it grows on rocky riverbanks, as an understorey plant in low open forest in association with *Tristaniopsis laurina* (Sm.) Peter G. Wilson & J.T. Waterh., *Backhousia myrtifolia* Hook., *Ligustrum sinense* Lour. and *Boronia rosmarinifolia* Endl. The habitat for the Parramatta plants is given by Robert Brown as "ad ripis saxosis rivuli", which means "near the rocky banks of the little river".

***Phenology*:** Flowering is recorded for November and December. Fruits are borne in February.

***Notes*:** The element upon which the original validating description of *Baeckea camphorata* is based, was a cultivated plant examined by Sims and then illustrated in the Botanical Magazine. No specimen of the cultivated plant is known to exist, hence the illustration, excluding Fig 1.5, is designated here as lectotype. Figure 1.5 illustrates a 5-locular ovary. However, all flowers and fruits that I have examined are 3-locular.

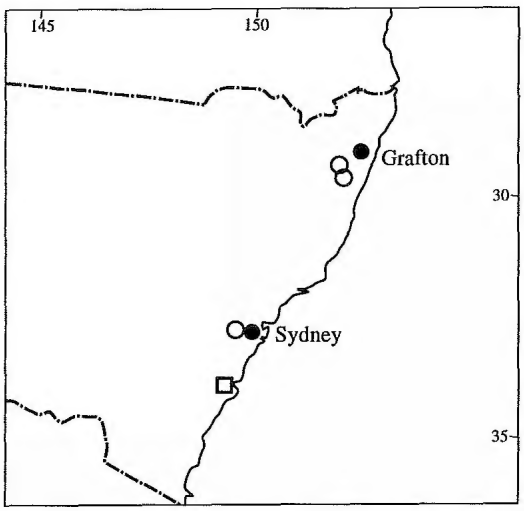
This species is not conspecific with *Baeckea imbricata* (Gaertn.) Druce, as was indicated by Thompson (1989). *Baeckea imbricata* is based on *Jungia imbricata* Gaertn.

***Affinities*:** *T. imbricata* has the smallest leaves (on average) of all *Triplarina* species. It is of similar appearance to *T. calophylla*, but *T. imbricata* has 8–9 ovules per loculus (10–11 for *T. calophylla*) and stipes 0.1–0.4 mm long (0.6–0.8 mm for *T. calophylla*).

*T. imbricata* differs from *T. nowraensis* by its hypanthium 1.5–1.6 mm long (1.8–2.0 mm for *T. nowraensis*); 8–9 ovules per loculus (10–12 for *T. nowraensis*); petals 1.5–1.7 mm long (2.0–2.4 mm for *T. nowraensis*); semi-orbicular calyx lobes (deltoid for *T. nowraensis*) and scattered foliar oil glands (in parallel lines for *T. nowraensis*).

***Conservation status*:** 2E according to the criteria of Briggs & Leigh (1988). The species is probably extinct in the Sydney area, as no herbarium collections following that of W. Woolls (probably in the 1850's) are known. Parramatta is a well collected locality, and the area has been subject to botanical survey, but no populations of *T. imbricata* are currently known (D. Benson, pers. comm. 1994). Riverbanks (which are the habitat of this species) are commonly subject to early invasion by exotic weeds, and it is likely that all Parramatta populations of *T. imbricata* have long since been overwhelmed.

The number of plants present in the Nymboida area is seemingly very few; the author has been able to locate just 30 plants in 2 populations along the Nymboida River. Furthermore, it is under threat there from exotic weeds, notably *Ligustrum sinense* Lour. and *Lantana camara* L.




**Map 4.** Distribution of *Triplarina imbricata* ○ and *T. nowraensis* □ .

**7. Triplarina nowraensis** A.R.Bean **sp. nov.**, *Triplarinae imbricatae* affinis, sed foliis latioribus truncatis, glandulis oleosis in ordinationibus linearibus, hypanthio longiore, loculo ovulis 10–12, glandula connectivi minore et sepalis deltoideis differt. **Typus:** New South Wales. South Coast: east of Flat Rock Dam, Nowra, 27 November 1994, K. Mills s.n. (holo: BRI; iso: NSW, distribuendi)

***Illustration*:** Harden (ed.), Fl. of N.S.W. 2: 183 (1991), as *Baeckea camphorata.*

Shrub to 3.5 m high. Bark grey and scaly on branchlets. Leaves obovate to oblanceolate, 3.4–5.0 mm long, 1.2–1.7 mm wide, slightly discolorous, large oil glands in two parallel rows either side of midrib, with numerous smaller glands lining the leaf margin, intramarginal vein not visible, apex of leaf truncate, recurved; petioles 0.4–0.6 mm long. Inflorescence comprising 2 flowers in each leaf axil, arising separately from a brachyblast. Peduncles 1.2–3.5 mm long, bracts leaf-like, obovate, c. 0.9 mm long; stipes c. 0.3 mm long, bracteoles somewhat persistent, 1.1–1.5 mm long. Flowers c. 4.5 mm across. Hypanthium obconical, 1.8–2.0 mm long, smooth. Calyx lobes deltoid, 0.7 × 0.9–1.0 mm, with oil glands, apex obtuse. Petals 2.0–2.4 × 2.0–2.2 mm. Stamens 15–17; filaments c. 0.6 mm long, connective gland c. 3 times length of anthers. Ovules 10–12 per loculus in 2 rows. Style c. 0.9 mm long. Fruits hemispherical, 2.0–2.9 × 2.1–2.8 mm, wrinkled but not ribbed, valves exceeding rim but not exceeding calyx lobes. Seeds brown, 0.6–0.8 mm long. **Fig. 1, H–L.**

***Specimens examined*: New South Wales.** Central Coast: near Nowra, Dec 1924, Rodway s.n. (A); in sandstone country near Nowra, Dec 1929, *Rodway* s.n. (K); Illaroo road, 10 mls [16km] W of Nowra, Dec 1935, *Rodway* 2098 (A,K); 'Bundanon', west of Nowra, Nov 1985, *Mills* s.n. (NSW). South Coast: Nowra Ck, Yalwal Road, west of Nowra, March 1925, *F.A. Rodway* s.n. (NSW); Flat Rock Creek, 3 mls [5 km] from Nowra on Yalwal road, Dec 1932, *Rodway* 988 (K); Nowra tip, west of Nowra, Mar 1990, *Mills* s.n. (NSW); Nowra tip on Yalwal Road, 500 m down from back of pit, Dec 1994, *Denham* s.n. (BRI,NSW); Wombat Flat Fire road, Boolijong Creek Valley, SW of Nowra, Nov 1994, *Mills* s.n. (BRI,MEL,NSW).

***Distribution and habitat*:** *T. nowraensis* is known only from the area just to the west and south-west of Nowra in New South Wales (**Map 4**). The habitat is heathland close to stream channels or swampy slopes, and commonly associated species include *Leptospermum polygalifolium* Salisb., *Melaleuca linariifolia* Sm., *Melaleuca thymifolia* Sm., *Baeckea virgata* (J.R.Forst. & G.Forst.) Andrews and *Kunzea ambigua* (Sm.) Druce. The surrounding vegetation is eucalypt woodland.

***Phenology*:** Flowers are recorded for November-December, and fruits have been recorded from December to March.

***Affinities*:** *T. nowraensis* is close to *T. imbricata*, but differs by its leaves 1.2–1.7 mm wide (1.0–1.4 mm for *T. imbricata*) with a truncate apex (obtuse for *T. imbricata*), and oil glands distributed in lines either side of the midrib (scattered for *T. imbricata*); hypanthium 1.8–2.0 mm long (1.5–1.6 mm for *T. imbricata*); 10–12 ovules per loculus (8–9 for *T. imbricata*); petals 2.0–2.4 mm long (1.5–1.7 mm for *T. imbricata*); somewhat persistent bracteoles (extremely caducous in *T. imbricata*); deltoid calyx lobes (semi-orbicular for *T. imbricata*) and smaller connective gland.

***Conservation status*:** 2V according to the criteria of Briggs & Leigh (1988). The species is known only from five small populations in the immediate Nowra area, and is not known from

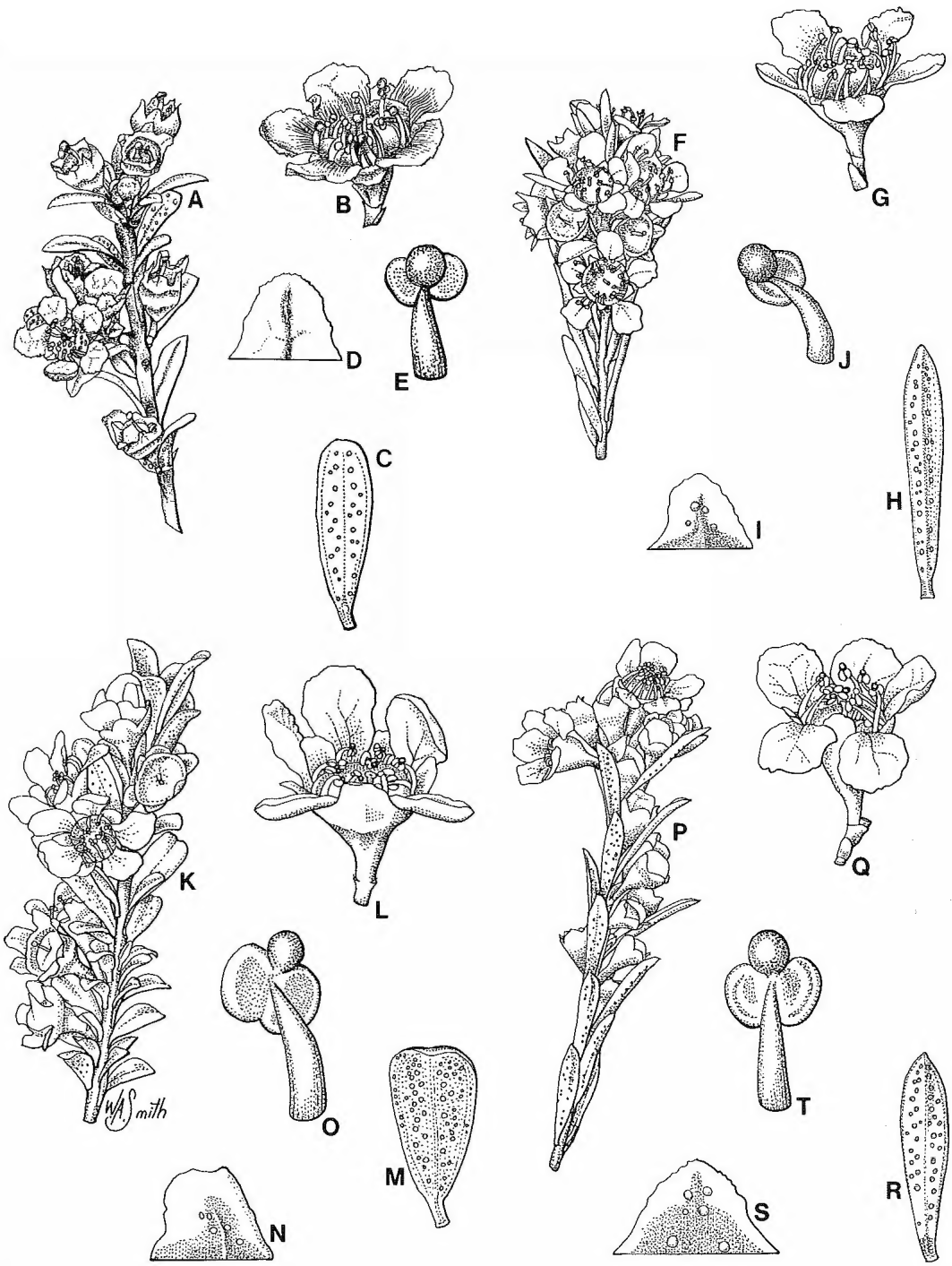



**Fig. 2.** *Triplarina bancroftii*. A. flowering branchlet × 3. B. flower × 6. C. leaf, lower surface × 6. D. calyx lobe × 18. E. stamen × 32. *Triplarina paludosa*. F. flowering branchlet × 3. G. flower × 6. H. leaf, lower surface × 6. I. calyx lobe × 18. J. stamen × 32. *Triplarina calophylla*. K. flowering branchlet × 3. L. flower × 6. M. leaf, lower surface × 6. N. calyx lobe × 18. O. stamen × 32. *Triplarina nitchaga*. P. flowering branchlet × 3. Q. flower × 6. R. leaf, lower surface × 6. S. calyx lobe × 18. T. stamen × 32. A–E, *Bean* 6966; F–J, *Bean* 6932; K–O, *Bean* 5173; P–T, *Lockyer* s.n. (AQ 549740).

any conservation reserve. Known threats include urban development, sedimentation and road widening. The type population comprises some thousands of plants, but all other known populations are much smaller. (K. Mills pers. comm.).

***Etymology***: The specific epithet refers to the occurrence of the species near the town of Nowra, New South Wales.

### Imperfectly known Taxon

The following appears to be a distinct species, but in the absence of fertile material, no firm judgement can be made.

*Triplarina* sp.

Shrub 2 m high. Bark grey, persistent. Leaves linear-lanceolate, 4–4.5 × 0.9–1 mm, oil glands in two vertical rows on abaxial surface; apex acute.

***Specimen examined***: **Queensland.** BURKE DISTRICT: Bertya Creek, W of "Warang", White Mountains NP, 20°27'S, 144°46'E, Jun 1992, *Bean* 4604 (BRI).

***Distribution and habitat***: This taxon was observed in two places in the White Mountains NP, where it is probably endemic. It grows in steep-sided sandstone gullies or gorges, in association with *Lophostemon suaveolens* and *Beyeria viscosa* var. *obovata* C.T.White.

### Acknowledgements

I wish to thank several people for their assistance. Dr Kevin Mills collected specimens of *T. nowraensis* at my request and supplied information about it. Belinda Pellow kindly forwarded a specimen of *T. nowraensis*. Michael Lockyer collected specimens of *T. nitchaga* at my request. Paul Forster commented on a draft of this manuscript. Ian Brooker helped to decipher a difficult Latin phrase and provided the Latin diagnoses. Laurie Jessup (Australian Botanical Liasion Officer) located and photographed a reputed type specimen of *Baeckea camphorata*. I thank the directors of A, BM, K, NE, NSW, QRS & MEL for the loan of specimens and/or access to their herbaria.

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# *Fasciculochloa*, a new grass genus (Poaceae: Paniceae) from south-eastern Queensland

**Bryan K. Simon and Carolyn M. Weiller**

**Summary**

Simon, Bryan K. & Weiller, Carolyn M. (1995). *Fasciculochloa*, a new grass genus (Poaceae: Paniceae) from south-eastern Queensland. *Austrobaileya* 4(3): 369–379. A new panicoid genus, *Fasciculochloa*, with a single species *Fasciculochloa sparshottiorum*, from the Moreton District of south-eastern Queensland is described and illustrated.

Keywords: Poaceae: Paniceae, *Fasciculochloa sparshottiorum*, *Fasciculochloa* - south-eastern Queensland.

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## Introduction

In 1993, Kym Sparshott of the Queensland Herbarium was requested to produce an environmental impact assessment on the Hancock Brothers' pine plantation, in the Logan Shire, south of Brisbane, prior to the re-assignment of this area to urban development at the culmination of its present use as an area for growing commercial timber. Among the collections of botanical specimens made by Kym and Peter Sparshott for the compilation of a plant inventory of the region, was an unusual grass allied to *Panicum* L. I (BKS) was unable to identify it and failed to key it to a recognisable genus in both the computerised INTKEY set of generic descriptions of the grass genera of the world by Watson and Dallwitz (1992–5) and in the key to genera by Clayton and Renvoize (1986). We are therefore describing this taxon as *Fasciculochloa*, a new genus in the Paniceae.

Using INTKEY this grass keys to *Loudetia*, but it differs from that genus by its glumes not being awned. It keys to couplet 81 in the key to genera of the Paniceae by Clayton and Renvoize (1986), leading to the genera *Arthropogon* Nees and *Reynaudia* Kunth; it differs from the former by its lower glume not being awn-like and from the latter by its lower glume not being bilobed. It keys to couplet 25 in the key to genera of Australian Paniceae by Webster (1987), leading to the genera *Rhynchelytrum* Nees and *Melinis* P.Beauv. (the former now included in *Melinis*), but differs by the upper glume being 3–5-nerved as opposed to 5–7-nerved in the latter genera, and by its fasciculate mature panicle branches. It keys to *Cliffordiochloa* B.K.Simon in Simon (1993).

*Fasciculochloa* is similar to *Alexfloydia* B.K.Simon, *Cliffordiochloa* B.K.Simon and *Dallwatsonia* B.K.Simon, three Australian panicoid genera recently described (Simon 1992) in that its spikelets are laterally compressed to terete and the lower glume is adaxial to the adjacent pedicel or inflorescence axis. In all four genera this feature is only clearly seen where the spikelets have short pedicels. The lower glume may sometimes appear to be abaxial in spikelets with longer pedicels due to twisting of the pedicels.

Morphological and anatomical characters of *Fasciculochloa* were coded using the Watson and Dallwitz DELTA character list (Watson & Dallwitz 1994) and the DIFFERENCES option of INTKEY was run to assess how this genus differed from *Alexfloydia*, *Cliffordiochloa*, *Dallwatsonia* and *Panicum*. In all the analysis revealed 75 character differences of which the 20 most obvious ones are shown in **Table 1**. The characters and character states of these 20 characters are shown in **Table 2**.

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**Table 1**. The main 20 characters distinguishing *Fasciculochloa* from related genera.

| Char | *Alexfloydia* | *Cliffordiochloa* | *Dallwatsonia* | *Fasciculochloa* | *Panicum* |
|---|---|---|---|---|---|
| 89 | 1 | 1 | 1 | 2 | 1/2 |
| 125 | 3–3.5 | 1.5 | 3.5–4 | 2.5 | 1.4–6 |
| 128 | 2 | 2 | 2 | 2 | 1 |
| 129 | 1 | 1 | 1/2 | 1/2 | 3 |
| 165 | 2 | 2 | 1 | 1 | 1/2 |
| 170 | 5–7 | 1 | 5 | 3 | 1–7 |
| 172 | 9 | 2–5 | 5–7 | 3–5 | 3–9 |
| 182 | 1 | 1 | 2 | 1 | 1/2 |
| 183 | 2 | 2 | 2 | 1 | 2 |
| 184 | 1 | 2 | 2 | 2 | 1/2 |
| 187 | 9 | 3–5 | 5 | 5 | 5 |
| 230 | 5 | 0 | 5–7 | 2 | 3–11 |
| 253 | 3 | 2 | 3 | 2 | 3 |
| 301 | 2 | 2 | 2 | 1 | 1 |
| 323 | 2 | 1 | 1 | 2 | 1/2 |
| 331 | 1 | 1 | 1 | 2 | 1 |
| 336 | $C_4$ | $C_3$ | $C_3$ | $C_3$ | $C_3/C_4$ |
| 360 | 1 | 1 | 1 | 2 | 1/2 |
| 362 | 1 | 2 | 1 | 2 | 1/2 |
| 364 | 2 | 1 | 1 | 1 | 1 |

Morphologically *Fasciculochloa* differs from *Cliffordiochloa* by the fasciculate nature of its spikelets at the apex of mature panicle branches, the branches being bare of spikelets at the base, by the lower glume being 3-nerved (1-nerved in *Cliffordiochloa*) and less than half the length of the lowest lemma (longer than half the length of the lowest lemma in *Cliffordiochloa*) and by its larger spikelets (c.2.5 mm long compared to c.1.5 mm long in *Cliffordiochloa*). It shares with *Cliffordiochloa* the characters of the sterile lower floret with a fully developed palea and the fertile floret with two stamens, a feature known only in one other panicoid genus, *Reynaudia* Kunth from Cuba (Watson & Dallwitz 1992). It differs from *Dallwatsonia* by the fasciculate nature of its spikelets at the apex of mature panicle branches, the branches bare of spikelets at the base, its smaller spikelets (c. 2.5 mm long compared to 3.5–4 mm long in *Dallwatsonia*), its 3-nerved lower glume (5-nerved in *Dallwatsonia*), its 3-5- nerved upper glume (5–7- nerved in *Dallwatsonia*), its palea of the lower floret being fully developed and becoming conspicuously hardened (reduced and not hardened in *Dallwatsonia*) and its fertile floret having two stamens (three in *Dallwatsonia*). *Fasciculochloa*

**Table 2. Characters and character states of the 20 characters used in Table 1, extracted from the DELTA chars file of Watson and Dallwitz (1992–5)**

#89. racemes <whether spikelet bearing to the base>/
1. spikelet bearing to the base/
2. without spikelets towards the base/

#125. <female-fertile> spikelets <approximate length>/
mm long/

#128. <female-fertile> spikelets <orientaion of sessile to subsessile forms>/
1. abaxial <G1 when present on the side away from the rachis; in panicoid forms having a proximal incomplete floret, the upper (female-fertile) lemma backs onto the rachis>/
2. adaxial <G1 when present against the rachis; in panicoid forms having a proximal incomplete floret, the upper (female-fertile) lemma is on the side away from the rachis>/

#129. <female-fertile> spikelets <plane of compression>/
1. compressed laterally <lying on the side when placed on a flat surface>/
2. not noticeably compressed <terete>/
3. compressed dorsiventrally <lying on front or back when placed on a flat surface>/

#165. lower glume <length relative to the lowest lemma>/
1. much shorter than half length of lowest lemma/
2. longer than half length of lowest lemma/

#170. lower glume <of female-fertile spikelet, nerve number>/
nerved/

#172. upper glume <of female-fertile spikelets, nerve number>/
nerved/

#182. palea of proximal incomplete florets <development>/
1. fully developed/
2. reduced/

#183. palea of proximal incomplete florets <whether hardened>/
1. becoming conspicuously hardened/
2. not becoming conspicuously hardened/

#184. proximal incomplete florets <of the female-fertile spikelets: sexuality>/
1. male/
2. sterile/

#187. proximal lemmas <of the female-fertile spikelets, nerve number/
nerved/

#230. <female-fertile> lemmas <number of nerves>/
nerved/

#253. stamens <number per female-fertile floret>/

#301. long-cells <of abaxial leaf blade epidermis, whether similar in shape costally and intercostally>/
1. similar in shape costally and intercostally/
2. markedly different in shape costally and intercostally/

#323. intercostal short-cells <abaxial leaf blade, presence>/
1. common/
2. absent or very rare/

#331. costal silica bodies <of abaxial leaf blade epidermis, presence>/
1. present and well developed/
2. poorly developed/
3. absent/

#336. <maximum cells-distant count; indicating photosynthetic pathway>/
1. <showing a maximum cells-distant count of one, reliably predicting> $C_4$/
2. <showing a maximum cells-distant count of two or more, reliably predicting> $C_3$/

#360. midrib <of the leaf blade, prominence>/
1. conspicuous <prominent in the outline>/
2. not readily distinguishable <other than by position>/

#362. midrib <whether extensively of colourless cells adaxially>/
1. with conspicuous colourless tissue adaxially/
2. without <conspicuous> colourless tissue adaxially/

#364. bulliforms <presence in the adaxial leaf blade of discrete adaxial groups: exclude 'hinge' groups flanking midribs>/
1. present in discrete, regular adaxial groups/
2. not in discrete, regular adaxial groups <bulliform cells absent or in ill defined or irregular groups, or constituting most of the epidermis>/

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shares with *Dallwatsonia* the characters of the lower glume being much shorter than half the length of the lower lemma, the lower floret being sterile and the 5-nerved lower lemma. It differs from *Alexfloydia* by its smaller spikelets (c.2.5 mm long compared to 3–3.5 mm long in *Alexfloydia*), by its 3-nerved lower glume less than half the length of the lower lemma (5–7- nerved lower glume longer than half the length of the lower lemma in *Alexfloydia*), its lower floret being sterile (male in *Alexfloydia*), its 5-nerved lower lemma (9-nerved in *Alexfloydia*) and the two stamens in the fertile floret (three stamens in *Alexfloydia*).

From the use of the DIFFERENCES option of DELTA, it is obvious there are 7 anatomical differences by which *Fasciculochloa* can be distinguished from allied Australian panicoid genera. The abaxial leaf-blade epidermis has long-cells that are costally and intercostally similar in shape in *Fasciculochloa*, but markedly different in *Alexfloydia*, *Cliffordiochloa* and *Dallwatsonia*, intercostal short-cells are infrequent in *Fasciculochloa* and *Alexfloydia*, but common in *Cliffordiochloa* and *Dallwatsonia* and costal silica bodies are poorly developed in *Fasciculochoa* but well developed in the other three genera. *Fasciculochloa*, *Cliffordiochloa* and *Dallwatsonia* have $C_3$ leaf anatomy in that the maximum cells-distant count between vascular bundles is two or more whereas *Alexfloydia* has $C_4$ leaf anatomy in that the maximum cells-distant count between vascular bundles is one. The leaf-blade midrib is not readily distinguishable in *Fasciculochloa* but conspicuous in the other genera and the midrib is without colourless tissue adaxially in *Fasciculochloa* and *Cliffordiochloa* but with conspicuous colourless tissue adaxially in *Alexfloydia* and *Dallwatsonia*. Bulliform cells are not in discreet regular adaxial groups in *Fasciculochloa*, *Dallwatsonia* and *Cliffordiochloa*, as they are in *Alexfloydia*.

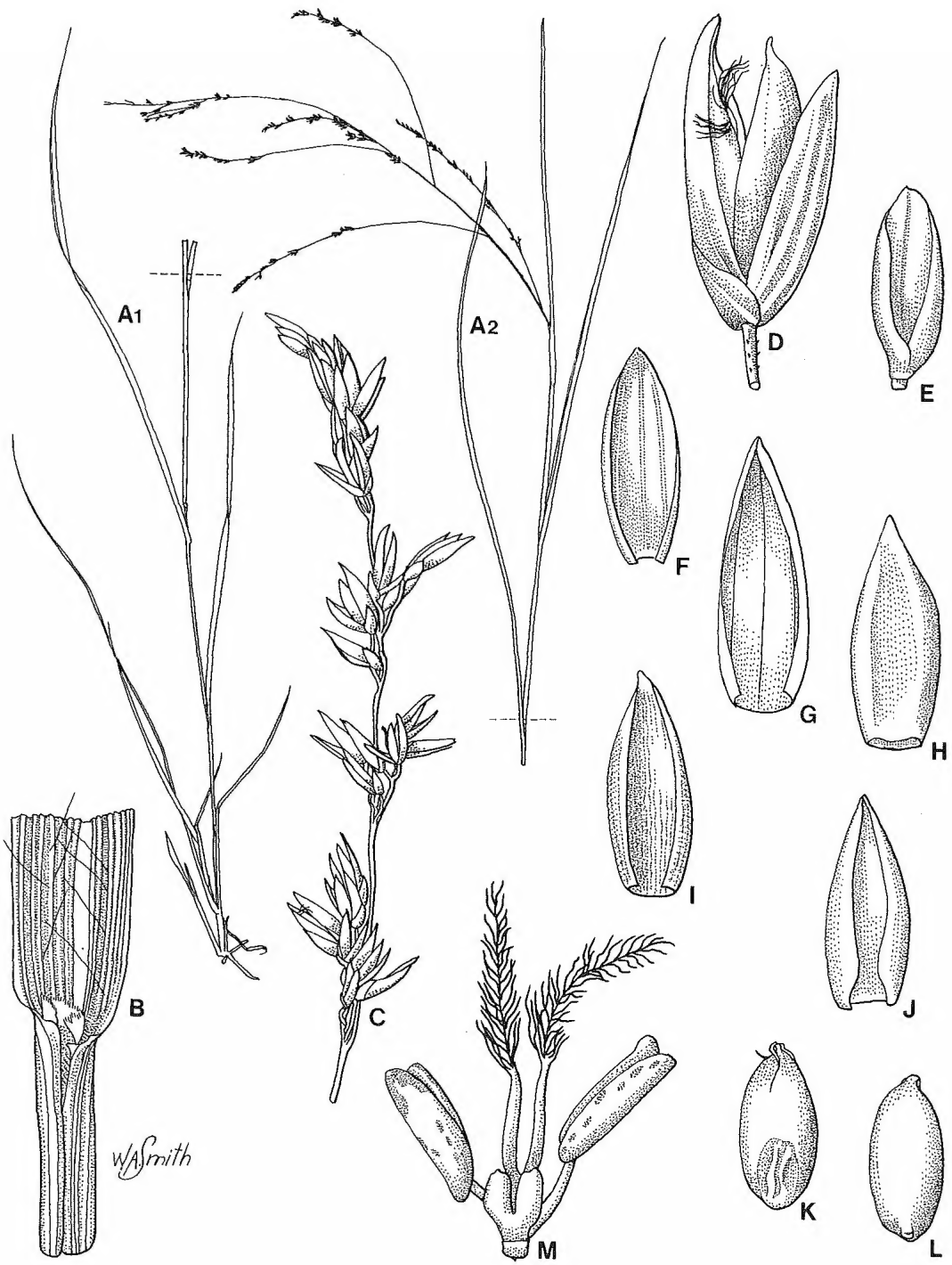


**Fig.1.** *Fasciculochloa sparshottiorum*: $A_1$ and $A_2$ habit × 0.5. B. leaf sheath junction with leaf blade, adaxial surface × 10. C. apex of inflorescence branch × 5. D. spikelet, lateral view × 20. E. lower glume. F. upper glume. G. lower lemma. H. lower palea. I. upper lemma. J. upper palea (D-J, all adaxial views, × 10). K. caryopsis, viewed from embryo side. L. caryopsis, viewed from hilum side (K-L, × 10). M. stamens, pistils and lodicules × 40 . All drawn from holotype.

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**Fasciculochloa** B.K.Simon & C.M.Weiller, **gen.nov.**, *Cliffordiochloae* B.K.Simon affine sed ramis paniculae maturae spiculis fasciculis ad apicem, basi nudis, spiculis grandioribus, glumis inferis 3-nervatis, *Dallwatsoniae* B.K.Simon affine sed ramis paniculae maturae spiculis fasciculis ad apicem, basi nudis, glumis inferis 3-nervatis, flosculis fertilibus staminibus duobus (non tribus), *Alexfloydiae* B.K.Simon affine sed spiculis parvioribus, glumis inferis 3-nervatis, glumis superis 5-nervatis, flosculis inferis sterilibus, flosculis fertilibus staminibus duobus (non tribus), *Melinis* P.Beauv. affine sed ramis paniculae maturae spiculis fasciculis ad apicem, glumis superis 3–5-nervatis, differt. **Typus**. *Fasciculochloa sparshottiorum* B.K.Simon & C.M.Weiller.

Flowering culms erect, tufted, sparingly branched, terminated by a solitary inflorescence, 3 or 4 noded. Internodes slightly longer than the associated leaf sheaths. Leaf sheaths compressed, glabrous, with smooth nerves. Ligule a fringed membrane. Mid-culm leaf blades flat, linear, glabrous except for cilia at base, smooth, tapering to a narrow apex, attenuate at the base, with imperceptibly scaberulous margins. Inflorescence a panicle, fully exserted at maturity. Main axis scaberulous. Primary branches with glabrous axils, spreading, angled, scaberulous, terminating in a spikelet. Pedicels flexuous with apices glabrous and cupuliform. Disarticulation at the base of the spikelet. Spikelets ± distal on branches, obscurely adaxial (with the lower glume facing the adjacent pedicel or inflorescence axis), overlapping, single or sometimes obscurely paired, ± terete to laterally compressed, oblong. Glumes unequal, membranous, smooth, glabrous: lower glume oblong, encircling the spikelet base, 3-nerved, acute or rounded at apex; upper glume elliptic, 3–5-nerved, rounded on the back, acute. Lower floret neuter: lemma ovate-elliptic, membranous, 5-nerved, with nerves smooth and conspicuous, glabrous, acute; palea ovate-elliptic, acute. Upper floret perfect, slightly shorter than the lower floret; lemma chartaceous, elliptic, rounded on the back, obscurely nerved, glabrous, acute; palea chartaceous, smooth, enclosed at its apex by the lemma. Lodicules well-developed. Stamens 2, styles basally free.

***Etymology*:** The genus name is derived from the fasciculate appearance of the spikelets on the branches of the mature panicle.

**Fasciculochloa sparshottiorum** B.K. Simon & C.M. Weiller, **sp. nov.** Culmus florens erectus, caespitosus, ad 60 cm altus, parce ramosus, terminatus inflorescentia solitaria, 3- vel 4- nodosus; nodi glabri; internodia spongiosi, glabra, leviter longiora quam vaginas contiguas; vaginae complanatae, glabrae, marginibus laevibus, nervis laevibus; ligula membranae fimbriatae, ad 0.4 mm longa; laminae lineares, ad 20 cm longae et ad 3.5 mm latae, contractae ad apices, attenuati ad bases, planae, glabrae praeter ciliatae ad bases, laeves, marginibus scaberulis. Panicula matura exserta; axis principalis ad 15 cm longus, dilute scaberulus; rami primarii cum axillis glabris, effusi, ad 5 cm longi, angulati, scaberuli, in spiculam terminantes. Pedicelli ad 1 mm longi, flexuosi, apicibus glabris, articulo ad basem spiculae. Spiculae abaxiales, imbricatae, in ramum primarium ad apicem dispositae, oblongae, teretes, ad 2.5 mm longae, ad 1 mm latae; gluma inferna oblonga, ad 1 mm longa, 3-nervata, membranacea, laevis, glabra, acuta vel rotundata ad apicem, basem spiculae cingens; gluma supera elliptica, ad 1.7 mm longa, 3–5-nervata, rotundata in dorsum, membranacea, glabra praeter cilia in marginibus, acuta. Flosculus infernus neuter; lemma ovatum vel ellipticum, ad 2.5 mm longum ad 0.5 mm latum, acutum. Flosculus superus bisexualis, leviter brevior quam flosculum infernum; lemma ellipticum, ad 2.2 mm longum, obscure nervatum, rotundatum in dorsum, chartaceum, aeque striatum, glabrum, glabrum, acutum; palea obscure nervata, chartacea, laevis, apex lemmate inclusus; lodiculae bene evolutae; anthera ad 0.75 mm longa; styli liberi ad bases. **Typus:** Queensland, Moreton District, Hancock Brother's Pine Plantation, 9 km SSE of Logan Village, 27°51'S 153°08'E, 27 Jan 1994, *B.K. Simon* 4270, *E.J. Thompson, P.& K. Sparshott & D.A. Simon*, drainage line dominated by *Melaleuca linariifolia* low woodland, growing with *Pseudoraphis paradoxa*

in wetter zones, delicate perennial, locally common. (holo: BRI (AQ632530 –2 sheets); iso: AD,B,BRI,CANB,DNA, IBSC,K,L,MEL,MO,NSW,PERTH, PRE,SRGH,US). **Fig. 1.**

A full English species description is not provided as the essential descriptive elements can be found in the English generic description. The following English diagnosis supplies characters of a specific nature, including mainly quantitative measurements, which can be used to compare any further species that may be discovered.

Flowering culms erect to 60 cm tall. Nodes glabrous. Internodes spongy, glabrous. Ligule to 0.4 mm long. Mid-culm leaf blades to 20 mm long, to 3.5 mm wide. Inflorescence with main axis to 15 mm long, faintly scaberulous. Primary branches to 5 mm long. Pedicels to 1 mm long, flexuous. Spikelets 35 to 45 on a typical lowermost primary branch, to 2.5 mm long, to 1 mm wide. Lower glume to 1 mm long. Upper glume to 1.7 mm long, Lower lemma to 2.5 mm long, 0.5 mm wide. Lower palea fully developed, ovate-elliptic, acute. Upper lemma to 2.2 mm long. Anthers to 0.75 mm long.

***Etymology*:** The species is named for Kym and Peter Sparshott, the original collectors of the species.

***Specimens examined*: Queensland.** MORETON DISTRICT: Hancock Brothers' Pine Plantation, *B.K. Simon* 4270, *E.J. Thompson, P.& K. Sparshott & D.A. Simon* (type - for details see above); Hancock Brothers' Pine Plantation, 27°49'03"S 153°07'30"E, associated with *Melaleuca linariifolia, Ludwigia* sp., *Juncus usitatus, Persicaria* sp., *Imperata cylindrica* and *Ischaemum australe*. Waterlogged area, plants in water, rooting at nodes, *K. Sparshott* 252 & *P. Sparshott* (BRI, CANB, NSW, SP).

***Distribution and habitat*:** Very restricted site in south-eastern Queensland, 9 km SSE of Logan village. Flowering Jan-Feb. Associated in marshy area dominated by *Melaleuca linariifolia*. **Fig 2.**

***Rare and threatened status*** (Briggs & Leigh 1988). 2E. Under the Queensland Nature Conservation Act (1992) we recommend that this taxon be considered endangered.

**Fig.2.** Type locality of *Fasciculochloa sparshottiorum* growing in marshy area dominated by *Melaleuca linariifolia*.

