



FLORA OF AUSTRALIA

Volume 2
Winteraceae to Platanaceae



Margaret A. Saul 1991

FLORA OF AUSTRALIA

Volume 2 describes 24 families of plants, representing some of the most ancient flowering plants known. Most of them are largely tropical, with the exception of Ranunculaceae, and the wholly introduced families Berberidaceae, Papaveraceae, Fumariaceae and Platanaceae.

In all the volume contains 24 families, 95 genera, and 456 taxa at species and infraspecific level.

The Lauraceae include many important timber trees in Queensland and New South Wales, as well as the invasive introduced tree species *Cinnamomum camphora*, the Camphor Laurel. Aristolochiaceae, Austrobaileyaceae and Piperaceae are often spectacular flowering vines in more northern areas, while in southern Australia *Cassytha* in the Lauraceae and *Clematis* in the Ranunculaceae are the most common climbing genera. *Ranunculus* is the largest genus described, with 51 species mostly in the south-east and Tasmania, and an important component of the alpine flora.

Fifty one authors, illustrators and photographers have contributed to this volume.

**Contents of volumes in the *Flora of Australia* the families (current at December 2006)
arranged according to the system of A.Cronquist (1981)**

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FLORA OF AUSTRALIA



Austrobaileya scandens C.T.White. Painting by Margaret Saul.

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Volume 2
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INTRODUCTION

Volume 2 of the *Flora of Australia* describes 24 families of plants, representing some of the most ancient flowering plants known. Most of them are largely tropical, with the exception of Ranunculaceae, and the wholly introduced families Berberidaceae, Papaveraceae, Fumariaceae and Platanaceae.

The Lauraceae include many important timber trees in Queensland and New South Wales, as well as the invasive introduced tree species *Cinnamomum camphora*, the Camphor Laurel. Other families with species harvested for timber are Monimiaceae and Atherospermataceae. Aristolochiaceae, Austrobaileyaceae and Piperaceae are often spectacular flowering vines in more northern areas, while in southern Australia *Cassytha* in the Lauraceae and *Clematis* in the Ranunculaceae are the most common climbing genera. *Ranunculus* is one of the larger genera described, with 51 species mostly in the south-east and Tasmania, and an important component of the alpine flora.

Platanaceae, in the Hamamelidales, has been added at the end of this volume. If it had been recognised as naturalised when the contents of the volumes of the *Flora* were originally circumscribed, it would have been the first family treated in volume 3.

Scope and Presentation of the *Flora*

The geographical area covered by the *Flora* includes the six Australian States, the Northern Territory, the Australian Capital Territory and immediate offshore islands. Other Australian and State-administered territories such as Christmas Is. and Lord Howe Is. are excluded, but the occurrence in those territories of species included in the *Flora* is added to the notes on distribution. Complete Floras of the oceanic islands are in Volumes 49 and 50.

Descriptions and discussion in the *Flora* are concise and supplemented by important references, synonymy, and information on type collections, chromosome numbers, distribution, habitat, and published illustrations. Descriptions are based on Australian material except for some taxa not confined to Australia for which the collections in Australian herbaria are inadequate. Synonymy is restricted to names based on Australian types or used in Australian literature. Misapplied names are given in square brackets together with an example of the misapplication. Alien taxa established in one or more localities, other than under cultivation, are considered naturalised and are included and asterisked (*). Native taxa naturalised outside their original ranges are marked with a hash (#).

Families are arranged in the system of A. Cronquist, *An Integrated System of Classification of Flowering Plants* (Columbia University Press, New York, 1981). Within families, genera and species are arranged to show natural relationships as interpreted by contributors. Although relationships cannot be shown adequately in a linear sequence, such an arrangement in a *Flora* assists comparison of related taxa. Intraspecific taxa are keyed out under relevant species. Up to seven collections are cited for each species and infraspecific taxon.

Maps showing distribution in Australia are arranged in the same sequence as the descriptions and are grouped together at the end of the main text. The term 'Malesia' is sometimes used in the notes on geographical distribution for species which occur widely in the region covered by *Flora Malesiana*, i.e. Malaysia, Singapore, Indonesia, the Philippines, New Guinea and adjacent islands.

Type citations under taxa in the main body of the text reflect the authors' belief in their current status (holotype, isotype, syntype, etc) and where they are held. In cases where the type specimen has not been examined, this is indicated by *n.v.* These type statements are not to be interpreted as lectotypifications. Where lectotypifications have been made previously,

INTRODUCTION

these are cited with *fide*, followed by a reference to the author and place of publication (or, sometimes, to a secondary reference). Any formal lectotypifications required for this volume, as in previous parts of the *Flora*, are confined to the Appendix.

New taxa and lectotypifications are included in an Appendix where they are formally published in accordance with the *International Code of Botanical Nomenclature* (Koeltz Scientific Books, Königstein, 1994). Abbreviations, contractions and notes on format are listed after the Appendix.

A key to families of flowering plants and a glossary of technical terms are provided in Volume 1 of the *Flora*. Supplementary glossaries are included in each volume as necessary.

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The co-operation of CSIRO Publishing in bringing this book to press is gratefully acknowledged.



Plate 1. *Tasmannia purpurascens*.
Photographer — M.Fagg.



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Photographer — M.Fagg.



Plate 3. *Eupomatia bennettii*.
Photographer — M.Fagg.



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Photographer — T. & S.Shaw.



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Photographer — G.Sankowsky.



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Photographer — B.Gray (© CSIRO).



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Photographer — M.Fagg (©ANBG).



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Photographer — B.Gray (© CSIRO).



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 Photographer — B.Gray (© CSIRO).



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 Photographer — B.Gray (© CSIRO).



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 Photographer — T.Low.



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Photographer — B.Gray (© CSIRO).



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Photographer — B.Jago.



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Photographer — B.Gray (© CSIRO).



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Plate 30. *Endiandra compressa*.
Photographer — B.Gray (© CSIRO).



Plate 31. *Endiandra discolor*.
Photographer — G.Leiper.



Plate 32. *Endiandra globosa*.
Photographer — B.Jago.

WINTERACEAE

*G.P. Guymer*¹

Trees or shrubs, dioecious, polygamo-dioecious or bisexual, without vessels, branching sympodially or monopodially, glabrous, rarely with hair-like papillae. Leaves exstipulate, alternate, in pseudo-whorls or subopposite (not in Australia); lamina simple, entire, finely pellucid-dotted. Flowers solitary and terminal, or in terminal or axillary cymose inflorescences, usually regular, hypogynous. Calyx calyptrate or 2–4 (–6)-lobed, valvate. Petals 2–many or absent, in 1 or 2 or more whorls, free (or outer ones connate). Stamens 3–numerous, free, inflated, obovoid or ribbon-like, anthers adnate or anthers distinct from the filament, tetrasporangiate, commonly with terminal or subterminal bisporangiate pollen sacs; pollen usually in tetrads. Carpels 1–several, in a single whorl, free or slightly connate, conduplicate and often unsealed with stigma decurrent along opposed margins to fully sealed with a terminal style and stigma; placentas 2, linear, opposite, parallel to the stigma or ventral, usually with 1 row of ovules; ovules 1–many, anatropous, descending or apotropous. Fruit apocarps, berry-like, or follicles, or connate into multilocular capsules or syncarps (not in Australia). Seeds with abundant endosperm.

A family of 9 genera and c. 130 species principally in the south-western Pacific, Australia and New Guinea with *Drimys* J.R.Forst. & G.Forst. from Mexico to the Straits of Magellan and *Takhtajania* Baranova & J.-F.Leroy confined to Madagascar. Two genera native to Australia.

A.C.Smith, Taxonomic notes on the Old World species of Winteraceae, *J. Arnold Arbor.* 24: 119–164 (1943); W.Vink, Taxonomy in Winteraceae, *Taxon* 37: 691–698 (1988); W.Vink, Winteraceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 630–638 (1993); A.Igersheim & P.K.Endress, Gynoecium in Magnoliales and Winteroids, *Bot. J. Linn. Soc.* 124: 213–271 (1997).

KEY TO GENERA

Flowers bisexual; twigs elongating sympodially after flowering; calyx soon rupturing and persisting under fruit

1. BUBBIA

Flowers functionally unisexual, plants dioecious; twigs elongating monopodially after flowering; calyx enclosing until anthesis, then rupturing and falling

2. TASMANNIA

1. BUBBIA

Bubbia Tiegh., *J. Bot. (Morot)* 14: 278, 293 (1900); derivation not given by van Tieghem.

Drimys sect. *Bubbia* (Tiegh.) Kuntze in T.E. von Post & C.E.O.Kuntze, *Lex. Gen. Phan.* 187 (1903). T: *B. howeana* (F.Muell.) Tiegh.

Shrubs or trees, bisexual, glabrous; terminal buds with cataphylls. Twigs branching sympodially after flowering. Leaves alternate. Inflorescences terminal, in compound dichasia to triads or solitary, 1–23-flowered. Flowers pedicellate, white, cream or yellow. Calyx calyptrate, soon rupturing, persistent. Petals 4–14, free, 1–3-seriate. Stamens 8–32, inflated, obovoid to slightly flattened (or laterally widened), anthers adnate. Carpels 1–8, free; stigma sessile; ovules 6–22 per carpel, in 1 or 2 rows. Fruit an apocarp, berry-like; pulpa not completely separating seeds. Seeds 3–12, obovoid or oblong-ovoid, slightly falcate, black, smooth or slightly pusticulate.

¹ Queensland Herbarium, Brisbane Botanic Gardens Mt Coot-tha, Mt Coot-tha Road, Toowong, Queensland 4066.



Figure 1. *Bubbia*. **A–B**, *B. whiteana*. **A**, fruiting branch; **B**, leaf lower surface (**A–B**, J.Clarkson 5592, BRI). **C**, *B. queenslandiana* subsp. *queenslandiana*, fruiting branch (L.Webb & J.Tracey 10818, BRI). **D–F**, *B. semecarpoides*. **D**, fruiting branch; **E**, fruit (T.S.); **F**, seed (**D–F**, W.Birch 15, BRI). Scale bars: **A**, **C**, **D** = 24 mm; **B** = 2 mm; **E** = 6 mm; **F** = 3 mm. Drawn by W.A.Smith.

A genus of c. 30 species from the Moluccas to New Caledonia and Australia. Three endemic species in Australia, all in north-eastern Qld. There is 1 species (*B. howeana* (F.Muell.) Tiegh.) endemic to Lord Howe Is. (see P.Green, *Fl. Australia* 49: 43 (1994)).