Austrobaileya 4(3): 369–379 (1995)

**Anatomy** (by C.M.Weiller)

***Abaxial leaf blade epidermis.*** *Costal/intercostal zonation* conspicuous, intercostal zones bordering the midrib 10–12 cells wide. Epidermis with differentiated long- and short-cells, long-cells similar in shape costally and intercostally, of similar wall thickness costally and intercostally. *Microhairs* present, confined to the non-stomatal files, in the middle of the intercostal zone, panicoid-type, elongated, longer than the stomatal complexes, clearly two-celled, slender, having both cells approximately the same shape. Distal cell blunt. Basal cell base neither constricted nor expanded, parallel-sided. Microhairs 51–69 μm long, 6 μm wide at the septum. Microhair apical cells 27-30 μm long. Crown cells absent. Prickles present, intercostal, fairly uniform in size and form. Prickle bases not paired with a short-cell. Intercostal prickles in the astomatal files (in between the stomatal files), infrequent. Intercostal prickles 4–6 per field. Bases of the intercostal prickles shorter than the width of an intercostal long-cell to about as long as the width of an intercostal long-cell, shorter than the stomata. Barbs of the intercostal prickles about as long as the bases to up to twice as long as the bases. Macrohairs absent. Intercostal long-cells fairly constant in shape. Mid intercostal long-cells markedly elongated, rectangular. Mid-intercostal long-cell walls moderately undulating. Undulations irregular. End walls vertical, or angled. Intercostal long-cell walls not conspicuously pitted. Outer surfaces of intercostal long-cells not pitted. Papillae absent.

*Costal zones* all histologically similar. Costal short-cells conspicuously in long rows. Costal cork-cells similar in shape to the silica cells, square to elongated-rectangular (ignoring cell wall undulations). Costal silica bodies present and conspicuous, confined to the outer edges of costal zones or confined to the central files of the costal zones (in narrow costal zones), with horizontal dumb-bells having flattened or indented ends. Isthmuses of the dumb-bells about as long as the expanded ends, wide.

*Intercostal short-cells* infrequent, throughout the intercostal zones (but of a slightly higher frequency between stomatal files), solitary. Unsilicified intercostal short-cells tall-and-narrow. Walls straight. Intercostal silica bodies absent.

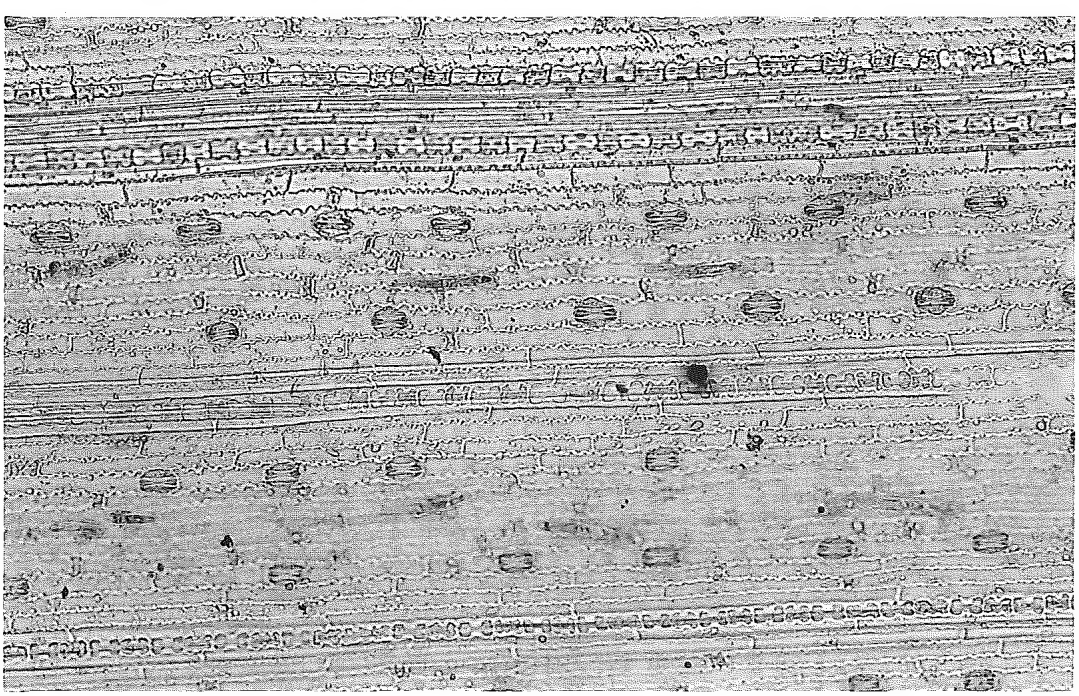

**Fig. 3.** *Fasciculochloa sparshottiorum*, abaxial leaf epidermis.

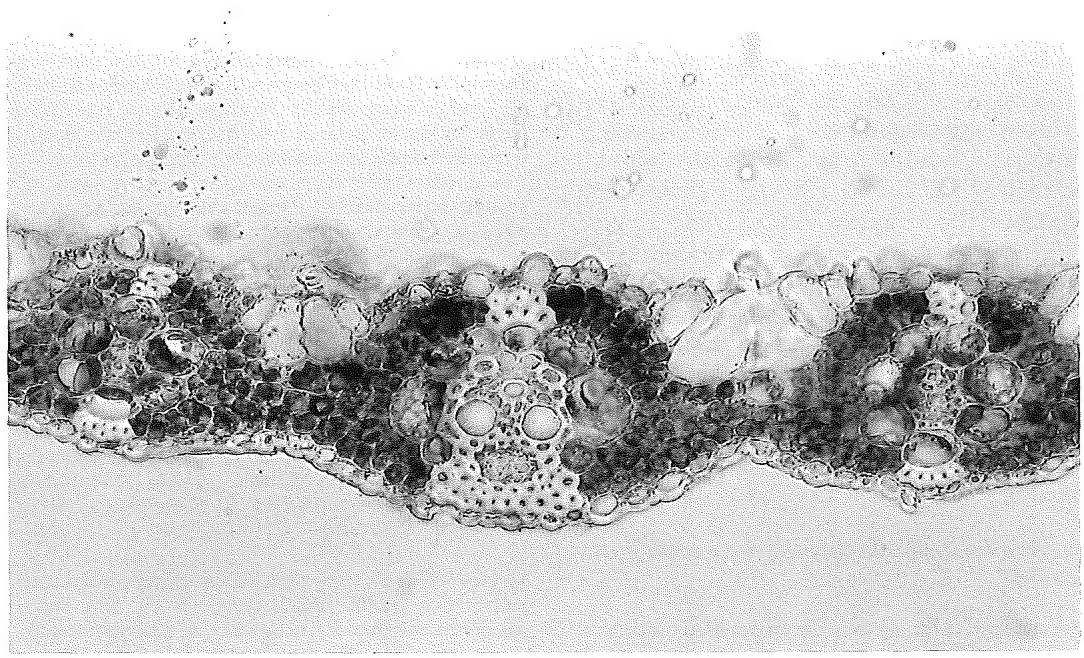

**Fig. 4.** *Fasciculochloa sparshottiorum*, transverse section of leaf blade. $C_3$, XyMS+.

*Stomata* common, present in all the intercostal zones, restricted in distribution within intercostal zones (in 2 files), arranged in definite rows. Stomatal rows in the widest intercostal zones 2, bordering the costae (but 2–3 cell files away). Stomata not over-arched by papillae, 18–27 μm long, having guard-cells flush with or overlapping the interstomatals. Subsidiaries dome-shaped. **Fig. 3.**

***Photosynthetic pathway and related features.*** $C_3$. XyMS+. PBS sheaths of the primary lateral vascular bundles interrupted. Mestome sheath single.

***Transverse section of the leaf blade.*** Lamina mid-zone in transverse section open, more or less flat. Width of lamina across primary ribs 84–90 μm. Lamina mid-zone in transverse section with shallow ribs both adaxially and abaxially, opposite one another. Adaxial furrows slight, narrow. Wavelength 120–135 μm. Amplitude 12–15μm. Adaxial furrows between all the vascular bundles (except for the smallest bundles). Adaxial ribs more or less constant in size, round topped to flat-topped, opposite all vascular bundles. Vascular bundles in the mid-lamina 3–4, 1 per rib. Abaxial furrows present between the vascular bundles. Abaxial ribs opposite all the vascular bundles, similar in size to the adaxial ribs. Midrib not pronounced in outline, not prominent adaxially or abaxially, tissue layout similar to that of other primary vascular bundles. Vascular bundles in the mid-lamina region of the midrib 1. Median vascular bundle without a protoxylem cavity, without an enlarged protoxylem vessel, without sclerosed phloem. Midrib without colourless tissue adaxially, without thin-walled sclerenchymatous cells adaxially, without lacunae. Lamina symmetrical on either side of the midrib.

Mesophyll chlorenchyma non-radiate, not of the *Isachne*-type (Plate 3:26 in Watson & Dallwitz 1988), tightly packed, without lacunae, without any obvious adaxial palisade, not traversed by columns of colourless cells, without arm cells, without fusoids. Bulliforms present in discrete groups. Bulliform groups situated between vascular bundles, without contiguous colourless mesophyll cells, large, simple, fan-shaped (with 2 large middle cells). Abaxial epidermis without bulliform-like epidermal cells or groups. Abaxial epidermal

cell walls thickened. Cells regular in shape, ovoid, or rectangular. Major vascular bundles interspersed with minor bundles. Outlines of primary vascular bundles more or less circular. Primary vascular bundles centrally situated, lateral vascular bundles with adaxial sclerenchyma, lateral vascular bundles with abaxial sclerenchyma. Adaxial and abaxial sclerenchyma forming girders, combined girders nowhere forming 'figures' (Plate 3:24 in Watson & Dallwitz 1988). Outlines of lower order vascular bundles more or less circular. Lower order vascular bundles centrally situated, with adaxial and abaxial sclerenchyma forming girders. Combined girders of the lower order vascular bundles nowhere forming 'figures'. **Fig. 4.**

### *Generic description comparative to other grass genera.*

A description of the genus in the format used by Watson and Dallwitz (1994) was generated with the TONAT option of DELTA, so that a comparative description to all other grass genera contained in that publication is available. The reader is referred to the character list (p. 9–49) for clarification/interpretation/definition of terms and references to character illustrations.

**Fasciculochloa** B.K.Simon & C.M.Weiller

**Habit, vegetative morphology.** Perennial; caespitose. Culms to 60 cm high; herbaceous; branched above (sparingly); not tuberous; 3–4-noded. Culm nodes glabrous. Upper culm leaf blades fully developed. Culm internodes solid. Young shoots intravaginal. Leaves not basally aggregated, clearly differentiated into sheath and blade. Leaf blades linear, narrow, to 3.5 mm wide; flat, parallel veined, persistent. Ligule a fringed membrane, to 0.4 mm long.

**Reproductive organisation.** Plants bisexual, with bisexual spikelets, with hermaphrodite florets.

**Inflorescence.** Inflorescence paniculate, open, with axes ending in spikelets, espatheate, not comprising 'partial inflorescences' and foliar organs. Spikelets solitary, or paired (obscurely), not secund, pedicellate. Pedicel apices cupuliform.

**Female-fertile spikelets.** Spikelets to 2.5 mm long, elliptic, adaxial (obscurely), terete to laterally compressed, falling with the glumes. Rachilla hairless.

**Glumes** two, very unequal, the upper slightly shorter than the spikelet, the lower about half as long; shorter than the adjacent lemmas, glabrous, awnless, non-carinate. Lower glume 0.6 times the length of the upper glume, shorter than the lowest lemma, 3-nerved. Upper glume 3–5 nerved. Spikelets with incomplete florets, the incomplete florets proximal to the female-fertile florets. Proximal incomplete florets 1, paleate, sterile. Palea of the proximal incomplete florets becoming conspicuously hardened (leathery) and enlarged laterally. Proximal lemmas resembling the upper glume, awnless, 5-nerved, similar in texture to the female-fertile lemmas, not becoming indurated.

**Female-fertile florets** 1. Lemmas elliptic, similar in texture to the glumes, smooth, not becoming indurated, entire; blunt, awnless; having the margins lying flat and exposed on the palea, 2 nerved. Palea tightly clasped by the lemma, entire, awnless, textured like the lemma. Palea back glabrous. Lodicules 2, joined at base, glabrous, not toothed. Stamens 2. Anthers to 0.75 mm long. Ovary glabrous. Styles free to their bases. Stigmas 2.

**Fruit, embryo and seedling.** Disseminule a free caryopsis. Fruit free from both lemma and palea, small, ellipsoid, not noticeably compressed, glabrous, smooth. Hilum short (about 5% of the length of the fruit). Embryo large (about 30% length of the fruit).

**Abaxial leaf blade epidermis.** Costal/intercostal zonation conspicuous. Papillae absent. Long-cells similar in shape costally and intercostally, of similar wall thickness costally and intercostally. Microhairs present, elongated, clearly two-celled, panicoid-type, 51–69 µm long, 6 µm wide at the septum. Microhair apical cells 27–30 µm long. Stomata common, 18–27 µm long. Subsidiaries non-papillae, dome-shaped. Guard-cells overlapped by the interstomatals, or overlapping to flush with the interstomatals. Intercostal short-cells absent or very rare, silicified. Intercostal silica bodies crescentic. Intercostal prickles present, fairly uniform in size. Crown cells absent. Costal zones with short-cells. Costal short-cells conspicuously in long rows. Costal silica bodies poorly developed, 'panicoid-type', dumb-bell shaped.

**Transverse section of leaf blade, physiology, culm anatomy.** $C_3$; XyMS+. Midrib not readily distinguishable. Bulliforms present in discrete, regular adaxial groups, in simple fans.

**Taxonomy.** Panicoideae; Panicodae; Paniceae.

**Ecology, geography, regional floristic distribution.** 1 species. Helophytic to mesophytic. South-eastern Queensland.

## Acknowledgements

We thank Jill Hartley for the anatomical preparations and Rod Henderson for improvements to the manuscript.

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# *Omphalea celata*, a new species of Euphorbiaceae from central Queensland

**Paul I. Forster**


## Summary

Forster, Paul I. (1995). *Omphalea celata*, a new species of Euphorbiaceae from central Queensland. *Austrobaileya* 4(3): 381–385. *Omphalea celata* P.I.Forst. is described and illustrated. This species is known from two localities in central Queensland and is considered vulnerable. A key is provided to identify the three species of *Omphalea* that occur in Australia.


Key words: *Omphalea celata*; Euphorbiaceae, Australia.

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## Introduction

The genus *Omphalea* L. comprises approximately fifteen species of scandent lianes, shrubs and small trees and is distributed in both the Old and New World tropics with a concentration of taxa in the latter region (Webster 1994). Until recently, one species of *Omphalea* has been recognised for Australia, namely *O. queenslandiae* F.M.Bailey from tropical north-eastern Queensland in the area known as the 'Wet Tropics' (e.g. Bailey 1902; Airy Shaw 1981). A second species, *Omphalea papuana* Pax & K.Hoffm. has recently been recognised for Queensland (Forster 1994), based on identifications by L. Gillespie (US) of collections from the Iron Range area, Cape York Peninsula, Queensland. Both *Omphalea papuana* and *O. queenslandiae* are scandent lianes which grow in the canopy of notophyll and mesophyll vineforest communities. Over twenty years ago, J.P. Stanton, an officer with the Queensland National Parks & Wildlife Service (QNPWS) collected a few flowering twigs of an unknown Euphorbiaceous plant near Eungella in central Queensland. Stanton gave the material to L.J. Webb and J.G. Tracey who deposited it at the Queensland Herbarium. Eventually this material acquired a label stating it to be a 'new species' of *Aleurites* and fruiting collections were made in the early 1990's by other officers of the QNPWS during botanical survey of the Eungella National Park and surrounds.

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While this material undoubtedly represented a new species of Euphorbiaceae, its systematic position was unclear due to the lack of good material of male and, particularly, female flowers. As a result, the few then-existing specimens were filed in the Queensland Herbarium as "*Aleurites* sp. (Hazlewood Gorge, S.G. Pearson SP439)" and listed as this in the recent census of Queensland vascular flora (Forster 1994). The eventual collection of flowering material of both sexes from this species has revealed it to be an undescribed species of *Omphalea*.

## Materials and Methods

This paper is based wholly on collections in the Queensland Herbarium (BRI) or to be distributed from there. The type locality was visited several times by the author in pursuit of fertile material of this taxon.

## Taxonomy

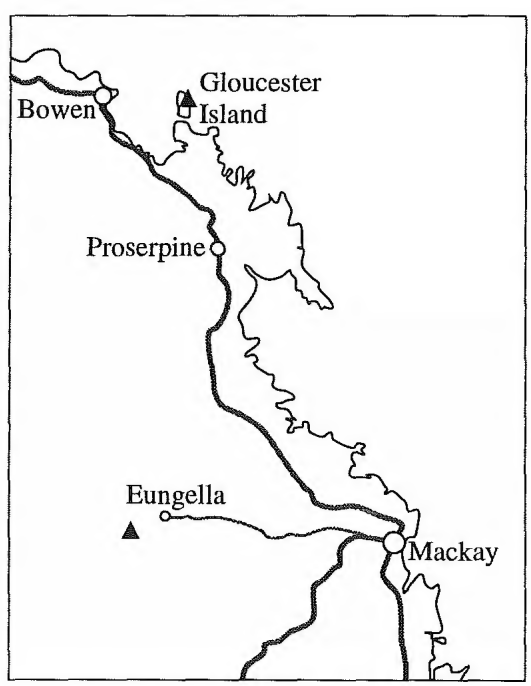
**Omphalea celata** P.I.Forst., **sp. nov.** affinis *Omphaleae papuanae* Pax & K.Hoffm. et *O. queenslandiae* F.M.Bailey a quibus habitu arboreo (non scandenti) et folii lamina venatione penninervi (non palmatinervi) venis lateralibus 8–14 in quoque latere costae differt. **Typus:** Queensland. South Kennedy District: Hazlewood Gorge, south-southwest of Eungella, 20 July 1994, *P.I. Forster* 15643 (holo: BRI [2 sheets + spirit]; iso: AD, DNA, K, L, MEL, NSW, MO).

*Aleurites* sp. (Hazlewood Gorge, S.G.Pearson SP439); Forster (1994: 107).

Small tree to 12 m high, perennial, evergreen, monoecious. Bark glossy with surface verrucose, cream; wood straw-coloured. Stipules lanceolate, 1.3–1.5 mm long, 0.5–0.6 mm wide, glabrous, caducous. Leaves alternate; petioles 20–75 mm long, 0.6–1 mm diameter, grooved adaxially, glabrous or with scattered trichomes; lamina lanceolate, lanceolate-ovate or ovate, 45–120 mm long, 16–80 mm wide, penninerved with 8–14 lateral veins per side of midrib and reticulate interlateral tertiary veins; upper surface dark grey-green with venation ± obscure, glabrous; lower surface pale grey-green with venation well developed, glabrous; tip acuminate; base attenuate to cuneate; glands 2, distal on petiole, ± sessile, circular, 0.8–1 mm diameter. Inflorescences terminal, up to 80 mm long, bisexual, with male flowers greatly outnumbering female flowers, paniculate; peduncles up to 17 mm long, glabrous or with scattered simple and stellate trichomes. Inflorescence bracts of two kinds; proximal bracts similar in form to leaves in being petiolate and with a lamina; petiole 50–80 mm long, c. 0.5 mm diameter, with 2 distal glands; lamina linear to lanceolate, 45–55 mm long, 1–8 mm wide, glabrous or with scattered trichomes; distal bracts sessile, lanceolate, 0.6–1 mm long, 0.4–0.5 mm wide, glabrous. Male flowers 1.4–1.5 mm long, 3–3.5 mm diameter; pedicels 5–9 mm long, c. 0.5 mm diameter, filiform, glabrous or with scattered trichomes; sepals 5, imbricate, broadly ovate to ovate-orbicular, 2–2.5 mm long, 2–2.4 mm wide, green; petals absent; disk composed of 5 fleshy lobes 1–1.2 mm long and 1.6–1.7 mm diameter, connate basally to form an annulus around the staminal column; staminal column c. 0.5 mm long and 0.2 mm diameter; anthers forming a peltate 3-lobed synandrium 0.6–0.8 mm diameter; anther thecae c. 0.5 mm long, yellow. Female flowers 4.5–5 mm long, c. 3 mm diameter, green; pedicels 2.5–3 mm long, 0.8–1 mm diameter, stout, with scattered trichomes; sepals 5, imbricate, ovate to orbicular-ovate, 2–3 mm long, 1.7–3 mm wide, with scattered trichomes; petals absent; disk composed of 5 small irregular fleshy lobes at the base of the sepals, each lobe 0.2–0.3 mm long; ovary ± globose, 0.9–1 mm long, 2- or 3-locular, with 1 ovule per locule; styles connate into a thick obtuse column c. 2 mm long and 1.6–1.7 mm diameter. Fruit subglobose, 2- or 3-lobed with a pointed apex, 50–60 mm long, 50–60 mm diameter, thick-walled, subdrupaceous and indehiscent; exocarp fleshy; endocarp woody. Seeds subglobose, 23–25 mm long, 23–25 mm wide, 20–22 mm across, smooth, pale grey-brown. **Fig. 1.**

***Additional specimens examined*: Queensland.** NORTH KENNEDY DISTRICT: Gloucester Island, east coast, 6 km N of Chinaman's Rock, Sep 1992, *Batianoff* 920913 (BISH, BRI). SOUTH KENNEDY DISTRICT: [all type locality] Dec 1973, *Stanton in Webb & Tracey 13724* (BRI, L, MEL, QRS); Feb 1992, *Pearson SP439* (BRI); Nov 1992, *Pearson s.n.* (BRI, MEL, QRS); Dec 1992, *Bean* 5278 (BRI); Jan 1993, *Forster* 12715 *& Pearson* (A, BRI, K, L, MEL, QRS); Dec 1993, *Forster* 14278 *& Pearson* (A, BRI, K, L, MEL, QRS); Jun 1994, *Forster* 15241 *et al.* (BRI, K, L, MEL, NSW, QRS).

***Distribution and habitat*:** *Omphalea celata* is known from two localities in the North Kennedy and South Kennedy districts of central Queensland (**Map 1**). At Hazlewood Gorge, plants grow in fragmented semi-evergreen vine thicket along a more or less permanent watercourse on weathered metamorphics in a steep-sided gorge at an altitude of about 560 m. On Gloucester Island they grow in a rocky granitic gully near to araucarian microphyll vineforest (G.N. Batianoff, pers. comm. 1994).




**Map 1.** Distribution of *Omphalea celata* in Central Queensland.

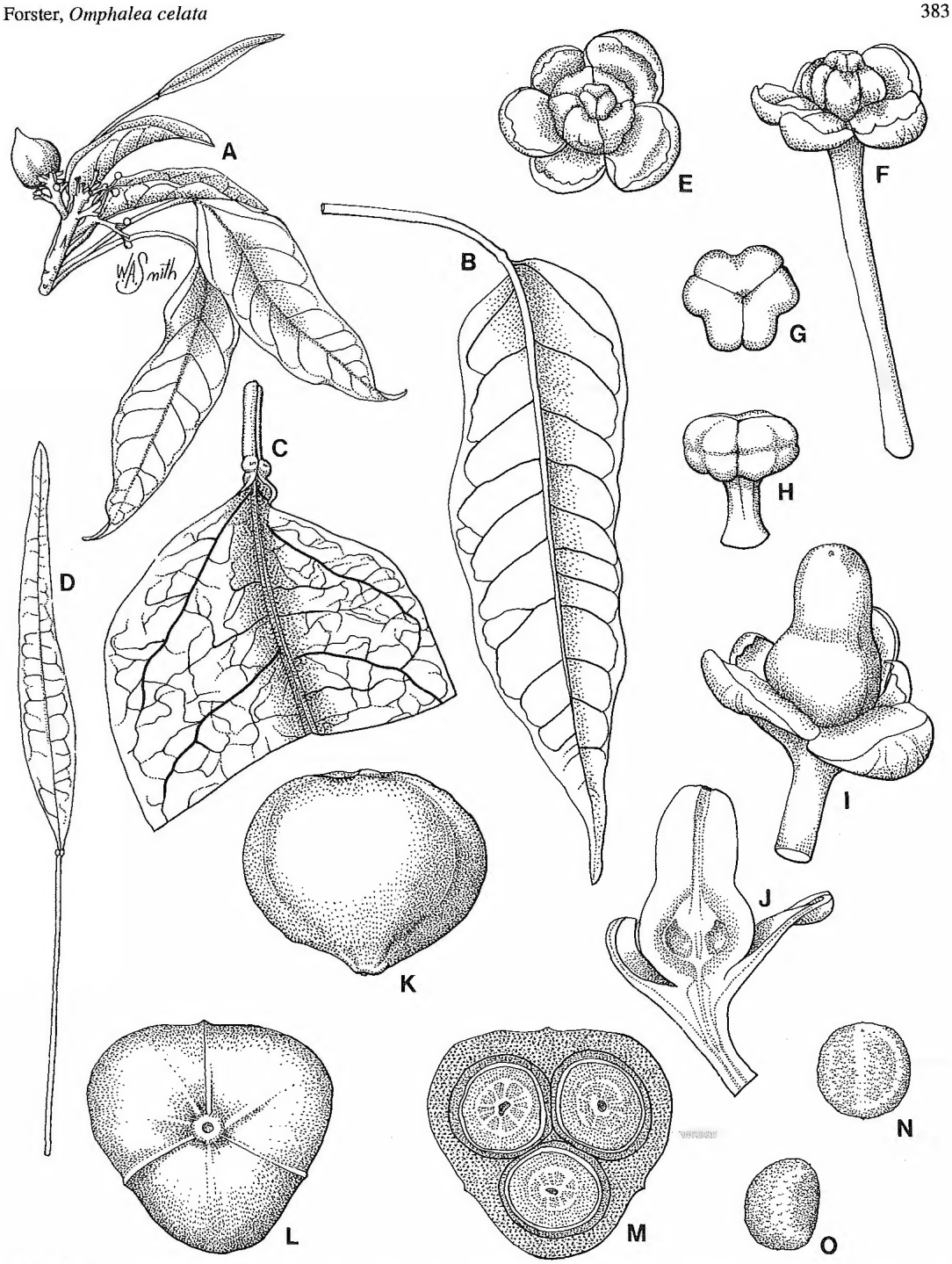



**Fig. 1.** A–O. *Omphalea celata*. A. shoot tip with young fruit × 0.6. B. abaxial surface of leaf × 1. C. lower portion of leaf lamina showing adaxial petiolar glands × 2. D. proximal inflorescence bract × 1. E. apical view of male flower × 6. F. lateral view of male flower × 6. G. apical view of anther synandrium × 16. H. lateral view of staminal column × 16. I. lateral view of female flower × 6. J. longitudinal section of flower × 6. K. lateral view of fruit × 0.5. L. basal view of fruit × 0.5. M. transverse section of fruit × 0.5. N. abaxial view of seed × 0.5. O. lateral view of seed × 0.5. (A–D from *Pearson* s.n. (BRI); E–J from *Forster* 15241 *et al.* (BRI); K–M from *Forster* 14278 & *Pearson* (BRI); N–O from *Forster* 12715 & *Pearson* (BRI)). Del. W. Smith.

***Notes*:** Determining the specific affinities of *Omphalea celata* has proved difficult. Both *Omphalea papuana* and *O. queenslandiae* are superficially similar, scandent canopy lianes with palminerved foliage, whereas *O. celata* is a small tree with penninerved foliage. Only *Omphalea papuana* is known to be present in adjacent New Guinea. There are several arborescent species in Borneo and the Philippines, but they are greatly disjunct from the occurrences of the new species. *Omphalea celata* is very restricted in its occurrence with limited effective dispersal of propagules, hence it is unlikely to have been in close contact with any other species of *Omphalea* in recent times.

*Omphalea celata*, together with *O. papuana*, *O. queenslandiae*, *Endospermum myrmecophilum* L.S.Sm. and *E. medullosum* L.S.Sm., is a host-plant for the endemic Australian day-flying Zodiac Moth *Alcides zodiaca* (Forster & Sankowsky 1995), thus indicating similar chemical consituents in all these taxa. Other taxa of *Omphalea* in the New World are host-plants for taxa of Uraniid moths related to *Alcides zodiaca* (Coleman & Monteith 1981; Monteith & Wood 1987). A study of the relationships between the Euphorbiaceous hosts and the uraniid moths over the ranges of both would be of great interest and may contribute towards an understanding of their phylogeny.

A full account of the genus *Omphalea* in Australia will be provided in the forthcoming 'Flora of Australia' Vol. 23. *Omphalea celata* may be distinguished from the other two Australian species using the following key.

**Key to the Australian species of *Omphalea***

1. Trees; leaves penninerved, with 8–14 lateral veins per side of midrib . . . **O. celata** P.I.Forst.
   Scandent lianes; leaves palminerved, 3–5-nerved at base and with 7–9 additional lateral veins per side of midrib . . . . . 2

2. Juvenile leaves trilobed; adult leaves 5-veined from base . . . **O. papuana** Pax & K.Hoffm.
   Juvenile leaves entire; adult leaves 3-veined from base . . . . . **O. queenslandiae** F.M.Bailey

***Etymology:*** The specific epithet is derived from the Latin *celatus*, concealed or hidden, and alludes to the populations of this plant occurring in inaccessible localities.

***Conservation status:*** *Omphalea celata* is common at the type locality with several dozen mature plants present within a small area of several hectares. The area is likely to be added to the Eungella National Park in the future and while there are no obvious immediate human threats, there is a continual danger of physical damage to the plants from rock avalanches at the locality. Less than a dozen plants have been observed at the Gloucester Island locality (G.N. Batianoff, pers. comm. 1994) which is within a National Park. *Omphalea celata* warrants a conservation coding of 3VC (cf. Briggs and Leigh 1988) due to its restricted distribution and the small number of known individuals.

**Acknowledgments**

W. Smith (BRI) provided the illustrations. Assistance with the collection of material was provided by G.N. Batianoff (BRI), A.R. Bean, G. Kenning, S.G. Pearson and M.C. Tucker. Comments on a draft of the manuscript were provided by A.R. Bean (BRI). Translation of the diagnosis into Latin was undertaken by P.D. Bostock (BRI). This work was funded by the Australian Biological Resources Study during 1992 to 1994 as a preferred objective research project for the 'Flora of Australia'.

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# A new species and new combination in *Ochrosperma* Trudgen (Myrtaceae)

**A.R. Bean**

**Summary**

Bean, A.R. (1995). A new species and new combination in *Ochrosperma* Trudgen (Myrtaceae). *Austrobaileya* 4(3): 387–390. *Ochrosperma adpressum* A.R.Bean from central Queensland, is described as new, illustrated and its known distribution mapped. The new combination *Ochrosperma oligomerum* (Radlk.) A.R.Bean is made. Additional distribution records for *O. lineare* (C.T.White) Trudgen are given. A key to all recognised species of *Ochrosperma* is presented.

Keywords: Myrtaceae, *Ochrosperma adpressum*, *Ochrosperma* - Australia, *Ochrosperma oligomerum*.

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## Introduction

Radlkofer (1884) named *Baeckea oligomera*, a species possessing just 5 stamens and a 3-locular ovary with 2 collateral ovules per loculus. He established a new section, *Baeckea* sect. *Pausomyrtus* Radlk., for this distinctive species. The sectional rank was in line with Bentham (1867).

This taxon was named at genus level (as *Ochrosperma*) by Trudgen (1987). The diagnostic features of *Ochrosperma* given by Trudgen were the almost sessile flowers with five antesepalous stamens, three-locular ovary with two ovules per loculus and pale coloured, reniform, arillate seeds. Other characters given include the almost terete filaments which are slightly flattened near the base, the ovary adnate to the hypanthium for nearly all its length, and the widely opening fruits.

The new species described here has features agreeing with the above except that the fruits do not open widely, and the number of stamens varies between 6 and 8. However, all stamens are antesepalous with one or two stamens opposite each sepal.

Because the new species has a greater number of stamens, a small change in the generic description of *Ochrosperma* is necessary to accommodate it, as follows: Stamens 5, one opposite each sepal, or 6–8, with two stamens opposite some sepals.

The new combination *Ochrosperma oligomerum* is made in this paper, based on *Baeckea oligomera* Radlk.

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## Taxonomy

**Ochrosperma** Trudgen, Nuytsia 6(1): 11–12 (1987). **Type:** *Ochrosperma monticola* Trudgen

*Baeckea* sect. *Pausomyrtus* Radlk., Ber. Deutsch. Bot. Ges. 2: 264 (1884). **Type:** *Baeckea oligomera* Radlk.

**1. Ochrosperma adpressum** A.R.Bean **sp. nov.** affinis *O. lineari* a quo foliis valde decussatis, concavo-convexis apice acuto uncinato, floribus staminibus plus numerosis, floribus fructibusque grandioribus differt. **Typus:** Queensland. LEICHHARDT DISTRICT: Mt Minda, Salvator Rosa National Park, 23 September 1987, *M.B. Thomas* 257 (holo: BRI).

*Baeckea* sp. 'Mt Minda' Thomas & McDonald, Rare and Thr. Plants of Qld, 2nd ed. 36 (1989).

Shrub 50–80 cm tall. Bark rough, grey and scaly. Leaves linear, straight, concavo-convex, keeled on lower surface, overlapping, 2.5–7.0

× 0.6–1.1 mm, strongly decussate, minutely ciliate on margins, apex acute, sometimes uncinate; petiole 0.3–0.5 mm long. Inflorescences consisting of solitary flowers in the leaf axils; peduncles 0.5–0.75 mm long; pedicels absent; bracteoles 2, persistent, ovate, acute, concave, c. 0.7 × 0.6 mm, in close contact with the hypanthium. Hypanthium with 5 antesepalous ribs, obconical, 2.0–2.5 mm long. Sepals semi-orbicular, longitudinally ridged, translucent, 0.5–1.0 × 0.8–1.2 mm, margins fimbriate. Corolla white, up to 8 mm diam.; petals orbicular, 1.5–2.5 mm diam., margins minutely fimbriate. Stamens 6–8, antesepalous, with either 1 or 2 stamens opposite each sepal; filaments slightly flattened, c. 1 mm long; anthers versatile, dorsifixed, c. 0.5 mm long, dehiscing by longitudinal slits; connective gland dark brown to black, globular, in diameter about half the length of the anthers. Style terete, less than 1 mm long; stigma broadly capitate. Ovary 3-locular, ovules 2 per loculus, collateral. Fruit shallowly convex, 1.9–2.3 × 3.3–4.0 mm, valves somewhat woody, conspicuous, not spreading widely on dehiscence. Seeds turgid, reniform, papillose, c. 1.4 mm long, pale brown in colour, with a small white aril overlying the hilum. **Fig. 1.**

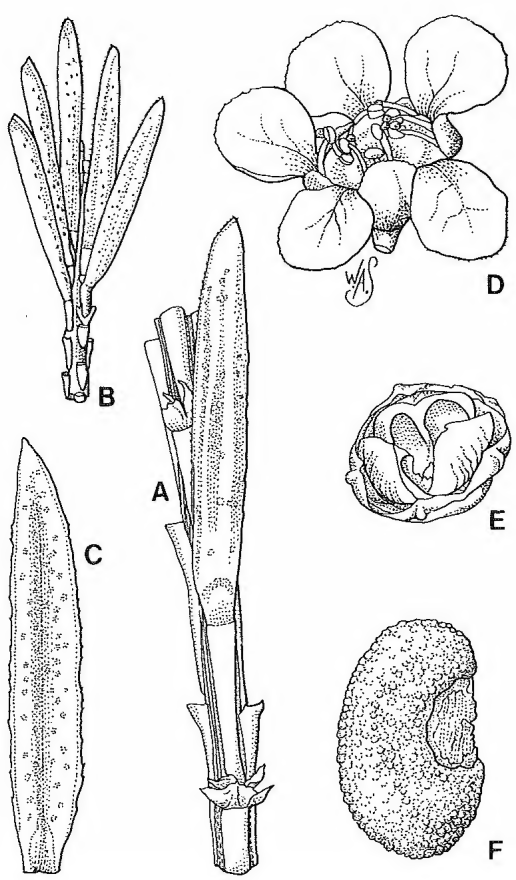



**Fig. 1.** *Ochrosperma adpressum*: A. branchlet × 8. B. leaves and stem × 5. C. leaf, lower surface × 10. D. flower × 5. E. fruit × 5. F. seed × 20.

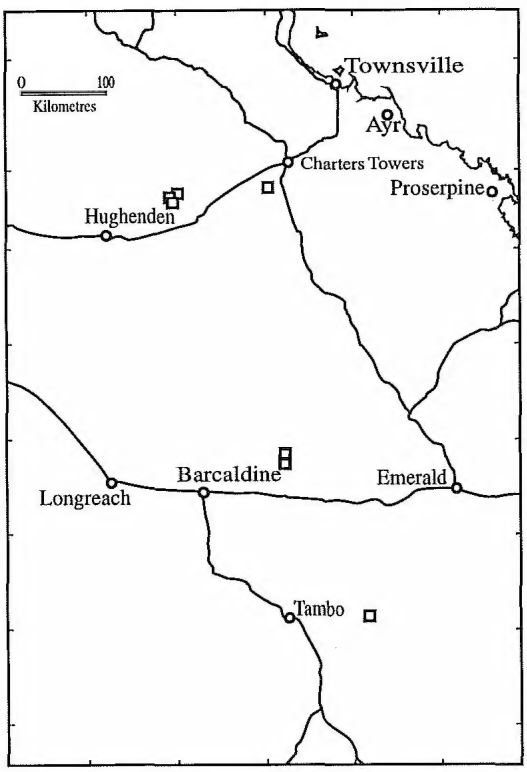
*Specimens examined*: **Queensland.** MITCHELL DISTRICT: 41 km N of Torrens Creek, May 1993, *Thompson* HUG257 & *Turpin* (BRI); near Red Gorge, White Mountains N.P., Jun 1992, *Bean* 4582 (BRI); Sandstone Wall, White Mountains N.P., Jun 1992, *Bean* 4602 (BRI). NORTH KENNEDY DISTRICT: 6 km NNW of 'Liontown', Just Range area, Nov 1991, *Thompson* 402 & *Robins* (BRI). SOUTH KENNEDY DISTRICT: 49 km NNE of Jericho, Jun 1993, *Thompson* JER76 & *Figg* (BRI); 39 km NNE of Jericho, Jul 1993, *Thompson* JER139 & *Figg* (BRI).

***Distribution and habitat***: *Ochrosperma adpressum* is known from four widely separated areas of central Queensland: the type locality in Salvator Rosa N.P.; near Jericho; the Just Range south-west of Charters Towers; and the White Mountains N.P. near Pentland (**Map 1**). In all cases, it grows on sandstone ridges with little or no soil development. Associated species include *Melaleuca uncinata* R.Br., *Eucalyptus leichhardtii* F.M.Bailey, *Grevillea sessilis* C.T.White & Francis, *Eucalyptus trachyphloia* F.Muell., *Homoranthus thomasii* (F.Muell.) Craven & S.R.Jones and *Goodenia racemosa* F.Muell.

***Phenology***: Flowers have been collected in September; fruits in November.

***Affinities***: *Ochrosperma adpressum* is related to *O. lineare*, but can be readily distinguished by its leaves with a keeled abaxial surface, acute or uncinate leaf apex (obtuse in *O. lineare*), 6-8 stamens (5 in *O. lineare*) and the shallowly-convex somewhat woody fruits (hemispherical and thin-walled in *O. lineare*). The fruit diameter in *O. adpressum* (3.3–4.0 mm) is greater than that in *O. lineare* (2.0–2.6 mm).

***Conservation status***: *O. adpressum* was listed (as *Baeckea* sp. "Mt Minda"), in Thomas & McDonald (1989) with a category of 1KC. Since that time, the species has been found in several places. It is now known to be present in two National Parks, and while the population at Salvator Rosa N.P. is probably only small, the




**Map1.** Distribution of *Ochrosperma adpressum* □ .

White Mountains population is quite extensive. Therefore no conservation code is thought necessary at this time.

***Etymology*:** The specific epithet is derived from the Latin word *adpressus*, meaning 'lying flat against', and alludes to the closely imbricate leaves of this species.

**2. Ochrosperma lineare** (C.T.White) Trudgen, Nuytsia 6(1): 12 (1987); *Baeckea linearis* C.T.White, Proc. Roy. Soc. Queensland 55: 65 (1944). **Type:** Queensland. MORETON DISTRICT. Tugun, , Sep 1940, *G.H. Barker* s.n. (holo: BRI).

***Additional specimens*: Queensland.** PORT CURTIS DISTRICT: Dismal swamp area, N of Yeppoon, 22°42'S, 150°45'E, Aug 1993, *Sharpe* 5495 (BRI); 17 km from Byfield on track to Five Rocks, 22°46'S, 150°46'E, Sep 1977, *Powell* 875 & *Armstrong* (BRI,K,L,MEL,MO,NSW); c. 14 km ENE of Byfield, 22°49'S, 150°47'E, Jul 1977, *Clarkson* 1030 & *Stanley* (BRI); Littabella N.P., c. 40km NW. of Bundaberg, 24°38'S, 152°03'E, Nov 1993, *Bean* 7010 (BRI).

***Note*:** The collections detailed above extend the known range of *O. lineare* as given by Trudgen (1987).

**3. Ochrosperma citriodorum** (A.R.Penfold & J.H.Willis) Trudgen, Nuytsia 6(1): 14; *Baeckea citriodora* Penfold & J.H.Willis, J. & Proc. Roy. Soc. New South Wales 89: 186 (1956). **Type:** New South Wales. NORTH COAST. Five miles [8 km] NW of Port Macquarie, 15 May 1955, *D.K. Hammond* s.n. (holo: NSW; iso: BRI).

**4. Ochrosperma oligomerum** (Radlk.) A.R.Bean **comb. nov.**

*Baeckea oligomera* Radlk., Ber. Deutsch. Bot. Ges. 2: 264 (1884). **Type:** New Holland, [in 1823], *Sieber* 512 (holo: M!; iso: B n.v. destroyed; G n.v., photo BRI; W!).

*Ochrosperma monticola* Trudgen, Nuytsia 6(1): 15 (1987) syn. nov. **Type:** New South Wales. CENTRAL TABLELANDS. Currant Mountain Gap, 24 km by road E of Rylstone, 10 August 1975, *R. Coveny* 6619 & *P. Hind* (holo: PERTH n.v.; iso: K n.v., MEL!, NSW!).

***Selected specimens*: New South Wales.** CENTRAL TABLELANDS: Blackheath, Oct 1900, *Hamilton* s.n. (NSW); Glowworm tunnels area, before first tunnel, Wollemi N.P., Oct 1987, *Hind* 5366 (CBG,MEL,NSW); end of fire trail near Cape Horn, Ben Bullen S.F., Oct 1990, *Hind* 6078 (MEL,NSW); Jones Hole, 1.5 mls [2.4 km] NNE of Mt Coricudgy, Apr 1965, *McGillivray* & *Rodd* 121 (NSW); 8.2 km S of Mt Boonboura on Gospers Mtn road, Apr 1983, *Benson* 1425 & *Keith* (NSW).

***Typification*:** All types of *Baeckea oligomera* seen by the present author bear the Sieber number 512, but according to Radlkofer (1884), a specimen of *Hibbertia dentata* R.Br. at B also bore this number. In this instance, the number 512 was evidently mistakenly attached, and other specimens of the *Hibbertia* bear the number 513.

## Key to the species of *Ochrosperma*

The following key is adapted from Trudgen (1987)

1. Leaves linear, straight ..... 2
   Leaves elliptic to obovate, usually recurved ..... 3

2. Leaves concavo-convex, adpressed; stamens 6–8 ..... **O. adpressum**
   Leaves flat, spreading; stamens 5 ..... **O. lineare**

3. Flowers c. 2.5 mm diameter; leaves 1.2–3.0 mm long ..... **O. citriodorum**
   Flowers 3.5–5.0 mm diameter; leaves 2.5–5.5 mm long ..... **O. oligomerum**

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## Acknowledgements

I am grateful to Megan Thomas, discoverer of *Ochrosperma adpressum*, for discussions on the Salvator Rosa site, to Laurie Jessup for locating and photographing types of *Baeckea oligomera*, the Directors of M and W for the loan of type specimens, the Directors of NSW and MEL for access to their collections, to Philip Sharpe for translating Radlkofer's paper, to Will Smith for the illustrations and distribution map, and to Les Pedley for the Latin diagnosis.

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# Nomenclature and type specimens in *Eustrephus* R.Br. and *Geitonoplesium* Hook. (Geitonoplesiaceae)

**Joseph E. Laferrière**

**Summary**

Laferrière, Joseph E. (1995) Nomenclature and type specimens in *Eustrephus* R.Br. and *Geitonoplesium* Hook. (Geitonoplesiaceae). *Austrobaileya* 4(3): 391–399. Type specimens of specific and infraspecific names in the genera *Eustrephus* and *Geitonoplesium* were examined. Lectotypes are designated for *Eustrephus angustifolius, E. latifolius* var. *brownii, E. latifolius, E. watsonianus, Geitonoplesium cymosum, Geitonoplesium cymosum* subsp. *angustifolium* and *Luzuriaga montana*. Neotypes are designated for *Spiranthera ovata* and *Geitonoplesium asperum*. Diagrams are presented clarifying the relationships between unorthodox infraspecific taxa proposed by J. Schlittler in 1951. No infraspecific taxon recognised by previous authors is here maintained. Descriptions are provided for the family and for each of its two species.

Keywords: Australia, New Guinea, Melanesia, *Eustrephus, Geitonoplesium.*

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## Introduction

*Eustrephus* R.Br. and *Geitonoplesium* Hook. have been regarded by most recent authors as two monotypic genera. Each contains glabrous, much-branched leafy climbers 1–5 m tall, native to New Guinea, Melanesia, eastern Indonesia and eastern Australia (Schlittler, 1951). Engler & Prantl (1930) included both genera in the Liliaceae. Dahlgren & Clifford (1982) included them in the Philesiaceae, whereas Dahlgren et al. (1985) placed both genera, plus *Luzuriaga*, *Behnia* and *Elachanthera*, in the Luzuriagaceae, separate from the Philesiaceae. Cronquist (1981) and Conran & Clifford (1986) placed them in the Smilacaceae. More recent cladistic and phenetic evidence suggests that while *Eustrephus* and *Geitonoplesium* are closely related to each other, they are only distantly related to *Smilax*, *Luzuriaga* and *Philesia* (Conran, 1987a). Their closest relatives appear to be in the Phormiaceae (Conran, 1989). Some authors have recently placed the two in a separate family, the Geitonoplesiaceae (Dahlgren & Rasmussen, 1983; Conran, 1987a, 1989, 1994).

The authorship of both generic names has long been miscited. Schlittler (1951) referred to them as "*Eustrephus* R.Br. ex Sims" and "*Geitonoplesium* (R.Br.) A.Cunn.," while Conran (1987b) called them "*Eustrephus* R.Br. ex Ker Gawl." and "*Geitonoplesium* A.Cunn. ex R.Br. in Hook". Both were first published in Curtis's Botanical Magazine. Authorship of early articles of this journal is not readily apparent but was discussed by Desmond (1987). The article containing the original description of *Eustrephus* was written by John Bellenden Gawler (also known as John Bellenden Ker). Ker-Gawler (1809) copied the name and description verbatim from an as yet unpublished manuscript by Robert Brown (1810). Hence, Brown should receive full credit because he wrote the description. The article containing the original description of *Geitonoplesium* was written by William J. Hooker (1832). Hooker says the name was suggested by Allan Cunningham. Brown's initials appear after the diagnosis of *Geitonoplesium* because it is copied verbatim from his previously published description of *Luzuriaga* (Brown, 1810). The International Code of Botanical Nomenclature (ICBN, Greuter et al. 1994) specifies that a published name must be accompanied either by a description or diagnosis, or by a direct or indirect reference to a previously published description or diagnosis. Hooker went further than necessary

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in copying the entire text of the published description to which he was referring, but this should not negate his authorship. Hence the preferred citation is "A. Cunn. ex Hook."

Each genus contains a single species. Both species are highly variable, especially in leaf morphology. Leaves of both species can vary from narrowly linear to lanceolate or even ovate (Conran, 1987b). As a result, many specific and infraspecific names have been published. Type specimens of many of these names have long been unknown. Others have been miscited in the literature. I examined the known types of most of these names, and searched for potential lectotypes of those for which no type has been designated.

Schlittler (1951) divided each of the two species into several infraspecific taxa. He divided each species into two subspecies, two varieties, two subvarieties, two forms, and two subforms. For *E. latifolius*, subspecies were distinguished by leaf shape, varieties by filament structure, subvarieties by number of flowers per fascicle, forms by flower colour, and subforms by the degree of fimbriation of the petal margins. For *G. cymosum,* subspecies were distinguished by leaf shape, varieties by inflorescence shape, subvarieties by leaf thickness, forms by flower colour, and subforms by whether the stems are smooth or scabrous. His names are validly published, as they are accompanied by Latin diagnoses and designations of type material. However, Schlittler did not envision his infraspecific taxa as being arranged hierarchically. For example, following his descriptions there are photographs of herbarium specimens. His Figures 66 and 67 are labelled " *Geitonoplesium cymosum* subsp. *macrophyllum* var. *timorense*, whereas Figures 68 and 69 are called "*Geitonoplesium cymosum* subsp. *angustifolium* var. *timorense*". This is despite the fact that only one description and only one type was accorded the name "*G. cymosum* var. *timorense*". Schlittler's published specimen listings and his handwritten notes on many specimens bear similar unorthodox formulae.

A system such as Schlittler envisioned might have certain advantages, but it is not consistent with the current ICBN. The type of *G. cymosum* var. *timorense* has lanceolate rather than narrowly linear leaves. The specimen bears a note in Schlittler's handwriting assigning it to *G. cymosum* subsp. *macrophyllum*. Hence, there can be no such variety within *G. cymosum* subsp. *angustifolium* despite his photograph to the contrary. Using similar reasoning, I examined Schlittler's type specimens to elucidate the true relationship of his taxa. The taxonomic system thus created is shown in **Figures 1** and **2.** *Eustrephus latifolius* var. *angustifolius* (R.Br.) Benth. and *E. latifolius* var. *intercedens* Domin are synonymous with Schlittler's *E. latifolius* subsp. *angustifolius*, whereas and *Luzuriaga latifolia* var. *uniflora* Hallier f. is synonymous with *E. latifolius* var. *latifolius*, using Schlittler's distinguishing characters. The type of *G. cymosum* forma *album* contains a note in Schlittler's handwriting indicating the specimen belonged to "var. aff. *paniculatum*". This might either imply that he considered the specimen intermediate between the two varieties, or that it belonged to a third, unnamed variety. A few of the taxa could not be assigned to taxa at the next higher level because of conflicting characters.

All of Schlittler's names are legitimate. None is a nomen superfluum. The ICBN defines a nomen superfluum as a name applied to a taxon which, as circumscribed by its original author, includes "the holotype or all the syntypes or the previously designated lectotype of another name which ought to have been adopted". Neither *E. latifolius* nor *G. cymosum* has a holotype or syntypes, and until present neither has had a correctly designated lectotype. Thus Schlittler's names are legitimate and might hypothetically be revived. This is true even of those names synonymized with autonyms in **Figures 1** and **2** because a future taxonomist might use different characters to circumscribe the taxa concerned.

Schlittler himself considered many of his taxa to be clinal extremes rather than discontinuous entities. Several of the characters used in distinguishing Schlittler's taxa are affected by elevation, sunlight and other environmental factors, or by the age of the plant (Conran, 1987b). Sometimes material

belonging to different taxa can be found on the same specimen (Conran, 1987b). Hence it appears that all of Schlittler's names should be reduced to synonymy, and each species regarded as a single polymorphic taxon.

Synonymy is given as follows. Lectotypes at BM were selected by Dr. William T. Stearn.

**Geitonoplesiaceae** R.M.T.Dahlgren ex J.G. Conran, Telopea 6: 39. (1994) Geitonoplesiaceae R.M.T. Dahlgren, Bot. J. Linn. Soc. 80: 98 (1980), nomen nudum. **Type:** *Geitonoplesium* Hook.

Glabrous, hermaphroditic, perennial, much-branched leafy climbers or subshrubs up to 5 m tall. Stems woody below, thin and flexuous above, green, much branched, twining, terete to compressed. Leaves alternate, distichous, with a prominent to obscure midrib, sessile or with a short petiole, sometimes sheathing at the base, lanceolate to ovate or sometimes linear; veins numerous, parallel with few or no cross veins; midrib prominent; spines and stipules lacking; leaves reduced to scales under each branch. Inflorescence an axillary fascicle or a loose terminal cyme or panicle; pedicel articulate immediately under the flower. Flowers small, perfect, actinomorphic, campanulate, hypogynous, often pendulous; perianth segments 6, oblong, spreading, equal in the length, white or greenish to pink or pale violet, free almost to the base or fused, often prolonged into a pericladium below, nectiferous at the base; corona absent; sepals firm, valvate in bud, shortly hood-shaped at apex; petals flat, obtuse, slightly imbricate, the margins thin and entire; stamens 3 + 3; filaments free or fused at the base, hypogynous, not exceeding the perianth; anthers oblong-linear, bilocular, basifixed, introrse, sagittate at base, erect, yellow, poricidal; ovary superior, trilocular with axile placentae; ovules few, anatropous or campylotropous, crassinucellate; style filiform; stigma punctate. Fruit a berry or capsule. Seeds several, rounded to angular-crescentic, black, shiny, sometimes strophiolate; endosperm copious, lacking starch; embryo linear.

## Key to the Genera

1. Flowers in axillary clusters arising from a globose to oblong cluster of imbricate scales; petals ciliate; filaments broad, flat, fused; roots often tuberous; fruit orange, dehiscent ..... **Eustrephus**

   Flowers in terminal cymes or panicles; petal margins entire; filaments filiform, separate; roots fibrous; fruit black, indehiscent ..... **Geitonoplesium**

**Eustrephus** R. Br. in Ker Gawl., Bot. Mag. 31: t. 1245 (1809). *Luzuriaga* Sect. *Eustrephus* Hallier f., Nova Guinea 8: 992 (1914), nomen nudum; *Luzuriaga* Sect. *Eustrephus* Hallier f. ex K. Krause in Engl. & Prantl, Nat. Planzenfam. II, 15a: 380 (1930). **Type:** holo: *Eustrephus latifolius* R.Br.

*Spiranthera* Raf., Flora Telluriana 4: 137 (1836), nom. illeg., non A. St.-Hil. (1823). **Type:** holo: *Spiranthera ovata* Raf.

Small shrubs or twining climbers, 1–5 m tall. Roots fusiform, sometimes tuberous. Leaves non-resupinate, sessile or nearly so, broadly ovate to lanceolate or narrowly linear, 2–20 cm long, 0.2–5.0 cm wide, firm, longitudinally striate-nerved, with costa scarcely distinct; apex usually acute. Inflorescence an axillary cymose bundle with 1–6 flowers; pedicels filiform but rigid, persistent, 5–18 mm long, with an ovate bract at the base, these scarious and imbricate. Flowers with perianth segments oblong, nearly equal, about 6 mm long; sepals elliptical-oblong, acute, 7–9-nerved, convex, firm, shortly hood-shaped at the apex; petals elliptical, thinner than sepals, flat, obtuse, bearing yellow or pellucid markings, fimbriate; filaments short, flat, connate at base; pollen monosulcate. Fruit a yellow, globular or rarely pyriform fleshy capsule 0.7–2.0 cm in diameter. Seeds 8–12, subspherical, evenly rounded to obtusely angled, strophiolate. 2n=18 (Stenar 1952).

A single species, native to eastern Australia, Melanesia, and eastern Indonesia.

**Eustrephus latifolius** R. Br. in Ker Gawl., Bot. Mag. 31: t. 1245 (1809). *Luzuriaga latifolia* (R.Br.) Poir., Encyc. Suppl. 3:535 (1813); *Eustrephus brownii* F.Muell., Fragm. 7: 73 (1870), nom. illeg. **Type:** Australia, New South Wales. Port Jackson, *R. Brown* 5663 *pro parte* (lecto, here designated: BM [photocopy!]). [The sheet in question contains two specimens. The one on the lower half of the sheet is selected as lectotype. Schlittler's (1951) designation of the illustration in Bot. Mag. 31, t. 1245, as lectotype is inappropriate because it is not based on Brown's original material.]

*Eustrephus angustifolius* R.Br., Prod. 281 (1810); *Luzuriaga angustifolia* (R.Br.) Poir., Encycl. Suppl. 3: 536 (1813); *Eustrephus brownii* var. *angustifolius* (R.Br.) Baker, J. Linn. Soc. 14: 573 (1875), nom. invalid., pro syn.; *Eustrephus latifolius* var. *angustifolius* (R.Br.) Benth., Fl. Austral. 7: 18 (1878); *Luzuriaga latifolia* var. *angustifolia* (R.Br.) Hallier f. in H.A. Lorentz, Nova Guinea 8: 993 (1914); *Eustrephus latifolius* subsp. *angustifolius* (R.Br.) Schlittler, Ber. Schweiz. Bot. Ges. 61: 213 (1951). **Type:** Australia, Queensland. Port Curtis District: Shoalwater Bay, No. 46, *R. Brown* 5664 (lecto, here designated: BM [photocopy!]). [This supersedes Schlittler's neotype at Z.]

*Eustrephus leucanthus* Hassk., Pl. Jav. Rar. 115 (1815); *Eustrephus latifolius* forma *leucanthus* (Hassk.) Schlittler, Ber. Schweiz. Bot. Ges. 61: 214 (1951). **Type:** Indonesia, West Java. Bogor, *C.A. Backer* 31600 (neo: BO! [Schlittler, Ber. Schweiz. Bot. Ges. 61: 214 (1951)]).

*Spiranthera ovata* Raf., Flora Telluriana 4: 31 (1836). **Type:** Australia, Queensland. Cook District: Daintree River, *S.F. Kajewski* 1456 (neo, here designated: A!).

[Rafinesque's original specimen, like most of his collection, was apparently destroyed after his death (Merrill 1949, Stuckey 1971; F. Armstrong, PH, in litt.). This name is not a nomen superfluum (cf. Conran & Clifford 1986). Rafinesque's description translates, in part, as " similar to *E. latifolius* but with ovate leaves". This specifically excludes the lectotype of *E. latifolius* because the specimen does not have ovate leaves. The neotype here designated matches the diagnosis.]

*Eustrephus watsonianus* Miq., Linnaea 18: 84 (1844); *Eustrephus latifolius* subsp. *watsonianus* (Miq.) Schlittler, Ber. Schweiz. Bot. Ges. 61: 213 (1951). **Type:** Australia, New South Wales [*fide* Miquel, loc. cit.], *A. Cunningham et al.* 169 (lecto, here designated: U!). [This supersedes Schlittler's neotype at Z.]

*Eustrephus amplexifolius* Schnitzl., Iconogr. famil. nat. regni. veget. 1 t. 55c (1849). **Type:** lecto: In Iconogr. famil. nat. regni. veget. 1 t. 55c, figs. 17–20! [Conran & Clifford, Flora of Australia 46: 192 (1986)]

*Luzuriaga latifolia* var. *uniflora* Hallier f. in H.A. Lorentz, Nova Guinea 8: 993 (1914); *Eustrephus latifolius* subvar. *uniflorus* (Hallier f.) Schlittler, Ber. Schweiz. Bot. Ges. 61: 214 (1951). **Type:** South New Guinea: *Koch* L15 (holo: L!).

*Eustrephus latifolius* var. *intercedens* Domin, Bibiloth. Bot. 20(85): 516 (1915). **Type:** Australia, Queensland. Moreton District: Tambourine Mt., *Domin* 2289 (holo: PR [photo at A!]).

*Eustrephus latifolius* var. *intermedius* Schlittler, ibid., 214 (1951). **Type:** Indonesia, West Java. Batavia, Weltevreden, *C.A. Backer* 26448 (holo: BO!).

*Eustrephus latifolius* var. *brownii* Schlittler, Ber. Schweiz. Bot. Ges. 61: 214 (1951). **Type:** Australia, Victoria. East Gippsland, *F. Mueller s.n.* (lecto: L; iso: BO!). [Schlittler called this specimen "topotypus" and listed *E. brownii* F.Muell. as purported basionym. However, an

illegitimate name cannot serve as basionym. Hence Schlittler's name must be ascribed to him alone.]

*Eustrephus latifolius* subvar. *fasciculatus* Schlittler, ibid., 214 (1951). **Type:** Australia, Queensland. North Kennedy District. Rockingham's Bay, *F. Mueller s.n.* (holo: L!).

*Eustrephus latifolius* forma *rubens* Schlittler, ibid., 214 (1951). **Type:** Indonesia, West Java. Bogor, Kebun Raya Botanical Garden, *Exemplar cult. Hort. Bog.* XC33a (holo: BO!).

*Eustrephus latifolius* subforma *integerrimus* Schlittler, ibid., 214 (1951). **Type:** New Caledonia, *M.Pancher s.n.* (holo: BO!).

*Eustrephus latifolius* subforma *fimbriatus* Schlittler, ibid., 214 (1951). **Type:** Australia, Queensland. Cook District: Daintree, *L.J.Brass & C.T.White* 326 (holo: SING [photo in Ber. Schweiz. Bot. Ges. 61:215!], iso: BRI [photocopy!], GH!).

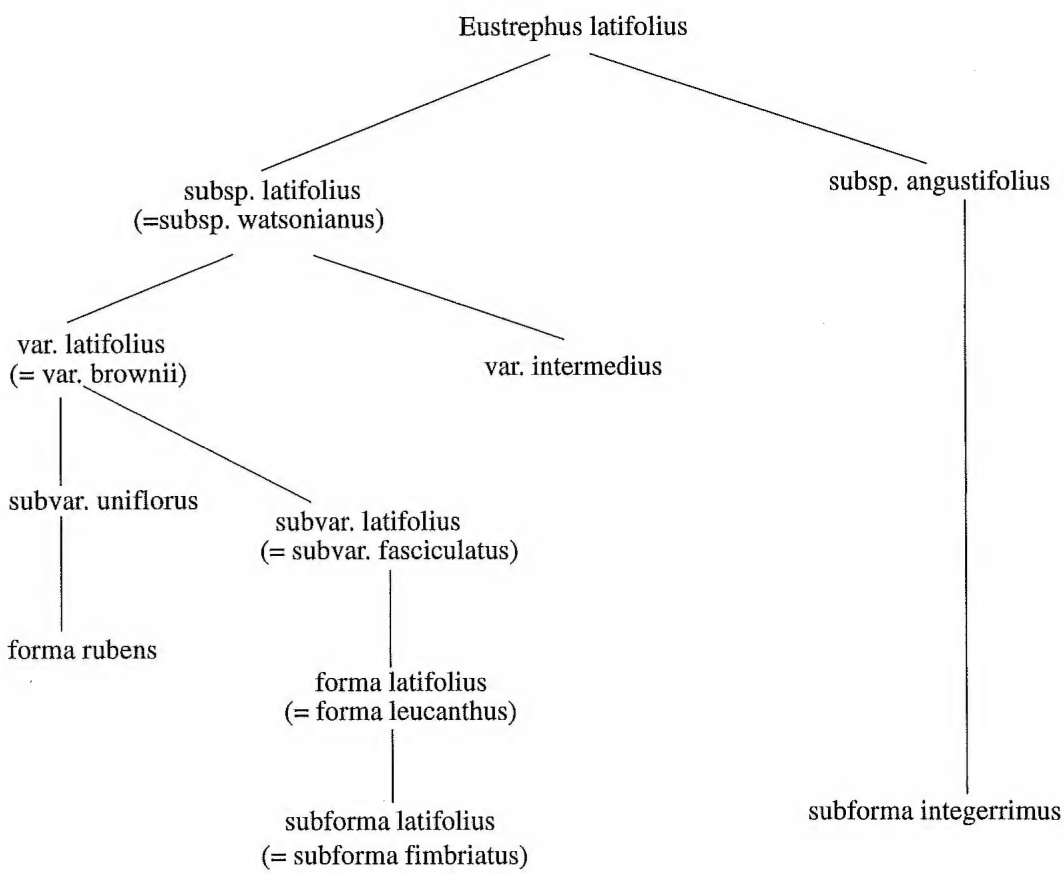


**Fig. 1.** Schlittler's (1951) taxonomy of *Eustrephus latifolius*.

**Geitonoplesium** A.Cunn. ex Hook., Bot. Mag. 59: t. 3131 (1832). *Luzuriaga* Sect. *Geitonoplesium* (Hook.) Hallier f., Nova Guinea 8: 991 (1914), nomen nudum; *Luzuriaga* Sect. *Geitonoplesium* (Hook.) Hallier f. ex K. Krause in Engl. & Prantl, Nat. Pflanzenfam. II, 15a: 379 (1930). *Calcoa* Salisb., Gen. Pl. Fragm. 67 (1866), nom. superfl. **Type:** lecto: *Geitonoplesium cymosum* (R.Br.) Hook. [Conran & Clifford, Fl. Australia 46: 194 (1986)]

*Luzuriaga* auct. non Ruiz & Pavon; R.Br., Prod. 281 (1810). [Cited by Engler & Prantl (1930) and Schlittler (1951) as an illegitimate homonym of *Luzuriaga* Ruiz & Pavon, Fl. Peruv. 3:65 (1802). Brown provided a description including only his own Australian collections, and commented that it might be a separate genus. However, he did credit Ruiz & Pavon for the name, and made no attempt to assign their South American species to a different genus. Therefore, this cannot be considered a homonym.]

Twining climber, 1–5 m tall. Roots fibrous. Leaves resupinate, with a short twisted petiole, broadly ovate to lanceolate or narrowly linear, 5–20 cm long, 0.5–5.0 cm wide, rigid, with a prominent to obscure midrib, the apex obtuse, acute or apiculate. Inflorescence a small, loose terminal cyme or panicle of 1-many flowers, pedicel 0.5–3.0 cm long, with a small bract. Flowers with perianth segments 6–8 mm long, white, green or pink to purplish, sometimes streaked, oblong, distinctly nerved, equal in length, free almost to the base; pericladium short and subattenuate or absent; sepals firm, shortly hood-shaped at apex; petals flat, obtuse, slightly imbricate, the margins thin and entire, filaments filiform, separate, geniculate below anther; pollen trichotomosulcate. Fruit a blue-black, globular, succulent, indehiscent berry 8–15 mm in diameter. Seeds 1–10, black, trigono-ovoid. 2n=20 (Conran 1985).

A single species, native to eastern Australia, Melanesia, and eastern Indonesia.

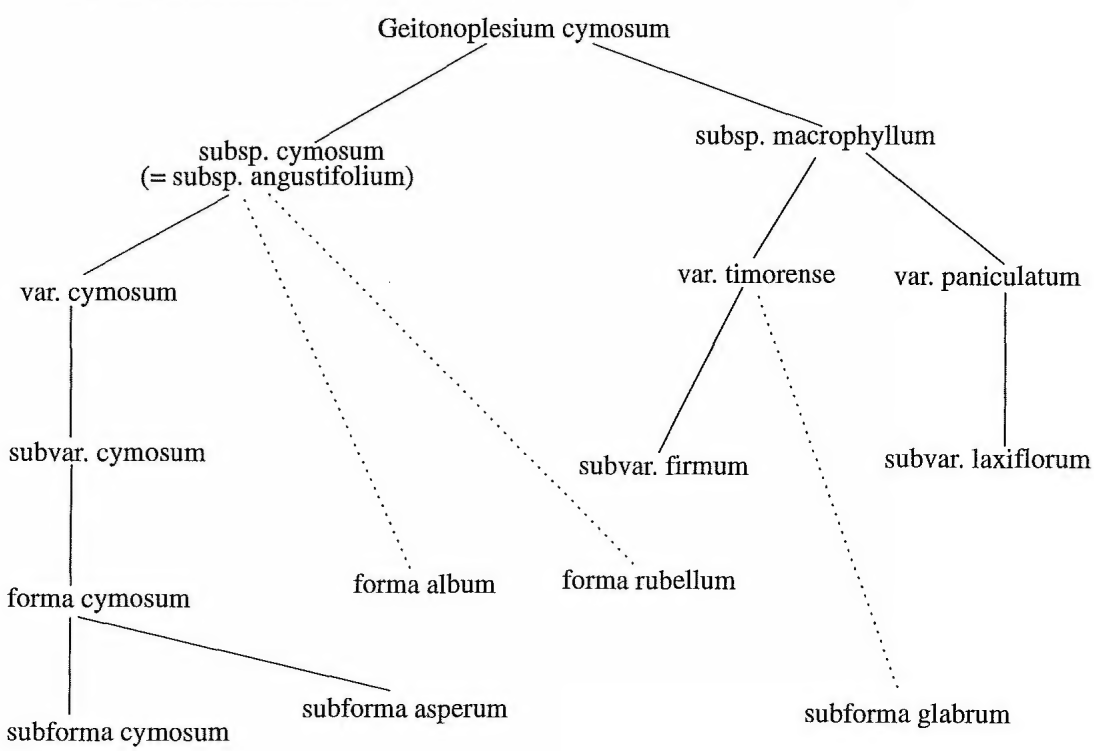


**Fig. 2.** Schlittler's (1951) taxonomy of *Geitonoplesium cymosum*

**Geitonoplesium cymosum** (R. Br.) A. Cunn. ex Hook., Bot. Mag. 59: t. 3131 (1832). *Luzuriaga cymosa* R.Br., Prod. 282 (1810). **Type:** Australia, New South Wales. Port Jackson, *R. Brown 5665* (lecto, here designated: BM [photocopy!]). [Schlittler's (1951) choice of the illustration in Bot. Mag. 59: t. 3131. as lectotype is inappropriate because it is not based on Brown's original material].

*Luzuriaga montana* R.Br., Prod. 282 (1810); *Geitonoplesium montanum* (R.Br.) Hook., Bot. Mag. 59: sub t. 3131 (1832). **Type:** Australia, New South Wales: Port Jackson, *R. Brown* 5666 (lecto, here designated: BM [photocopy!]).

*Geitonoplesium asperum* A.Cunn. in Hook., Bot. Mag. 59: sub t. 3131 (1832). *Geitonoplesium cymosum* subforma *asperum* (A.Cunn.) Schlittler, Ber. Schweiz. Bot. Ges. 61: 229 (1951). **Type:** Papua-New Guinea. Arfak Range, *K. Gjellerup* 1078 (neo, L [photo in Nova Guinea 8, tab. 181!]; iso: BO!).

[Schlittler (1951) erroneously called this lectotype; the specimen in question was collected over 80 years after the original description was published. His erroneous lectotypification is corrected to represent a neotypification under article 9.8 of the ICBN. Conran & Clifford's (1986) designation of the illustration in Bot. Mag. 59, t. 3131 is also incorrect. The illustration in question is obviously intended to represent *G. cymosum*, as evidenced by the title of the article and by the apparently smooth stems in the illustration. I unsuccessfully attempted to find potential lectotype material at K and BM.]

*Eustrephus timorensis* Ridl. in H.O. Forbes, Nat. Wand. East. Archipel., 520 (1885); *Luzuriaga timorensis* (Ridl.) Hallier f. in H.A. Lorentz, Nova Guinea 8: 992 (1914); *Geitonoplesium cymosum* var. *timorense* (Ridl.) Schlittler, Ber. Schweiz. Bot. Ges. 61: 228 (1951). **Type:** Indonesia, Timor. Turskain, *H.O. Forbes* 3530 (holo: K; iso: BO!).

*Luzuriaga laxiflora* Hallier f. in H.A. Lorentz, Nova Guinea 8: 991 (1914); *Geitonoplesium cymosum* subvar. *laxiflorum* (Hallier f.) Schlittler, Ber. Schweiz. Bot. Ges. 61: 228 (1951). **Type:** Papua-New Guinea. Hellwig Range, *von Roemer* 932 (holo: L! [photo in Nova Guinea 8, tab. 180!]; iso: BO!).

*Luzuriaga aspericaulis* Hallier f. in H.A. Lorentz, Nova Guinea 8: 991 (1914). **Type:** Papua-New Guinea. Arfak Range, *K. Gjellerup* 1078 (holo: L [photo in Nova Guinea 8, tab. 181!]; iso: BO!).

*Geitonoplesium cymosum* subsp. *angustifolium* Schlittler, Ber. Schweiz. Bot. Ges. 61: 227 (1951). **Type:** Slovakia. Bratislava, *Pl. ex Herb. Trevirani, cult. Hort. Wratislav,* 1828 (lecto, here designated: L! [called "neotypus" by Schlittler]).

[see note under nomina excludenda, below]

*Geitonoplesium cymosum* subsp. *macrophyllum* Schlittler, ibid., 228 (1951). **Type:** Indonesia, Maluku. Buru Island, *Toxopeus* 435 (holo: L! [photo in Ber. Schweiz. Bot. Ges. 61: 230!]; iso: BO!).

*Geitonoplesium cymosum* var. *paniculatum* Schlittler, ibid., 228 (1951). **Type:** Papua-New Guinea. Wissel Lake Region, *P.J. Eyma* 5393 (holo: BO! [photo in Ber. Schweiz. Bot. Ges. 61: 231!]).

*Geitonoplesium cymosum* subvar. *firmum* Schlittler, ibid., 228 (1951). **Type:** Papua-New Guinea. Wissel Lake Region, *P.J. Eyma* 4368 (holo: BO!).

*Geitonoplesium cymosum* forma *album* Schlittler, ibid., 229 (1951). **Type:** Australia, Queensland. Moreton District: Springbrook, *C.E. Hubbard* 4236 (holo: L!).

*Geitonoplesium cymosum* forma *rubeullum* Schlittler, ibid., 229 (1951). **Type:** Solomon Islands. Guadalcanal, *S.F. Kajewski* 2641 (holo: BO!).

*Geitonoplesium cymosum* subforma *glabrum* Schlittler, ibid., 229 (1951). **Type:** Indonesia, Sumba Island. Kanangar, *Grevenst* 192 (holo: BO!).

## Excluded names

*Eustrephus celebicus* (Blume) D. Dietr., Syn. Pl. 2: 1117 (1840). [= *Rhuacophila javanica* Blume]

*Eustrephus javanicus* (Blume) D. Dietr., ibid. (1840). [= *Rhuacophila javanica* Blume]

*Geitonoplesium angustifolium* (W.Aiton) K. Koch, Ind. Sem. Hort. Berol., App. 10, 1854. - *Medeola angustifolia* J.Mill. ex W. Aiton, Hort. Kew. 490 (1789).