W.Vink, *Blumea* 31: 39–55 (1985) included *Bubbia* in a heterogeneous assemblage of taxa under *Zygogynum* Baill. Morphological data and recent evidence from molecular analysis indicates *Zygogynum* to be polyphyletic. *Bubbia* is therefore reinstated here at the generic level.

1 Lower leaf surface smooth; stamens 8–13

1. *B. queenslandiana*

1: Lower leaf surface minutely punctulate; stamens 14–32

2 Leaves 11–36 cm long; midrib sunken above

2. *B. semecarpoides*

2: Leaves 4–12 cm long; midrib flush above

3. *B. whiteana*

1. *Bubbia queenslandiana* Vink, *Blumea* 28: 318, figs 3, 4, 6c, 7c–f, 8a–d (1983)

Zygogynum queenslandianum (Vink) Vink, *Blumea* 31: 54 (1985). T: North Mary Logging Area, State Forest Reserve 143, Mt Lewis, Qld, *B.Gray* 484; holo: L; iso: BRI, MEL, QRS.

Shrubs or small trees to 8 m high. Leaves: petiole 1–4 cm long; lamina obovate to oblanceolate, 5–16 cm long, 1.5–5.5 cm wide, subcoriaceous, glaucous and smooth below; base cuneate to attenuate; margin slightly recurved; apex rounded to obtuse; midrib slightly impressed above. Inflorescences 4–10, 1.5–5 cm long, 1–3 (–6)-flowered; pedicels 3–13 mm long (21–31 mm long for solitary flowers). Calyx 2–4-lobed. Petals 4–8, ovate to oblong, 5.5–8 mm long, 2.3–5 mm wide. Stamens 8–13, 1- or 2-seriate. Carpels (1–) 2–5; ovules 6–11. Apocarpis globose, 9–11.5 mm long, purple to black. Seeds 4–9, obovoid, 5–6 mm long.

Extends from Mt Finnegan to Innisfail, NE Qld; in rainforest at 680–1300 m alt. Two subspecies are recognised.

Petals 4 or 5, 1-seriate; leaves with 2 adaxial subepidermal layers

1a. subsp. *queenslandiana*

Petals 7 or 8, 2-seriate; leaves with 1 adaxial subepidermal layer

1b. subsp. *australis*

1a. *Bubbia queenslandiana* Vink subsp. *queenslandiana*

Zygogynum queenslandianum (Vink) Vink subsp. *queenslandianum*

Illustrations: W.Vink, *Blumea* 28: 319, fig. 3, 320, fig. 4a–e, h, 327, fig. 7c–f (1983).

Shrubs or trees 3–17 m high. Leaves with 2 adaxial subepidermal layers. Petals 4 or 5, 1-seriate.

Occurs in montane rainforest between Mt Finnigan and Mt Lewis, NE Qld. Flowers Dec.–Feb., Apr.; fruits Sept.–Dec. Map 1.

Qld: 12 km SW of Mossman, *L.W.Jessup GJM* 180, *G.P.Guymer & W.J.F.McDonald* (BRI); Mt Spurgeon, *C.T.White* 10644 (BRI); Horan's Ck, Mt Finnegan, *P.I.Forster PIF*25075 & *R.Booth* (BRI).

1b. *Bubbia queenslandiana* subsp. *australis* Vink, *Blumea* 28: 322 (1983)

Zygogynum queenslandianum subsp. *australe* (Vink) Vink, *Blumea* 31: 54 (1985). T: State Forest Reserve 310, W side of Mt Bartle Frere, Qld, *K.J.White QF* 52/235; holo: BRI.

Illustrations: W.Vink, *Blumea* 28: 320, fig. 4f & g, 326, fig. 6c, 328, fig. 8a–d (1983).

Shrubs or small trees to 5 m high. Leaves with 1 adaxial subepidermal layer. Petals 7 or 8, 2-seriate. Fig. 1C.

Occurs in rainforest between Boonjie and Russell R., Qld. Flowers May; fruits Dec. & Jan. Map 2.

Qld: Coolamon Ck, Towalla, *R.Booth* 3110 & *R.Jensen* (BRI); On track to Phoenix Battery, Old Towalla Goldfield, *R.L.Jago* 5975 (BRI); Stockwellia site, Boonjee, *J.Hunter JH*239 (BRI); Upper Russell R., *S.Johnson s.n.* (MEL).

2. *Bubbia semecarpoides* (F.Muell.) B.L.Burtt, *Icon. Pl.* V, 4, t. 3315 (1936), as *semicarpoides*

Drimys semecarpoides F.Muell., *Victorian Naturalist* 8: 15 (1891); *Bubbia semecarpoides* (F.Muell.) B.L.Burtt var. *semecarpoides*, *Blumea* 28: 325 (1983); *Zygogynum semecarpoides* (F.Muell.) Vink, *Blumea* 31: 54 (1985); *Zygogynum semecarpoides* (F.Muell.) Vink var. *semecarpoides*, *Blumea* 31: 54 (1985). T: Harveys Creek, Russell River, Qld, *W.Sayer* 293; holo: MEL; iso: BRI.

Illustrations: W.Vink, *Blumea* 28: 323, fig. 5e–g, 326, fig. 6d & f, 328, fig. 8e & f (1983), as *B. semecarpoides* var. *semecarpoides*.

Shrubs or trees to 20 m high. Leaves: petiole 0.7–4 cm long; lamina obovate to oblanceolate, (11–) 13–36 cm long, 3.5–8.5 cm wide, coriaceous, minutely pusticulate and glaucous below; base narrowly cuneate; margin slightly recurved; apex rounded to obtuse; midrib sunken above. Inflorescences 1–14, 1.2–10 cm long, 1–8-flowered; pedicels 2–13 mm long (4–19 mm long for solitary flowers). Calyx 2–4-lobed. Petals 5–12, elliptic to obovate, 3–7 mm long, 1.5–4 mm wide. Stamens 25–32, 2- or 3-seriate. Carpels 5–18; ovules 10–20. Apocarps obovoid, 12–15 mm long, black. Seeds 10–12, oblong-ovoid, slightly falcate, 4.5–5 mm long. *Winter Beech*, *Winterwood*. Fig. 1D–F.

Extends from Mt Carter, Cape York Penin. to Mt Dryander, NE Qld; in rainforest at 400–1200 m alt. Flowers Jan., June; fruits Jan.–Mar., Oct., Dec. Map 3.

Qld: c. 1 km NW of summit of Mt Dryander, *G.P.Guymer* 1727 (BRI); Copperlode Falls Dam, Cairns, *W.R.Birch* 15 (BRI); c. 32 km NNW of Daintree, *D.E.Boyland* & *J.G.Gillieatt* 433 (BRI); Mt Carter, *B.P.M.Hyland* 7524 (BRI, QRS).

3. *Bubbia whiteana* A.C.Sm., *J. Arnold Arbor.* 24: 145–147, fig. 4a–f (1943)

Bubbia semecarpoides var. *whiteana* (A.C.Sm.) Vink, *Blumea* 28: 325 (1983); *Zygogynum semecarpoides* var. *whiteanum* (A.C.Sm.) Vink, *Blumea* 31: 54 (1985). T: Queensland: Thornton Peak (Mt Alexander), Daintree River region, 14 March 1932, *L.J.Brass* 2278; holo: A n.v.; iso: BRI, K, P.

Illustration: W.Vink, *Blumea* 28: 323, fig. 5a–d, (1983), as *B. semecarpoides* var. *whiteana*.

Shrubs or small gnarled trees to 8 m high. Leaves: petiole 1.5–1.8 cm long; lamina obovate to oblanceolate, 4–12 cm long, 1.5–3.5 (–4.5) cm wide, coriaceous, minutely pusticulate, glaucous below; base attenuate; margin strongly recurved; apex obtuse or rounded; midrib flush above. Inflorescences 1–7, 1.2–2.5 cm long, 1- or 2-flowered; pedicels 8–18 mm long (–25 mm in fruit). Calyx 2- or 3-lobed. Petals 6 or 7, ovate-dentate, 6–6.5 mm long, 2.5–3.5 mm wide. Stamens 14–19, 2-seriate. Carpels 1–4; ovules 7–10. Apocarps subglobular or obovoid, 8–12 mm long, black. Seeds 3–6, oblong-obovoid, slightly falcate, 4.5–5 mm long. Fig. 1A–B.

Restricted to microphyll mossy thickets on and near the summit of Thornton Peak, NE Qld, at 1250–1300 m alt. Flowers Dec.–Mar.; fruits Mar., Sept.–Dec. Map 4.

Qld: Thornton Peak, *J.R.Clarkson* 5592 (BRI); Mt Alexander [Thornton Peak], Daintree R., *S.F.Kajewski* 1495 (BRI, NSW).

2. TASMANNIA

Tasmannia R.Br. in A.P. de Candolle, *Syst. Nat.* 1: 445 (1817); after Abel Janszoon Tasman (1603–1659), Dutch explorer.

Drimys sect. *Tasmannia* (R.Br.) F.Muell., *Pl. Victoria* 1: 20 (1862). T: *T. insipida* R.Br.

Trees or shrubs, dioecious, glabrous or with hair-like papillae. Twigs branching monopodially after flowering. Leaves alternate or subopposite (not in Australia), usually pseudo-whorled below resting buds, with a spicy scent when crushed. Inflorescences pseudo-terminal and umbel-like below a dormant vegetative bud, 1–16-flowered with flowers single in axils of caducous bracts. Flowers functionally unisexual, white, cream or yellow. Calyx calyptrate, enclosing bud until anthesis, often rupturing laterally into 2 or 3 lobes and then falling; petals 1–9 or absent, 1-seriate, free. Stamens 6–98 in ♂ flowers, 2–4-seriate, anthers

and filaments distinct, filaments terete, progressively shorter and broader away from centre of flower; staminodes absent in ♀ flowers. Carpels 1–11 (–18), free; stigma extending over adaxial side and slightly over apex of carpel; ovules 2–36; sterile carpels 1–5 (rarely absent) in ♂ flowers. Fruit apocarps, berry-like; transversely septate pulpa present or absent. Seeds 1–27, laterally flattened, slightly to strongly curved, black.