[Koch's description is clearly based on a narrow-leaved specimen of *G. cymosum*. However, he lists two apparent synonyms: *Eustrephus angustifolius* Link, Enum. Pl. Hort. Berol. 1: 340 (1821); and *Medeola angustifolia* Delile in Redouté, Liliaceae 7, t. 393 (1813). Neither Link nor Delile was attempting to describe a new species. Link (loc. cit.) credits the name *E. angustifolius* to R. Brown (see above). The Redouté illustration accompanying Delile's (loc. cit.) description appears to be of *G. cymosum*, but the description itself differs from this taxon in several characters. Delile did not intend his description as representing a new taxon, but as a redescription of the South African plant *M. angustifolia* W. Aiton. Koch made no attempt to assign the types of these names to other taxa. Because Aiton's name is the oldest legitimate synonym listed by Koch for his taxon, it must be regarded as basionym. Aiton's type must therefore be regarded as Koch's type. However, when Schlittler (1951) reduced the taxon described by Koch to the rank of subspecies, he credited Koch with the basionym but added "*Medeola angustifolia* Redouté, ... excl. descr." (sic). Thus he appeared to be including Redouté's illustration within the boundaries of his taxon, but excluding the material covered by Delile's description. Schlittler thus clearly intended to exclude Aiton's taxon, and the South African type of his name, from his circumscription of his subspecies. Schlittler also listed *E. angustifolius* as a synonym, but his key places its type specimen in *Eustrephus*. Schlittler's taxon thus has a new name attributable solely to him.]

*Geitonoplesium humile* Hassk., Cat. Hort. Bot. Bogor., 31 (1844). [=*Asparagus* sp.]

*Geitonoplesium scandens* Hassk., ibid. (1844). [= *Asparagus* sp.]

## Acknowledgments

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# Taxonomic studies on the genus *Hoya* R.Br. (Asclepiadaceae: Marsdenieae) in Papuasia, 7*[1]

**Paul I. Forster, David J. Liddle & Iris M. Liddle**

**Summary**

Forster, Paul I., Liddle, David J. & Liddle, Iris M. (1995). Taxonomic studies on the genus *Hoya* R.Br. (Asclepiadaceae: Marsdenieae) in Papuasia, 7. *Austrobaileya* 4(3): 401–406. The new species *Hoya onychoides* P.I.Forst., D.J.Liddle & I.M.Liddle from Papua New Guinea is described and illustrated. *Hoya onychoides* is compared with the closely allied *H. macgillivrayi* F.M.Bailey from Australia and *H. archboldiana* C.Norman from Indonesia and Papua New Guinea, with a description and illustration provided of the latter.

Keywords: Asclepiadaceae, *Hoya* - Australia, Papuasia, *Hoya archboldiana*, *Hoya macgillivrayi*, *Hoya onychoides*.

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## Introduction

In this paper we continue our long-term taxonomic studies on the genus *Hoya* R.Br. in Papuasia (Forster & Liddle 1992, 1993) with the description of a new species *H. onychoides* that is allied to *H. macgillivrayi* F.M.Bailey from Australia and *H. archboldiana* C.Norman from Indonesia and Papua New Guinea. This trio of species appears to be closely allied to each other and they are notable for their large showy, predominantly red to purple flowers. They form an apparently natural group within the genus by virtue of their more or less succulent, deep green, glabrous, lanceolate-ovate to lanceolate-elliptic leaf laminas, and the distinctive staminal corona lobes that are linear to oblong in outline, with the outer apex blunt to broad-ovate and slightly antrorse.

Schlechter (1913) provided a major revision of infrageneric groups in *Hoya*, and this has been recently expanded in a privately published book by Kloppenburg (1993: see also Forster 1994). None of the three previously mentioned species were known to Schlechter (1913). *Hoya macgillivrayi* was included in *H.* section *Physostelma* (Wight) Blume by Kloppenburg (1993), but that author did not mention *H. archboldiana* anywhere in his account.

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* continued from Austrobaileya 4: 51-55 (1993)

[1] Christensen Research Institute Contribution No. 139

The foliage and staminal coronas of *Hoya archboldiana*, *H. macgillivrayi* and *H. onychoides* are similar in some respects to those of most species included in *Hoya* section *Physostelma*. These three species appear to differ from plants of *Hoya* section *Physostelma* in their more or less succulent foliage, large red-purple flowers, and linear to oblong in outline staminal coronal lobes with an antrorse outer apex. In future publications we intend to provide a revised infrageneric classification of *Hoya*; however, for now it suffices to say that the three species covered here will form a separate group because of their uniquely shared features.

Since the early 1980's, all of these three species (with various clones) have been widely cultivated, particularly in Australia and the U.S.A., and have usually been labelled as *H. macgillivrayi*, *H. megalaster* Warb. or *H. archboldiana* (Liddle 1988). Despite the distinctive morphological features of the different species, there has been widespread confusion with respect to naming of cultivated material, mainly resulting from misuse of the name *H. megalaster* for *H. onychoides* (cf. Liddle 1988; Burton 1990). *Hoya megalaster* also has large red flowers (Liddle 1993), but differs from the three species mentioned above in its more mesophytic foliage, and much shorter staminal coronal lobes that lack the antrorse outer apex.

## Materials and Methods

This paper is based on herbarium collections at A, B, BM, BO, BSIP, CANB, CBG, K, L, LAE, MICH, SING, NY, W and WRSL, our field collections in Australia and Papuasia, and plants cultivated at Emerald Creek, Mareeba. Descriptive terminology and format is as in our previous papers (Forster & Liddle 1992, 1993).

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## Taxonomy

### Key to species in the *Hoya macgillivrayi* group

1. Corolla campanulate, lobes markedly shorter than tube and < 15 mm long, reflexed ..... **3. H. archboldiana**
   Corolla campanulate-rotate or rotate, lobes as long as or longer than tube and > 15 mm long, semi-erect to incurved ..... 2

2. Leaf petiole grooved on upper surface; corolla lobes strongly incurved giving a 'claw-like' appearance to the lobe, with margins strongly reflexed creating a fleshy protusion at the base of sinus between the corolla lobes ..... **2. H. onychoides**
   Leaf petiole rounded on upper surface; corolla lobes weakly incurved giving a flattened appearance to the flower, with margins weakly reflexed with no fleshy protusion formed at the base of the sinus between the corolla lobes ..... **1. H. macgillivrayi**

**1. Hoya macgillivrayi** F.M.Bailey, Queensl. Agric. J. n.s. 1: 190 (1914). **Type:** Australia, Queensland. Cook District: Claudie River, Lloyd Bay, *W. Macgillvray* s.n. (holo: BRI [AQ333104]).

Illustrations: Forster & Liddle (1990); (colour) Liddle (1992).

**Description, Specimens Examined etc.**

Refer to Forster & Liddle (1990) and Liddle (1992).

***Distribution*:** Apparently restricted to Australia in the areas of Iron Range and McIlwraith Range on Cape York Peninsula, Queensland.

***Additional notes*:** Cultivated plants of *H. macgillivrayi* have sometimes been incorrectly named as *H. megalaster* in the horticultural trade.

**2. Hoya onychoides** P.I.Forst., D.J. Liddle et I.M.Liddle **sp. nov.** affinis *H. macgillivrayi* F.M.Bailey a qua corollae lobis valde incurvatis sic florem aspectu ungui simili, et corollae loborum marginibus valde reflexis sic sinus base inter corollae lobos protuberatione carnosa, et antherarum appendicibus obovatis margine serrato differt. **Typus:** cultivated at Emerald Creek, Mareeba, Queensland (ex plant collected Lae - Boana road, Morobe Province, Papua New Guinea), Oct 1990, *D.J. Liddle* IML559 (holo: BRI [2 sheets + spirit]).

[*Hoya megalaster* auct. non Warb.; Liddle (1988); Burton (1990)]

Illustrations (colour): Liddle (1988: 4); Burton (1990: 62).

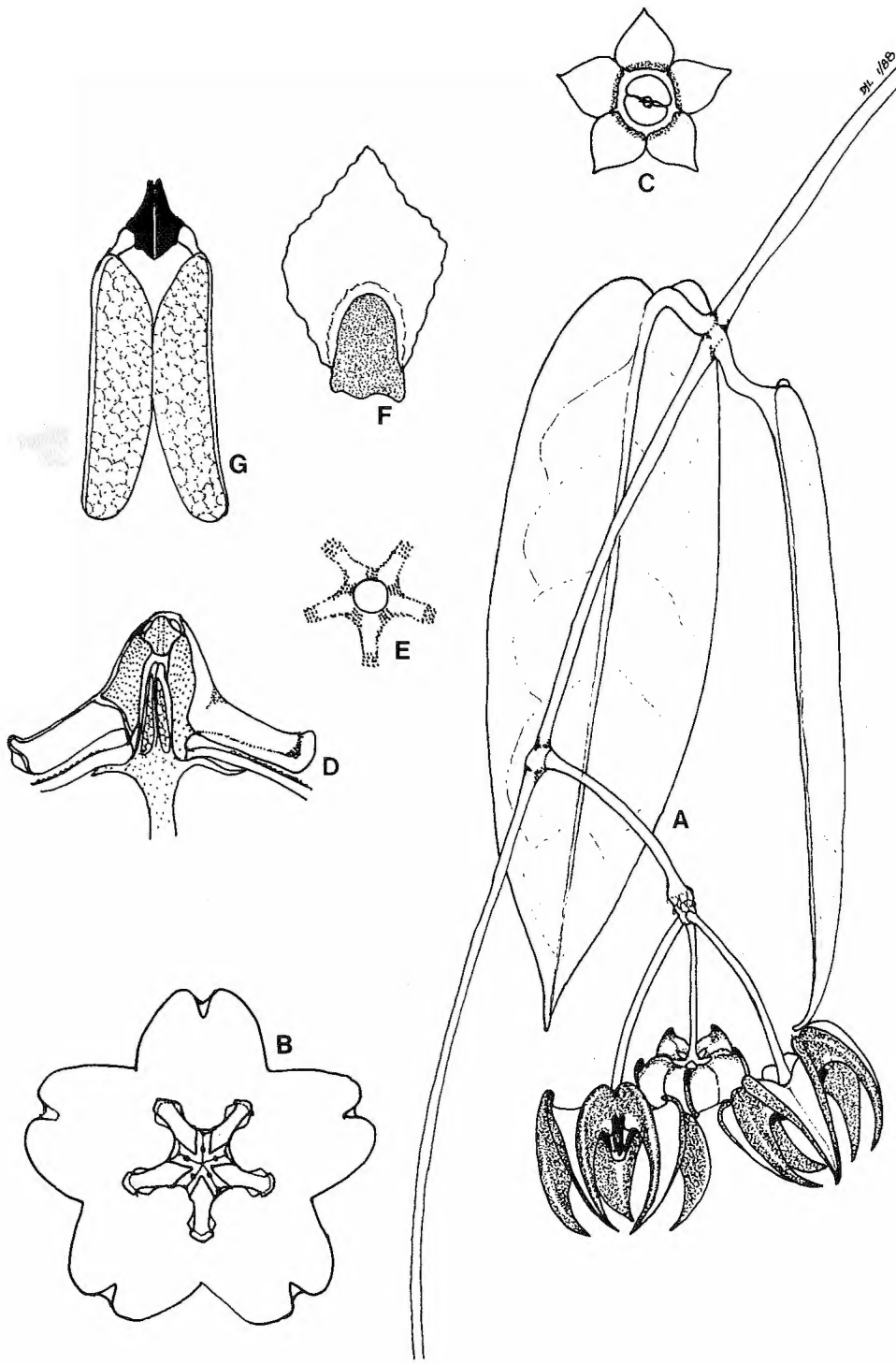


**Fig. 1.** *Hoya onychoides*: A. habit of flowering stem × 0.5. B. apical view of flower × 0.5. C. apical view of calyx and ovaries with corolla and staminal column removed × 3. D. longitudinal section of staminal column and corona × 1.5. E. pattern of hairs at base of staminal corona × 25. F. anther appendage × 10. G. pollinarium (inverted) × 25. Drawn from live material of *Liddle* IML559. Del. D.J. Liddle.

Epiphytic succulent liane, latex white. Stems up to several metres long, glabrous; internodes up to 120 mm long and 5 mm diameter. Leaves petiolate; lamina lanceolate-ovate, up to 120 mm long and 55 mm wide, succulent, discolorous, glabrous, with venation obscure; upper surface dark green; lower surface pale green; tip acute to shortly acuminate; base cordate; petiole 18–22 mm long, 4–5 mm diameter, grooved on upper surface; colleters 3 or 4 at lamina base, often coalesced. Cyme racemiform, up to 170 mm long, positively geotropic; peduncle 80–130 mm long and c. 3 mm diameter, glabrous; bracts triangular, 1–1.2 mm long, 1–1.2 mm wide, glabrous. Flowers 25–27 mm long, 32–45 mm diameter; pedicels 45–60 mm long, 1–2 mm diameter, glabrous; sepals lanceolate-ovate to ovate, 3.5–5.6 mm long, 2.6–3.2 mm wide, glabrous; corolla pink throughout or pink with white towards centre, glabrous apart from sparse trichomes at base of staminal column and corona; tube 10–13 mm long, 20–30 mm diameter; lobes triangular to lanceolate, 18–32 mm long, 15–18 mm wide, held erect giving the lobe a 'claw-like' appearance, margins revolute, resulting in the sinuses between the corolla lobes forming a sharp protusion at the base of the lobes. Staminal corona pink, c. 17 mm long and 11 mm diameter, inserted on column ±flush with corolla; lobes 12–13 mm long, 2–2.2 mm wide, with inner apex lanceolate-oblong, outer apex blunt-oblong and somewhat infolded at base, top rounded. Staminal column c. 10 mm long and 6 mm diameter; anther appendages lanceolate, 2.9–3 mm long, 1.5–1.6 mm wide; alar fissure c. 4 mm long. Style-head conical-globose, 1.9–2 mm diameter. Pollinaria 1.85–1.9 mm long, 1.15–1.2 mm wide; pollinia narrowly-oblong, 1.8–1.85 mm long, 0.5–0.52 mm wide, with pellucid germination mouth on outer edge; corpusculum oblong, 0.7–0.75 mm long, 0.38–0.4 mm wide; caudicles 0.4–0.45 mm long, 0.15–0.2 mm wide, winged on upper edge. Fruit and seed not seen. **Fig. 1.**

*Other specimens examined*: **Papua New Guinea.** Milne Bay Province: Fife Bay, Sep 1930, *Turner* 104A & B (BRI).

***Distribution and habitat*:** Known from Milne Bay and Morobe Provinces in Papua New Guinea. The habitat where this species occurs naturally is not known.

***Notes*:** The name *Hoya megalaster* Warb. has been used for this species by Liddle (1988) and Burton (1990). *Hoya onychoides* has been confused by *Hoya* cultivators with several other species of *Hoya*, including the unrelated *H. subcalva* Burk. from the Solomon Islands (Burton 1990).

***Etymology*:** The specific epithet is derived from the Greek, *onyx* (claw) and *-oides* (similar) and alludes to the 'claw-like' appearance of the corolla lobes.

**3. Hoya archboldiana** C.Norman, Brittonia 2: 328 (1937). **Type:** Papua New Guinea. Central Province: Rona, Laloki River, 3 Nov 1933, *L.J. Brass* 3621 (holo: NY).

*Hoya* sp. ABG-41–48 (Burton 1994).

Illustration (colour): Burton (1994: 48).

Epiphytic succulent liane to several metres long; latex white. Stems cylindrical, glabrous when young becoming corky with age; internodes up to 200 mm long and 5 mm diameter. Leaves petiolate; lamina lanceolate-ovate to lanceolate-elliptic, up to 160 mm long and 70 mm wide, ± succulent, discolorous, glabrous, with venation obscure on both surfaces; upper surface dark glossy green; lower surface pale green; tip acute; base cordate; petiole grooved on upper surface, 14–20 mm long, c. 4 mm diameter, glabrous; colleters 4 at lamina base. Cyme racemiform, up to 100 mm long, positively geotropic; peduncle 25–30 mm long, c. 3 mm diameter, glabrous, lenticellate with age; bracts triangular, 0.9–1 mm long, 0.9–1 mm wide, glabrous. Flowers 18–20 mm long, 40–47 mm diameter; pedicels 45–55 mm long, 1.8–2 mm diameter, glabrous. Sepals lanceolate-ovate, 3–4.5 mm long, 4–4.1 mm wide, glabrous. Corolla campanulate, pink to pink with white, glabrous; tube 23–25 mm long, 28–30 mm diameter; lobes triangular, 13–14 mm long, 18–19 mm wide, reflexed, with margins revolute. Staminal corona pink, 10–11 mm long, 17–18 mm diameter, inserted on column ±flush with corolla; lobes 2.5–2.7 mm long, 3.5–3.6 mm wide at base, inner apex lanceolate-oblong, confluent but not fused with corolla for most of length with the outer apex upturned and infolded with the upturned part

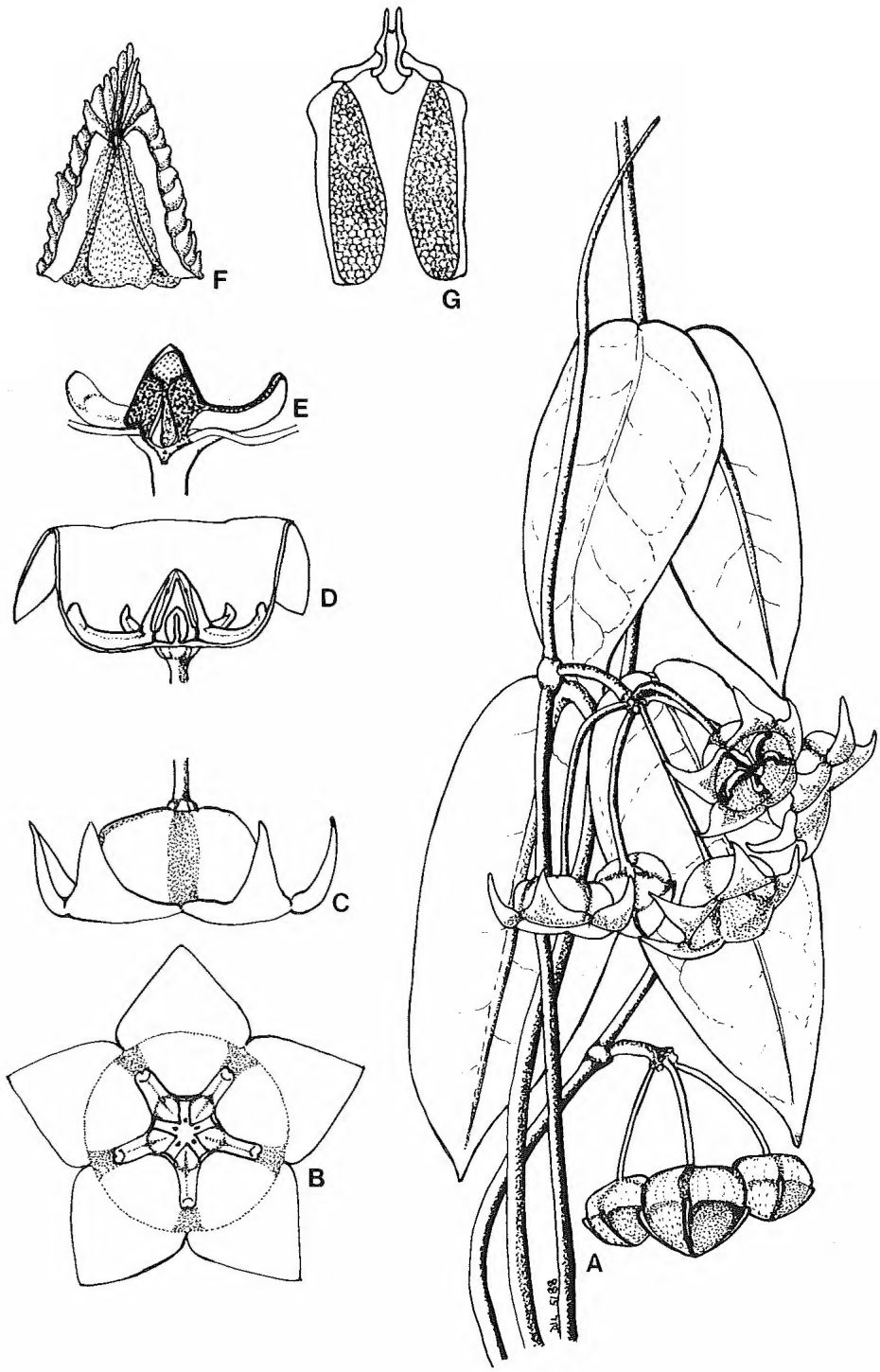


**Fig. 2.** *Hoya archboldiana*: A. habit of flowering stem × 0.5. B. apical view of flower × 0.5. C. lateral view of flower × 0.5. D. lateral view of flower with corolla partially removed to show corona × 0.5. E. longitudinal section of staminal column and corona × 1.5. F. anther appendage × 10. G. pollinarium (inverted) × 25. Drawn from live material of *Liddle* IML560. Del. D.J. Liddle.

2.5–2.7 mm long, top rounded. Staminal column c. 8 mm long and 6 mm diameter; anther appendages lanceolate, c. 2 mm long and 1.5 mm wide; alar fissure c. 3.5 mm long. Stylehead depressed-globose, 2.6–3 mm diameter. Pollinaria 1.9–2 mm long, 1.15–1.2 mm wide; pollinia narrowly-oblong, 1.56–1.65 mm long, 0.44–0.45 mm wide, with pellucid germination mouth on outer edge; corpusculum ovoid, 0.7–0.77 mm long, 0.38–0.4 mm wide; caudicles 0.38–0.4 mm long, 0.13–0.3 mm wide, winged on upper edge. Fruit and seed not seen. **Fig. 2.**

*Specimens examined:* **Indonesia. Aru Islands.** Wokam, May 1938, *Buwalda* 5052 (BO). **Papua New Guinea.** WESTERN PROVINCE: Oriomo River, 8°50'S, 143°00'E, Apr 1968, *Millar* NGF35498 (LAE). CENTRAL PROVINCE: Sogeri, Sirinumu Dam, Sep 1971, *Millar & Womersley* 1282 (LAE, L); Brown River Logging road, 9°15'S, 147°20'E, Aug 1970, *Millar* NGF48617 (LAE, L); Mori River, Cape Rodney, 10°05'S, 148°27'E, Jun 1968, *Henty* NGF38598 (LAE); NORTHERN PROVINCE: Idua - Haijo Logging Area, 3 km NE of Hohota village, 8°45'S, 148°15'E, Oct 1975, *Wiakabu & Kairo* LAE70276 (LAE, L). **Cultivated.** cultivated at Emerald Creek, Mareeba, Australia (ex plant collected at Cape Rodney, Central Province, Papua New Guinea), Oct 1990, *Liddle IML560* (BRI).

***Distribution and habitat*:** *Hoya archboldiana* appears to be the most widely distributed species of the group with collections from the Aru Islands in Indonesia, and Western, Central and Northern Provinces in southern Papua New Guinea. Plants grow as canopy epiphytes in lowland rainforests below 600 m alt.

***Notes*:** *Hoya archboldiana* is distinctive within this trio of species in the possession of campanulate flowers with the reflexed corolla lobes shorter than the tube. Norman (1937) did not ally *H. archboldiana* to any species and merely made the comment 'The large shiny leaves, large flowers and corona seem very distinct and unlike any other species'.

Burton (1994) discussed two forms of this species where there are some minor differences in the length of the staminal coronal lobes and speculated that one of them (as *Hoya* sp. ABG-41-48) may represent *H. patella* Schltr. *Hoya patella* is a distinctive, much smaller flowered species with mesophytic, densely pubescent foliage and with a staminal corona typical of other taxa in *Hoya* section *Physostelma*.

## Acknowledgements

L.A. Craven (CANB) kindly provided the Latin translation. The Directors/Curators of the cited herbaria allowed access to collections in their care, either on loan or during visits to their institutions.

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# A new species and a new record for *Astrotricha* DC. (Araliaceae) in Queensland

**A.R. Bean**

**Summary**

Bean, A.R. (1995). A new species and a new record for *Astrotricha* DC. (Araliaceae) in Queensland. *Austrobaileya* 4(3): 407–409. *Astrotricha pauciflora* A.R.Bean, a new species from Mount Barney National Park is described, illustrated and compared to related species. *Astrotricha roddii* Makinson is newly recorded for Queensland.

Keywords: *Astrotricha*-Queensland, *Astrotricha pauciflora*, *Astrotricha roddii*, Araliaceae.

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## Introduction

Recent taxonomic research on *Astrotricha* (Bean 1991; Makinson 1991) has resulted in the naming of several new species in eastern Australia.

The species named here as *A. pauciflora* was discovered by C.T. White in 1931 and identified by him as *A. biddulphiana* F.Muell., a reasonable course of action in view of the paucity of fertile material available to him. Recent collections representing a wide range of material have shown that this taxon is distinct from *A. biddulphiana* in several features, as outlined below. Continuing botanical exploration of Queensland has uncovered a population of *A. roddii*, hitherto known only from New South Wales, as detailed below.

## Taxonomy

**Astrotricha pauciflora** A.R.Bean **sp. nov.** affinis *A. biddulphianae* F.Muell. sed inflorescentia multo breviore, umbellarum floribus paucioribus parvioribus et fructibus viridibus differt. **Typus:** Queensland. Moreton Region: North Ridge, Mt Barney National Park, 16 July 1994, *A.R. Bean* 7734 & *D.A. Halford* (holo: BRI; iso: CANB,K,MEL,NSW).

A bushy, well-branched shrub, to 90 cm high. Bark smooth, lenticels conspicuous. Stems, petioles and abaxial surfaces of leaves stellate-pubescent, with individual hairs c. 0.25 mm across. Leaves alternate, linear, 35–60 × 2.2–3.5 mm, acuminate, dark green adaxially, pale yellow to brownish abaxially, midrib impressed adaxially, raised abaxially; petioles terete, 3–4 mm long. Panicles terminal, 3–9 cm long, glabrous, purple in colour; bracts linear, 1.5–2.5 mm long, with a few stellate hairs. Unit inflorescence umbellate, 2–4(–5)-flowered; peduncles and pedicels slender, pedicels 5–8 mm long. Flowers bisexual, protandrous, 4–4.5 mm across. Hypanthium glabrous, 1.5–2.0 mm long at anthesis, campanulate; calyx teeth deltoid, apex acute or obtuse, c. 0.5 x 0.5 mm. Petals 5, deltoid, 1.4–1.6 × 1.0–1.2 mm, purple, acuminate, caducous; stamens 5, purple, alternating with the petals; filaments terete, c. 1.5 mm long; anthers white, c. 1.3 mm long, versatile, dorsifixed, opening by longitudinal slits. Styles 2, 1.8–2 mm long; at first erect, later spreading from base. Fruit a schizocarp, glabrous, elliptical in transverse section, 6–9.5 mm long, 3–4 mm wide, 2–3 mm thick; 2-locular, splitting at maturity; obovoid except for basal 1–3 mm which is narrow, cylindrical; green except for persistent calyx teeth and styles. **Fig. 1.**

*Additional specimens examined*: **Queensland.** Moreton District: Mount Barney, Aug 1931, White 7827 (BRI); northern slopes of Mt Maroon, May 1990, *Bean* 1602, *Forster* & *Bird* (AD,BRI,CANB,K,MEL,NSW); South ridge, Mt Barney, Sep 1994, *Bean* 7856 & *Forster* (BRI,MEL).

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***Distribution and habitat*:** *A. pauciflora* is apparently confined to Mt Barney and Mt Maroon in Queensland, both close to the Queensland-New South Wales border. It grows in rocky crevices in low eucalypt woodland or heathland, at altitudes above 600 metres. The estimated annual rainfall there is 1500 mm.

***Flowering period*:** Flowers have been collected in May, July and August.

***Affinites*:** *A. pauciflora* is closely related to *A. biddulphiana* F. Muell. but it differs from that in its leaves 2.2–3.5 mm wide (3.5–7 mm for *A. biddulphiana*), petioles 3–4 mm long (4–6 mm long), inflorescences only 3–9 cm long (16–30 cm long), pedicels 5–8 mm long (8–13 mm long), 2–4(5) flowers per umbel (4–8(11) flowers), petals 1.4–1.6 mm long (2.0–2.2 mm long) and green fruits (purple). In *A. pauciflora*, the base of the fruit tapers gradually into the pedicel, whereas in *A. biddulphiana*, it contracts abruptly into the pedicel.

*A. biddulphiana* has a broad, but highly disjunct distribution in southern Queensland.

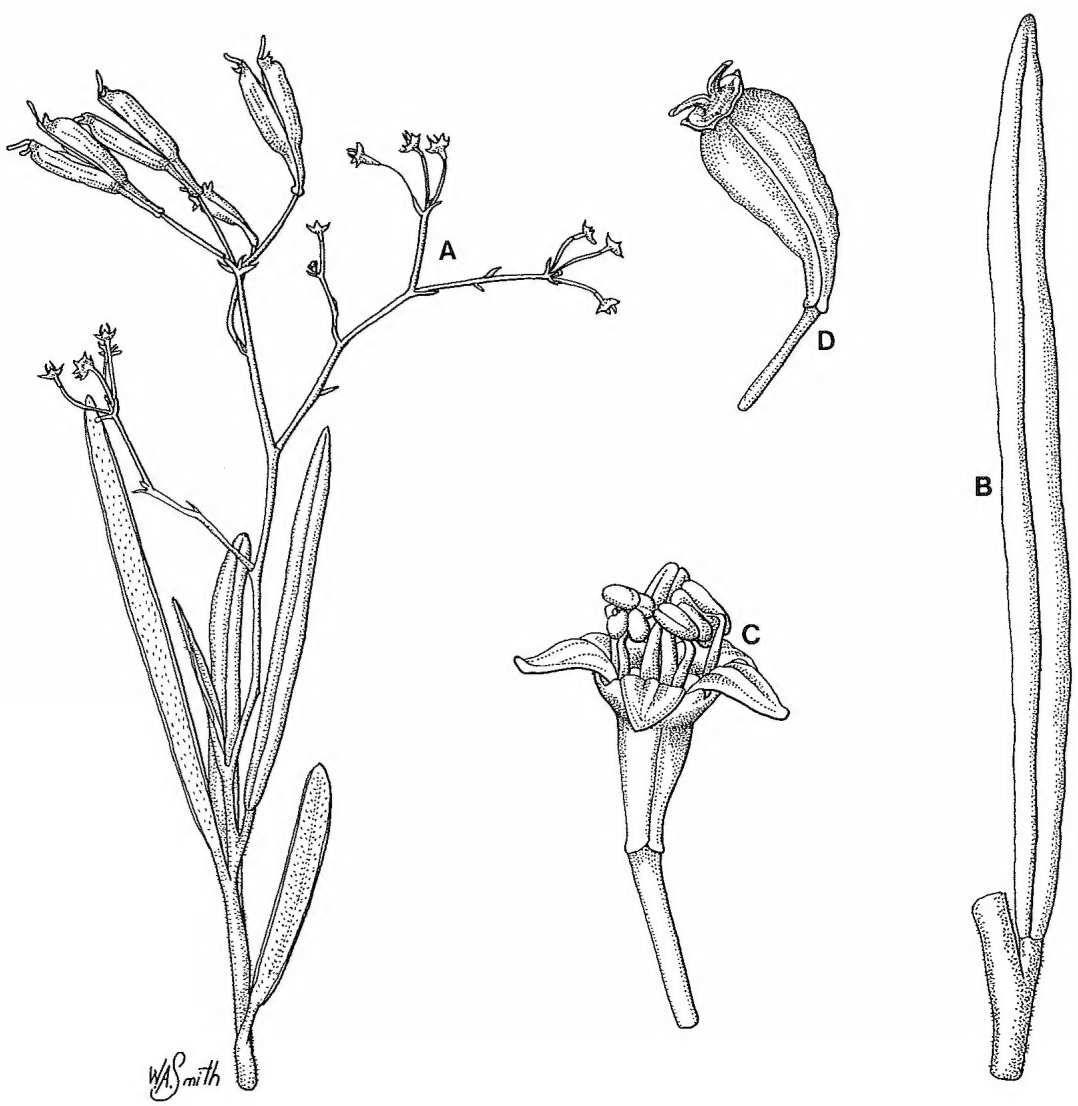


**Fig. 1.** *Astrotricha pauciflora*. A. fruiting branchlet × 2. B. adaxial surface of leaf × 4. C. flower × 8. D. fruit × 4. All from *Bean* 7734.

The northernmost record of it is from Lake Elphinstone near Nebo, and its southern limit is in the Mundubbera and Chinchilla areas. All occurrences are 100–400 kilometres from the coast, where the annual rainfall is less than 800 mm.

***Conservation Status*:** *A. pauciflora* is a rare plant but it is totally confined to Mount Barney National Park. There are no apparent threats to its continued survival. Therefore, a conservation coding of 2RC is recommended, according to the criteria of Briggs & Leigh (1988).

The recommended conservation status as defined by the Queensland Nature Conservation Act is rare.

***Etymology*:** The specific epithet refers to the few-flowered inflorescences of this species, compared to those of its nearest relative *A. biddulphiana.*

**Astrotricha roddii** Makinson, Telopea 4(2): 313–6 (1991). **Type:** New South Wales. North Western Slopes. Macintyre Falls, 3 km S of junction of Macintyre and Severn Rivers, 23 November 1984, *A.N. Rodd* 4096 (holo: NSW; iso: BRI,MEL).

***Additional specimens examined*: Queensland.** Darling Downs District: western end of Mt Bullaganang, c. 40 km NE of Texas, Oct 1994, *Bean* 7987 (BRI,CANB); 'Atholbar' station, Mt Bullaganang, Nov 1994, *Sparshott* KMS 494 & *Grimshaw* (BRI,CANB,MEL,NSW).

***Note*:** These specimens provide the first definite record of *Astrotricha roddii* in Queensland. *A. roddii* was described by Makinson (1991) and was considered at that time to be endemic to New South Wales, though the author did cite a specimen collected last century by Lau (MEL 119649), which could have originated from Queensland. It was previously known from four small populations in northern New South Wales (J. Benson, pers. comm.). The Queensland population occurs on a granitic mountain where it grows on skeletal soil in association with *Eucalyptus dealbata* Schauer, *Leptospermum brevipes* F.Muell. and *Callitris glaucophylla* J.Thomps. & L.A.S.Johnson. Individual plants are scattered but this population comprises at least 100 plants.

## Acknowledgements

I am grateful to Les Pedley for the Latin diagnosis, to Will Smith for the illustrations, and Kym Sparshott for collection of specimens.

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# *Gouania exilis* (Rhamnaceae), a new species from northern Australia and Papua New Guinea, with notes on the identity of *Gouania hillii* F.Muell.

**K. R. Thiele and J. G. West**

**Summary**

Thiele, K. R. & West, J.G. (1994). *Gouania exilis*, a new species from northern Australia and Papua New Guinea, with notes on the identity of *Gouania hillii* F.Muell. *Austrobaileya* 4 (3): 411–416. Examination of herbarium material of *Gouania* in Australia indicates that *G. hillii* F.Muell. is synonymous with *G. australiana* F.Muell. A taxon which occurs on northern Cape York Peninsula (Australia) and in Papua New Guinea, which was previously referred to *G. hillii*, is here described as *Gouania exilis* K.R.Thiele *sp. nov.*

Keywords: Rhamnaceae, *Gouania* - Australia, *Gouania hillii*, *Gouania exilis*.

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## Introduction

Two species of *Gouania* Jacq., *G. australiana* F.Muell. and *G. hillii* F.Muell., are currently known from north Queensland, Australia. The name *G. hillii* has generally been applied to plants collected from the McIlwraith Range-Iron Range-Pascoe River area of Cape York, while *G. australiana* has been used for plants from further south, in the Cairns region. However, examination of types for a treatment of Rhamnaceae for the Flora of Australia has shown that this usage is incorrect.

## The identity of *Gouania hillii* F.Muell.

Mueller (1874) described *Gouania hillii* from material collected near the Daintree River in north Queensland by Walter Hill. The holotype, held at MEL, comprises a branch tip with numerous mature fruits and a single leaf, and is annotated "99/Small tree/Daintree River/ Gouania hillii F.v.M.". The protologue (*l.c.*) runs (our translation):

> Tree, young branches and petioles dark-brown tomentose, leaves ovate- or cordate-orbicular but with slightly acute apices, quite entire, glabrous above, sparsely pilose below, racemes spiciform in a terminal panicle, *fruits small, glabrous*, one and a half times broader than long or less.
>
> Near the Daintree River; Walt. Hill.
>
> Small tree by the notes of the collector. Leaves with moderately long petioles, herbaceous rather than coriaceous, costate with nerves conspicuously raised below, 2–3" long, 1½–2" broad. Stipules caducous. Curled tips absent from the single available branch. Flowers seen only in a very withered state. Fruiting spikes semipedate or shorter. Cocci, including the wings, about 2 lines broad.
>
> Easily separated from the other Australian species thus far collected (see Fragm. iv. 144) on account of its leaves with longer petioles, much more glabrous, thicker and more strongly nerved, and by the clusters on the spikes being shortly pedunculate. Fruit very similar in size and shape to *G. tomentosa*.
>
> *G. javanica* (Miq. Flor. Ind. Batav. i. 649) differs in its leaves that are dentate along their entire length.

Mueller compared his new species with three others, viz *G. australiana* (i.e. the species he previously described from Australia in *Fragmenta* 4), *G. tomentosa* Jacq. and *G. javanica* Miq. *Gouania tomentosa* is conspecific with *G. polygama* (Jacq.) Urban, a species from central America and the West Indies (Suessenguth 1953). The noted similarity in size and shape of the fruits of these two species is probably not indicative of close relationship since many *Gouania* species have relatively similar fruit. The comparison with the south-east Asian species *G. javanica* is

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somewhat misleading, since the leaf on the Hill specimen is not, in fact, quite entire as Mueller described it but has a number of minute teeth towards the leaf apex, and leaves of *G. javanica* are not always dentate along their entire length but are usually entire-margined towards the leaf base. *Gouania javanica* differs from the type of *G. hillii* in its much larger, darker fruits, sparser flower-clusters on the inflorescence axes and smaller, more distinctly toothed leaves.

The comparison with Mueller's previously described Australian species, *G. australiana*, is more important. The single leaf on the Hill specimen does indeed have a slightly longer petiole and is somewhat thicker, less densely hairy and more strongly nerved ("*folia longis petiolata multo glabriora crassiora et validius nervosa*") than does other material of *G. australiana* that would have been available to Mueller; however, these are well within the range of variation for *G. australiana* based on the wider sample now available (**Table 1**). There are discernible differences in the lengths of the peduncles of the fruit-clusters between the Hill specimen and material of *G. australiana*; however, since the Hill specimen is fruiting and Mueller's type material of *G. australiana* is flowering, the comparison is not valid anyway. The specimen is identical in all other respects to *G. australiana*.

The reference on the label of the Hill specimen to the plant being a tree is puzzling, since all Australian and south-east Asian species of *Gouania* are robust lianes climbing high into the rainforest canopy by tightly curled stem-tips. Mueller himself appears to have doubted Hill on this point since, although he refers to *G. hillii* in the diagnosis as a tree, in his notes he purposely ascribes this to Hill ("*Arbor e notis inventoris minor*") and notes the absence of curled, climbing shoot-tips from the *available* material ("*Cirri in ramulo unico suppetente nulli*").

Thus, all characters by which *Gouania hillii* is supposed to differ from *G. australiana* are weak or erroneous, and the types of the two names match well. *Gouania hillii* is reduced here to a synonym of *G. australiana*:

**Gouania australiana** F. Muell., *Fragm.* 4: 144 (1864). **Typus:** Queensland. Cook District: Rockingham Bay, *Dallachy* (holo: MEL).

*G. hillii* F.Muell., *Fragm.* 8: 163 (1874). **Typus:** Queensland. Cook District: Daintree River, *W. Hill* (holo: MEL), *syn. nov.*

**The identity of *Gouania 'hillii' auct. non* F.Muell.**

While the type of *G. hillii* was collected from near the Daintree River, *c.*80 km north of the nearest known extant population of *G. australiana*, specimens of the taxon that has subsequently been ascribed to *G. hillii* all come from the Iron Range-McIlwraith Range-Pascoe River area, some 400 km further north (and from southern Papua New Guinea in the Port Moresby district; **Fig. 2**). These clearly constitute a distinct, geographically disjunct species, differing from *G. australiana* in leaf, inflorescence, fruit and seed characters (**Fig 1; Table 1**).

Nine species of *Gouania* occur in south-east Asia and Malesia (see Suessenguth 1953, Lauterbach 1922). Of these, two species (*G. microcarpa* DC. and *G. leptostachya* DC.) occur in Papua New Guinea; these are also the two most widely-distributed species of the genus in the region, being found in south-east Asia and eastern India.

Lauterbach (1922), in a footnote to a key to the Australasian species of *Gouania*, noted that *G. hillii* appeared to be very similar to *G. microcarpa*, but that he had before him only fragments of fruit of *G. hillii*. However, the Iron Range-McIlwraith Range plants clearly differ from *G. microcarpa*: in the former the disk margin forms attenuate processes adjacent to the sepals, and the fruit is almost as long as broad, while in *G. microcarpa* the disk has short, broad, emarginate lobes adjacent to the sepals, and the fruit pyrenes are much broader than long so that the whole fruit is propeller-shaped.

Examination of material of *G. leptostachya* DC. at BM, CANB and K, and of a microfiche photograph at AD of the type suggests that the Cape York taxon is closely

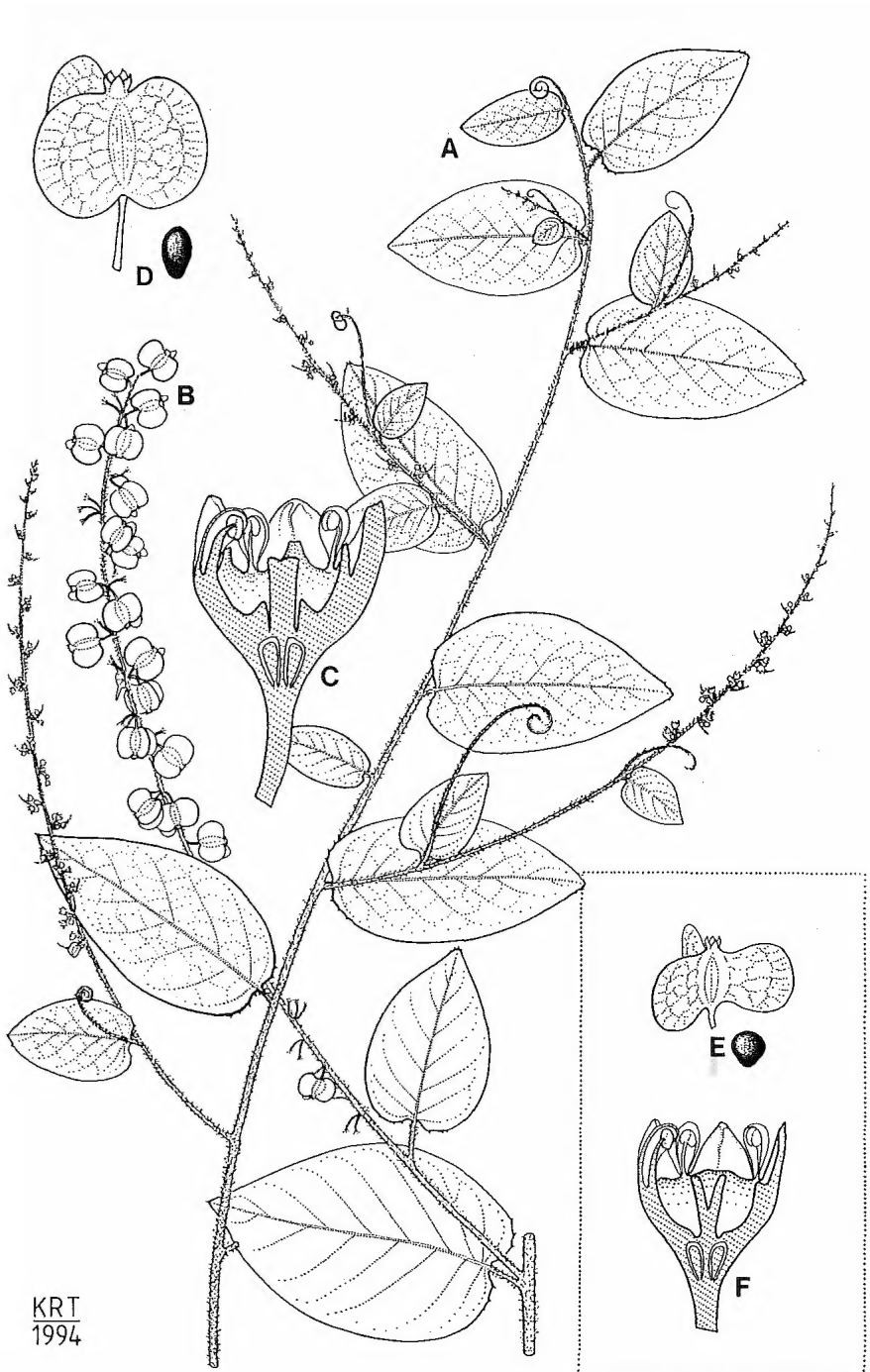


**Fig. 1.** A-D - *Gouania exilis*: A. habit × 0.5. B. infructescence × 0.5. C. half-flower × 10. D. fruit and seed × 2.5. E–F - *Gouania australiana*: E. fruit and seed × 2.5. F. half-flower × 10. A from *Brass* 19192 (CANB); B,D from *Irvine 280* (BRI); C from *Hyland* 14823 (QRS); E *sans coll.* (BRI [AQ109541]); F from *Hyland* 7244 (CANB).

**Table 1. Diagnostic characters of Australian *Gouania*.**

| Characters\Taxa | *G. australiana* | Type of *G. hillii* | *G. exilis* |
|---|---|---|---|
| leaves | thick, dark green | thick, dark green | thin, light green |
| leaf adaxial surface | scattered to dense tubercles | scattered tubercles | smooth |
| leaf abaxial lacunae | raised, verrucose | raised, verrucose | smooth |
| leaves - length (mm)<br>- width (mm) | (52–)60–95(–120)<br>(30–)50–80(–90) | (leaf fragmentary, not measurable) | (30–)55–70(–90)<br>(15–)35–55(–60) |
| petiole length (mm) | 10–20 | *c.* 18 | (4–)6–12(–18) |
| lateral nerve widths (mm) | 2.0–3.0 | *c.* 2.5 | 1.0–1.5 |
| lateral nerve indumentum | sparsely to densely hirsute | densely hirsute | sparsely to densely hirsute |
| pseudoracemes | aggregated at branch-ends | aggregated at branch-ends | single, axillary |
| pedicels in fruit (mm) | 0.5–1.4 | 0.8–1.3 | 2.0–3.3 |
| pyrenes | broader than long | broader than long | about as long as broad |
| pyrene body length (mm) | 2.6–4.0 | 3.5–4.0 | 5.5–8.2 |
| inner face of pyrene | thin, membranous | thin, membranous | thick, chartaceous |
| seed length (mm) | 1.7–1.9 | *c.* 1.8 | 2.2–2.7 |

related to that species. They share slender inflorescence axes which tend to be single in the upper axils (rather than having stout axes aggregated towards the branch-ends, as in most other species in the region), a disk with attenuate processes and relatively large fruits that are longer than broad and have chartaceous adaxial faces to the pyrenes. However, *G. leptostachya* differs from the Cape York taxon in having leaves which are regularly finely crenate (rather than largely entire with a few small, thick teeth at the base and apex), and larger fruits and seeds.

*Gouania* in south-east Asia is in great need of revision, and most collections of its species in all herbaria examined are not determined to species level. Until a complete revision of *Gouania* in the region is prepared, the limits and degree of variability of its species will be uncertain. However, the Cape York taxon is clearly distinct from all other described species. It is therefore described as a new species, *Gouania exilis* K.Thiele.

**Gouania exilis** K.Thiele, **sp. nov.** *Gouaniae leptostachyae* DC. similis sed foliis plerumque integris, ad basin et apicem dentibus paucis crassis parvisque, fructibus minoribus (5.5–8.2 mm longis) et seminibus minoribus (2.2–2.7 mm longis) differt. **Typus:** Australia. Queensland. Cook District: Iron Range, 15 June 1948, *L.J. Brass* 19192 (holo: CANB; iso: BRI).

Evergreen liane, climbing by curled, tendril-like shoot-tips; stems, inflorescence axes and flowers pubescent or pilose with sparse to

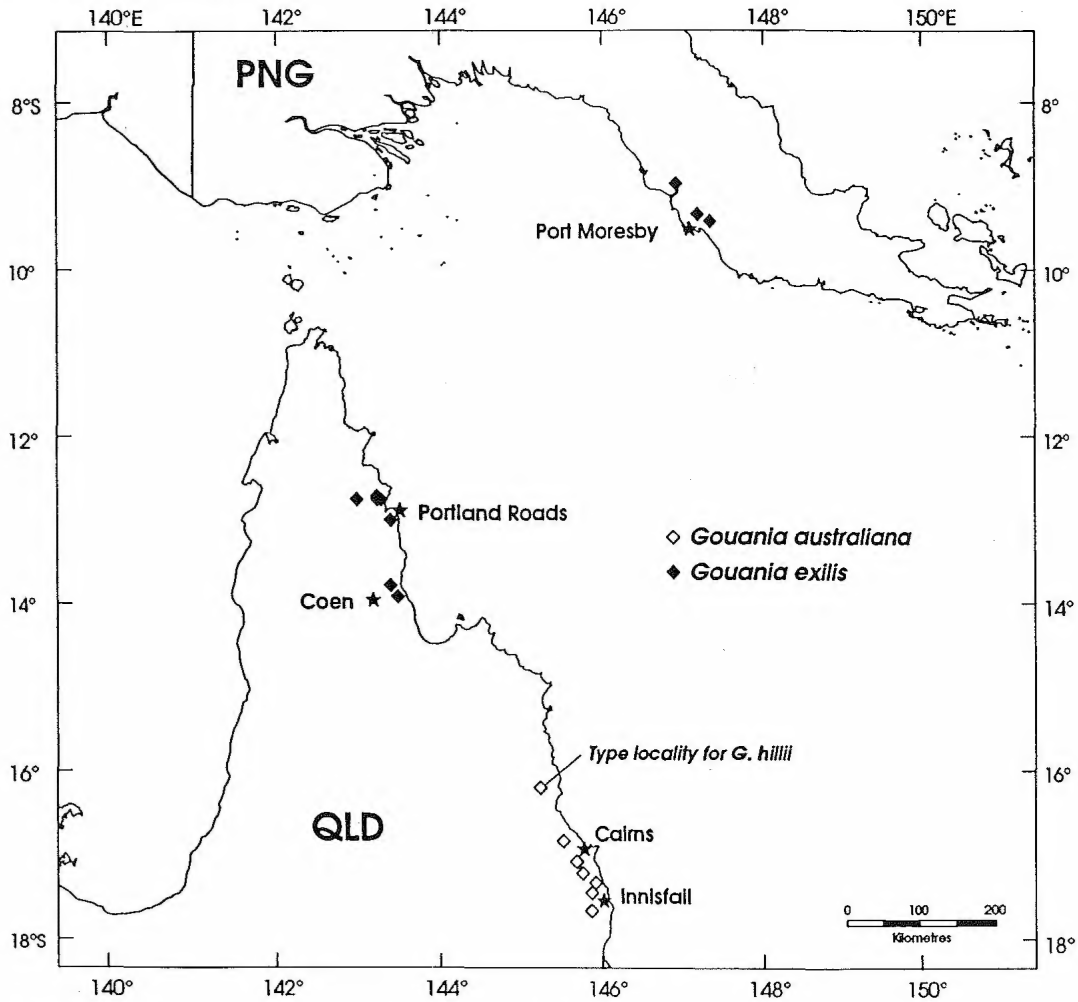


**Fig. 2.** Distribution of *Gouania australiana* and *G. exilis*.

dense, straight or flexuose, loosely appressed or spreading, rusty, simple hairs. Leaves alternate; lamina ± concolorous or somewhat discolorous, ovate, (30–)55–70(–90) mm long, (15–)35–50(–60) mm wide; margin largely entire but usually with a few small, thick teeth at the base and towards the apex; base symmetric, cordate; apex acute, obtuse or acutely to obtusely acuminate; venation penninerved, the primary veins clearly visible below, diverging from the midrib at 35–60°; fully mature leaves sparsely pilose or pubescent abaxially; glabrous or sparsely pubescent or pilose adaxially; petiole (4–)6–12(–18) mm long; stipules 2–5.5 mm long, caducous, coriaceous to scarious, narrowly triangular, acute, free, entire, abaxially sparsely pilose, adaxially glabrous. Inflorescences solitary in the upper leaf-axils, comprising 3- to many-flowered contracted cymes (appearing as congested clusters) arranged in little-branched elongate pseudoracemes; bracts caducous. Flowers bisexual, 5-partite; pedicels 0.9–2 mm long; hypanthium cup-shaped, 1.4–2.5 mm diameter; sepals 0.75–1.4 mm long, erect to incurved, persistent on fruits; petals 0.75–1 mm long, cucullate, not clawed; stamens subequal to petals, incurved; anther 0.4–0.5 mm long; disk conspicuous, lining the hypanthium tube, smooth, glabrous, the margin with short, linear lobes adjacent to the sepals; ovary inferior, 3-carpellate. Fruit a pale brown

ellipsoid or globular schizocarp, 5.5–8.2 mm long with lateral wings 2–3.5 mm wide, crowned by the persistent sepals. Seed 2.2–2.7 mm long, uniformly dark brown. **Fig. 1, A–D.**

***Additional specimens examined*: Papua New Guinea:** Kanosia, Apr 1935, *Carr* 11754 (CANB [CANB61663]); Rouna, Jun 1935, *Carr* 12481 (CANB [CANB44425]); Tovobada Hills, 12 miles N of Port Moresby, May 1965, *Heyligers* 1192 (CANB [CANB155487]); Tavai Creek area, c. 46 miles SE of Port Moresby, May 1967, *Pullen* 6888 (CANB [CANB169121]); Brown River Forest Reserve, Jun 1960, *Gray & Thorne* [NGF12893] (CANB [CANB98804]). Australia, **Queensland.** Cook District: Pascoe River - Talus Ridge, Jul 1972, *Irvine 280* (BRI [AQ109542]); West Claudie River, Jun 1972, *Hyland* 6187 (CANB [CANB242543]); Claudie River between Portland Roads and Iron Range, Oct 1968, *Webb & Tracey* 8532 (BRI [AQ3076]); Claudie River, Jun 1993, *Hyland* 14823 (QRS [QRS101980]); Rocky River on the eastern foothills of McIlwraith Range, Oct 1969, *Webb & Tracey* 9519 (BRI [AQ109544]).

***Distribution and habitat*:** occurs in Papua New Guinea north of Port Moresby and in north Queensland, Australia, between the Pascoe River (Iron Range) and Rocky River (McIlwraith Range) (**Fig. 2**), in rainforests and vine forests on the lower slopes of the ranges, at 20–150 m altitude. Flowers in April-June; fruits in June-October.

***Conservation status*:** This species, as *G. hillii*, has been assigned a conservation status of 3R by Briggs and Leigh (1989) and Thomas and MacDonald (1989). This should be amended to 3R+ since it is now known to occur outside Australia.

***Derivation of name*:** from Latin *exilis* (thin, slender, meagre), in reference to the sparse, slender inflorescences.

## Acknowledgements

We thank Ian Brooker, Tony Orchard and Douglas Kelly for help with the Latin translations and the directors of BRI, MEL and QRS for the loan of material; Bernie Hyland (QRS) first pointed out to us that typification of *G. hillii* was problematical. This work was undertaken with support from the Australian Biological Resources Study (ABRS).

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# A taxonomic revision of *Calycopeplus* Planch. (Euphorbiaceae)

**Paul I. Forster**

**Summary**

Forster, Paul I. (1995). A taxonomic revision of *Calycopeplus* Planch. (Euphorbiaceae). *Austrobaileya* 4(3): 417–428. The endemic Australian genus *Calycopeplus* Planch. is revised. Five species are recognised, *C. casuarinoides* L.S.Sm., *C. collinus* P.I.Forst. sp. nov., *C. oligandrus* P.I.Forst. sp. nov., *C. paucifolius* (Klotzsch) Baill. and *C. marginatus* Benth. All species are described and illustrated and notes are provided on their distribution, habitat, typification and conservation status.

Keywords: Euphorbiaceae, *Calycopeplus casuarinoides, Calycopeplus collinus, Calycopeplus oligandrus, Calycopeplus paucifolius, Calycopeplus marginatus.*

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## Introduction

The genus *Calycopeplus* was described by Planchon (1861) with the single species *C. ephedroides* Planch. from south-western Western Australia. Boisser (1862) united the then monotypic genus with the pantropical *Euphorbia* L. as *E.* section *Calycopeplus* (Planch.) Boiss.; however, Baillon (1866) and later Bentham (1873) supported acceptance of *Calycopeplus* as a distinct genus. Bentham (1873) added a second species, *C. marginatus* Benth. from south-western Western Australia, but no further research on the genus occurred until Smith (1969) described *C. casuarinoides* L.S.Sm. from north Queensland. This latter name has been applied to plants that occurred both in north Queensland and also in tropical areas of the Northern Territory and Western Australia (Hassall 1977; Lazarides *et al.* 1988; Dunlop 1989; Wheeler 1992).

*C. ephedroides* was considered conspecific with *Euphorbia paucifolius* Klotzsch by Baillon (1866) who therefore, made the combination *C. paucifolius*. Both these names appear in recent floras (e.g. Weber 1986, Wheeler 1987) where the number of species is given as three or four.

*Calycopeplus* quite clearly belongs in the tribe Euphorbieae Pax & Hoffm. of the subfamily Euphorbioideae. Its relationship to other genera within the tribe is unclear and a rigorous, objective classification of the eleven genera involved is long overdue (Gilbert 1994). Both Croizat (1937) and Webster (1967) suggested relationships or homologies between *Calycopeplus* and different taxa of *Euphorbia* from geographically distant places such as Africa and Peru, but these comparisons have been made on limited information mainly relating to floral arrangement. Webster (1994) included *Calycopeplus* in the subtribe Neoguillauminiinae Croiz. with *Neoguillauminia* Croiz. Taxa of this subtribe differ from those in the other two subtribes of Euphorbieae (Anthosteminae (Baill.) Webster and Euphorbiinae), primarily in the pseudopetals of the cyathia developing from involucral bracts rather than from the interbracteal glands. *Neoguillauminia* is monotypic and endemic to New Caledonia and differs from *Calycopeplus* in the alternate, well-developed foliage, petaloid involucres and 8 or 10 cyathial glands (McPherson & Tirel 1987; Webster 1994).

Taxa of *Calycopeplus* are superficially similar to many taxa of *Euphorbia*, particularly the aphyllous species (e.g. *E. sarcostemmoides* J.H.Willis; Forster 1987). *Calycopeplus* may be differentiated from *Euphorbia* by the involucral glands without appendages and the male flowers being arranged in 4 groups of 3–16 individual flowers, each group of flowers being subtended by floral bracts (calyculate). *Euphorbia* in comparison has involucral glands

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with appendages, does not have the male flowers arranged in 4 groups, and the flowers are not calyculate.

No modern revision of *Calycopeplus* exists that takes into consideration all of the published names. It is apparent that some names have been misapplied (e.g. *C. casuarinoides* in the Northern Territory and Western Australia), and new, undescribed species are present. The current paper provides a revision of *Calycopeplus* based on morphological data, prior to an account in the 'Flora of Australia' Vol. 23.

As noted by Hassall (1977), *Calycopeplus* consists of small shrubs or trees that are 'ephedroid' in appearance, i.e. they appear leafless and the primary photosynthetic organs are the rounded or flattened stems. This ephedroid habit was considered by Hassall to be adaptive towards periodic drought, although the mechanisms for this remain uninvestigated. Beard (1990) commented on the "succulent shrub *Calycopeplus ephedroides*", but the stems in the taxon concerned are not truly succulent and his comment may result from a casual comparison of it with superficially similar Australian plants such as *Euphorbia sarcostemmoides* (Forster 1987) or *Sarcostemma* (Asclepiadaceae) (Forster 1992) where the aphyllous stems do possess water storage tissue. Rather, the photosynthetic stems of *Calycopeplus* are somewhat woody, and dried specimens show a rigid structure and obvious areas of woody support tissue. Major wood and bark development occurs only in the small tree *C. casuarinoides* from Cape York Peninsula, whereas the other four species remain as small shrubs or subshrubs. At least one species, *C. collinus* from the Northern Territory and northern Western Australia, is thought to be short lived (less than 5 years), but there is little published phenological and ecological information for the three species from south-western Western Australia.

## Materials and Methods

This revision is based on herbarium collections at AD, BRI, CANB, CBG, DNA, MEL, NSW, PERTH and QRS, type collections at K and LD, microfiche of specimens at G–DC, and my own collections and field observations in the Northern Territory and Queensland.

## Terminology

The GRIDCELLS format follows the simple procedure whereby if the taxon is recorded, for example, from the 1°grid cell 29°00'S to 29°59'S latitude, 114°00'E to 114°59'E longitude, then its GRIDCELL is recorded as 29114. Thus distribution of a given taxon may be quickly ascertained at the continental scale enabling significant distributional records (i.e. occurrences in additional grid cells) to be easily determined.

Conservation codings are proposed using the system of Briggs & Leigh (1988).

## Taxonomy

**Calycopeplus** Planch., Bull. Soc. Bot. France 8: 30 (1861). **Type:** *Calycopeplus ephedroides* Planch.

***Derivation of name*:** From the Greek *kalyx* (calyx) and the Latin *peplus* (a robe of state), alluding to the involucre resembling a collective calyx.

Trees, shrubs or undershrubs, evergreen, perennial, monoecious. Stems virgate, cylindrical, ridged or complanate, with white latex, becoming woody with age; bark smooth, or fissured and tessellated in one species. Stipules absent or if present then entire, inconspicuous and deciduous. Leaves opposite, ± sessile, linear, linear-lanceolate or oblanceolate, elobate, penninerved, entire, eglandular or glandular. Inflorescences axillary, pedunculate, pseudanthial with 1 or 2 involucres per axil, 2-bracteate. Involucres (cyathia) campanulate and resembling a calyx, 4-lobed and with small glands alternating between the lobes. Male flowers arranged in 4 clusters of 3–16 within the involucre and opposite its lobes, each cluster subtended and more or less embraced by bracts, the outer 1 or 2 much enlarged and enclosing the cluster; flowers each consisting of a single pedicellate stamen, with a well-marked articulation between pedicel and filament, and lacking a perianth; filaments filiform to somewhat flattened; anthers

dorsifixed, bilobate, thecae oblong and longitudinally dehiscent. Female flower solitary in the centre of the involucre, pedicellate, with a 4- or 6-lobed perianth (or involucel); ovary sessile or shortly pedicellate, 2 or 3-locular, ovules uniloculate; styles 2 or 3, shortly connate, shortly bifid. Fruits capsular, trilobate, smooth, dehiscing into 3 bivalved cocci. Seeds oblong to subglobose-obloid; testa crustaceous; albumen fleshy; caruncles entire; cotyledons broad, flat.

Endemic to Australia, with five species.

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**Key to species of *Calycopeplus***

1. Stems 2-angular in cross-section, longitudinally complanate ..... **4. C. marginatus**
   Stems 6-angular or round in cross-section, longitudinally ridged or cylindrical ..... 2

2. Stems round in cross-section, longitudinally cylindrical ..... **3. C. paucifolius**
   Stems 6-angular in cross-section, longitudinally ridged ..... 3

3. Small trees developing black tessellated bark; involucre glands larger and longer than involucre lobes ..... **1. C. casuarinoides**
   Shrubs or subshrubs not developing bark; involucre glands shorter and smaller than involucre lobes ..... 4

4. Involucre lobes broad-triangular, 0.8–1 mm long, c. 2 mm wide; glands < 0.5 mm long; male flowers in groups of 2 or 3; anthers 0.7–0.9 mm long ..... **5. C. oligandrus**
   Involucre lobes triangular, 1–2.2 mm long, 0.8–2 mm wide; glands > 0.5 mm long; male flowers in groups of 5–14; anthers 0.4–0.6 mm long ..... **2. C. collinus**

**1. Calycopeplus casuarinoides** L.S.Sm., Contrib. Queensland Herb. 6: 4 (1969). **Type:** Queensland. Cook District: Aurukun Mission, near Archer River mouth, 21 Feb 1964, *W.F. Mackenzie* [AQ342460] (holo: BRI).

*Ephedra arborea* F.Muell. ex Parlatore in A.DC., Prodr. 16(2): 360 (1868), **nomen nudum. Type:** Queensland. Cook District: Foot of Newcastle Range, Apr 1857, *F. Mueller* (holo: G–DC [fiche at BRI]).

Shrub or small tree to 10 m high, long-lived. Bark well-developed with age, black, fissured and tessellated. Stems 6-angular in cross-section, longitudinally ridged; internodes 10–100 mm long, 1–3 mm diameter on upper branches; red 'fruit-like' galls often present at nodes. Stipules absent. Leaves linear, 1.5–20 mm long, 0.5–1.6 mm wide, concolorous, glabrous, eglandular. Inflorescences with peduncles 1–1.5 mm long, generally with a single involucre; bracts ovate-triangular, 1–2 mm long, 0.8–1.8 mm wide, glabrous. Involucres campanulate, 1.5–2.2 mm long, 2.2–3 mm diameter, glabrous, generally with male and female flowers together in same involucre; lobes ovate-truncate, 0.7–1 mm long, 1.2–1.5 mm wide, entire, shorter than glands; glands ellipsoid-spherical, 1.4–1.8 mm long, 1.8–2 mm wide, clearly visible between lobes and inserted on involucre at same level as lobes. Male flowers in clusters of 4–9 flowers; bracts 3, oblanceolate, 2–2.5 mm long, 0.8–1 mm wide, ± free or somewhat fused, shortly ciliate on tips for 0.2 mm; pedicels flattened-terete, 1–6 mm long, c. 0.2 mm diameter; filaments flattened-terete, 0.5–1 mm long, 0.1–0.2 mm diameter; anthers c. 0.5 mm long, 0.6–0.7 mm wide. Female flowers with pedicels to 1 mm long; perianth segments 4, oblanceolate, 0.8–1.2 mm long, 0.5–0.7 mm wide, glabrous; ovary sessile, c. 0.8 mm long and 0.8 mm wide, glabrous; styles 3, erect to slightly recurved, 0.7–0.8 mm long, shortly connate for 0.2–0.5 mm at base, tips distally bifid for c. 0.2 mm of

their length. Fruit ± globose, 4–4.5 mm long, 4–4.5 mm diameter. Seed obloid, 2.5–3 mm long, 1.8–2 mm wide, pale yellow-tan; caruncle pyramidal, c. 0.4 mm long and 0.7 mm wide, pale yellow. **Fig. 1A–H.**

***Selected specimens examined*: Queensland.** Cook District: Cape York, N of Jardine River, c. 29 km S of Bamaga, 11°09'S, 142°22'E, Oct 1971, *Dodson* [AQ003636] (BRI); Jardine River, May 1948, *Brass* 18883 (BRI); Road to Pennefather, 12°20'S, 141°53'E, Jul 1988, *Dalliston* CC266 (BRI); Sandy Creek, Weipa to Stones Crossing road, 69 km from Weipa, 12°25'S, 142°10'E, Jul 1993, *Forster* 13501 *et al.* (BRI, QRS); Botchet Swamp, 18 km NNW of Lorim Point, Weipa, 12°31'S, 141°48'E, Mar 1981, *Morton* 1154 (BRI, MEL); 15 km N of Batavia Downs on the Peninsula Development road, 12°31'S, 142°39'E, Apr 1990, *Clarkson* 8459 & *Neldner* (BRI, DNA, MBA, QRS); Weipa concession, Willum Swamp, 12°40'S, 142°00'E, Sep 1974, *Dockrill* 863 (BRI, CANB, QRS); 62.5 km along main Weipa road, off Peninsula road, 12°56'S, 142°24'E, Apr 1988, *Forster* 4068 & *Liddle* (BRI); Embley Range, 13 km SSW of the Batavia Downs Homestead, Jul 1985, *Clarkson* 6065 (BRI, MBA); Archer River, 13°25'S, 142°10'E, Sep 1974, *Hyland* 7573 (BRI, QRS); 60 km W of Strathmay on Musgrave to Edward River road, 14°42'S, 142°18'E, Oct 1980, *Clarkson* 3494 (BRI, DNA, MBA, QRS); 2 km S of Hann River Crossing, c. 70 km NW of Laura, Apr 1976, *Hassall* 7613 (BRI); near Lakes Creek, c. 21 miles [35 km] SE of Hann River crossing on Laura - Coen road, Oct 1962, *Smith* 12041 (BRI); 47 miles NW of Laura, 15°15'S, 144°00'E, Jun 1971, *Hyland* 5192 (BRI, QRS); near Normanby River, north of Kalpowar, 14°45'S, 144°15'E, Oct 1970, *Hyland* 4869 (BRI, QRS); 47 miles [78.3 km] NW of Laura, 15°15'S, 144°00'E, Jun 1971, *Hyland* 5192 (BRI, QRS); Kowanyama Aboriginal Reserve 8.3 km from Shelfa crossing of Mitchell River, on track from Kowanyama via Yalko yards, 15°23'S, 141°53'E, Aug 1980, *Clarkson* 3360 (BRI, QRS); beside Dorunda Lake Homestead, 16°32'S, 141°49'E, Jun 1990, *Neldner* 2940 & *Clarkson* (BRI, CANB, MBA); Wyaaba Creek, 16°45'S, 142°00'E, Aug 1936, *Blake* 12554 (BRI, CANB).

***Distribution and habitat*:** GRIDCELLS: 11142, 12141, 12142, 12143, 13141, 13142, 13143, 14141, 14142, 14144, 15141, 15143, 15144, 16142. *Calycopeplus casuarinoides* is restricted to Queensland and occurs sporadically over most of western Cape York Peninsula and is also probably throughout much of the country bordering the Gulf of Carpentaria (**Map 1**). Plants grow in seasonally inundated eucalypt or melaleuca open woodlands often dominated by *Eucalyptus microtheca* F.Muell. and *Melaleuca viridiflora* Sol. ex Gaertn. and ephemeral swamps.

***Notes*:** *Ephedra arborea* was first mentioned in the literature by Mueller (1862) as a *nomen nudum* in his list of plants collected on the Landsborough expedition to the Gulf of Carpentaria while looking for the ill-fated Burke and Wills. The name was subsequently listed under species dubiae in Parlatore's (1868) account of *Ephedra* with the brief statement "In Nova Hollandia orientali, Newcastle Range (Ferd. Mueller). Possideo Tantum ramos qui insigniter sulcati." The specimen in G–DC has "Foot of Newcastle Range, Apr 1857 F v Mueller". Both Bentham (1873) and Smith (1969) mentioned *E. arborea* in their accounts; however, neither chose to take up the name and it is considered to represent a *nomen nudum* because of the lack of adequate diagnosis.

***Phenology*:** Flowers March to May; fruits April to June.

***Conservation status*:** Widespread and common. No conservation coding necessary.

**2. Calycopeplus collinus** P.I.Forst. **sp. nov.** affinis *C. casuarinoides* L.S.Sm. a qua in habitu fruticis vel suffruticis breviviventis vel suffrutice usque 2 m alti, cortice laevi, et lobis involucri triangularibus et distincte longioribus majoribusque quam glandes differt. **Typus:** Northern Territory. Headwaters of Liverpool River, Arnhem Land, 12°46'S, 133°44'E, 4 Apr 1984, *G. Wightman* 1433 & *L. Craven* (holo: DNA; iso: BRI, CANB, MEL).