A genus of c. 50 species from Malesia and eastern Australia. Eight species endemic to Australia from Tas. to northern Qld. Vink (1970, 1988) considers *Tasmannia* to be a section of *Drimys*. This view is not adopted here given the evidence provided by Ehrendorfer *et al.* (1968), Smith (1969), Sampson *et al.* (1988) and Doust and Drinnan (2004).

F.Ehrendorfer *et al.*, Chromosome numbers and evolution in primitive angiosperms, *Taxon* 17: 337–353 (1968); A.C.Smith, A reconsideration of the genus *Tasmannia* (Winteraceae), *Taxon* 18: 286–290 (1969); W.Vink, The Winteraceae of the Old World. I. *Pseudowintera* and *Drimys* - morphology and taxonomy, *Blumea* 18: 225–354 (1970); F.B.Sampson, J.B.Williams & P.S.Woodland, The Morphology and Taxonomic Position of *Tasmannia glaucifolia* (Winteraceae), a new Australian species, *Austral. J. Bot.* 36: 395–413 (1988); R.E.Raleigh *et al.*, Morphometric Studies of the genus *Tasmannia* (Winteraceae) in Victoria, Australia, *Muelleria* 8: 235–256 (1994); A.Doust & A.Drinnan, Floral development and molecular phylogeny support the generic status of *Tasmannia* (Winteraceae), *Amer. J. Bot.* 91: 321–331 (2004).

- | | | |
|----|--|----------------------------------|
| 1 | Leaves minutely papillose below; petals absent or rarely 1 or 2 | 8. <i>T. glaucifolia</i> |
| 1: | Leaves without papillae below; petals (1–) 2–9 | |
| 2 | Carpels stipitate; apocarps with stipes 1–8 mm long, funicle $\frac{1}{3}$ to twice length of seed | |
| 3 | Leaves oblanceolate, 8–21 cm long, 3–8 cm wide; petals 2 or 3 (–8); fruit glaucous, blue-mauve to blue-black, stipes 1–5 mm long | 3. <i>T. purpurascens</i> |
| 3: | Leaves narrowly lanceolate to narrowly elliptic, 5–13 cm long, 0.7–2 cm wide; petals (1–) 2 (–6); fruit deep blue-violet, stipes 4–8 mm long | 4. <i>T. stipitata</i> |
| 2: | Carpels sessile or subsessile; apocarps with stipes less than 1 mm long, funicle $< \frac{1}{10}$ length of seed or absent | |
| 4 | Leaves 8–20 (–25) mm long, 2–6 mm wide | 5. <i>T. vickeriana</i> |
| 4: | Leaves >20 mm long, >6 mm wide | |
| 5 | Branchlets finely tuberculate | 7. <i>T. xerophila</i> |
| 5: | Branchlets smooth | |
| 6 | Leaves auriculate or cuneate at base, green below; berries with transversely septate pulpa | 1. <i>T. insipida</i> |
| 6: | Leaves attenuate or cuneate at base, glaucous or slightly glaucous below; transversely septate pulpa absent or slightly developed | |
| 7 | Petals (2–) 3–9; transversely septate pulpa absent; bushy shrubs or small trees 1.5–4 m high | 6. <i>T. lanceolata</i> |
| 7: | Petals (1 or) 2; transversely septate pulpa slightly developed; shrubs or trees 15 m high | 2. <i>T. membranacea</i> |

1. *Tasmannia insipida* R.Br. in A.P. de Candolle, *Syst. Nat.* 1: 445–446 (1817)

Drimys insipida (R.Br.) Pilg. in H.G.A.Engler & K.A.E.Prantl, *Nat. Pflanzenfam. Suppl.* 3: 108 (1906); *Drimys dipetala* F.Muell., *Pl. Victoria* 1: 21 (1862), *nom. illeg.* T: Port Jackson, [N.S.W.], *R.Brown*; lecto: G-DC, *fide* W.Vink, *Blumea* 18: 310 (1970).

Tasmannia monticola A.Rich. in J.S.C.Dumont d'Urville, *Voy. Astrolabe Part 2* 50–51, t. 19 (1834). T: Blue Mtns, N.S.W., *C.Fraser*; holo: P (photo seen); iso: NSW.

Shrubs or small trees 1.5–6 m high; branchlets smooth, green or reddish. Leaves: petiole 1–4 mm long; lamina obovate to linear-lanceolate, (4–) 8–20 cm long, 1.5–5.5 cm wide, chartaceous; base truncate and auriculate; apex acuminate. Petals 2 (–4), oblanceolate or

obovate, 7.5–13 mm long, 1.5–2.5 mm wide. Male flowers: pedicels 8–50 mm long; petals 6.5–14.5 mm long; stamens 17–65; sterile carpel 1 (rarely absent or 2). Female flowers: pedicels 8–29 mm long; petals 5–10 mm long; carpel 1, sessile; ovules 15–40. Apocarps ellipsoidal, 15–20 mm long, usually purplish, sometimes white and mottled with red; transversely septate pulpa present; stipes to 1 mm long. Seeds 8–27, slightly curved, 3–4 mm long, 1.7–2.5 mm wide. *Brush Pepperbush*. Fig. 2A–D.

Occurs in or near rainforest from Mt Misery, NE Qld, to Moruya, SE N.S.W.; from 25–1100 m alt. Flowers Aug.–Nov.; fruits Dec.–May. Map 5.

Qld: Bogimbah Ck, Fraser Is., *J.Russell-Smith & D.Lucas 1768* (♂) (BRI); near picnic area, Cunninghams Gap, *R.J.F.Henderson H2665* (♂) (BRI). N.S.W.: c. 38 km SE of Yarrawitch, 20 Dec. 1970, *J.B.Williams* (♀) (BRI, NE, NSW); Mt Boss State Forest, *L.J.Webb & J.G.Tracey 11472* (♀) (BRI).

2. *Tasmannia membranacea* (F.Muell.) A.C.Sm., *Taxon* 18: 287 (1969)

Drimys membranacea F.Muell., *Fragm.* 5: 175 (1866). T: Mackay River, Qld, *J.Dallachy*; holo: MEL; iso: BRI. *Drimys piperita* Hook.f. entity 38. ‘membranacea’, W.Vink, *Blumea* 18: 347 (1970)

Shrubs or trees 1.5–8 m high; branchlets striate, reddish. Leaves: petiole 1–13 mm long; lamina obovate to lanceolate, 8–17 cm long, 0.9–4 cm wide, membranous, slightly glaucous below; base attenuate and decurrent on petiole; apex acute to acuminate. Male flowers: pedicels 7–36 mm long; petals 2, oblanceolate, 6–13 mm long; stamens 30–62; sterile carpels 1 or 2 (or 3). Female flowers: pedicels 6–23 mm long; petals 2, 3.5–10 mm long, 1.5–4.5 mm wide; carpel 1, sessile; ovules 14–36. Apocarps globose to ovoid, 10–11 mm long, black; transversely septate pulpa slightly developed; stipes 0.1–0.4 mm long. Seeds 4–7, obovoid, slightly curved, 3–3.5 mm long. *Pepper Tree*. Fig. 2E–F.

Occurs in north-eastern Qld from Big Tableland to Paluma; in notophyll vine forest from 500–1300 m alt. Flowers June–Oct.; fruits Apr., May and July. Map 6.

Qld: State Forest 185 Danbulla, *P.I.Forster PIF10675 & M.C.Tucker* (♂) (BRI); summit area of Mt Lewis, *J.R.Powell 781 & J.Armstrong* (♂) (BRI); S.F.R. 185, Kauri Logging Area, *B.P.M.Hyland 5013* (♀) (BRI, QRS); Paluma Dam, *R.J.Cumming 14259* (♀) (BRI).

3. *Tasmannia purpurascens* (Vickery) A.C.Sm., *Taxon* 18: 287 (1969)

Drimys purpurascens Vickery, *Proc. Linn. Soc. New South Wales* 62: 78–79, fig. 1 (1937). T: Barrington Tops, N.S.W., May 1936, *L.Fraser & J.Vickery*; holo: NSW.

Shrub or small tree 1–5 m high; branchlets smooth, or minutely striate or tuberculate, glaucous, purplish. Leaves: petiole to 5 mm long; lamina narrowly lanceolate, oblanceolate to narrowly elliptic, 8–21 cm long, 3–8 cm wide, chartaceous; base attenuate, cuneate; apex acute to obtuse. Petals 2 or 3 (–8), 8–12 mm long, ovate. Male flowers: pedicels 20–45 mm long; stamens 60–98; sterile carpels 2. Female flowers: pedicels 12–39 mm long; carpels 1–4 (–8), with stipes 1.8–3 mm long; ovules 11–27. Apocarps ellipsoidal, 10–15 mm long, glaucous, blue-mauve to black; transversely septate pulpa present; stipes 1–5 mm long. Seeds 2–6, strongly curved, 2.5–3.5 mm long. *Broad-leaved Pepperbush*. Plate 1.

Occurs on Barrington Tops, Gloucester Tops and in Ben Halls Gap State Forest, Northern Tablelands, N.S.W.; in *Eucalyptus* forest and on the margin of *Nothofagus moorei* temperate rainforest and woodland between 1200 m and 1520 m alt. Flowers Nov.; fruits Feb.–June. Map 7.

N.S.W.: Barrington Tops, *C.T.White 11472* (♀) (BRI); 55 km from Gloucester on road to Scone, Barrington Tops Natl Park, *P.Hind 5303 & G.D'Aubert* (BRI, NSW); Barrington Tops forest road, *A.N.Rodd 5505*, *S.Corbett & J.Gentle* (♀) (BRI, NSW); Brayshaw Ck, Ben Halls Gap State Forest, 18 Nov. 1990, *J.B.Williams* (♂) (BRI, CANB, NSW).

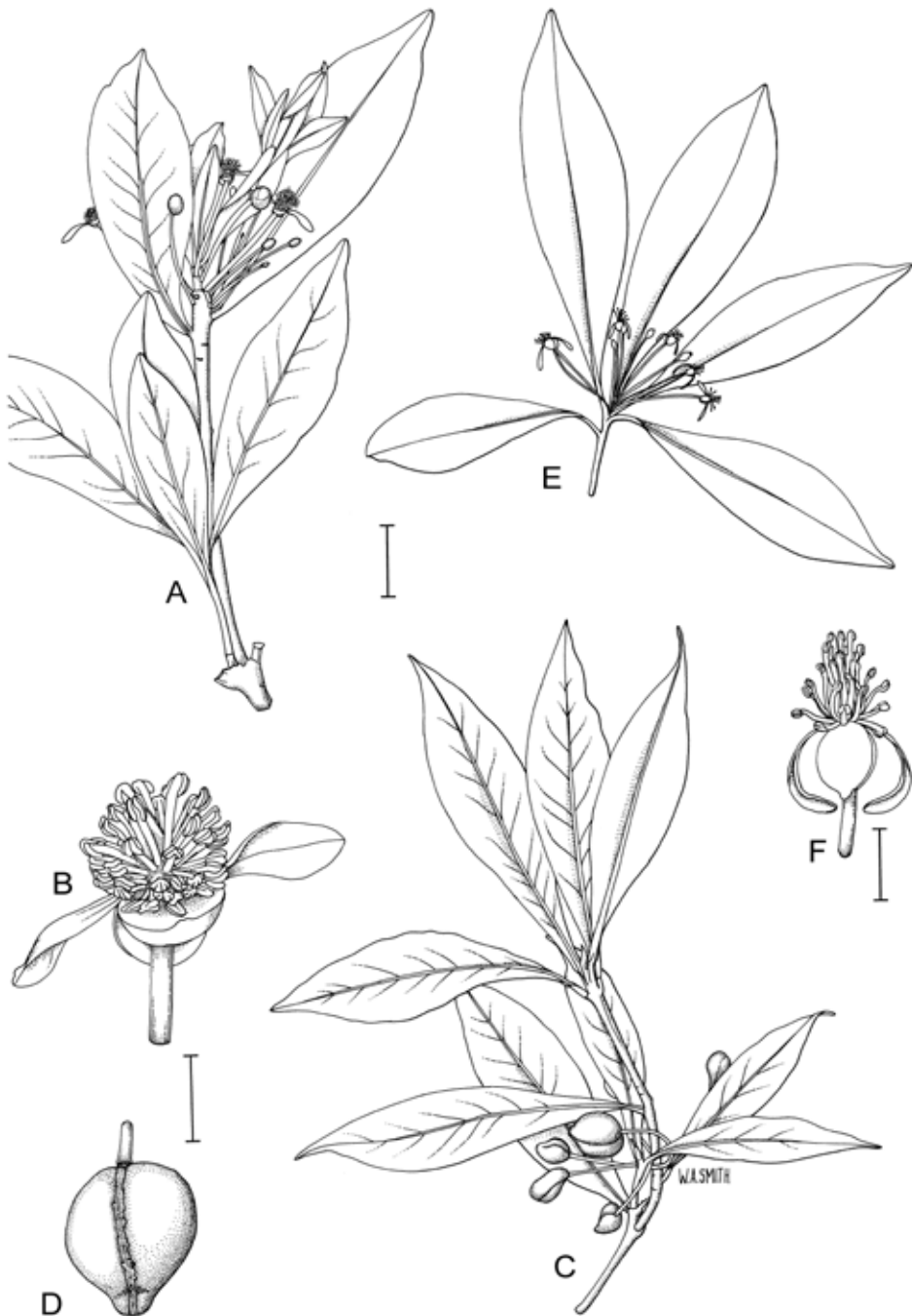


Figure 2. *Tasmannia*. **A–D**, *T. insipida*. **A**, flowering branch; **B**, male flower (**A–B**, J.Clarkson 6571, BRI); **C**, fruiting branch; **D**, fruit (**C–D**, W.McDonald *s.n.*, BRI). **E–F**, *T. membranacea*. **E**, flowering branch; **F**, male flower (**E–F**, P.Bostock 1017, BRI). Scale bars: **A**, **C**, **E** = 20 mm; **B**, **D** = 8 mm; **F** = 5 mm. Drawn by W.A.Smith.

4. *Tasmannia stipitata* (Vickery) A.C.Sm., *Taxon* 18: 287 (1969)

Drimys stipitata Vickery, *Proc. Linn. Soc. New South Wales* 62: 80, fig. 2 (1937). T: Guy Fawkes, N.S.W., Feb. 1895, J.H.Maiden; holo: NSW

Drimys aromatica var. *pedunculata* Maiden, *Agric. Gaz. New South Wales* 5: 600 (1894). T: Beilsdown Ck, Dorrigo Forest Reserve, Dec. 1893, J.H.Maiden; holo: NSW, iso: A n.v.

Shrubs 1–3 m high; branchlets smooth, slightly glaucous, dull purplish. Leaves: petiole absent or to 2 mm long; lamina linear-lanceolate to linear-obovate, 5–13 cm long, 0.7–2 cm wide, paler below; base cuneate; apex acute. Petals (1–) 2 (–6), 5–15 mm long, ovate. Male flowers: pedicels 12–20 mm long; stamens 21–65; sterile carpel 1 (or 2). Female flowers: pedicels 17–30 mm long; carpels 2–9, with stipes 1.5–2 mm long; ovules 13–22. Apocarps oblong to ovoid, 5–7 mm long, blue-violet; transversely septate pulpa present; stipes 4–8 mm long. Seeds 12–15, strongly curved, 2.3–2.6 mm long, 1.8–2.1 mm wide. *Northern Pepperbush*.

Occurs from Girraween Natl Park, south-eastern Qld, to Barrington Tops, north-eastern N.S.W. In moist eucalypt forest and in temperate rainforest, especially *Nothofagus moorei* communities, usually above 1,000 m alt. Flowers Sept.–Nov.; fruits Nov.–Apr. Map 8.

Qld: Girraween Natl Park, P.Grimshaw, 27 Dec. 1977 (♀) (BRI). N.S.W.: Dorrigo tablelands, near Megan, R.D.Hoogland 8603 (♀) (NSW); Cathedral Rocks, Snowy Ra., I.R.Telford 12014 (♀) (BRI, CANB, NSW); Cobark Forest Park, W of Gloucester, A.R.Bean 11528 (♀) (BRI); Carrai State Forest, c. 42 km WNW of Kempsey, D.McGillivray 2480 (NSW).

Natural hybrids between *T. stipitata* and *T. glaucifolia* have been reported in the Point Lookout region, NSW, by Sampson *et al.* 1988.

5. *Tasmannia vickeriana* (A.C.Sm.) A.C.Sm., *Taxon* 18: 287 (1969)

Drimys vickeriana A.C.Sm., *J. Arnold Arbor.* 24: 130–131, fig. 3a–e (1943). T: Mt Mueller, near Mt Baw Baw, Vic., 1893, J.G.Luehmann & C.French s.n.; holo: GH n.v.; iso: MEL, UC n.v.

Drimys xerophila var. *alpina* F.Muell. ex P.Parm., *Bull. Sci. France Belgique* 27: 226, 300 (1896), as *D. aromatica* var. *alpina* on page 300 only. T: Baw Baw Ranges, Vic., F.Mueller s.n.; holo: P (photo seen).

Drimys lanceolata var. *parvifolia* Vickery, *Proc. Linn. Soc. New South Wales* 62: 83 (1937). T: Upper Yarra, Vic., Apr. 1911, J.Staer s.n.; holo: NSW.

Tasmannia aff. *xerophila* (Baw Baws), J.H.Ross, *Census Vasc. Pl. Victoria* 4th edn 205 (1993)

Shrubs 0.5–1.2 m high; branchlets finely tuberculate, red to brown. Leaves: petiole 1.5–3.5 mm long; lamina lanceolate to oblanceolate, 0.8–2 (–2.5) cm long, 0.2–0.6 cm wide, coriaceous; base acute or attenuate; apex obtuse. Petals 2, 2.5–3 mm long, c. 1 mm wide, obovate-oblong. Male flowers: pedicels 3–8 mm long; stamens 8–26; sterile carpel 1 (or 2). Female flowers: pedicels 3–6 mm long; carpels 1–6, sessile; ovules 3–6. Apocarps globose to ovoid, 6–12 mm long, dark red; transversely septate pulpa absent; stipes less than 0.1 mm long. Seeds 2–5, slightly curved, 2.5–3 mm long, 1.5–2 mm wide. *Baw Baw Pepper*.

Occurs in the Baw Baw Ra., Vic.; in *Eucalyptus pauciflora* woodland at 1300–1500 m alt. Flowers Dec.–Jan.; fruits Jan.–May. Map 9.

Vic.: Mt Baw Baw, H.U.Stauffer 5449, J.H.Willis & T.B.Muir (♂) (BRI).

6. *Tasmannia lanceolata* (Poir.) A.C.Sm., *Taxon* 18: 287 (1969)

Winterana lanceolata Poir., *Encycl.* 8: 799–800 (1808), as *Winterania*; *Drimys lanceolata* (Poir.) Baill., *Hist. Pl.* 1: 159 (1868); *Drimys lanceolata* (Poir.) Baill. var. *lanceolata*, J.Vickery, *Proc. Linn. Soc. New South Wales* 62: 83 (1937). T: New Holland, Labillardiere s.n. in herb. Desfontaines n.v.; holo: FI n.v.; iso: P (photo seen).

Tasmannia aromatica R.Br. in A.P. de Candolle, *Syst. Nat.* 1: 445 (1817); *Drimys aromatica* (R.Br.) F.Muell., *Pl. Victoria* 1: 20 (1862); *Drimys aromatica* (R.Br.) F.Muell. var. *aromatica*, J.H.Maiden, *Agric. Gaz. New South Wales* 5: 600 (1894). T: Van Diemen's Island [Tasmania], R.Brown s.n.; lecto: G-DC, fide W.Vink, *Blumea* 18: 304 (1970).

Drimys xerophila var. β *aromatica* P.Parm., *Bull. Sci. France Belgique* 27: 226, 300 (1896), as *D. aromatica* var. β on page 300 only. T: Mt Bischoff, Tas., coll. unknown; holo: P (photo seen).

Bushy shrubs to small trees, 1.5–4 m high; branchlets smooth, reddish. Leaves: petiole 2–6 mm long; lamina lanceolate, narrow-elliptic or oblanceolate, 2–12 cm long, 0.6–3.5 cm wide, paler below; apex acute. Petals 3–9, linear-oblong or narrowly obovate, 4–10 mm long, 1.5–3.5 mm wide. Male flowers: pedicels 8–25 mm long; stamens 15–28; sterile carpel 1 (rarely absent or 2). Female flowers: pedicels 4–12 mm long; carpel 1 (or 2), sessile; ovules 9–18. Apocarps globose and deeply furrowed, 5–10 mm long, deep maroon to glossy black; transversely septate pulpa absent; stipes 0.1–0.3 mm long. Seeds 4–18, strongly curved, 2.5–3.5 mm long, 1.3–2 mm wide. *Pepper Tree*, *Native Pepper*, *Mountain Pepper*.