[*Calycopeplus casuarinoides* auct., non L.S.Sm.; Lazarides *et al.* (1988: 13); Dunlop (1989: 35); Wheeler (1992: 596)]

Shrub or subshrub to 2 m high, short-lived (< 5 years). Bark smooth. Stems 6-angular in cross-section, longitudinally ridged; internodes 15–90 mm long, 1–3 mm diameter on upper branches; red 'fruit-like' galls not formed at nodes. Stipules absent. Leaves linear to linear-lanceolate, 1–46 mm long, 0.4–2 mm wide, concolorous, glabrous, eglandular. Inflorescences with peduncles 1.5–3.5 mm long, with 1 or 2 involucres; bracts ovate-triangular, 1–1.5 mm long, 0.7–1.5 mm wide, glabrous. Involucres campanulate, 1.5–3.5 mm long, 1.7–3 mm diameter, glabrous, generally with male and female flowers together in same involucre; lobes triangular, 1–2.2 mm long, 0.8–2 mm wide,

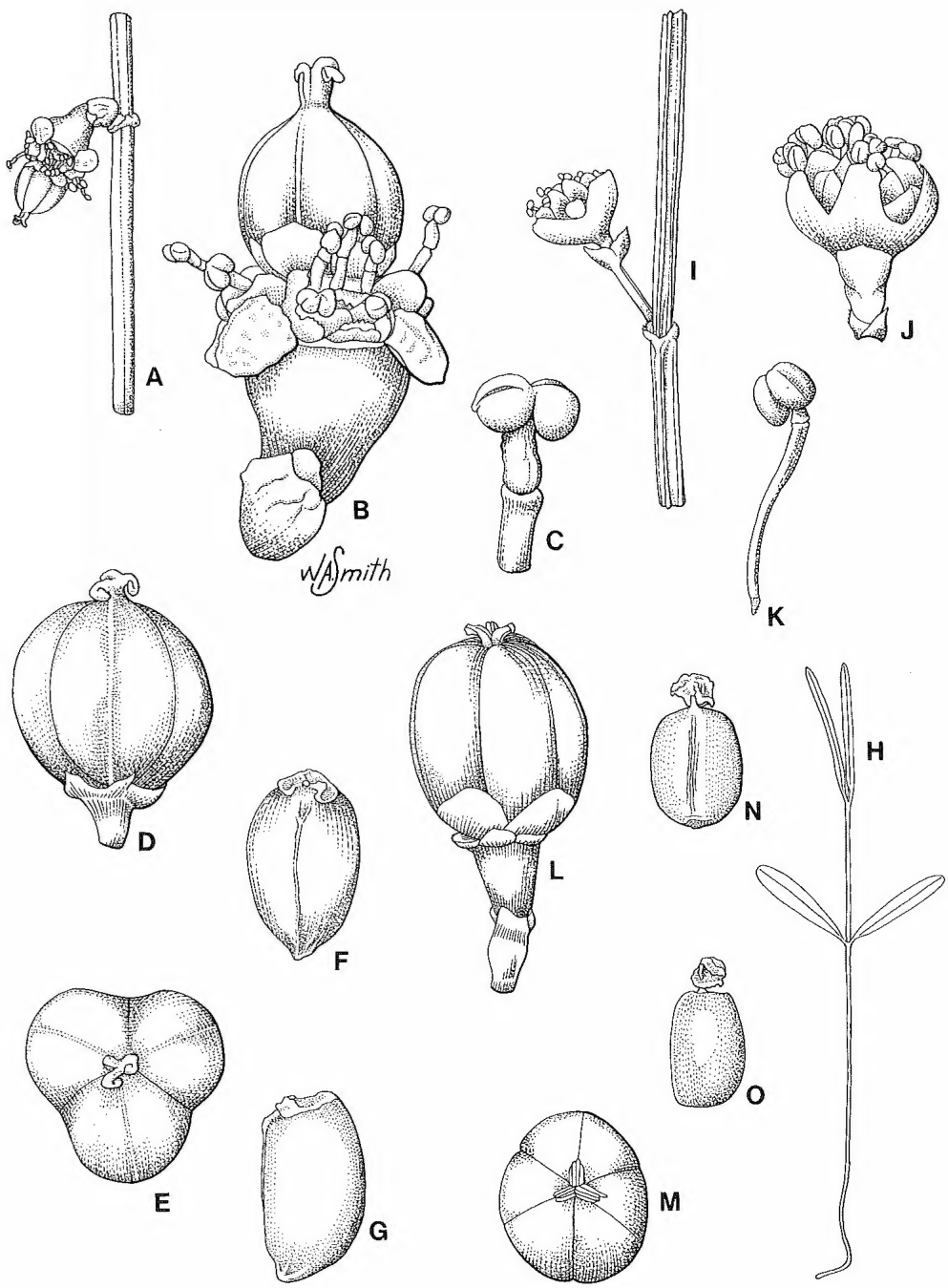



**Fig. 1.** A–H. *Calycopeplus casuarinoides*; I–O. *C. collinus*. A & I. stem with inflorescence A, × 2; I × 4. B & J. inflorescence B, × 6; J, × 8. C & K. male flower × 16. D & L. side view of fruit D, × 6; L, × 4. E & M. apical view of fruit E, × 6; M, × 4. F & N. dorsal view of seed F, × 8; N, × 4. G & O. ventral view of seed G, × 8; O, × 4. H. seedling × 1. A–C from *Clarkson* 8459 (BRI); D–G from *Mackenzie* [AQ025370] (BRI); H from *Forster* 13501 *et al.* (BRI); I from *Telford* 8122 (BRI); J–M from *van der Werff* 11848 (QRS); N–O from *Halford* Q1162 (BRI). Del. W. Smith.

entire, longer than glands; glands ellipsoid-spherical, 0.5–1 mm long, 0.5–0.8 mm wide, clearly visible between involucre lobes and inserted on involucre at same level as lobes. Male flowers in clusters of 5–14 flowers; bracts 3, ovate to obovate, 2–3 mm long, 1.8–2 mm wide, ± free or somewhat proximally fused, shortly ciliate on tips for 0.2 mm; pedicels filiform, 0.8–2.8 mm long, c. 0.2 mm diameter; filaments filiform, 0.4–0.5 mm long, c. 0.2 mm diameter; anthers 0.4–0.6 mm long, 0.7–0.8 mm wide. Female flowers sessile; perianth segments 5, ovate-oblong, c. 1.8 mm long and 1.8 mm wide, glabrous; ovary sessile, 1.8–2 mm long, 1.8–2 mm wide, glabrous; styles 3, erect to slightly recurved, 1–1.2 mm long, shortly connate for c. 0.2 mm at base; tips distally bifid for c. 0.2 mm of their length. Fruit ± obloid, 6–7 mm long, 5–6 mm diameter. Seed oblong, 4–4.5 mm long, 2.2–3.2 mm wide, brown; caruncle hemispherical, 1–1.3 mm long, 1.8–2 mm wide, pale yellow. **Fig. 1I–O.**

***Selected specimens examined*: Western Australia.** Limestone hills W of Weaber Range, c. 50 km N of Kununurra, c. 13 km NW of Point Springs, Mar 1978, *Lazarides* 8427 (BRI, CANB, PERTH). **Northern Territory.** 5 miles [8.3 km] W of Rum Bottle Creek, 12°04'S, 133°44'E, Jun 1972, *Maconochie* 1596 (BRI, DNA); 50 km E of Oenpelli, 12°15'S, 133°15'E, Aug 1983, *Wightman* 681 (DNA); gorge between Twin Falls & Jim Jim Falls, 12°19'S, 132°52'E, Mar 1984, *Wightman* 1308 & *Craven* (AD, CANB, DNA); Nabarlek, Arnhem Land, 12°19'S, 133°19'E, Mar 1989, *Hinz* 457 (DNA); Kakadu N.P., 2.5 km NW of Koongarra Saddle, 12°45'S, 132°55'E, *Telford* 8122 & *Wrigley* (BRI, CBG); Upper East Alligator River, Arnhem Land, 12°47'S, 133°21'E, Apr 1988, *Russell–Smith* 5230 & *Lucas* (DNA); west of Koongarra jump-up, 12°51'S, 132°50'E, May 1978, *Rice* 2625 (BRI); near Koongarra Saddle, 1.5 km N of Koongarra, 12°51'S, 132°51'E, May 1980, *Craven* 5716 (CANB, DNA); 6 miles [10 km] S of Yaimanyi Creek, 12°51'S, 134°32'E, Jun 1972, *Byrnes* 2697 (CANB, DNA); Mt Basedow Range, 12°59'S, 132°41'E, Jun 1973, *Hartley* 13895 (CANB, DNA); Kakadu N.P., adjacent to Round Jungle, 13°18'S, 132°38'E, Apr 1987, *Russell–Smith* 2174 & *Lucas* (DNA); Waterfall Creek, above escarpment, 13°19'S, 132°27'E, Apr 1984, *Wightman* 1288 & *Dunlop* (DNA); 1 km upstream from Twin Falls, 13°20'S, 132°42'E, Mar 1988, *Fensham* 871 (DNA); 6 km ESE of Twin Falls, 13°22'S, 132°48'E, May 1980, *Craven* 5846 (CANB, DNA); Kakadu N.P., Birdie Creek, 13°57'S, 132°52'E, Apr 1990, *Cowie* 1108 & *Leach* (DNA, MEL); Katherine Gorge, 15 miles [25 km] E of Katherine township, Mar 1964, *Lazarides* 7029 (CANB, DNA); Katherine Gorge N.P. above Edith Falls, 14°11'S, 132°14'E, Feb 1982, *King* 55 (DNA); Edith Falls, 14°12'S, 132°11'E, Mar 1978, *Reed* 56 (DNA); Eva Valley, 14°20'S, 132°50'E, Apr 1990, *van der Werff* 11848 (QRS).

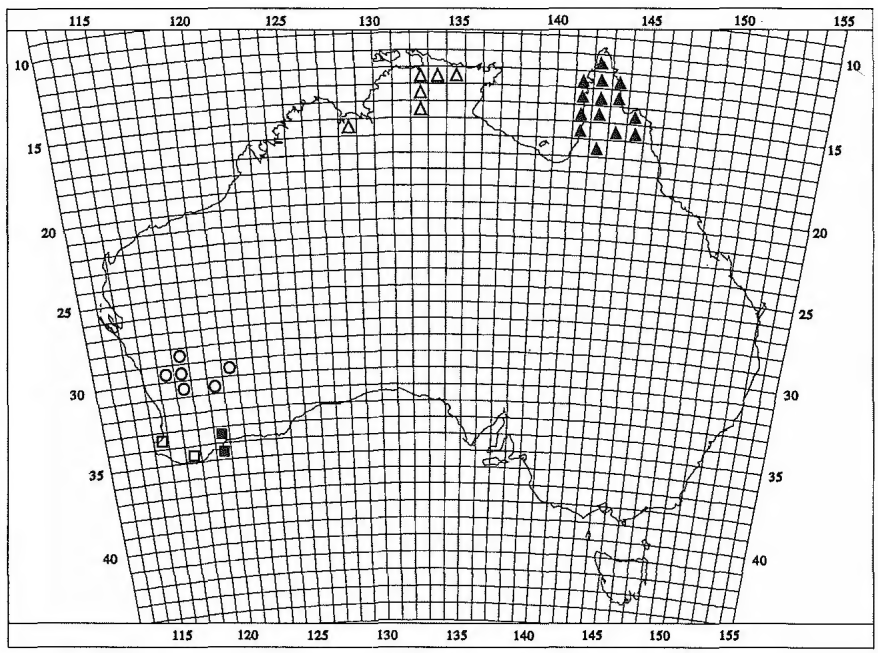
***Distribution and habitat*:** GRIDCELLS: 12132, 12133, 12134, 13132, 14132, 15128. *C. collinus* occurs in monsoonal Northern Territory and from a single disjunct record in the Western Australian Kimberley (**Map 1**). In the Northern Territory, plants grow on or associated with the extensive sandstone escarpments that are widespread in eastern Arnhem Land. The major vegetation type from which the species is recorded is low open eucalypt woodland dominated by species such as *E. phoenica* F.Muell. or *E. miniata* A.Cunn. ex Schauer, and with spinifex (*Triodia* spp.) dominant in the understorey. The single collection from Western Australia is recorded from a limestone gorge in association with *Eucalyptus cliftoniana* W.Fitzg. ex Maiden, *Grevillea* sp. and *Triodia* sp.

***Notes*:** *C. collinus* has previously been included in *C. casuarinoides* and the numerous collections from the Northern Territory have been widely distributed under the name *C. casuarinoides*. The most obvious macroscopic difference between *C. casuarinoides* and *C. collinus* is habit. *C. casuarinoides* is a long-lived small tree to 10 m in height that develops a prominent black, fissured bark with age. *C. collinus* is a relatively short-lived (2–3 years apparently) subshrub or shrub to 2 m in height that does not develop fissured bark. Flowering material of the two species is also easily distinguishable as *C. collinus* has involucres with lobes markedly longer and larger than the glands, whereas with *C. casuarinoides* the situation is reversed. In addition, the habitats where the two occur could not be more dissimilar, escarpments for *C. collinus* and seasonal swamps for *C. casuarinoides*.

***Phenology*:** Flowers January to July; fruits January to August.

***Conservation status*:** *C. collinus* is common and relatively widespread in the Northern Territory where most of the populations are present in Kakadu National Park. The status of the single known Western Australian population has yet to be determined.

***Etymology*:** The specific epithet is derived from the Latin *collinus* (hills) and alludes to the preference of this species for escarpment habitats.




**Map 1.** *Calycopeplus collinus* △, *C. casuarinoides* ▲, *C. marginatus* ■, *C. oligandrus* □, *C. paucifolius* ○.

**3. Calycopeplus paucifolius** (Klotzsch) Baill., Adansonia 6: 319 (1866); *Euphorbia paucifolia* Klotzsch in Lehmann, Pl. Preiss. 1: 174 (1845). **Type:** Western Australia. ad riparim fluvii Canning, 2 Nov 1839, *L. Preiss* 1208 (iso: LD).

*Calycopeplus ephedroides* Planch., Bull. Soc. Bot. France 8: 31 (1861). **Type:** Western Australia. Swan River, *Drummond* (holo: K; iso: K *n.v.* [photo at BRI]).

*Calycopeplus helmsii* F.Muell. & Tate, Trans. Proc. Roy. Soc. S. Aust. 16: 341 (1896), **synon. nov. Type:** Western Australia. 36 miles [50 km] N.W. from Southern Cross, 26 Nov 1891, *R. Helms* [AD96832137] (holo: AD; iso: NSW).

Illustration: Boissier (1866, t. 120).

Shrub or subshrub to 1.5 m high, lifespan unknown. Bark smooth. Stems round in cross-section, longitudinally cylindrical; internodes 20–90 mm long, 1.5–5 mm diameter on upper branches; red 'fruit-like' galls not formed at nodes. Stipules absent. Leaves linear, 5–25 mm long, 0.7–0.9 mm wide, concolorous, glabrous, with 1 or 2 small sessile glands per side of midrib on the margins 2–7 mm from the base. Inflorescences with peduncles 1–2 mm long, with 1 or rarely 2 involucres; bracts lanceolate-ovate, c. 3 mm long, 2–2.8 mm wide, glabrous. Involucres broad-campanulate, 2–3 mm long, 4.5–5 mm diameter, glabrous, generally with male and female flowers in separate involucres; lobes triangular-truncate, 1.5–2.5 mm long, 2.6–3.2 mm wide, entire, longer than glands; glands ellipsoid-spherical, 0.8–1.2 mm long, 0.9–1.3 mm wide, clearly visible between involucre lobes and inserted on involucre at same level as lobes. Male flowers in clusters of 3–7 flowers; bracts 3, ovate to obovate, 2–3.5 mm long, 2–2.5 mm wide, ± free or somewhat fused proximally, glabrous; pedicels filiform, 2–3.5 mm long, c. 0.4 mm diameter; filaments filiform, 0.5–0.7 mm long, c. 0.4 mm diameter; anthers 1.4–1.5 mm long, c. 1.8 mm wide. Female flowers sessile or shortly pedicellate with pedicels up to 1.8 mm long; perianth segments 5, triangular, 2–2.5 mm long, 2.8–3 mm wide, glabrous; ovary sessile, 3.5–4 mm long, c. 3 mm wide, glabrous; styles 3, erect to slightly recurved, 0.6–0.8 mm long, connate for c. 0.4 mm at base; tips distally bifid for 0.1 mm long. Fruit globose-obloid, 6–8 mm

long, 6–6.6 mm diameter. Seed obloid, 3.5–4.6 mm long, 2.3–2.5 mm wide, tan-grey; caruncle hemispherical, c. 1 mm long and 1.5 mm wide, pale yellow. **Fig. 2G–M.**

***Additional specimens examined*: Western Australia.** 40 km N of Paynes Find on the Mt Magnet road, 28°58'S, 117°48'E, Oct 1981, *Craven* 7139 (AD, BRI, CANB); 54.3 miles [90.5 km] N of Wubin towards Paynes Find, Oct 1966, *Lullfitz* 5720 (PERTH); 5.6 km W of Yalgoo turnoff from Paynes Find, 29°12'S, 117°39'E, Nov 1977, *Chinnock* 4025 (AD); 8 km W of Great Northern Highway on Paynes Find - Fields Find road, Nov 1987, *Green* 5247 (CANB); Mt Churchman, Sep 1970, *Ashby* 3594 (AD, PERTH); 21.1 km E along Mt Gibson Homestead road off Wubin - Paynes Find road, 29°34'S, 117°18'E, Aug 1976, *Coveny* 7890 & *Maslin* (NSW); Helena River, Nov 1902, *Fitzgerald* s.n. (NSW); Helena Valley, Nov 1977, *Seabrook* 272 (CANB); 6 km NNW of Scorpion Rock, Walling Rock Station, 29°46'S, 120°17'E, Nov 1988, *Cranfield* 7455 (CANB); Hospital Rocks on Menzies to Dielmals road, 29°50'S, 120°07'E, Oct 1984, *Corrick* 9143 (MEL); Hospital Rock, 30 miles [50 km] W of Riverina, Sep 1973, *Beard* 6520 (NSW); 1 mile [1.6 km] S of Mt Stephen, Nov 1963, *Brown* [PERTH02756013] (PERTH); Koolanook Hills, Sep 1931, *Gardner* 2672 (PERTH).

***Distribution and habitat*:** GRIDCELLS: 28117, 29116, 29117, 29119, 30117, 30119. *C. paucifolius* occurs in the southwest of Western Australia in the Murchison Region (**Map 1**). There are no records from South Australia (Weber 1986) and the species should be deleted from the flora of that State.

The type of *Euphorbia paucifolia* Klotzsch is purportedly from the Canning River in suburban Perth (cf. Marchant 1990); however, there are no recent collections of the taxon from this region which suggests that the recorded locality is probably suspect. Wheeler (1987) noted a single record from the Helena Valley (based on an old Fitzgerald collection at PERTH); however, there is one more recent collection from the area (see *Seabrook* 272 above) and further exploration is required in that area to localise the population(s).

*C. paucifolius* grows on granite rock outcrops where there are large areas of exposed bare-rock slabs alternating with *Casuarina campestris* Diels thickets (Beard 1990). According to Beard (1990), *C. paucifolius* is common in the more open areas of thicket, often associated with *Calothamnus gilesii* F.Muell.

***Notes*:** *C. paucifolius* is the only species of the genus with cylindrical stems. Weber (1986) recognised that *C. paucifolius* was conspecific with *C. ephedroides*; however, *C. helmsii* is newly reduced to synonymy of *C. paucifolius* in this paper.

***Phenology*:** Flowers September to November; fruits September to December.

***Conservation status*:** There are relatively few collections of this plant from a wide area, with most collections from the vicinity of Paynes Find. Even so, Hopper *et al.* (1990) did not consider this plant as rare or threatened.

**4. Calycopeplus marginatus** Benth., Fl. Austral. 6: 53 (1873). **Type:** Western Australia. Towards Cape Riche [Cape Riche is c. 34°37'S, 118°47'E], *Drummond*, 5th Coll. n. 213. (holo: K; iso: K *n.v.* [photo at BRI], PERTH).

Shrub or subshrub to 4 m high, lifespan unknown. Bark smooth. Stems 2-angular in cross-section, longitudinally complanate; internodes 10–105 mm long, 1.5–5 mm diameter on upper branches; red 'fruit-like' galls not formed at nodes. Stipules linear-lanceolate, 0.4–1 mm long, 0.1–0.2 mm wide, glabrous or with a few marginal cilia. Leaves linear-lanceolate, 0.4–1 mm long, 0.1–0.2 mm wide, concolorous, glabrous, eglandular. Inflorescences with peduncles 2–15 mm long, generally with 1 involucre; bracts lanceolate-ovate to obovate, 1–1.2 mm long, 0.4–0.5 mm wide, glabrous. Involucres broad-campanulate, 1.2–1.5 mm long, 2.2–3 mm diameter, glabrous, generally with male and female flowers together in the one involucre; lobes obovate to ovate, 1.5–2.2 mm long, 1.5–2.4 mm wide, entire, longer than glands; glands ellipsoid to triangular, 0.3–0.4 mm long, 0.4–0.5 mm wide, obscured by involucre lobes and inserted on involucre at base below lobe insertion. Male flowers in clusters of 4–12 flowers; bracts 3, obovate, 1.3–3 mm long, 1–2.5 mm wide, ± free or somewhat fused proximally, shortly serrate on tips for c. 0.4 mm; pedicels filiform, 0.5–0.8 mm long, c. 0.2 mm diameter; filaments filiform, 0.5–1.5 mm long, c. 0.2 mm diameter; anthers 0.3–0.5 mm long,

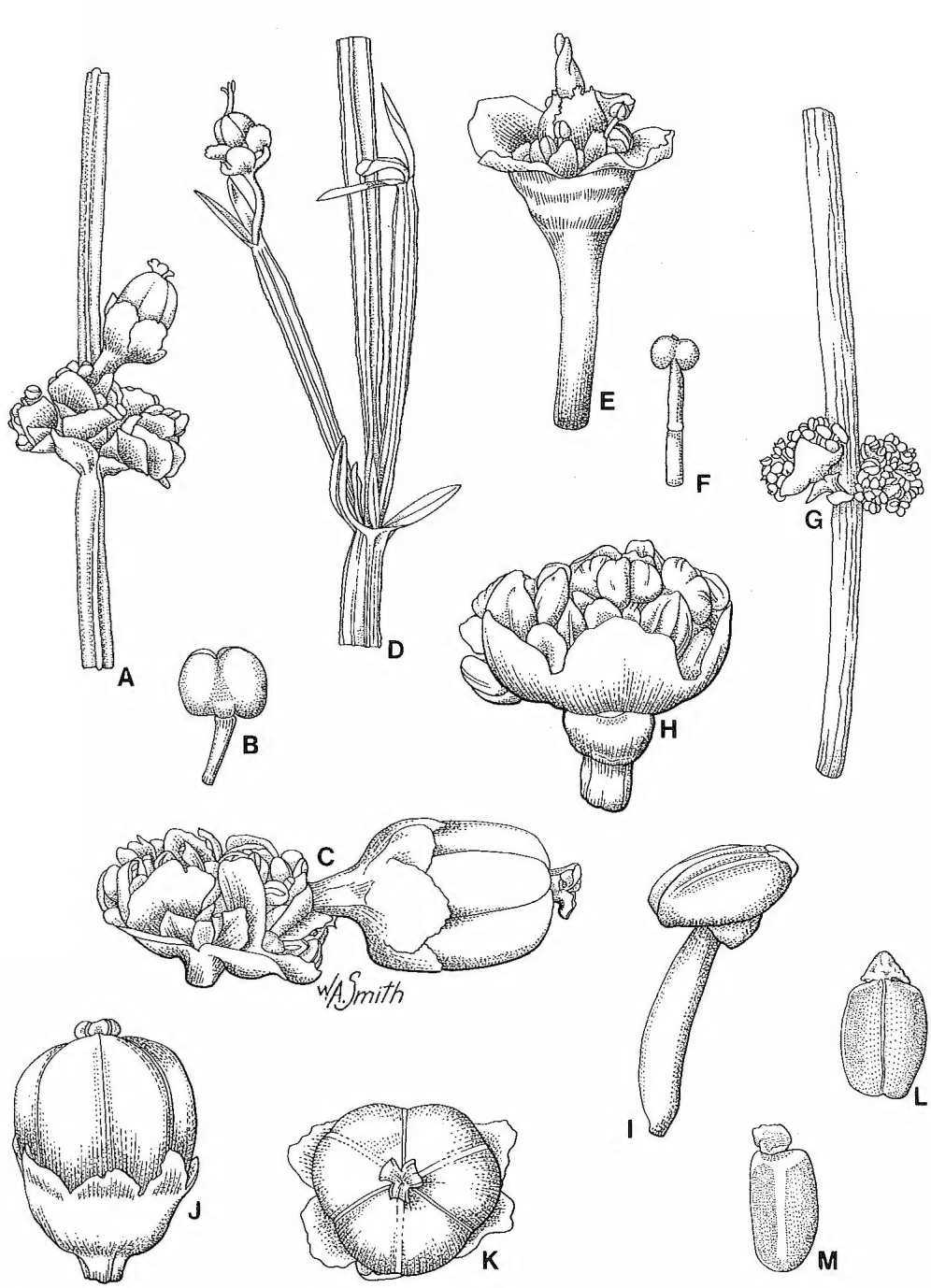



**Fig. 2.** A–C. *Calycopeplus oligandrus*; D–F. *C. marginatus*; G–M. *C. paucifolius*. A,D,G. stem with inflorescence A, × 8; D, × 4; G, × 4. B,F,I. male flower × 24. C,E,H. inflorescence × 12. J. side view of fruit × 8. K. apical view of fruit × 8. L. dorsal view of seed × 8. M. ventral view of seed × 8. A–C from *White* 5335 [AQ201809] (BRI); D–F from *Gardner* (PERTH01079018); G–M from *Craven* 7139 (BRI). Del. W. Smith.

0.4–0.5 mm wide. Female flowers sessile; perianth segments 4, obovate, 2–3 mm long, 1.5–1.8 mm wide, shortly serrate to 0.4 mm; ovary sessile, 1.6–2 mm long, 1.3–1.5 mm wide, glabrous; styles 2 or 3, erect, 1.5–2 mm long, connate for 1.5–2 mm at base; tips distally bifid for c. 0.4 mm long. Fruit ± globose, 4–5 mm long, 4.5–5 mm diameter. Seed obloid, c. 3 mm long and 2.5 mm wide, brown-orange; caruncle hemispherical, c. 1 mm long and 1.4 mm wide, cream-yellow. **Fig. 2D–F.**

***Additional specimens examined*: Western Australia.** Between Hamersley River estuary & East Mt Barren, Oct 1970, *Maslin* 914 (PERTH); Thumb Peak, Fitzgerald N.P., Oct 1970, *Royce* 9264 (PERTH); Fitzgerald River Reserve, western edge of main valley, Jul 1970, *Royce* 8896 (CANB, PERTH); Thumb Peak Range, Oct 1965, *George* 7165 (PERTH); Summit of mid Mt Barren Range, SW of Ravensthorpe, Sep 1925, *Gardner* [PERTH01079018] (PERTH); Fitzgerald River, Sep 1948, *Gardner* 9219 (PERTH); Fitzgerald River Flat, Sep 1970, *Aplin* 3582 (PERTH); Fitzgerald River area, c. 70 miles [112.7 km] ESE of Ongerup, Sep 1970, *Aplin et al.* 3201 (NSW).

***Distribution and habitat*:** GRIDCELLS: 33119, 34119. *C. marginatus* is restricted to two 1° grid cells in the south-west of Western Australia and is particularly well known from the Fitzgerald River area (**Map 1**). Plants have been recorded as growing in white sand or red loam, often near watercourses, but recorded ecological information is otherwise scant.

***Notes*:** *C. marginatus* is distinctive within the genus by virtue of the complanate, 2-winged stems and the different form of insertion of the involucre gland.

***Conservation status*:** *C. marginatus* occurs in a restricted area; however, it is present in the Fitzgerald National Park. Hopper *et al.* (1990) listed the species as "Priority Three...(those taxa with several poorly known populations, some on conservation lands)" in their assessment of the conservation status of the Western Australian flora. An appropriate conservation coding, therefore, is 2RC.

**5. Calycopeplus oligandrus** P.I.Forst., **sp. nov.** affinis *C. paucifolio* (Klotzsch) Baill. a qua involucris brevioribus (c. 1.8 mm longis) lobis late triangularibus brevioribus (0.8–1 mm longis) et glandibus minoribus (c. 0.4 × 0.5 mm); staminibus filamentis longioribus et tenuioribus (1.6–1.8 × c. 0.2 mm), et antheris minoribus (0.7–0.9 × c. 1 mm) differt. **Typus**: Western Australia. road between Youngs siding and Denmark, Denmark Railway, 6 Nov 1927, *C.T. White* 5335 [AQ201809] (holo: BRI [1 sheet].

Shrub or subshrub to 3 m high, lifespan unknown. Bark smooth. Stems 6-angular in cross-section, longitudinally ridged; internodes 15–100 mm long, 1–3 mm diameter on upper branches; red 'fruit-like' galls not formed at nodes. Stipules absent. Leaves linear, 7–25 mm long, c. 1 mm wide, concolorous, glabrous, eglandular. Inflorescences with peduncles up to 1.5 mm long, with 2 involucres; bracts broadly-triangular, c. 2 mm long and 2.4 mm wide, glabrous. Involucres broad-campanulate, c. 1.8 mm long and 2.8 mm diameter, glabrous, generally with male and female flowers together in each involucre; lobes broad-triangular, 0.8–1 mm long, c. 2 mm wide, entire, longer than glands; glands ellipsoid-spherical, c. 0.4 mm long and 0.5 mm wide, clearly visible between involucre lobes and inserted on involucre at same level as lobes. Male flowers in clusters of 2 or 3 flowers; bracts 3, obovate, 1.5–1.6 mm long, 0.8–1 mm wide, ± free or somewhat fused, shortly ciliate on tips for 0.2 mm; pedicels filiform-terete, 1.6–1.8 mm long and 0.2 mm diameter; filaments filiform-terete, c. 0.7 mm long and 0.4 mm diameter; anthers 0.7–0.9 mm long, c. 1 mm wide. Female flowers sessile; perianth segments 5, ovate, c. 2 mm long and 1.8 mm wide, glabrous; ovary sessile, c. 1.5 mm long and 1.4 mm wide, glabrous; styles 3, ± erect, c. 0.4 mm long, connate for c. 0.3 mm at base; tips distally bifid for 0.1 mm long. Fruit obloid, c. 4 mm long and 3 mm diameter. Seed not seen. **Fig. 2A–C.**

***Additional specimens examined*: Western Australia:** Busselton district, Dec 1963, *Royce* 7813 (PERTH); Abba River, Busselton district, Oct 1953, *Royce* 4576 (PERTH); Hay River, c. 26 miles W of Albany, Jul 1953, *Melville* 4455 & *Royce* (PERTH).

***Distribution and habitat*:** GRIDCELLS: 33115, 34117. *C. oligandrus* is known from a small number of collections in the south-west of Western Australia (**Map 1**). The habitat of this plant has been recorded as "Paperbark swamp by riverbank" (label data of *Melville* 4455 & *Royce*).

***Notes*:** There are three collections by C.T. White at BRI numbered as 5335. All are from south-west Western Australia and come from different localities, collected on different dates and pertain to different taxa. This numbering inconsistency is apparently common with White's earlier collections. Despite this, there should be little doubt as to the locality where this plant occurs, as White collected other plants on the same day (and adjacent days) from the Denmark area. Collectors familiar with this area should localise the type locality further and perhaps collect more of this plant.

*C. oligandrus* is a distinctive species within the genus by virtue of its very small involucres with few-flowered male flower clusters.

***Conservation status*:** The last collection of this plant is from 1963 and further survey work is required to ascertain its current localities. An appropriate conservation coding is 1K.

***Etymology*:** The specific epithet is derived from Greek *oligo* (few) and *andrus* (stamens) and alludes to the small number of male flowers within the involucre in this species.

## Acknowledgements

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# Four new species of *Solanum* L. (Solanaceae) from south east Queensland

**David E. Symon**

**Summary**

Symon, David E. (1995). Four new species of *Solanum* L. (Solanaceae) from south east Queensland. *Austrobaileya* 4(3): 429–437. *Solanum coracinum, S. dissectum, S. gympiense* and *S. stupefactum* are newly described. All occur south of Rockhampton in south-eastern Queensland.

Keywords: Solanaceae, *Solanum coracinum, Solanum dissectum, Solanum gympiense, Solanum stupefactum, Solanum* – south east Queensland.

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## Introduction

When my revision of *Solanum* in Australia was published (Symon 1981), a number of collections in the Queensland Herbarium were labelled only as related to some appropriate species. Further collections of the relevant taxa have become available and sorting of the Queensland Herbarium collections resulted in a number of these taxa being given numerical distinction and published as such in volume 2 of the Flora of south-eastern Queensland (Stanley & Ross 1986). These numbers are referred to in the notes that follow the species descriptions below.

Three of these, *S. coracinum, S. dissectum* and *S. gympiense*, belong to the *S. ferocissimum* group (Whalen 1984) that have relatively small, deep-red, succulent fruits. This group of species extends to Papua New Guinea and to New Caledonia. One of these new species is exceptional in that no stellate hairs could be found despite the fact that I believe it clearly belongs in the *S. ferocissimum* group of species. The presence of stellate hairs has been considered a significant diagnostic character in the subgenus *Leptostemonum* to which this species group belongs.

The fourth of the new species, *S. stupefactum*, was recognised in 1981 as distinctive and was thought then a possible introduction. However, more collections of it have become available which have persuaded me to formally name it. It is unusual in that it is an androdioecious species (i.e. lower flowers hermaphrodite, upper flowers male). Though androdioecious, this species does not seem close to the more western species of the largely dioecious *S. dioicum* group (Whalen 1984) and immediate relatives in eastern Australia are not evident. Incidentally, the circumscription of this group as accepted by Whalen, includes some discordant elements and some of the Australian species he included, at least, seem closer to his *S. incanum* group, from Africa, which includes *S. melongena*, the commercial eggplant, than to the *S. dioicum* group.

Accepted for publication 13 January 1995

## Taxonomy

**Solanum coracinum** D. E. Symon, **sp. nov.**

Frutex ad 1.5 m altus, erectus, effuse ramosus. Aculei ad 1 cm longi, conferti in caulibus, copiosi in foliis, recti vel aciculares, erecti, saepe rubiginosi. Pili sparsi, minuti, stellati, interdum absentes. Folia late elliptica in circumscriptione sed profunde lobata; lobi ad 2.5 cm longi et 5–7 mm lati, apice acuto, sinubus rotundatis. Inflorescentia cyme usque ad 5–8 cm longae, spisse aculeata infra medium et supra sparsim aculeata; pedicellus c. 5 mm longus, tenuis, inermis; calyx c. 3 mm longus, lobis lanceolatis apiculatis inermibus; corolla c. 8 mm longa, stellata, purpurea aut violacea;

filamenta staminalia c. 1 mm longa; antherae c. 5 mm longae, sursum angustatae, poris distalibus; ovarium (globosum?) c. 1 mm diametro, glabrum; stylus c. 6 mm longus, rectus, erectus, glaber; stigma parvum, capitatum. Bacca globosa, 7–8 mm diametro, coracina. Semina obtuse triangularia in circumscriptione, compressa, 2.5–3 mm lata, foveolata. **Typus:** Queensland. DARLING DOWNS DISTRICT: 26°37'S, 149°23'E, c. 22 km E of Yuleba, on road to Miles, 17 Nov 1975, *R.J. Henderson* 2381, undulating plain, red brown sandy

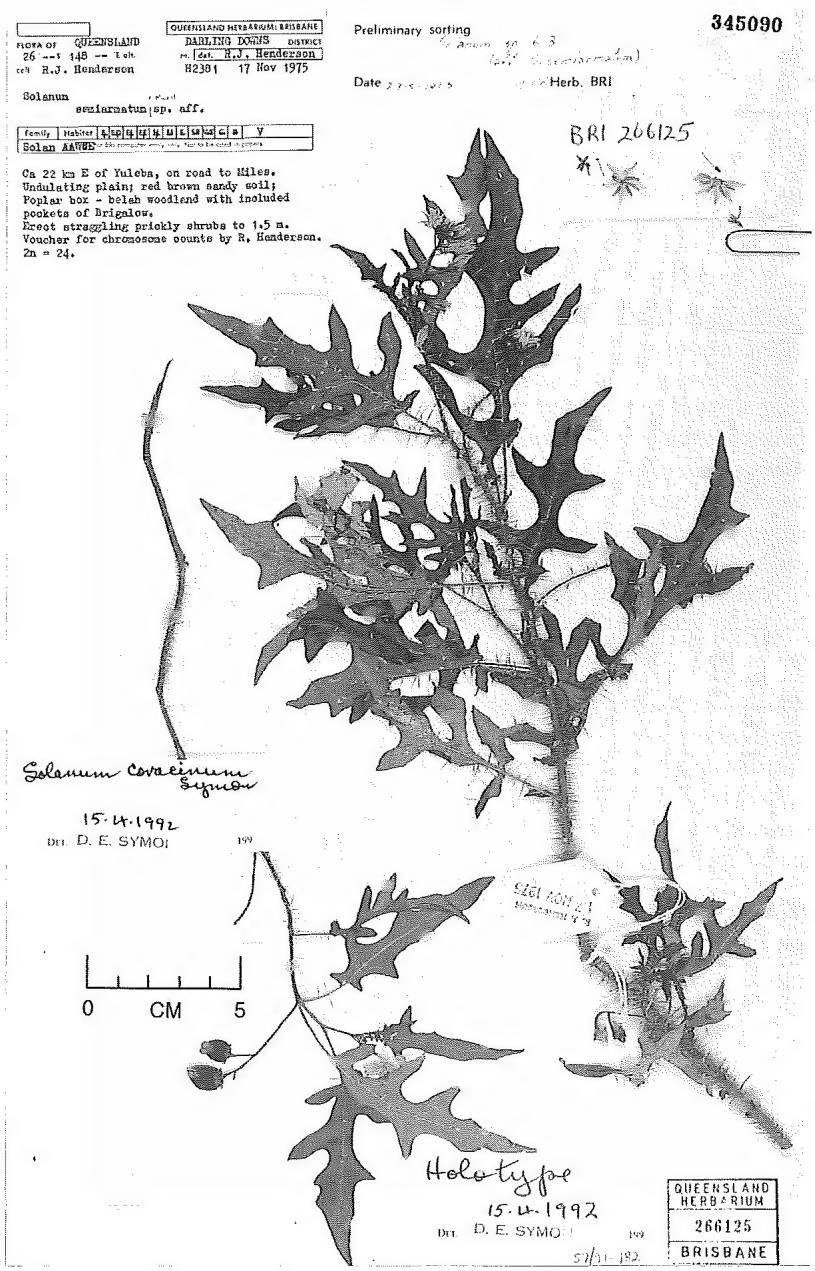


**Fig. 1.** Type of *Solanum coracinum*.

soil, poplarbox-belah woodland with included pockets of brigalow, erect straggling prickly shrub to 1.5 m, 2n = 24 (chromosome count by R. Henderson) (holo: BRI (BRI 266125); iso: AD). **Fig. 1.**

Erect, weakly branched shrub to 1.5 m tall, straggly with age. Prickles dense, crowded on main stems, abundant on upper and lower leaf surfaces, straight, erect, acicular, to 1 cm long, often reddish. Indumentum of sparse, minute, stellate hairs [sessile, porrect stellate, the central ray equal to the lateral rays] and minute subpapillate glandular hairs, usually present on young growing tips, scattered on upper and lower leaf surfaces and on apices of corolla lobes (lens needed), or absent. Leaf lamina broadly elliptic in outline but deeply lobed with 3 or 4 lobes on each side, up to 8 cm long and 6 cm wide; lobes 1–2.5 cm long, 5–7 mm wide, the longer ones with broadly triangular secondary lobes 1–2 mm long; sinuses rounded; lobe apices acute; leaf apex acute; base often oblique. Inflorescence a cyme 5–8 cm long, unbranched, bearing c. 4–25 flowers, densely prickly in the lower half, less so above; pedicel c. 5 mm, slender, unarmed; calyx c. 3 mm long, with lobes lanceolate, apiculate, unarmed; corolla c. 8 mm long, divided about halfway into 5 triangular lobes, purple (2 records) or mauve (1 record); filaments c. 1 mm; anthers c. 5 mm long, tapered upwards, poricidal; ovary c. 1 mm long, glabrous; style c. 6 mm long, straight, erect, glabrous; stigma small, capitate. Fruiting pedicel c. 1 cm long, slightly thickened distally, calyx lobes little enlarged in fruit; berry 7–8 mm diameter (dried material only), glossy black when mature (1 record). Seeds flattened irregularly discoid to bluntly triangular in outline, 2.5–3 mm wide, minutely reticulate, 36 and 48 in two fruits examined. Chromosome number: 2n = 24 (Henderson 2381, BRI).