Occurs in south-eastern N.S.W., Vic. and Tas.; at 300–1400 m alt. in open forest or temperate rainforest. Flowers Sept.–Nov.; fruits Dec.–Feb. Map 10.

Tas.: Mt Wellington, *F.E.Davies* 765 & *P.Ollerenshaw* (♀) (BRI, CANB). Vic.: summit of Mt Merragunegia, *D.E.Albrecht* 3650 & *N.Walsh* (♂) & (♀) (BRI, CANB, MEL). N.S.W.: Clyde Mtn, 12 miles [20 km] ESE of Braidwood, *L.G.Adams* 2472 (♂) (BRI, NSW).

The dried leaves and berries of this species are sold as pepper substitutes by ‘bush food’ suppliers in Australia, and extracts of the plant are also used to flavour chewing gum, candy and wasabi paste in Japan.

7. *Tasmannia xerophila* (P.Parm.) M.Gray, *Contr. Herb. Austral.* 26: 8 (1976)

Drimys xerophila P.Parm., *Bull. Sci. France Belgique* 27: 226, 300 (1896); *D. xerophila* var. *xerophila* P.Parm. *loc. cit.*, as *D. aromatica* var. *xerophila* on page 300 only. T: Australian Alps, Vic./N.S.W., *F.Mueller s.n.*; holo: P (photo seen).

Drimys piperita Hook.f. entity 39. ‘xerophila’, W.Vink, *Blumea* 18: 349 (1970)

Bushy shrubs to small trees, 0.6–4 m high, usually clumped due to root suckering; branchlets finely tuberculate, reddish to brown. Leaves: petiole 2–6 mm long; lamina oblanceolate to narrowly oblanceolate, (2–) 3–14 cm long, 0.5–3 cm wide, coriaceous; base cuneate or attenuate; apex obtuse. Male flowers: pedicels 7–23 mm long; stamens 9–30; sterile carpel 1 (or 2). Female flowers: pedicels 5–16 mm long; petals 2 (–4), 5–7 mm long, 1–2 mm wide; carpels 1–8 (–11), sessile; ovules 2–9. Apocarps globose to ovoid, 6.5–11 mm long, glossy black to glaucous; transversely septate pulpa absent; stipes 0.1–0.2 mm long. Seeds 2–7, slightly curved, 2.5–3.5 mm long, 2–2.5 mm wide. *Alpine Pepper*.

Occurs in south-eastern N.S.W., A.C.T. and Vic. Flowers Dec.–Feb.; fruits Mar. Two subspecies are recognised.

Shrubs to 2.5 m high; leaf lamina (2–) 3–9 cm long, 0.5–1.7 cm wide

7a. subsp. *xerophila*

Shrubs to small trees, 2.5–4 m high; leaf lamina 7–14 cm long, 2–3 cm wide

7b. subsp. *robusta*

7a. *Tasmannia xerophila* (P.Parm.) M.Gray subsp. *xerophila*

Shrubs to 2.5 m tall. Leaves: petiole 1.5–3 mm long; lamina (2–) 3–9 cm long, 0.5–1.7 cm wide. Female flowers: carpels 2–6 (–11); ovules 2–9 per carpel. Plate 2.

Occurs in the central highlands of south-eastern N.S.W., A.C.T. and Vic.; mostly in open forest, woodland or subalpine grassland between 600–1800 m alt. Map 11.

N.S.W.: Perisher Ck, Mt Kosciuszko, *L.A.S.Johnson* & *E.F.Constable* NSW 18679 (K, NSW). A.C.T.: Mt Gingera, *N.T.Burbidge* 7753 (♀) (BRI, CANB). Vic.: Wombargo Ra., E Gippsland, *J.H.Willis*, 4 Dec. 1962 (♂) (BRI, MEL); Track to Mt Baldy, S of Mt Butler, *P.C.Jobson* 4049 (♀) (BRI, MEL).

7b. *Tasmannia xerophila* subsp. *robusta* Raleigh, *Muelleria* 8: 255 (1994)

T: Goonmirk Rocks, East Gippsland, Vic., 8 Jan. 1992, *R.Raleigh* 103 (♀); holo: MEL; iso: MELU n.v.

Tasmannia aff. *xerophila* (Errinundra Plateau), J.H.Ross, *Census Vasc. Pl. Victoria* 4th edn 205 (1993)

Shrubs to small trees, 2.5–4 m high. Leaf: petiole 3.5–6 mm long; lamina 7–14 cm long, 2–3 cm wide. Female flowers: carpels 1–8; ovules 3–7 per carpel.

Occurs at Mt Ellery and Goonmirk Rocks, in E Gippsland, Vic.; in tall open forest. Map 12.

Vic.: Summit of Mt Ellery, E Gippsland, *D.B.Foreman* 1962 (♀) & 1963 (♂) (AD, BM, CANB, NSW); Goonmirk Rocks, E Gippsland, Jan. 1988, *J.B.Williams* & *D.B.Foreman* (BRI, NE).

8. *Tasmannia glaucifolia* J.B.Williams, *Austral. J. Bot.* 36: 396, fig. 1, 2, 4–6 (1988)

T: Moffat Falls, 8 km W of Point Lookout, N.S.W., Nov. 1979, *J.B.Williams* 79888b (♀); holo: NE; iso: CANB, MEL, NSW.

Drimys piperita Hook.f. entity 37. 'apetala', W.Vink, *Blumea* 18: 347 (1970)

Tasmannia sp. A, S.W.L.Jacobs & J.Pickard, *Pl. New South Wales* 221 (1981)

Shrubs 1–3 (–4) m high, root suckering; branchlets maroon to reddish brown, glaucous, minutely tuberculate. Leaves: petiole 0.3–2 mm long; lamina oblanceolate to narrowly oblanceolate, 3–6 (–8) cm long, 0.4–1.5 cm wide, subcoriaceous, glaucous and minutely papillose below; base narrowly cuneate-attenuate; apex acute. Petals absent (or 1 or 2), when present c. 3 mm long, 1 mm wide. Male flowers: pedicels 7–22 mm long; stamens 8–24; sterile carpel 1 (rarely absent or 2). Female flowers: pedicels 4–12 mm long; carpels 1 or 2 (–4), sessile; ovules 4–13. Apocarps broadly obovoid to globose, shortly beaked, 5–9 mm long, glossy or purplish black; transversely septate pulpa absent; stipes to 0.3 mm long. Seeds 1–4 (–6), strongly curved, 2–3 mm long, 0.7–2.7 mm wide. *Fragrant Pepperbush*.

The species is confined to the northern tablelands of N.S.W. in the Barrington Tops to Gloucester Tops area and the Point Lookout area, at 1200–1530 m alt. It is restricted to near watercourses in *Nothofagus moorei*/*Elaeocarpus holopetalus* cool-temperate rainforest or in tall *Leptospermum flavescens*/*Acacia melanoxylon* communities. Flowers Nov.–Dec., fruits Mar.–June. Map 13.

N.S.W.: Guy Fawkes, *W.G.Trappell* A72 (♀) (BRI, CANB, K); New England Natl Park, 28 Nov. 1989, *J.B.Williams* & *G.J.Harden* (♂) (BRI, NE, NSW); Barrington Tops, *J.Boorman* 12 (♂) (MEL, NSW); Gloucester R., 37 km WSW of Gloucester, *R.G.Coveny* 4840 (♀) (BRI, K, L, NSW).

EXCLUDED NAMES

Drimys muelleri P.Parm., *Bull. Sci. France Belgique* 27: 227, 300 (1895)

T: Mt Victoria, Tas., 1883, *C.Glover* 5; syn: MEL, P n.v.

This is *Persoonia muelleri* (P.Parm.) Orchard, *Brunonia* 6: 226 (1984); see P.Weston, *Fl. Australia* 16: 69 (1995).

Drimys oblonga S.Moore, *J. Bot.* 55: 302 (1917)

T: dense scrub on summit of Bellenden Ker, Qld, *L.S.Gibbs* 6319; holo: BM.

This is *Hypsophila halleyana* F.Muell., *Victorian Naturalist* 3: 168 (1887); see L.Jessup, *Fl. Australia* 22: 170 (1984).

Tasmannia piperita (Hook.f.) Miers, *Ann. Mag. Nat. Hist.* ser. 3, 2: 110 (1858)

Drimys piperita Hook.f., *Icon. Pl.* 9: t. 896 (1851). T: Mt Kinabalu, Borneo, *H.Low* s.n.; holo: K.

This is a species from SE Asia. It does not occur in Australia.

Drimys intermedia P.Parm., *Bull. Sci. France Belgique* 27: 223, 224 (1895), *nom. nud.*

Parmentier *loc. cit.* reported its wood had vessels and therefore it is likely to be synonymous with *Drimys muelleri* = *Persoonia muelleri*.

HIMANTANDRACEAE

*L.W.Jessup*¹

Trees. Indumentum of dark brown, peltate trichomes. Leaves alternate, simple, exstipulate; lamina entire, pinnately veined. Inflorescence axillary; peduncle bearing 1–3 flowers. Flowers bisexual. Perianth absent. Floral envelope of 2 axis-embracing, calyptrate, irregularly circumscissile bracts. Receptacle broadly conical. Tepals or outer staminodes, stamens and inner staminodes spirally arranged, linear to very narrowly ovate, lanceolate or subulate, reflexing after anthesis. Stamens not differentiated into filament and anther; thecae 4 in 2 collateral pairs, embedded in abaxial side of stamen, each pair opening by a longitudinal slit. Carpels 6–28, spirally arranged, weakly connate near base; style short; stigma decurrent; ovules 1 or rarely 2, anatropous. Fruit a globose, fleshy multi-locular syncarp. Seeds with oily endosperm.

A family with a single genus, *Galbulimima*, with 2 or more species native to eastern Australia, New Guinea, the Moluccas and Celebes; 1 endemic species in Australia.

The floral structure has been interpreted by earlier authors as consisting of either 2 sepals only or an outer envelope of 2 connate sepals and an inner one of 4 connate petals. The bracteate origin of the floral envelope as interpreted by Endress (1977, 1993) is accepted here.