***Additional specimens examined*: Queensland**. DARLING DOWNS DISTRICT: Palardo, May 1934, *Blake* 5866 (BRI); 16 km E of Texas, Jun 1951, *Everist* 2539 & *Webb* (AD, BRI); Shellbourne, NE of Miles, May 1960, *Johnson* 1630 (BRI); E of Combidiban Farm, Cypress Downs, Sep 1961, *Jones* 164 (BRI); 'Benandre', 23 miles [37 km] SE of Texas, Apr 1962, *Pedley* 988 (BRI); 20 km W of Millmerran, Feb 1984, *Stower* [AQ396755] (BRI);

***Distribution and habitat*:** South-eastern Queensland with most collections from Giligulgul, Yuleba and Condamine with outliers near Millmerran and Texas, to the south east, on dark clay soil, forest loam or shallow soil on stony ridges.

***Etymology*:** The specific epithet is derived from the Latin *coracinus*, meaning shiny or glossy black, a reference to the ripe fruits.

***Notes*:** This species is closely related to *S. semiarmatum* and *S. dissectum*. From the former, it differs in the leaves being almost glabrous below and with much greater degree of lobing, the simple cymes and possibly darker coloured fruits (red vs. black). *S. coracinum* was segregated in the Queensland Herbarium as *Solanum* sp. (Miles R.W.Johnson 1630) and may be keyed out in the Flora of south-eastern Queensland (Stanley & Ross 1986, 418) to *Solanum* sp. 3, as will *S. dissectum*. The two species may be distinguished by the following characters:-

**Table of differences between *S. coracinum* and *S. dissectum*.**

| *S. coracinum* | *S. dissectum* |
|---|---|
| stem prickles dense | stem prickles scattered |
| stellate hairs sparse, minute | stellate hairs absent |
| inflorescence 4–25-flowered | inflorescence 4 or 5-flowered |
| berry black | berry red |

**Solanum dissectum** D.E. Symon, **sp. nov.** Suffrutex ad 50 cm altus, erectus, rubellus. Aculei 5–9 mm longi, recti, sparsi; omnes partes glabrae praeter pilos axillares minutos papillosos. Folia 2–6 cm longa, late lanceolata in circumscriptione sed profunde lobata; lobi 5–15 mm longi, 2–5 mm lati, sinubus inter lobos rotundatis. Inflorescentia cymae c. 1 cm longae, aculeis 1 vel 2 et floribus 4 vel 5; pedicellus c. 7 mm longus; calyx c. 4 mm longus. Corolla profunde divisa, lilacina; lobi c. 7 mm longi, c. 2 mm lati; antherae c. 3.5 mm

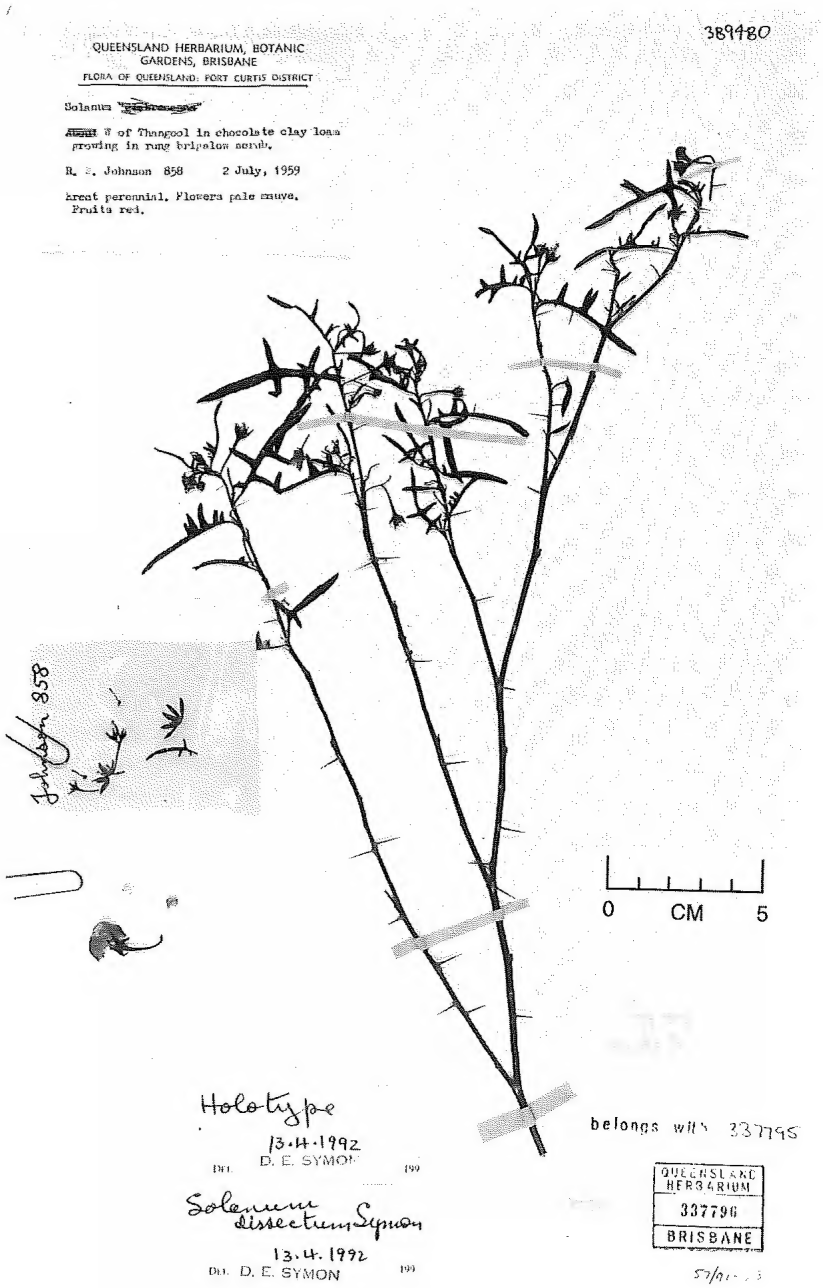


**Fig. 2.** Type of *Solanum dissectum*.

longae, sessiles, poris distalibus; ovarium globulare, c. 1.5 mm diametro; stylus 4–5 mm longus. Bacca globularis c. 1 cm diametro, rubra. Semina late reniformia in circumscriptione, compressa, c. 4 mm longa. **Typus:** Queensland. PORT CURTIS DISTRICT: West of Thangool, 2 Jul 1959, *R.W. Johnson* 858, chocolate clay loam, growing in rung brigalow scrub, erect perennial, flowers pale mauve, fruits red (holo: BRI (BRI 337796); iso: BRI (BRI 337795)). **Fig. 2.**

Small shrub to 50 cm tall; stems erect, reddish. Prickles 5–9 mm long, straight, scattered, 4–10 per 10 cm of stem in the few collections seen and a few on the mid-vein on the upper and lower surface of the leaves. All parts glabrous except for minute papillose hairs in leaf axils and towards the apex of the corolla lobes. Leaves 2–6 cm long, the lamina 2–4 mm wide, broadly lanceolate in outline but the lamina deeply lobed with (1) 2 or 3 (or 4) lobes on each side, rarely reduced to 1 pair or absent; lower lobes shorter than mid lobes; lobes 5–15 mm long, 2–5 mm wide, the sinuses between the lobes rounded. Inflorescence a short cyme c. 1 cm long bearing 1 or 2 prickles and 4 or 5 flowers; pedicel c. 7 mm long; calyx lobes c. 3 mm long, c. 2 mm wide at base, acumen 1 mm long; corolla deeply divided almost to base, pale mauve; lobes c. 7 mm long, c. 2 mm wide; anthers c. 3.5 mm long, c. 1 mm wide, sessile, poricidal; ovary globular, 1.5 mm diameter; style 4–5 mm long. Fruiting pedicel c. 12 mm long, slightly thickened distally; calyx not much enlarged in fruit; berry c. 1 cm diameter (few fruits seen), red. Seeds broadly reniform in outline, c. 4 mm long, flattened.

*Additional specimens examined*: **Queensland.** LEICHHARDT DISTRICT: McCrae property, 80 km S of Duaringa, Jul 1966, *Everist & McDonald* 3 (BRI). PORT CURTIS DISTRICT: 9.6 km W of Biloela, Jul 1959, *Johnson* 870 (BRI); Biloela, Sep 1966, *Brooks* per *Stevens* (BRI).

***Distribution and habitat*:** South-eastern Queensland.

***Etymology*:** The specific epithet is derived from the Latin *dissectus,* meaning dissected, a reference to the species' deeply divided leaves.

***Notes*:** *Solanum dissectum* is unusual for a species with prickles in lacking stellate hairs, in which character it joins *S. pugiunculiferum,* an unusual species from northern Australia. Despite the lack of stellate hairs, I consider it clearly belongs with the group of Australian red-fruited species known as the *S. ferocissimum* group (Whalen 1984). These have simple, mostly acicular prickles, lobed leaves in some species, generally moderate to small flowers and inflorescences, and in all cases, red to blackish succulent fruits. The closest relatives of *S. dissectum* appear to be *S. coracinum,* described here, and *S. ferocissimum,* from which it differs in its glabrous nature, and more regularly and more deeply lobed leaves. This species was segregated in the Queensland Herbarium as *Solanum* sp. (Duaringa S.L.Everist+ 3) affin. *S. ferocissimum* but was not accounted for in the Flora of south-eastern Queensland (Stanley & Ross 1986). It would key there to *Solanum* sp. 3, now named *S. coracinum.* To separate these two species see table of differences under *S. coracinum* above.

**Solanum gympiense** D.E. Symon, **sp. nov.**
Frutex ad 1 m altus, inermis, dense pubescens, pilis stellatis, plus minusve floccosis, interdum viscidis. Folia late elliptica, 6–12 cm longa, c. 4 cm lata; apex acutus; basis rotundata; in margine lobis late triangularibus; petiolus c. 1.4 cm longus. Inflorescentia cymae floribus 2–6; pedicellus c. 8 mm longus; calyx 5–7 mm longus; corolla ad 3 cm diametro, stellata-rotata, lobis late triangularibus, violacea; filamenta staminalia brevia; antherae c. 5 mm longae, tenues, sursum angustatae, poris distalibus; ovarium late conicum, glabrum; stylus c. 6 mm longus. Bacca globosa, vel apiculata, 5–7 mm diametro, rubra. Semina subtriangularia vel subreniformia in circumscriptione, compressa, 2–2.5 mm longa, foveolata. **Typus:** Queensland. WIDE BAY DISTRICT: Gundiah, 21 June 1927, *C.T. White* 3527 (holo: BRI (AQ038941)). **Fig. 3.**

A shrub to 1 m high, unarmed, with dense indumentum of stellate hairs (multiseriate stalked, porrect stellate, central cell as long as or much longer than lateral cells), somewhat

floccose, sometimes viscid, one report says plants aromatic. Leaves broadly elliptic, (3–) 6–12 cm long, (2.5-) 4–7 cm wide; apex acute; base rounded; margins with shallow broadly triangular to rounded lobes, more rarely undulate-sinuate; petiole (0.5-) 1.4–3.0 cm long. Inflorescence a short cyme of 2–6 flowers from a mid to upper internodal position; peduncle (to first flower) 5–20 mm long; rhachis 5–25 mm long; pedicel c. 8 mm long; calyx c. 5–7 mm long, the lobes flattened, narrow, elliptic; corolla to 3 cm diameter (few available), stellate-rotate, divided nearly halfway, the lobes broadly triangular, pubescent outside, purple blue;

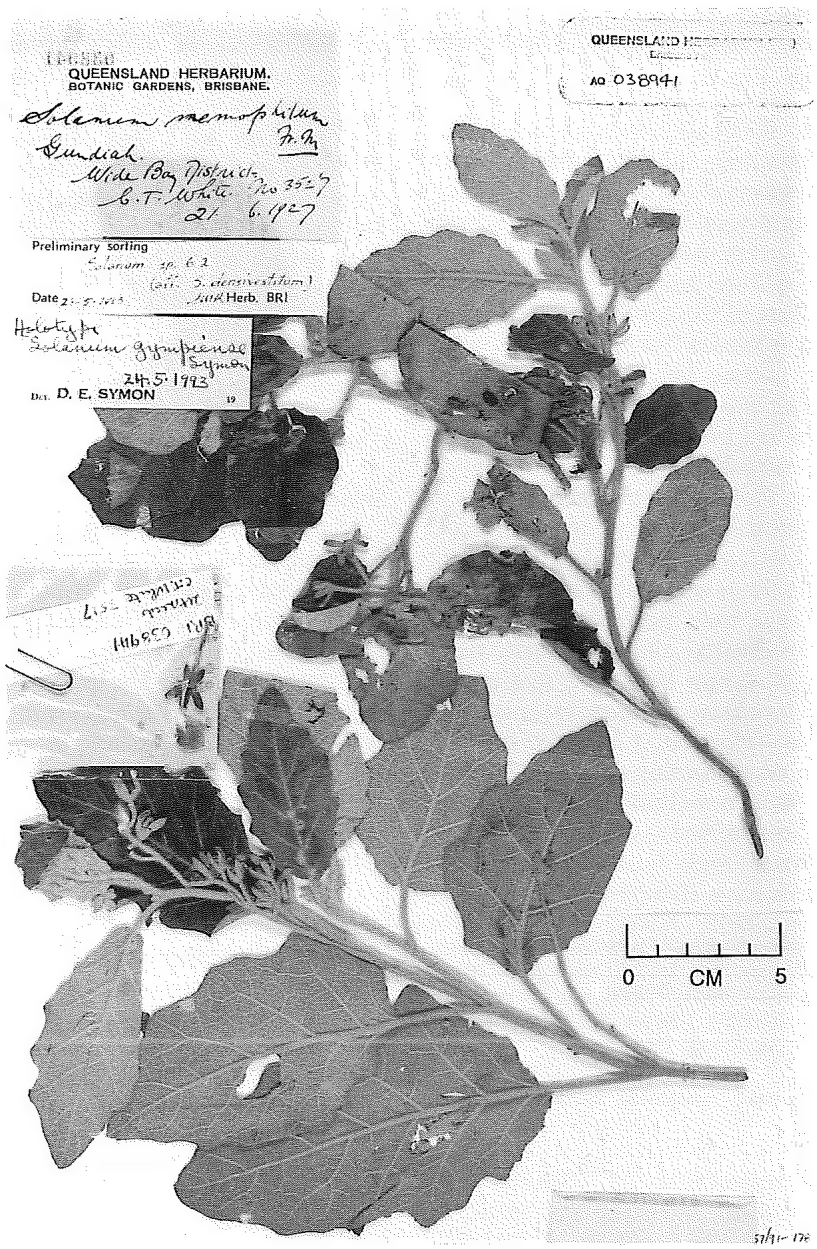


**Fig. 3.** Type of *Solanum gympiense*.

staminal filaments short; anthers c. 5 mm long, slender, tapered upwards, poricidal; ovary broadly conical, glabrous; style c. 6 mm long. Berry globular to apiculate, 5–7 mm diameter, red at maturity; calyx lobes then elliptic, 7 mm long, 2.5–3 mm wide flattened, subleafy. Seeds irregularly discoid or flattened and subtriangular to subreniform in outline, 2–2.5 mm long, minutely reticulate.

***Additional specimens examined*: Queensland.** LEICHHARDT DISTRICT: Crest of Carnarvon Range, Mar 1960, *Johnson* 1451 (BRI); Carnarvon Range, Apr 1962, *Gittins* 452 (BRI). PORT CURTIS DISTRICT: Rosedale, Mar 1953, *Dovey* K5 (BRI). WIDE BAY DISTRICT: Woondum, Oct 1917, *Moore* 257 (BRI); Gympie, May 1953, *Douglas* [AQ323781] (BRI); Gympie, without date, *Kenny* [AQ323769] (BRI); Gympie, without date, *Anon* 14 [AQ323772] (BRI); 9.6 km NW of Tiaro, Apr 1959, *Ridley* [AQ323775] (BRI); Gundiah, without date, *Kajewski* [AQ323780] (BRI); 11.6 km N of Gympie, North Deep Creek road, Nov 1972, *Tutt* [AQ8344] (BRI); 11.6 km N of Gympie, North Deep Creek road, Dec 1972, *Tutt* [AQ8343] (BRI); 64 km S of Bundaberg, Jul 1983, *Jansen* 87 (BRI). MARANOA DISTRICT: 'Claravale', May 1962, *Johnson* 2440 (BRI); 1.5 km SW of Kilmorey homestead, May 1982, *Nelder & Thomas* 633 (BRI).

***Distribution*:** South-eastern Queensland with most collections from between Rosedale and Cooroy but with an interesting disjunction in the Carnarvon Range area and south-westward towards Mitchell.

***Etymology*:** The epithet in the name is derived from the town of Gympie in the general vicinity of which most collections have been made.

***Notes*:** The information on the 16 collections seen is disappointingly scanty; only two give any dimensions of the plant, none describe the fresh berry and only one gives flower colour. These collections were originally labelled *S. nemophilum* or *S. densevestitum* or "affinities *S. densevestitum*" by me and were segregated in the Queensland Herbarium as *Solanum* sp. Q2. The species may be keyed out in the Flora of south-eastern Queensland (Stanley & Ross 1986, 418) as *Solanum* sp. 2.

The species is closely related to *S. densevestitum* F. Muell. from which it differs in its broadly elliptic leaves, shallow leaf lobing generally present and the presence of a peduncle bearing several flowers. There may also be a slight difference in fruit shape but this requires more field work to confirm.

*Solanum nemophilum, S. densevestitum* and *S. gympiense* form a closely related trio whose relationships require more study.

**Solanum stupefactum** D.E. Symon, **sp. nov.**
Frutex ad 2 m altus, erectus. Aculei 1–5 mm longi, patentes vel aliquantum retrorsi, praecipue in caule. Omnes partes dense pubescentes pilis stellatis. Folia lamina late lanceolata, plerumque c. 9 × 3.5 cm, in margine integra; apex acutus; basis rotunda et obliqua; venae infra prominentes; petiolus c. 2 cm longus. Inflorescentia cymae floribus 4–12; flos infimus bisexualis; flores ceteri masculini. Flos infimus pedicello ad 2.5 cm longo, corolla rotata-stellata, ad 5 cm diametro et caesia, filamentis staminalibus c. 1 mm longis, antheris c. 7 mm longis, sursum angustatis, poris distalibus, ovario dense piloso, stylo c. 12 mm longo. Flores ceteri parviores, ovario et stylo vestigiali. Bacca globosa, ad 3 cm diametro, aurantiaca. Semina discoidea, 3–4 mm diametro, foveolata. **Typus:** Queensland. MORETON DISTRICT: northern outskirts of Yarraman township, 26°50'S, 151°59'E, 3 April 1975, *R.J. Henderson* 2286, southern facing hillslope amongst regeneration in a farm paddock, erect shrubs to 2 m, flowers pale blue, to c. 5 cm diameter, fruit green (immature), when ripe orange-yellow and 2–2.5 cm diameter, voucher for chromosome count by R. Henderson (2n = 24) (holo: BRI (AQ390461); iso: CANB). **Fig. 4.**

Shrub to 2 m high with clonal regeneration. Prickles 1–5 mm long, straight, spreading or slightly retrorse mainly on the stem, a few on the petiole, rare on the upper and lower leaf surface. All parts with a dense indumentum of stellate hairs [multiseriate stalked, porrect stellate hairs with the central cell as long or much longer than lateral cells] somewhat floccose, slightly rusty. Leaves broadly lanceolate, to 15 × 7 cm though commonly 9 × 3.5 cm; margin mostly entire, occasionally repand on vigorous leaves; apex acute; base rounded, oblique; veins prominent below; petiole 2–3.5 cm long. Inflorescence a short cyme of 4–12 flowers from an upper internodal position, the lowest flower bisexual,

the upper flowers male; rhachis 1–5 cm long; lowest pedicel to 2.5 cm long; upper pedicels 1–1.5 cm long; calyces densely pubescent, calyx of hermaphrodite flower armed, lobes narrow triangular to 12 mm long, calyx of male flower unarmed, lobes narrowly triangular c. 7 mm long. Corolla of hermaphrodite flower rotate-stellate to 5 cm diameter, divided scarcely halfway into broad rounded lobes. Staminal filaments c. 1 mm long. Anthers to 7 mm long, tapered upwards, poricidal. Ovary globular, densely pubescent with long hairs; style to 12 mm long. Male flowers smaller, ovary and style vestigial. Fruiting pedicel to 2 cm long, calyx

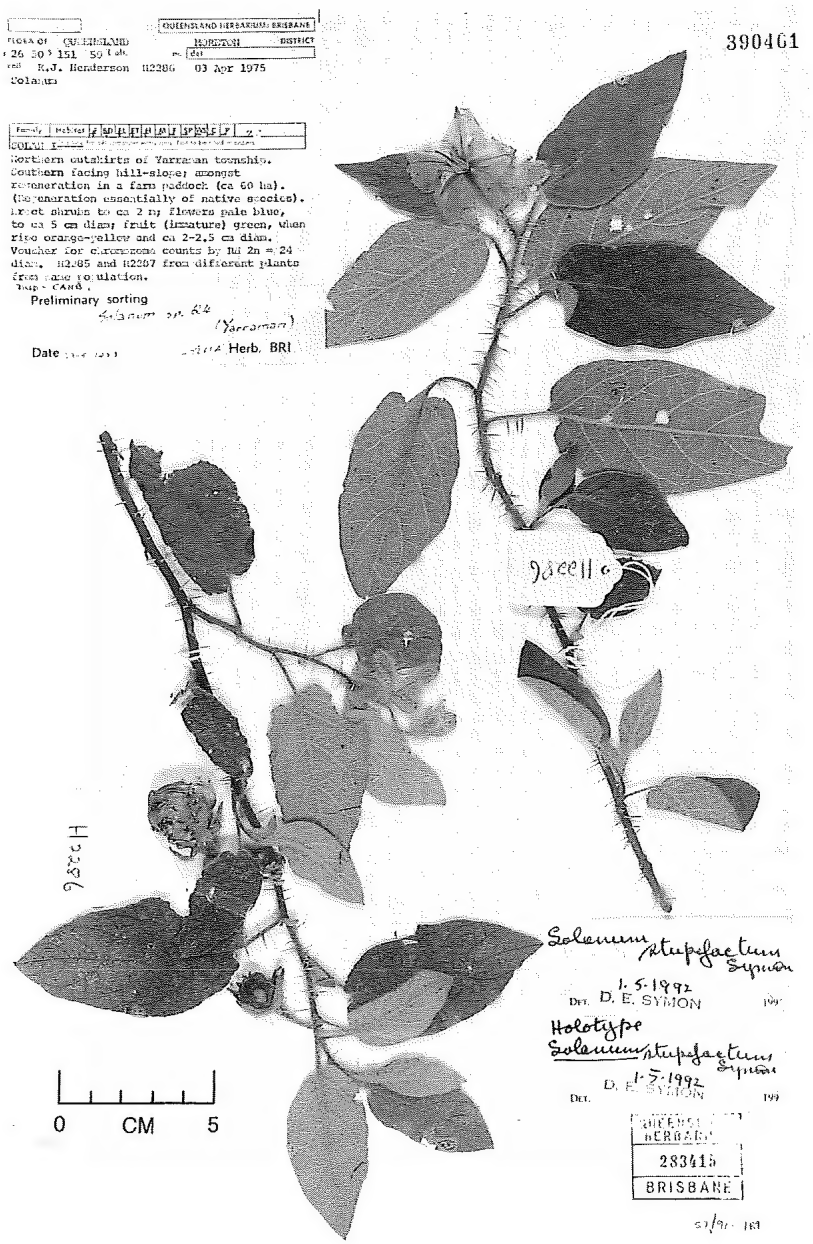


**Fig. 4.** Type of *Solanum stupefactum*.

enlarged to cover base of berry. Berry globose to flattened globose, to 3 cm diameter, finally orange-yellow. Seeds discoid with a hilum notch, 3–4 mm diameter, minutely pitted. Chromosome number 2n = 24 (*Henderson* 2286, BRI).

***Specimens examined*: Queensland.** BURNETT DISTRICT: Portion 140, Neumgna-Tarong road, Apr 1975, *Sampson* [AQ107004] (BRI). DARLING DOWNS DISTRICT: Gowrie Mountains, without date, *Bailey* [AQ332189] (BRI). MORETON DISTRICT: adjacent State Forest 289, Yarraman, Mar 1975, *Moriarty* 1650, 1655, 1657, 1658 (AD, BRI); outskirts of Yarraman, Apr 1975, *Henderson* 2285, 2286, 2287 (BRI); Rockmount, 25 km S of Helidon, Aug 1986, *Bird* [AQ440370] (BRI); Paradise Falls, Sep 1986, *Bird* [AQ440401] (BRI); Paradise Range, Mt Sylvia, Sep 1986, *Williams* 86016 (BRI).

***Distribution and habitat*:** South-eastern Queensland in the area bounded by Nanango, Pittsworth and Laidley, on disturbed agricultural land.

***Etymology*:** The epithet in the name is derived from Latin *stupefactus*, to be stunned, relating to the surprise and astonishment at finding such a species in southern Queensland.

***Notes*:** *Solanum stupefactum*, an east coast species, is unusual in its clear expression of andromonoecy. This character is more common in western Australian species of *Solanum*.

In eastern Australia, *S. campanulatum* may have several lower flowers berry-bearing but it has a deeply campanulate corolla and black seeds. *S. cinereum* may also have several lower flowers with berries below relatively few male flowers. Again, the seeds of that species are dark grey and its berry finally dark brown to black and brittle. To neither of these does *S. stupefactum* seem closely related. Nor do the western Australian species seem closely related to it; these have denser tomentum, more prominent prickles on the calyx, larger fruits that are yellow rather than orange-yellow in colour and black or dark seeds. This species was segregated in the Queensland Herbarium as *Solanum* sp. (Yarraman V.K.Moriarty 1650) and is keyed out in the Flora of south-eastern Queensland (Stanley & Ross 1986, 420) as *Solanum* sp. 4.

## Acknowledgements

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# Two new species of *Hibiscus* section *Furcaria* DC. (Malvaceae) from northern Queensland

**F.D. Wilson and L.A. Craven**

**Summary**

Wilson, F.D. & Craven, L.A. (1995). Two new species of *Hibiscus* section *Furcaria* DC. (Malvaceae) from northern Queensland. *Austrobaileya* 4(3): 439–447. Two new species of *Hibiscus* section *Furcaria* DC. from northern Queensland are described, namely *H. forsteri* F.D. Wilson and *H. saponarius* Craven. A key and an exsiccatae list are included for the seven species of *H.* section *Furcaria* we recognise as occurring in Queensland and New South Wales. We provide taxonomic notes on *H. diversifolius* Jacq. and the *H. heterophyllus* Vent. complex, and draw attention to the correct type of *H. splendens* Fraser ex Graham.

Key Words: Malvaceae, *Hibiscus* -New South Wales, *Hibiscus* -Queensland, *Hibiscus divaricatus*, *Hibiscus diversifolius*, *Hibiscus forsteri*, *Hibiscus heterophyllus*, *Hibiscus meraukensis*, *Hibiscus saponarius*, *Hibiscus splendens*.

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## Introduction

*Hibiscus* section *Furcaria* DC. (Malvaceae) is set apart from other sections in the genus *Hibiscus* L. by each calyx lobe having a prominent, thickened midrib and two thickened marginal ribs (Hochreutiner 1900). The more than 100 known species in this section are widely distributed in tropical and subtropical areas of Africa, Asia, Australia, and the Americas, and also in Oceania (Wilson 1994). All but three of the 30 or more species occurring in Australia are endemic. In this paper, we describe two new species from Cape York Peninsula and provide a key for the seven species that we recognise as occurring in Queensland and New South Wales. We also provide taxonomic notes for *H. diversifolius* Jacq., a widespread and variable species, and for the *H. heterophyllus* Vent. complex, for which reconsideration of morphological diversity has resulted in the reduction of *H. heterophyllus* subsp. *luteus* (Hochr.) F.D. Wilson to *H. divaricatus* Graham. Attention is drawn to the correct type of *H. splendens* Fraser ex Graham.

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## Taxonomy

**Hibiscus forsteri** F.D. Wilson, **sp. nov.** Frutex 1–3 m altus; ramulis stellato-pubescentibus, aculeis vel aculeis carentibus et pilis glandulosis; foliis in circumscriptione generali ellipticis, anguste ovatis, ovatis, vel orbicularibus, stellato-pubescentibus, nectariis foliaribus; floribus epedunculatis; segmentis epicalycis stellato-pubescentibus et setis grossis, linearibus, late complanatis versus apicem, projecturis minutis in marginibus duabus vel nullis; calyce stellato-pubescentibus et setis grossis, enectariis; petalis albis vel subroseis, basi atrorubris; capsula pilis appressis stramineis densis; seminibus striatis et minute pectinato-pubescentibus. **Typus**: Queensland. Cook District: 6.8 km from Bromley on the track to Carron Valley, 16 July 1990, *Eucalyptus tetrodonta* F. Muell.-*E. nesophila* Blakely woodland on grey, sandy soil, *J.R. Clarkson* 8866 & *V.J. Neldner* (holo: CANB; iso: BRI; DNA, K, L, MBA, NY, *n.v.*).

Shrub 1–3 m tall. Branchlets with fine stellate hairs in a longitudinal band between the nodes and less dense or absent on the remainder of the internode, or sometimes the branchlets with a fine dense stellate-pubescence; with coarse stellate hairs sparse and sometimes inserted upon tubercles; with aculei 1–1.3 mm long or aculei absent; with glandular hairs; the aculei and glandular hairs more or less evenly distributed. Stipules at length deciduous, unlobed, linear to subulate (rarely the distal third to half slightly flattened as in the epicalyx segments), with stellate and glandular hairs, 0.6–1.3 cm long. Climax leaves with the petiole with indumentum similar to that of the branchlet or sometimes dissimilar (aculei always absent, stellate hairs usually more dense than on the branchlets and sometimes the fine stellate hairs present only as a longitudinal adaxial band), 3.5–12.5 cm long; lamina usually weakly discolorous, in general outline elliptic, ovate, narrowly ovate, broadly ovate or orbicular, unlobed to shallowly 3-lobed, 9.0–22.0 cm long, 5.0–18.0 cm wide, the base cuneate to truncate, the margin serrate to serrulate (to subcrenulate, with minute teeth in the sinuses), the lobes as long as wide to shorter than wide, the apex acute to rounded (to rarely retuse), the indumentum similar on both surfaces or more dense on the abaxial surface, with dense stellate and glandular hairs on each surface or abaxially with fine stellate hairs absent or more or less evenly distributed across the surface and coarse stellate hairs, when present, restricted to the veins (the coarse hairs scattered to moderately dense on the major veins, becoming progressively smaller, less coarse and less dense on the finer veins); foliar nectary present at base of the lamina, 3–9 mm long. Distal leaves reduced in shape and size or only in size, narrowly elliptic, elliptic, or ovate. Flowers solitary in leaf axils and in short sympodia, not pedunculate. Pedicel with sparse to very dense fine stellate hairs, sometimes with sparse aculei, or with scattered to moderately dense coarser stellate hairs inserted upon small tubercules, sometimes the pedicel with both fine and coarse stellate hairs and aculei, 13–21 mm long. Epicalyx with sparse to dense fine stellate hairs, sometimes with moderately to very dense coarser stellate hairs inserted upon tubercles (these mostly on the segment margins), 15–28 mm long, 10–12-segmented, the segments free, 0.65–0.95 times the length of the calyx, incurved, linear, 3-nerved, rounded or flattened in cross-section proximally, variously flattened and widened distally (apparently two types, the first with a rounded or flattened proximal part, 4–12 mm long, and a flattened, widened distal part, 7–12 mm long, 1–2 mm wide; the second also with a rounded or flattened proximal part, 11–13 mm long, and a flattened, widened distal part, 7–8 mm long, 2 mm wide, but with a minute projection on each of the two margins at the base of the distal part). Calyx with whitish to yellowish, very sparse to dense fine stellate hairs, sometimes with moderately dense to dense aculei on ribs, or scattered to moderately dense coarser tubercle-based stellate hairs (these mostly on the ribs), 21–32 mm long; calyx nectary absent. Petals white with a pink flush on one margin, and with the proximal region reddish, 6.5–8.5 cm long. Staminal column 16–30 mm long, the stamens distributed throughout the length of the column, the filaments 1–2 mm long. Style exserted 10–16 mm beyond apex of staminal column, the branches 4–7 mm long. Stigmas capitate, the hairs 0.2 mm long. Capsule densely appressed-pubescent, ovoid and beaked, 19–30 mm long, the beak glabrous, conspicuous or inconspicuous, 1–3 mm long. Seed striate and minutely pectinate-pubescent, angular-reniform, c. 4 mm long. **Fig. 1.**

***Other Specimens Examined*: Queensland.** Cook District: Near Glennie Mt, Bolt Head Road, off Maloneys Springs Road, Jun 1989, *Forster* 5518 (ASU,BRI); Maloneys Springs, Bromley Station, Jul 1991, *Forster* 8792 (BRI,CANB); Maloneys Springs, 40 km E by road of Moreton Telegraph Station, Jun 1989, *Forster* 5234 (ASU, BRI,CANB,MEL;DNA, QRS, *n.v.*); 92 km N of the Lockhart River road on the track to Wattle Hill, Aug 1991, *Clarkson* 9078 & *Neldner* (BRI, CANB;MBA, QRS, *n.v.*); Garraway Hill, southern slopes, Jul 1991, *Forster* 9040 (BRI,CANB); Brown Creek on Iron Range Road (174 km N of Coen by road), Sep 1975, *Coveny & Hind* 7100 (ASU,BRI,NSW); Brown Creek Crossing on the road to Iron Range, Aug 1987, *Clarkson* 7341 (CANB;BRI,L,MBA,QRS, *n.v.*); Claudie River, Jun 1972, *Irvine* 213 (QRS); 48 km S of Portland Roads, Jul 1968, *Pedley* 2750 (BRI); Brown Creek, Pascoe River, Jun 1948, *Brass* 19181 (BRI, CANB; A, *n.v.*); Iron Range Road, 6 km before Garraway Creek Crossing, Apr 1988, *Forster* 4249 (ASU, BRI); Cape York Peninsula, 1930, *Thompson* 26 (BRI); Old Lockhart-Nundah Road, Oct 1973, *Hyland* 6947 (QRS); Between Hopevale Mission and Elderslie Station, May 1969, *Bates* 259 (BRI); 53 km from Cooktown on Old McIvor Road, 6 km from Hope Vale Turnoff, May 1970, *Blake* 23449 (BRI, CANB);


**Fig.1.** *Hibiscus forsteri*. A, *Forster* 4249 (ASU) (flower: *Coveny & Hind* 7100 (ASU)). B, fruiting calyx of *Forster* 5518 (ASU). C, fruiting calyx of *Pedley* 2750 (BRI).

27 km NW of Cooktown along McIvor River road, Jun 1972, *Wrigley & Telford* NQ1386 (CBG). North Kennedy District: Foot of Mt Elliot, Oct 1950, *Blake* 18710 (BRI, CANB; K, MO, NT, *n.v.*); Burdekin Delta Area, Jun 1950, *Kleinschmidt* 78 (CANB); Ollera Creek Holding near N.P.R. 477, Mt Spec, Feb 1972, *Hyland* 5916 (QRS). Australian Capital Territory. cultivated in Canberra Botanic Garden (*ex Wrigley & Telford* NQ1386), *Cummings* 100 (CBG).

***Distribution and habitat*:** *Hibiscus forsteri* occurs in far north Queensland in the Pascoe-Lockhart Rivers area west of Iron Range, at McIvor River near Cooktown, and near Townsville. **Map 1.**

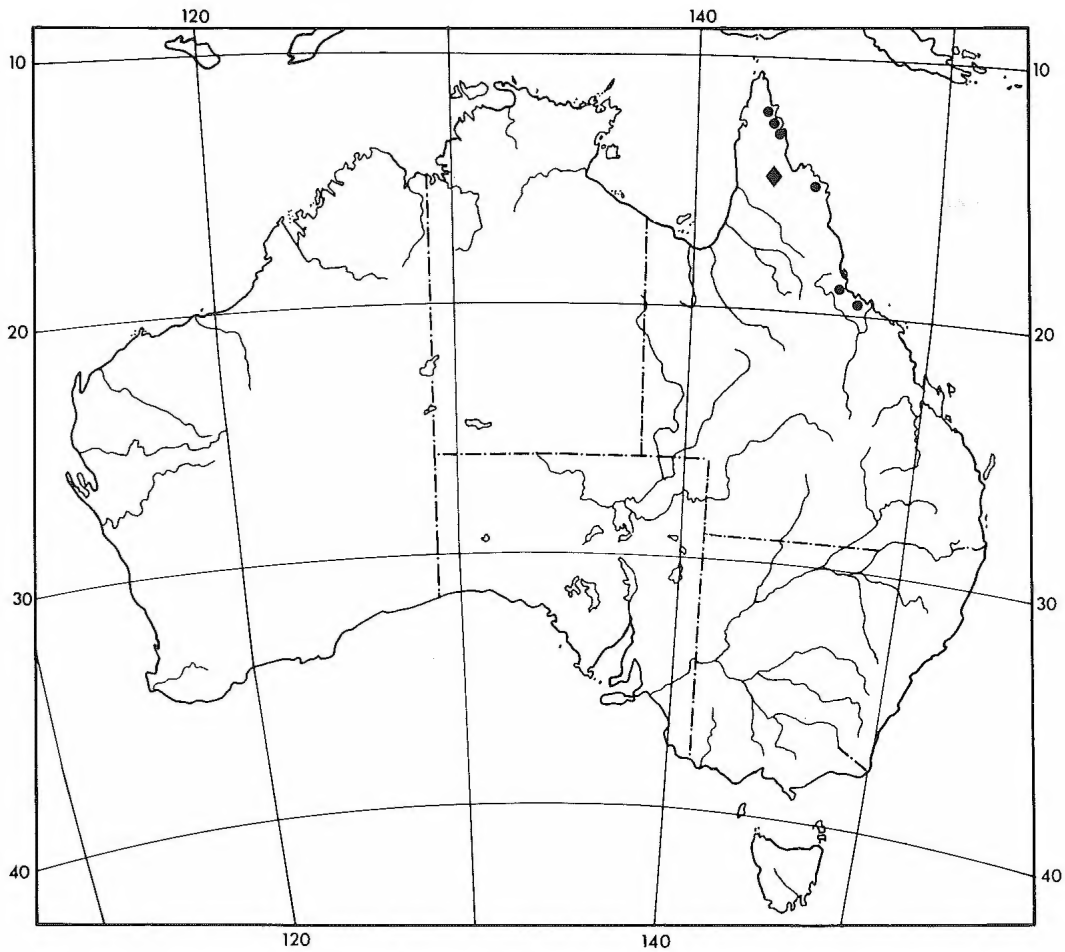
It has been recorded as occurring in *Eucalyptus tetrodonta* F. Muell.-*E. nesophila* Blakely woodland, open eucalypt forest on sandy soil, *E. hylandii* Carr & Carr-*Welchiodendron* Peter G. Wilson & Waterhouse shrubby woodland, scrubby eucalypt forest on granite sand with large boulders, and a rainforest road clearing.

***Etymology*:** Named in honor of Paul Forster of the Queensland Herbarium who has collected extensively in northern Queensland and has shared with us his knowledge of this interesting plant.

***Notes*:** Wilson (1994) incorrectly interpreted the projections on the distal part of the epicalyx segments of some collections of *H. forsteri* as a bifurcation, a feature common in African and American species of *Hibiscus* section *Furcaria*. Apparently, Wilson's previous (Wilson 1974) statement that the Australian species of this section lack bifurcate epicalyx segments is correct. Plants of *H. forsteri* from three separate localities possess the projections on the epicalyx segments: *Irvine* 213, *Pedley* 2750, and the CANB sheet of *Blake* 23449 (*Blake* 23449 at BRI has flattened, slightly widened segments but lacks projections). Paul Forster (pers. comm., 1994) noted that Maloneys Springs plants (e.g. *Forster* 5234) are prickly and deciduous, and occur on sandstone, whereas the Iron Range plants (e.g. *Forster* 4249) are hispid and evergreen, and occur on granite. It is obvious from the morphological description given above and Forster's field observations that *H. forsteri* is quite variable, but there seems to be no consistent morphological and distributional pattern that would allow us to separate the various populations as distinct entities.

**Hibiscus saponarius** Craven, **sp. nov.** Suffrutex fusus; ramulis vitta pilorum stellatorum tenuium mollium in quoque internodio, setis tenuibus longis densis pluriarmatis ubique et pilis glandulosis ubique; foliis in circumscriptione generali orbicularibus usque depressi-ovatis, 3–5-lobatis infirme usque valde, setis tenuibus brevibus densis; nectariis foliaribus plerumque carentibus; floribus pedunculatis; pedunculo, pedicello, epicalyce et calyce setis tenuibus longis densis; segmentis epicalycis linearibus, complanatis, apici integris; enectariis calycinis; petalis albis vel subroseis, basi atrorubris; capsula pilis appressis sparsissimis; seminibus striatis et pilis brevis albis crassis. **Typus**: Queensland. Cook District: 4.2 km E of King River on the Edward River to Musgrave road, 3 June 1989, *Eucalyptus tetrodonta* F. Muell.-*E. hylandii* Carr & Carr woodland on white sand with a grassy ground layer, *J.R. Clarkson* 8107 *& V.J. Neldner* (holo: CANB; iso: BRI;K,MBA, *n.v.*).

Sprawling subshrub. Branchlets with fine, soft stellate hairs to 1 mm long present in a longitudinal band on each internode, throughout with very dense, straight, soft, whitish, 1-several-armed fine hairs to 3 mm long, and throughout with minute glandular hairs. Stipules more or less persistent, subulate, unlobed or 2-lobed, with fine hairs as those on the branchlets and with minute glandular hairs, 4–7 mm long (up to 12 mm long in cultivated plants). Climax leaves with the petiole with indumentum similar to that of the branchlet, 4.0–7.0 cm long (up to 16.5 cm long in cultivated plants); lamina very weakly discolorous, in general outline orbicular to depressed ovate, shallowly to deeply 3–5-lobed (more commonly 5-lobed on mid-stem leaves (mid-stem leaves are sometimes shallowly to moderately lobed in cultivated plants)), 4.5–8.5 cm long (up to 12.0 cm long in cultivated plants), 8.0–11.0 cm wide (up to 18.0 cm wide in cultivated plants), the base cordate to cuneate, the margin serrate to serrate-sinuate, the lobes usually longer than wide, the apex acute to obtuse, the indumentum generally similar on each surface, on the abaxial surface usually with




**Map 1.** Distributions of *Hibiscus* species. ● , *H. forsteri*; ◆ , *H. saponarius*.

moderately dense to very dense fine hairs similar to, but shorter than, those on the branchlets and with minute glandular hairs, the midrib and primary vein indumentum similar to that of the interveinal regions or sometimes more dense on the major veins; foliar nectary usually absent (observed only in very early mid-stem leaves of cultivated plants where situated at base of the lamina and 0.8–1 mm long). Distal leaves reduced in shape and size, linear or 3-lobed (the lobes then being linear to oblong). Flowers solitary in leaf axils, pedunculate. Peduncle, pedicel, epicalyx, and calyx with moderately dense (very dense on pedicel), straight, soft, 1- to 4-fid fine hairs to 3 mm long. Peduncle 10–38 mm long. Pedicel 13–27 mm long. Epicalyx 9–12 mm long, 9–11-segmented, the segments free at the base, 0.6–0.75 times the length of the calyx, straight or slightly recurved, linear, flattened, 3-nerved, entire at the apex. Calyx with hairs on the ribs, otherwise glabrous, 14–20 mm long (*Clarkson* 7181 & *Simon* has markedly acuminate calyx lobes to 20 mm long — other specimens have shorter, slightly acuminate lobes); calyx nectary absent. Petals white, with a suffusion of pink mainly on the veins on the abaxial side, and with the proximal region reddish, 5.5–6.5 cm long. Staminal column 12 mm long, the stamens distributed along distal 10 mm of the column, the filaments 1.5–2 mm long. Style exserted 5 mm beyond apex of staminal column, the

branches 1.5–2 mm long. Stigmas capitate, the hairs 0.5 mm long. Capsule very sparsely hairy, with a few appressed hairs throughout, ovoid and beaked, 8–11 mm long, the beak glabrous, conspicuous, 1 mm long. Seed striate and with very short, white, thick hairs, angular-reniform, c. 3.5 mm long. **Fig. 2.**

***Other Specimens Examined*:** Queensland. Cook District: 9 km W of the Glen Garland turnoff on the Musgrave to Edward River road, May 1987, *Clarkson* 7181 *& Simon* (BRI, CANB, DNA, MBA, PERTH, QRS). Australian Capital Territory. Cultivated in glasshouse at Canberra, ACT (*ex Clarkson* 8107 *& Neldner*), *Craven* 8817 (CANB), 8820 (ASU, CANB), 8824 (CANB).

***Distribution and habitat*:** *Hibiscus saponarius* is known only from the two cited populations along the road from Musgrave to Edward River on Cape York Peninsula, Queensland. (**Map 1**).

It has been recorded as occurring in *Eucalyptus tetrodonta* F. Muell.-*E. hylandii* Carr & Carr woodland with a grassy ground layer (which once was noted as being sparse *Schizachyrium* Nees) on sandy soil (once noted as having surficial laterite pebbles).

***Etymology*:** From Latin *sapo* (soap), for the distinctive slippery or soapy feeling of the branchlets of living plants of this species, apparently caused by an exudate from the glandular hairs.

***Notes*:** *Hibiscus saponarius* seems to be most closely related to *H. meraukensis* Hochr. Both species have acuminate calyx lobes that are glabrous except on the ribs. The capsules of *H. saponarius* are sparsely pubescent, those of *H. meraukensis* are glabrous to sparsely pubescent, in contrast to all other Australian species which have densely pubescent capsules. The branchlets of *H. meraukensis* are usually glabrous or have recurved aculei but two collections examined (*Clarkson* 6471, 6934 & *Neldner* (BRI, CANB)) have hairs similar to those on *H. saponarius* except that they are shorter and not quite as dense. *Clarkson* 6934 & *Neldner* appears to be from a small, trailing plant and has a glabrous capsule; *Clarkson* 6471 & *Neldner* was described as a trailing shrub and has a sparsely pubescent capsule. All other collections of *H. meraukensis* seen from Queensland represent the typical, non-stellate-pubescent, aculeate form of the species.

## Key to Species of Hibiscus sect. Furcaria in Queensland and New South Wales

1. Nectary present on calyx midrib ..... 2. **H. diversifolius**
   Nectary absent ..... 2

2. Capsule glabrous or at the summit sparsely pubescent; pedicel glabrous or aculeate ..... 5. **H. meraukensis**
   Capsule sparsely or densely pubescent throughout; pedicel stellate-pubescent and with or without aculei ..... 3

3. Flowers pedicellate and pedunculate ..... 4
   Flowers pedicellate, peduncle absent ..... 5

4. Branchlets with very dense, velvety, simple to stellate fine hairs and simple to branched aculei to 2 mm long; capsule densely pubescent ..... 7. **H. splendens**
   Branchlets with 1–4-fid soft and flexible hairs to 3 mm long; capsule sparsely pubescent ..... 6. **H. saponarius**

5. Epicalyx segments flattened and slightly to markedly widened towards the apex ..... 3. **H. forsteri**
   Epicalyx segments not flattened or widened towards the apex ..... 6

6. Calyx densely stellate-pubescent and without aculei, the indumentum distinctly coloured (straw- to rust-coloured when dry) ..... 4. **H. heterophyllus**
   Calyx sparsely stellate-pubescent and/or aculeate, the indumentum not distinctly coloured ..... 1. **H. divaricatus**

***Hibiscus diversifolius* Jacq:** A purple-flowered form of *H. diversifolius* occurs at Lake Euramoo on the Atherton Tableland in north Queensland (*Brass* 33650 (BRI), *Kershaw & James* ANU 10025 (CANB), *Scarth-Johnson s.n.* (BRI)). Exell (1961) noted that the only form of *H. diversifolius* that occurs in the Flora Zambesiaca area is purple-flowered and uniformly pubescent and is referrable to *H. diversifolius* subsp. *rivularis* (Bremek. & Oberm.) Exell. The yellow-flowered *H. diversifolius sens. strict.*, that occurs both north and south of the Flora Zambeziaca area, is distinguished not only by its flower colour, but also by the longitudinal line or lines of pubescence on its stems. This distinction, however, does not hold in Australia because uniformly pubescent stems occur on yellow-flowered collections (e.g., *McDonald* 459 (CANB)), and a purple-flowered form has lines of pubescence as well as being otherwise pubescent (e.g., *Kershaw & James* ANU 10025). Therefore, we regard the purple-flowered form of *H. diversifolius* in Australia as merely a colour variant. Such variants are common among species of *Hibiscus* section *Furcaria* (Wilson 1994).

**The *Hibiscus heterophyllus* complex:** Wilson (1974) recognized three taxa in the *H. heterophyllus* complex in east-central and south-eastern Queensland: *H. heterophyllus* Vent. subsp. *heterophyllus*, occurring from latitude 17 to latitude 34 degrees South and distinguished by the very dense stellate indumentum on the calyx; *H. heterophyllus* subsp. *luteus* (Hochr.) F.D. Wilson, occurring from latitude 23 to latitude 26 degrees South and distinguished by a sparse stellate pubescence on the calyx; *H. divaricatus* Grah., occurring in a limited area from latitude 25 to latitude 26 degrees South and longitude 151 to longitude 152 degrees East, and distinguished by having bristles and/or aculei on the calyx ribs. A study of more recently collected specimens of this complex shows that the latter two taxa intergrade and cannot be distinguished morphologically with any degree of certainty. Therefore, in the key above, only two taxa in the complex are included, namely *H. heterophyllus sens. strict.* and *H. divaricatus*, the latter including *H. heterophyllus* subsp. *luteus*. If one accepts that species must be reproductively isolated from others, some doubt remains about this conclusion as Menzel & Martin (1974) produced vigorous, fertile hybrids between *H. heterophyllus sens. strict.* and the form that Wilson (1974) called *H. heterophyllus* subsp. *luteus*, and also between *H. heterophyllus sens. strict.* and *H. splendens*. *Hibiscus heterophyllus* x *H. splendens* hybrids are available in the nursery trade (Menzel & Martin 1974; Colleen Keena, Brisbane, Queensland, pers. comm., 1994). Apparently, natural crosses between these species also occur in Queensland (*Bates* 340, 341 (BRI) from Wide Bay District, which were interpreted by the collector as representing interspecific hybrids because the plants concerned were intermediate morphologically between the two putative parental species, *H. heterophyllus* and *H. splendens*, that occurred in close proximity). Paul Forster (BRI) drew our attention to a number of collections at BRI representing plants from Port Curtis District, Queensland, growing on serpentinite and displaying flower colours ranging from white with a pink flush to apricot, pale pink, pink, orchid pink, and rose pink. All fall within the morphological limits of *H. heterophyllus* as accepted in this paper. It is obvious that more than a morphological study will be required to resolve the relationships among these taxa.

To the synonymy of *H. heterophyllus* Vent. *sens. strict.* may be added the following: *H. amaliae* Domin, Biblioth. Bot. 89: 404 (1928) (MEL, iso.). The examined isotype clearly falls within the variability of *H. heterophyllus* as we are defining this species.

***Hibiscus splendens* Fraser ex Graham:** Wilson's (1974) designation of the specimen *Fraser* s.n., 1825, Hastings River, New South Wales, at Edinburgh (E) as neotype of *H. splendens* was unnecessary because the holotype exists at Kew (K) (Lauener & Paul 1985). The specimen Wilson designated neotype is, in fact, an isotype of *H. splendens*.

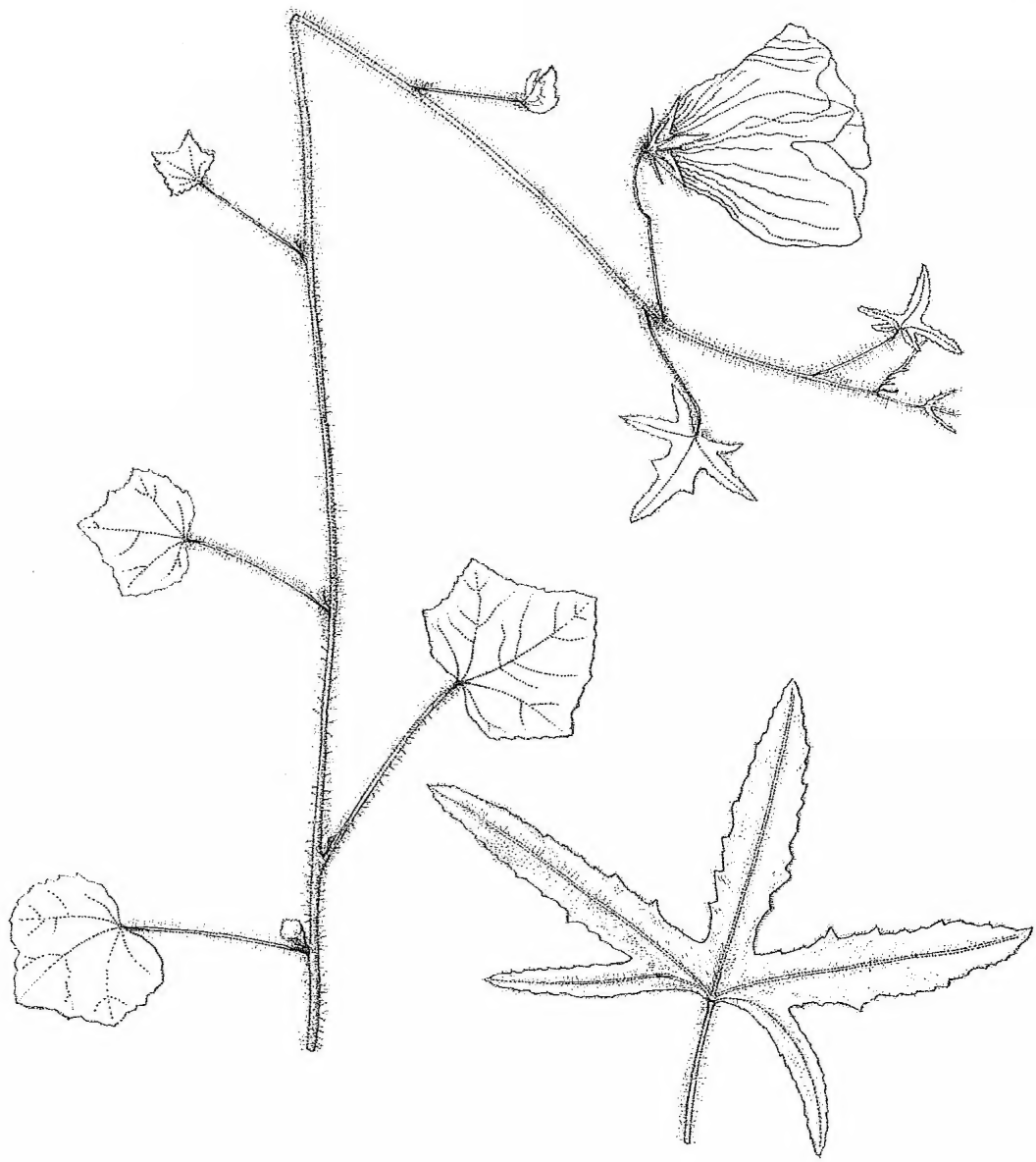


**Fig. 2.** *Hibiscus saponarius Craven* 8820 (ASU).

## Acknowledgements

We thank Donald Pinkava and Leslie Landrum, ASU, for providing working space for FDW at that institution. FDW's visit to Canberra was supported by the Visiting Scientist Program of CSIRO Division of Plant Industry, the Australian Nature Conservation Agency, and Queensland Region of Society for Growing Australian Plants; to these organisations we extend our thanks. The directors and curators of the following herbaria are thanked for the opportunity to study collections in their care: ASU, BRI, CANB, CBG, MBA, MEL, QRS. John Clarkson, especially, is thanked for his interest in collecting the mallows of northern Queensland. Marsha Minnis prepared the illustrations.

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## Index to Numbered Exsiccatae of *Hibiscus* section *Furcaria* from Queensland and New South Wales

The number following the colon is the number of the species given in the key above.

Adams 3649: 2. Anderson 2029: 4. Andrews & Simon 25: 1.

Bates 259: 3; 323: 1; 338: 7. Batianoff 3200, 3625A, GG9105028, MS9105110: 4. Batianoff & Dalliston 3107: 4. Batianoff & McDonald 681, 799: 1. Bean 3167, 3184, 3185: 4; 6753: 7. Bell 282: 4. Bennett 1: 4; 2: 3. Blake 12729 *p.p.*: (BRI) 1, (CANB) 4; 18710: 3; 19966: 1; 23449: 3. Brake R3: 4. Brass 18501, 18755, 18977: 5; 19181: 3; 33650: 2. Brooker 4112: 5. Burbidge 5394: 1. Burkitt 45: 3. Byrnes & Clarkson 3745: 4.

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Fagg 717: 4. Fensham 287, 1050, 1051: 4; 682, 1052, 1053: 1. Forbes 2779: 4; 2780: 7. Forster 4024, 6370: 5; 4249, 5234, 5518, 8792, 9040: 3; 6688, 7923, 14140: 1; 7637, 9409, 9891: 4. Forster & McDonald 8022, 8179, 8238: 4. Forster & Smyrell 9187: 2. Forster, Tucker & Kenning 9982: 4. Forster, Tucker & Orford 5866: 4.

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Austrobaileya 4(3): 449–450 (1995)

## Notes

# Distribution, habitat and conservation status of *Peperomia bellendenkerensis* (Piperaceae), a rare endemic from the 'Wet Tropics' of north-eastern Queensland

In the recent account of *Peperomia* in Australia (Forster 1993), *P. bellendenkerensis* Domin was known only from the two original collections made by Karel Domin on Bellenden Ker, north-eastern Queensland in 1909. No information was available on the habitat of the species and a conservation coding of 1K (sensu Briggs & Leigh 1988) was suggested.

During investigation (by PDB) of the fern flora of the Russell River valley in September 1993, plants of *Peperomia bellendenkerensis* were rediscovered. Based on the population size, the land-use at the site [Bellenden Ker Resources Reserve] and the close proximity of cleared farm-land, the conservation coding of this species was changed to E (Henderson 1994). Subsequent collections have now revealed at least six discrete populations of *P. bellendenkerensis*. A reliable but unconfirmed report has also been received from R.L. Jago (pers. comm.) that the species occurs also at the head of the East Mulgrave River, NW of Babinda (within Wooroonooran National Park).

**Peperomia bellendenkerensis** Domin, Biblioth. Bot. 89(4): 559 (1928); P.I. Forster, Austrobaileya 4: 95 (1993).

***Additional specimens examined*:** Queensland. Cook District: Wooroonooran N.P. (formerly N.P. 226), unnamed tributary of Westgid Creek 1.5 km NW of Cable Car Base Station, Apr 1994, *Chinnock* 8741 & *Bostock* (AD, BRI); Wooroonooran N.P., Frenchmans Creek, south branch, Apr 1994, *Bostock* 1549 & *Chinnock* (BRI); Wooroonooran N.P., Frenchmans Creek, west branch, Apr 1994, *Bostock* 1560 & *Chinnock* (BRI); Weinerts Creek, 1 km NW of Babinda, Dec 1993, *Jago* 3055 (BRI); Wooroonooran N.P., Josephine Falls, May 1994, *Bostock* 1611 & *Chinnock* (BRI); Bellenden Ker Resources Reserve (formerly Departmental & Official Purposes Reserve [Dept of Minerals and Energy/Dept of Environment and Heritage] 1692), Majuba Creek, Sep 1993, *Bostock* 1459 & *Turpin* (BRI).

***Distribution and habitat*:** *P. bellendenkerensis* is known to occur over 11 minutes of latitude from Westgid Creek in the north to Majuba Creek in the south (**Fig. 1**), with all of the recorded localities in the eastern foothills of the Bellenden Ker/Bartle Frere mountain massif.

Plants of *P. bellendenkerensis* are usually lithophytic on the northern to north-western faces of granite boulders in lowland complex mesophyll vineforest where they grow in loose humus in deep shade, sometimes associated with *P. enervis* C.DC. & F.Muell. and with the ferns *Antrophyum callifolium* Blume, *A. plantagineum* (Cav.) Kaulf. and *Microsorum membranifolium* (R.Br.) Ching. At the west branch of Frenchmans Ck, plants were also observed to be epiphytic in the upper parts of the canopy.

***Conservation status*:** *Peperomia bellendenkerensis* is infrequent at the known localities. However, it is likely that such a small and easily overlooked plant occurs quite widely in the area where it has been located to date. All of the known localities are either within Wooroonooran N.P. or are in land parcels immediately adjacent to this park and, with the possible exception of the Weinerts Creek site, can be considered as being relatively secure with no obvious threats from human activities. It is suggested that an appropriate conservation status is therefore 2RC (Briggs & Leigh 1988).

### Acknowledgements

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Accepted for publication 17 January 1995

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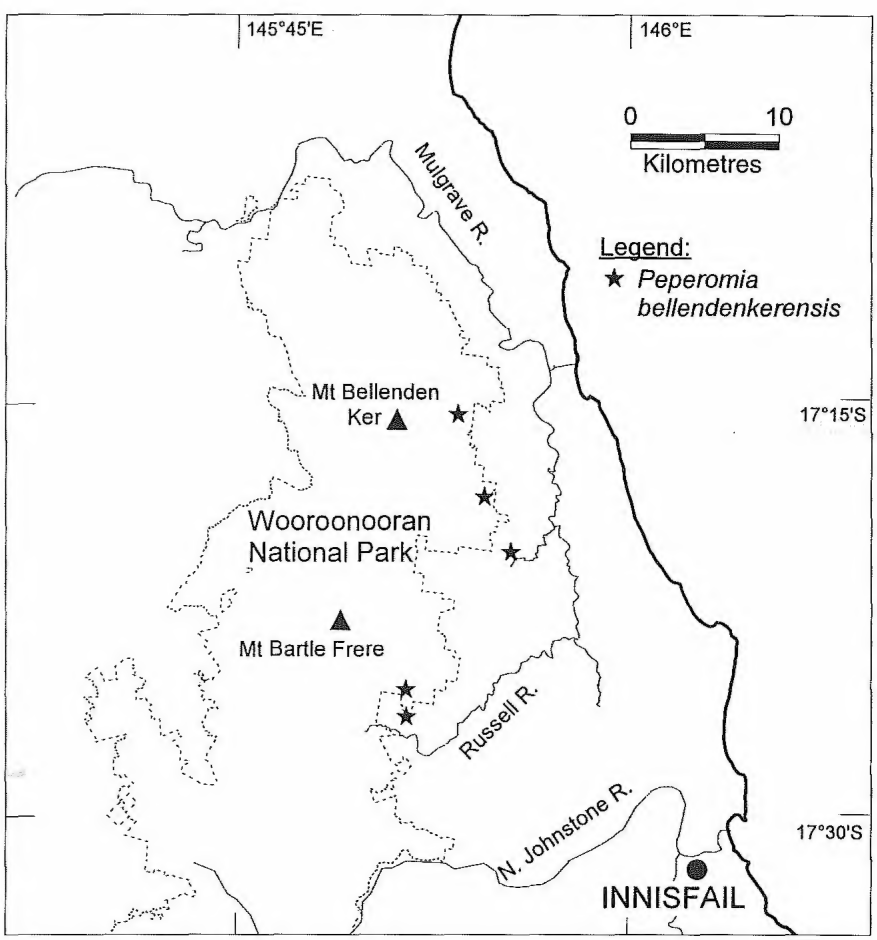
**Peter D. Bostock & Paul I. Forster**

**Queensland Herbarium, Meiers Road, Indooroopilly, Qld 4068, Australia**




**Map 1**. Distribution of *Peperomia bellendenkerensis* in north-eastern Queensland.

Austrobaileya 4(3): 451–452 (1995)

# Notes

## *Ehretia grahamii* (Boraginaceae): notes on distribution, habitat, variation and conservation status

Randell (1993) described as new *Ehretia grahamii* based on a type collected west of Sarina in central Queensland. *Ehretia grahamii* was stated to occur between Proserpine and Rockhampton in dry rainforests (synonymous with vinethickets and vineforests) on reddish stony soil or light clay. Randell made no comment on the conservation status of the new species and cited only five specimens additional to the type, despite having annotated other collections at BRI. *Ehretia grahamii* was subsequently listed with a conservation coding of R in Henderson (1994).

Recent dry rainforest surveys in central and north Queensland provide considerable new data on habitat and distribution. *Ehretia grahamii* is far more widespread than stated by Randell with a northern distributional record at Mingela Bluff southwest of Townsville and a southern distributional record at Targinie south of Rockhampton (previously listed in Forster *et al.* 1991). The species is known from at least 53 localities in eleven 1 ° grid cells (**Map 1**) and was present in 42 of 358 sites sampled in north Queensland dry rainforests (data base of Fensham in press). It is concluded that no conservation coding is warranted for this plant, although the species is undoubtedly critically endangered at certain localities due to continued clearing of dry rainforests for agricultural purposes.

Randell's short description appears to be based on few fertile collections. Some additional morphological description is now possible due to the increase in material available, notably... pedicels 1.8–2.5 mm long, 1.5–1.6 mm diameter; calyx 1.5–3 mm long; corolla 3–4.5 mm long, 4.5–5 mm diameter, lobes 2–2.5 mm long, 1–1.2 mm wide; filaments 2–3 mm long; fruits subconical, 5–6 mm long, 6–7 mm diameter, fleshy, red.

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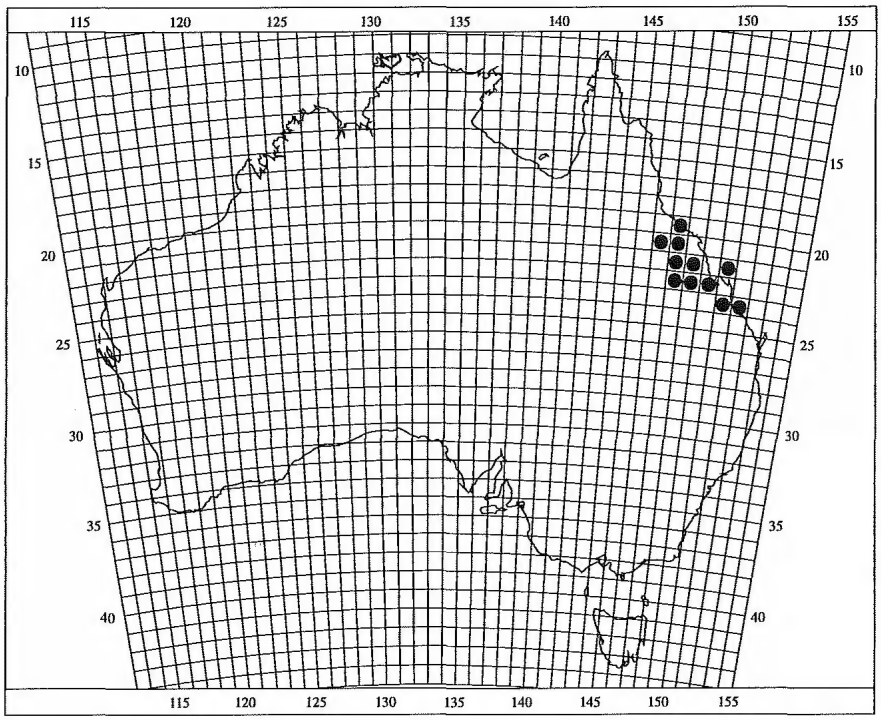
Randell appears to have ignored apparent hybrid or introgressed individuals between *E. grahamii* and *E. membranifolia* R.Br. [the combination *E. saligna* var. *membranifolia* (R.Br.) Randell is not accepted at BRI]. *Ehretia membranifolia* is sympatric with *E. grahamii* at nearly 40 localities of the latter and intermediate individuals are present at 5 of these localities (data base of Fensham in press). The label on specimen *Forster* 7989 & *McDonald* at BRI (determined as *E. grahamii* by Randell) quite clearly states that the plant appeared intermediate.

*Ehretia grahamii* occurs in microphyll dry rainforests where mean annual precipitation ranges between 500 and 1 000 mm, on soils derived from rocks such as basalt, granodiorite, quartzified sandstone or granite. This species is usually present in small populations of less than 1 000 individuals at the localities where I have encountered it and does not represent a significant proportion of the structural component in the vegetation.

**Ehretia grahamii** Randell, J. Adelaide Bot. Gard. 15: 94 (1993). **Type:** Queensland. LEICHHARDT DISTRICT: Pine Mountain, State Forest 79, 21°44'S, 148°50'E, 21 Apr 1991, *P.I. Forster* 7998 & *W.J. McDonald* (holo: BRI; iso: K, L, MEL, QRS).

*Ehretia* (N. Gibson 793). Forster *et al.* (1991: A–179).

***Selection of specimens examined:*** **Queensland.** NORTH KENNEDY DISTRICT: Mingela Bluff, 19°53'S, 146°45'E, Jan 1992, *Forster* 9421 & *Bean* (BRI, K, MEL, QRS); Leichhardt Range, 20°03'S, 147°03'E, Jul 1993, *Fensham* 944 (BRI). SOUTH KENNEDY DISTRICT: 'Kerale', 20°36'S, 147°41'E, Apr 1993, *Fensham* 896 (BRI); Mt Blackjack, 'Weetalaba', 21°00'S, 147°55'E, Jul 1993, *Forster* 13412 & *Tucker* (BRI); 'Exmoor', 21°00'S, 148°06'E, Dec 1992, *Fensham* 463 (BRI); Percy Island, Nov 1987, *Innis* 327 (BRI); Crest of Leichhardt Range along pipe line road between Hillalong & Turrawulla, Sep 1978, *Anderson* [AQ265922](BRI); Hazlewood Gorge, SSW of Eungella, 21°15'S, 148°22'E, Jan 1993, *Forster* 12716 & *Pearson* (BRI, K, L, MEL, QRS); 'Strathmore', 22°31'S, 147°42'E,




**Map 1.** Distribution of *Ehretia grahamii* in 1° grid squares.

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Aug 1992, *Fensham* 299 (BRI). LEICHHARDT DISTRICT: Mt Britton Mine, Homevale Station, Dec 1973, *Stanton in Webb & Tracey* 13723 (BRI); Back Creek, 'Killarney', Connors Range, 22°19'S, 149°14'E, Mar 1993, *Fensham* 748 (BRI); 32 km S of Lotus Creek, [Old] Bruce Highway (Marlborough - Sarina [road]), 22°35'S, 149°13'E, Aug 1977, *Williams* 77196 (BRI); Clements Creek, 'Clive', 22°48'S, 149°25'E, Sep 1993, *Fensham* 1230 (BRI). PORT CURTIS DISTRICT: S.F.60, Rundle Range, *Gibson* 752 (BRI); S.F.60, Rundle Range, N side of Telegraph road, 23°38'S, 150°58'E, Aug 1985, *Gibson* 764 (BRI); Targinie, Mt Larcom Range, 23°45'S, 151°04'E, May 1986, *Gibson* 793 (BRI); 2 km SE of Butlerville, northern end of Mt Larcom Range, 23°46'S, 151°04'E, Jan 1988, *Forster* 3383 & *Gibson* (BRI).

**Putative hybrids or introgressed individuals between *E. grahamii* and *E. membranifolia*:** **Queensland.** SOUTH KENNEDY DISTRICT: Mt Sambo, 20°58'S, 147°53'E, Dec 1992, *Fensham* 461 (BRI); Nebo to Sarina road, 2 km S of Pine Mt, S.F. 79, 21°46'S, 148°50'E, Apr 1991, *Forster* 7989 & *McDonald* (BRI).

## Acknowledgement

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Austrobaileya 4(3): 453 (1995)

# Correction

**Austrobaileya 4(1): 70 (1993).**

P.I. Forster, Conspectus of *Cryptolepis* R.Br. (Asclepiadaceae: Periplocoideae) in Malesia

The correct type collection number for *Cryptolepis multinervosa* P.I.Forst. is *M. Jacobs* 9247 (not 9287).

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