Under the rules of the International Code of Botanical Nomenclature the genus name *Himantandra* was not validly published until after the name *Galbulimima* was published by Bailey (1894). Diels validated *Himantandra* (as *Himatandra*) in 1913 and published the family name Himantandraceae in 1917. A proposal to conserve the name *Himantandra* over *Galbulimima* was rejected.

L.Diels, Über die gattung *Himantandra*, ihre verbreitung und ihre systematische stellung, *Bot. Jahrb. Syst.* 55: 126–134 (1917); A.C.Smith, Nomenclatural note on the Himantandraceae, *J. Arnold Arbor.* 23: 366–368 (1942); I.W.Bailey, C.G.Nast & A.C.Smith, The family Himantandraceae, *J. Arnold Arbor.* 24: 190–206 (1943); P. van Royen, Sertulum Papuanum 6, Himantandraceae, *Nova Guinea* 10(9): 127–135 (1962); P.K.Endress, Über blütenbau und verwandtschaft der Eupomatiaceae und Himantandraceae (Magnoliales), *Ber. Deutsch. Bot. Ges.* 90: 83–103 (1977); P.K.Endress & L.D.Hufford, The diversity of stamen structures and dehiscence patterns among Magnoliidae, *Bot. J. Linn. Soc.* 100: 45–85 (1989); P.K.Endress, Himantandraceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 338–341 (1993); A.Igersheim & P.K.Endress, Gynoecium in Magnoliales and Winteroids, *Bot. J. Linn. Soc.* 124: 213–271 (1997).

GALBULIMIMA

Galbulimima F.M.Bailey, *Bot. Bull. Dept. Agric. Queensland* 9: 5 (1894); from the Latin *galbulus* (fruit of the cypress) and the Greek *mimos* (mimic), referring to the resemblance of the fruit to a strobilus with fleshy cone-scales.

Type: *G. baccata* F.M.Bailey

Himantandra F.Muell. ex Diels, *Bot. Jahrb. Syst.* 49: 164 (1913), as *Himatandra*. T: *H. belgraveana* F.Muell.

¹ Queensland Herbarium, Brisbane Botanic Gardens Mt Coot-tha, Mt Coot-tha Road, Toowong, Queensland 4066.

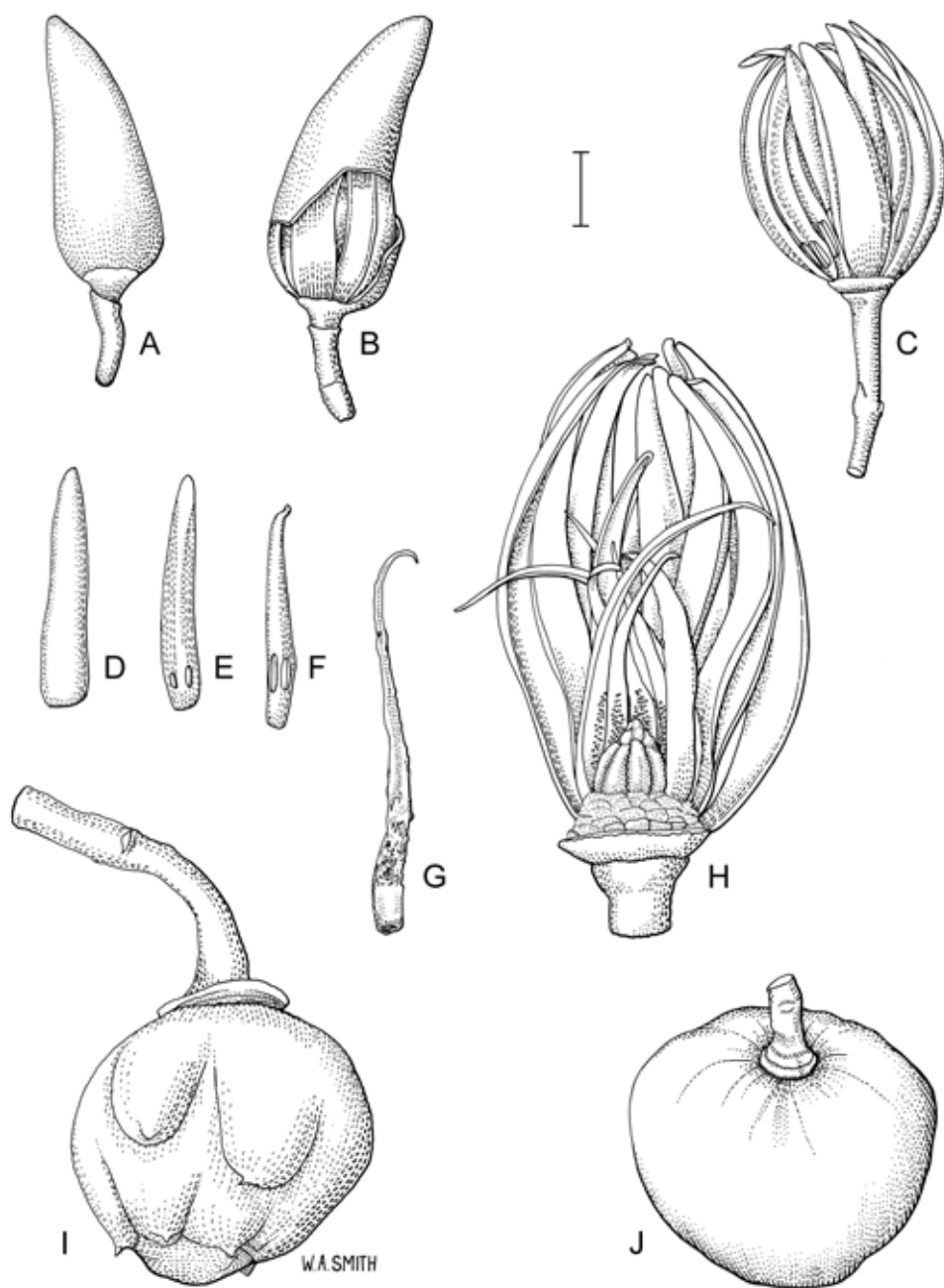


Figure 3. *Galbulimima baccata*. **A**, bud; **B**, flower bud with part of calyptras removed (**A–B**, B.Gray 1010, BRI). **C**, flower; **D**, tepal or outer staminode showing abaxial surface; **E**, **F** stamens showing microsporangia, abaxial surface; **G**, inner staminode showing adaxial surface; **H**, flower with some tepals, stamens and staminodes removed (**C–G**, B.Gray 4608, BRI). **I**, immature fruit, apical view (L.Smith 10407, BRI). **J**, mature fruit, basal view (P.Sharpe 4786, BRI). Scale bars: **A–F**, **J** = 5 mm; **G** = 2 mm; **H**, **I** = 2.5 mm. Drawn by W.A.Smith.

***Galbulimima baccata* F.M.Bailey, Bot. Bull. Dept. Agric. Queensland 9: 5 (1894)**

Himantandra baccata (F.M.Bailey) Diels, Bot. Jahrb. Syst. 55: 128 (1917). T: Eumundi, Qld, *E.H.Arundell BRI 011547*; holo: BRI.

Tree to 40 m tall. Shoots densely peltate-scaly. Leaves: petiole 8–20 mm long; lamina elliptic, lanceolate, rarely oblanceolate, usually 5–12 cm long, 1.5–4 cm wide, acute, shortly decurrent or obtuse at base, shortly acuminate or acute at apex, glabrescent or glabrous above, with reddish brown peltate trichomes scattered beneath; secondary veins usually 7–11 pairs, with distinct intersecondary veins. Peduncle 1–1.5 cm long, densely peltate-scaly. Calyptras subcoriaceous, ovoid to narrowly ovoid with an acute or rounded tip, 1.5–2 cm long, densely peltate-scaly. Tepals or outer staminodes 7–10, 12–17 mm long. Stamens 25–40, 10–15 mm long; microsporangia 1.5–2 mm long. Inner staminodes 11–13, 10–15 mm long. Carpels narrowly ovoid, laterally compressed, 1.2–1.8 mm long. Fruit to 2 cm diam., red. Plate 4; Fig. 3.

Occurs from Mt Misery to Mt Fox and from Kin Kin to Conondale Ra., Qld; in mesophyll and notophyll vine forest. Map 14.

Qld: Conondale Ra. (Natl Park 1100 Kilcoy), *W.J.McDonald 3684 & J.B.Williams* (BRI); S.F.R. 310, Gadgarra, c. 4 km ESE of L. Barrine, *V.K.Moriarty 1992* (BRI); E Cedar Ck, Blackall Ra., c. 8 km NNW of Mapleton, *P.R.Sharpe 4786* (BRI); Mt Formartine, *L.S.Smith 10842* (BRI); Mt Misery, c. 45 km S of Cooktown, *L.J.Webb & J.G.Tracey 10762* (BRI).

Excluded name

Galbulimima belgraveana (F.Muell.) Sprague, *J. Bot.* 60: 138 (1922)

Eupomatia belgraveana F.Muell., *Australas. J. Pharm.* 2: 4 (1887). T: Owen Stanley Ranges [New Guinea], *H.O.Forbes [759]*; holo: *n.v.*

Galbulimima belgraveana does not occur in Australia. The name has been given as a synonym of *G. baccata* by authors (e.g. van Royen, *loc. cit.*) who consider that the genus is monotypic.

EUPOMATIACEAE

*L.W.Jessup*¹

Shrubs or small trees. Leaves alternate, simple, exstipulate; lamina entire, pinnately veined, oil-dotted. Flowers bisexual, axillary or terminal, protogynous, usually solitary, sometimes 2 or 3, each enclosed in a calyptrate floral envelope formed from a bract fused around the floral axis and opening by abscission or partial laceration; peduncle bracteate. Perianth absent. Androecium of spirally arranged outer stamens and inner petaloid staminodes, abscissing entirely as a synandrium following anthesis. Stamens with a laminar base, reflexed or erect; anthers introrse to latrorse; pollen sacs separated; connective thickened, produced. Staminodes with glandular hair tufts functioning as osmophores, imbricate, spreading during female phase to expose gynoecium, reclosing at onset of male phase. Carpels numerous, spirally arranged, unsealed, connate by their margins; stigmas distinct or contiguous, sessile; ovules 2–several per carpel, anatropous. Fruit aggregate, berry-like, with a rim left by abscission of calyptra; carpels usually 1- or 2-seeded, immersed in fleshy receptacle. Seeds with ruminant endosperm.

A family with a single genus, *Eupomatia*, with 3 species, native to eastern Australia and New Guinea; 2 species endemic.

¹ Queensland Herbarium, Brisbane Botanic Gardens Mt Coot-tha, Mt Coot-tha Road, Toowong, Queensland 4066.

EUPOMATIACEAE

Descriptions of the flower of *Eupomatia* published before Endress (1977) interpret the calyptra as consisting of fused sepals and petals or tepals, similar to the perianth in *Corymbia* (Myrtaceae). Endress's interpretation that the flower has no perianth and that the calyptra is bracteate in origin is accepted here.

G.Bentham, Anonaceae [Annonaceae], *Fl. Austral.* 1: 53–54 (1863); A.T.Hotchkiss, Geographical distribution of the Eupomatiaceae, *J. Arnold Arbor.* 36: 385–396 (1955); J.C.Th.Uphof, Eupomatiaceae, in H.G.A.Engler & K.Prantl, *Nat. Pflanzenfam.* 2nd edn, 17a(2): 173–176 (1959); P.K.Endress, Über Blütenbau und Verwandtschaft der Eupomatiaceae und Himantandraceae. *Ber. Deutsch. Bot. Ges.* 90: 83–103 (1977); P.K.Endress, The flowering process in the Eupomatiaceae (Magnoliales), *Bot. Jahrb. Syst.* 104(3): 297–319 (1984); G.Bergstrom *et al.*, Chemical basis of a highly specific mutualism: chiral esters attract pollinating beetles in Eupomatiaceae, *Phytochemistry* 30(10): 3221–3225 (1991); P.K.Endress, Eupomatiaceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 296–298 (1993); A.Igersheim & P.K.Endress, Gynoecium in Magnoliales and Winteroids, *Bot. J. Linn. Soc.* 124: 213–271 (1997); S.Kim *et al.*, Sequence and expression studies of A-, B-, and E-class MADS-BOX homologues in *Eupomatia* (Eupomatiaceae): support for the bracteate origin of the calyptra, *Int. J. Plant Sci.* 166(2): 185–198 (2005).

EUPOMATIA

Eupomatia R.Br., *Voy. Terra Austr.* 2: 597 (1814); from the Greek *eu* (well, completely) and *poma* (to cover, furnish with a lid), referring to the calyptrate floral envelope.

Type: *E. laurina* R.Br.

- | | | |
|----|--|------------------------|
| 1 | Stem internodes terete; flowers axillary, solitary or up to 3 | 1. <i>E. laurina</i> |
| 1: | Stem internodes 2-ridged, decurrent with petiole; flowers terminal, usually solitary | |
| 2 | Stamens glabrous or with scattered minute hairs; outer staminodes glabrous or fimbriate; inner staminodes with glandular hair tufts on margins and both surfaces | 2. <i>E. bennettii</i> |
| 2: | Stamens and outer staminodes with densely entangled dendritic hairs; inner staminodes with glandular hair tufts only on adaxial surface | 3. <i>E. barbata</i> |

1. *Eupomatia laurina* R.Br., *Voy. Terra Austr.* 2: 597, t. 2 (1814)

T: Port Jackson, N.S.W., *R. Brown iter Austral.* 2921; isosyn: MEL.

Illustration: K.A.W.Williams, *Native Pl. Queensland* 1: 121 (1979).

Shrub with long, arching branches, or small tree to 8 m tall; not known to have tubers. Stem internodes terete. Leaves: petiole 5–10 mm long, not decurrent with stem; lamina obovate, oblong or elliptic, usually 6–18 cm long, 2–7 cm wide, acuminate, glabrous; base decurrent or acute; secondary veins usually 8–11 pairs with intersecondary veins. Flowers not forming well-circumscribed inflorescences, axillary; peduncle 6–15 mm long. Floral envelope cap hemispherical or slightly apiculate, abscissing by a circumferential fissure. Stamens oblong, broadened at base, glabrous, firstly reflexed during female phase, later erect during male phase, 6–12 mm long, 1 mm wide; anthers c. 4 mm long. Staminodes oblong, 5–10 mm long, 2–3 mm wide; margins pubescent; adaxial surface with irregular patches of hairs. Aggregate fruits urceolate, 1.5–5.5 cm diam., green to very pale orange-yellow. *Bolwarra*, *Native Guava*. Fig. 4A–F.

Occurs from the McIlwraith Ra., Qld, to near Orbost, Vic.; in various types of rainforest and in rainforest margins. Also occurs in New Guinea. Flowers Nov.–Mar.; fruits May–Sept., early in the tropics and later in N.S.W. and Vic. Map 15.

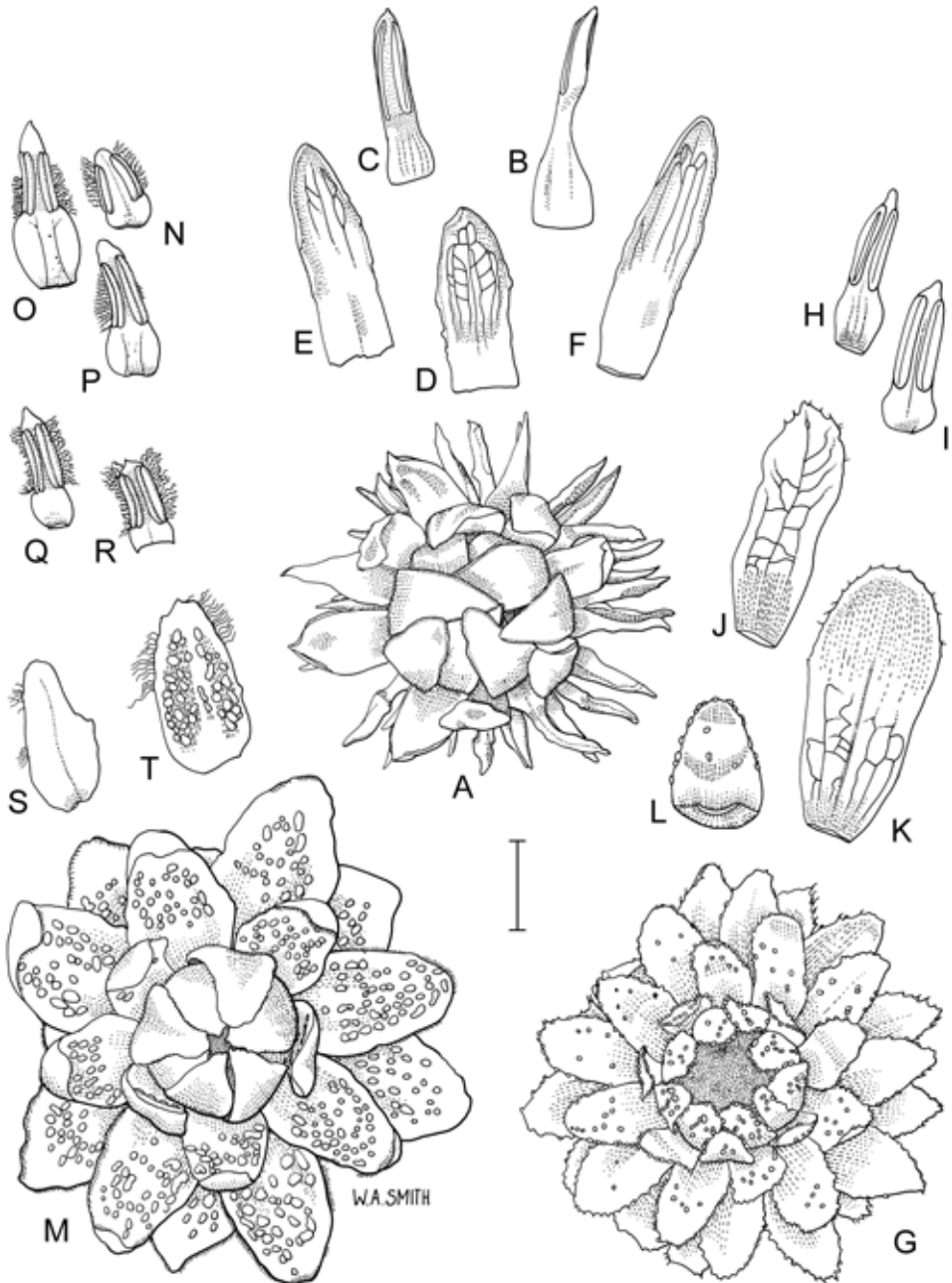


Figure 4. *Eupomatia*. A–F, *E. laurina*. A, flower; B–F, stamens & staminodes (A–F, L.W.Jessup 902, BRI). G–L, *E. bennettii*. G, flower; H–L, stamens & staminodes (G–L, P.Bostock *s.n.*, AQ567859, BRI). M–T, *E. barbata*. M, flower; N–T, stamens & staminodes (M–T, G.Sankowsky *s.n.*, AQ567858, BRI). Scale bars: A, G, M = 6 mm; B–F, H–L, N–T = 4 mm. Drawn by W.A.Smith.

Qld: Mt Eerwah, 4 km W of Eumundi, *P.R.Sharpe 3614* (BRI); Deluge Inlet, Hinchinbrook Is., *L.J.Webb & J.G.Tracey 10268* (BRI). N.S.W.: Couria Ck, Mt Dromedary, *N.T.Burbidge 7821* (BRI); headwaters of Clyde R., 8 km S of Sassafras, *E.F.Constable NSW57887* (NSW). Vic.: W branch of Harrisons Ck, Howe Ra., c. 16 km NE of Mallacoota, 6 Feb. 1972, *R.Youl & J.H.Willis* (MEL).

Details on pollination biology may be found in J.E.Armstrong & A.K.Irvine, Functions of staminodia in the beetle-pollinated flower of *Eupomatia laurina*, *Biotropica* 22: 429–431 (1990).

2. *Eupomatia bennettii* F.Muell., *Fragm.* 1: 45 (1858)

T: Clarence River, *F.Mueller* [probably collected by C.Moore but labelled incorrectly]; syn: MEL; Moreton Bay, *F.Mueller*; syn: MEL *n.v.*

Illustration: K.A.W.Williams, *Native Pl. Queensland* 1: 121 (1979).

Shrub to 1.5 m tall, often smaller and unbranched; roots with tubers. Stem internodes 2-ridged. Leaves: petiole 4–8 mm long, decurrent with stem ridges; lamina oblanceolate or narrowly obovate, 6–20 cm long, 1.3–5 cm wide, acuminate, glabrous; base attenuate; secondary veins 12–16 pairs. Flowers terminal; peduncle c. 0.5 cm long above uppermost foliaceous bract. Floral envelope cap conical, opening by laceration. Stamens obspathulate, (5–) 7–10 (–12) mm long, 1.3–2.5 mm wide near base, glabrous or with scattered minute hairs; anthers 2.2–4 mm long. Outer staminodes oblong to obovate, 7.5–13 mm long, 2.5–5 mm wide, entire or irregularly dentate, glabrous or fimbriate. Inner staminodes thicker than outer, oblong, 7–10 mm long, 3–4 mm wide, red near base, with stipitate tufts of glandular, unicellular hairs on margins and both surfaces. Aggregate fruit broadly obconical, 2–3 cm diam., greenish yellow. Plate 3; Fig. 4G–L.

Occurs from the Mary R., Qld, to the Nambucca R., N.S.W.; in notophyll vine forest and some wet sclerophyll forest. Flowers Aug.–Oct.; fruits June–Nov. Map 16.

Qld: Nambour, 16 Aug. 1930, *E.N.McKie* (BRI); summit of Mt Gipps, 1 Oct. 1978, *G.W.Thorpe* (BRI). N.S.W.: Stokers Siding, Tweed R., 28 Aug. 1937, *Bray* (NSW); Mt Lindesay, 11.2 km ENE of Woodenbong, *R.Coveny 4557 & A.N.Rodd* (NSW); Tirralong via Bowraville, Aug. 1930, *G.Garrett* (NSW).

3. *Eupomatia barbata* Jessup, *Austrobaileya* 6: 333–335, Fig. 1 (2002)

T: Noah's Head area, Cape Tribulation, Qld, Oct. 1971, *L.J.Webb & J.G.Tracey 10269*; holotype: BRI.

Illustration: L.W.Jessup, *loc. cit.*

Shrub to 1 m tall, often smaller; roots with tubers. Stem internodes 2-ridged. Leaves: petiole 2.5–6 mm long, decurrent with stem ridges; lamina oblanceolate or narrowly obovate, 6–22 cm long, 1.5–5.5 cm wide, attenuate at base, acuminate, glabrous above, very sparsely pilose below with simple and dendritic hairs, glabrescent; secondary veins 10–14 pairs. Flowers terminal, solitary; peduncle c. 0.5 cm long above uppermost foliaceous bract. Floral envelope cap conical with attenuate tip, splitting irregularly. Stamens ovate, oblong or obspathulate, 3.5–6.5 mm long, 1.2–2.5 mm wide near base; anthers 1.8–3 mm long. Anther thecae and upper margins of stamens and outer staminodes with densely entangled, dendritic hairs, 0.5–1 mm long, hyaline. Outer staminodes membranous, ovate, 6–7 mm long, 3.5–4 mm wide. Inner staminodes fleshy, oblong, 5–7 mm long, 2.5–4 mm wide, with shortly stipitate glandular hair tufts on adaxial surface. Aggregate fruit obconical, 1.5–2 cm diam., green. Fig. 4M–T.

Occurs from the Annan R. to the Tully R., Qld; in mesophyll and notophyll vine forest. Flowers Oct.–Nov; fruits July–Aug. Map 17.

Qld: Speewah, upper Clohesy R., *L.J.Brass 18218* (BRI); Junction Ck, Russell R., *L.J.Brass 18270* (BRI); Crawfords Lookout to Tchupalla Falls track, *L.W.Jessup 475 & J.G.Tracey* (BRI); Juara Ck area, c. 16 km NE of Atherton, *L.S.Smith 3785* (BRI); near Koolmoon Ck, *K.J.White 1304* (BRI).

Excluded name

Eupomatia belgraveana F.Muell., *Australas. J. Pharm.* 2: 4 (1887)

T: Owen Stanley Ranges [New Guinea], *H.O.Forbes* [759]; holo: *n.v.*

This is *Galbulimima belgraveana* (F.Muell.) Sprague (Himantandraceae), a New Guinean species formerly erroneously recorded for Australia.

AUSTROBAILEYACEAE

*E.M.Ross*¹

Woody climbers, glabrous. Leaves simple, opposite or subopposite, stipulate. Flowers solitary, axillary, bisexual. Perianth in 3 series; tepals grading inwards from bract-like to petaloid. Stamens in a spiralled whorl, petaloid, innermost reduced to staminodes; ventral surface of stamen with bilocular anther opening by longitudinal slits. Carpels superior, free on torus; ovules alternate in 2 series; styles with canal exuding mucilage, converging apically, at anthesis embedded in a massive mucilage cap; stigmas transversely bilobed. Fruit an asymmetric berry; seeds several.

A monotypic family, endemic in north-eastern Australia.

L.Croizat, Notes on the Dilleniaceae and their allies: *Austrobaileya* subfam. nov., *J. Arnold Arbor.* 21: 397–404 (1940); New families, *Cact. Succ. J. (Los Angeles)* 15: 64 (1943); P.Endress, The reproductive structures and systematic position of the Austrobaileyaceae, *Bot. Jahrb. Syst.* 101: 393–433 (1980); I.Telford, Austrobaileyaceae, in B.D.Morley & H.R.Toelken (eds), *Fl. Pl. Australia* 38–39 (1983); D.L.Jones & B.Gray, *Climbing Pl. Australia* 156 (1988); E.Ross, *Austrobaileya scandens* C.White, *Austrobaileya* 3: 163–165 (1989); P.K.Endress, Austrobaileyaceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 138–140 (1993); J.J.Brophy, R.J.Goldsack & P.I.Forster, Leaf Essential Oil of *Austrobaileya scandens* C.White, *J. Essent. Oil Res.* 6: 301–303 (1994); A.Igersheim & P.K.Endress, Gynoecium in Magnoliales and Winteroids, *Bot. J. Linn. Soc.* 124: 213–271 (1997).

AUSTROBAILEYA

Austrobaileya C.T.White, *Contr. Arnold Arbor.* 4: 29 (1933); named in honour of both F.M.Bailey, noted Queensland Botanist, and I.W.Bailey, a wood anatomist at Harvard University, U.S.A.

Type: *A. scandens* C.T.White

Austrobaileya scandens C.T.White, *Contr. Arnold Arbor.* 4: t. IV, 29 (1933)

T: Boonjie, Atherton Tableland, Qld, 10 Oct. 1929, *S.F.Kajewski* 1629; holo: BRI.

Austrobaileya maculata C.T.White, *J. Arnold Arbor.* 29: 255 (1948). T: Mt Spurgeon, Sept. 1936, *C.T.White* 10734; holo: BRI.

Illustrations: P.Endress, *Bot. Jahrb. Syst.* 101: 402–422 (1980); B.D.Morley & H.R.Toelken (eds), *Fl. Pl. Australia* 38, fig. 12A–B (1983); D.L.Jones & B.Gray, *Climbing Pl. Australia* 152 (1988); E.Ross, *Austrobaileya* 3: 164 (1989).

¹ Department of Environment and Conservation, Locked Bag 914, Coffs Harbour, New South Wales 2450.

Robust vine. Stems lenticellate; young branchlets smooth, sometimes narrowly winged. Leaves: petiole 1–2.8 cm long; lamina oblong to narrowly ovate, 4.5–20 cm long, 2–9 cm wide, abruptly acuminate, leathery; venation interstitial, reticulate, prominent. Flowers ±pendant, with fetid odour, 5–6 cm diam.; pedicel 7–15 mm long. Tepals 11–23, overlapping, very variable in size but outermost smallest, 5.5–30 mm long, 6–21 mm wide; outer tepals glossy green; inner tepals creamish green with red to purple dots. Stamens 7–11, ±flat to strongly boat-shaped, 14–17 mm long, 5–9 mm wide, ±acute to truncate or rounded; anthers 3–5 mm long. Staminodes 9–16, 15–17 mm long, narrow, often plicate. Carpels 8 or 9, 6.5–9 mm long; ovary c. 3 mm long, with 4–14 ovules; styles c. 6 mm long. Fruit stalked, ellipsoidal to globose, 5–7 cm long, 4–5 cm diam., fleshy, orange-yellow; stalk 1.5–2 cm long. Seeds whitish, often lenticular. Cover; Fontispiece.

Recorded from the Mt Carbine Tableland area, S to the Walter Hill Ra. near Tully, Qld; in rainforest. Flowers usually Aug.–Sept. Map 18.

Qld: Mt Misery on Mt Carbine Tableland, *L.J.Webb & J.G.Tracey 11703* (BRI); T.R. 1230 Boonjie L.A., *B.Hyland 6392* (BRI, QRS); Gunbarrel Dr., Cannabullen L.A., via Ravenshoe, *L.J.Webb & J.G.Tracey 6185* (BRI); Koolmoon Ck, c. 17.6 km SSE of Ravenshoe, *L.S.Smith 4631* (BRI).

ANNONACEAE

*L.W.Jessup*¹

Trees, shrubs or lianas usually with striate bark. Leaves and bark often aromatic. Leaves simple, mostly distichous-alternate, entire, pinnately veined, exstipulate. Inflorescence determinate, terminal, axillary, leaf-opposed, internodal, ramal or cauline. Flowers often solitary or in rhipidia, sometimes fasciculate. Pedicels medially or basally articulated, bracteate. Flowers mostly hermaphroditic, hypogynous, actinomorphic. Sepals 3, free or connate, valvate or imbricate. Petals commonly 6 in 2 series of 3, rarely 3, 5, 7 or 8, free or connate, valvate or imbricate, sometimes apically coherent. Stamens mostly numerous and spirally arranged; filament short, connective often expanded or extended above anther; Anther thecae extrorse or latrorse by longitudinal slits. Pollen grains solitary or in tetrads or polyads. Gynoecium of few to numerous free, rarely connate, conduplicate carpels on a flat, convex or rarely hollowed receptacle. Ovules 1–many, mostly anatropous, usually basal if 1 or 2, otherwise marginal. Fruit 1–many, mostly fleshy, indehiscent apocarps or rarely dehiscent (follicles), rarely syncarpous, 1–several seeded. Seeds transverse or longitudinal to long axis of apocarp, sometimes arillate. Endosperm ruminant.

A pantropical family including about 132 genera and 2300 species. Most genera are restricted to either America, Africa or Asia and only *Xylopia* occurs in all three centres of distribution. Represented in Australia by 17 genera, 2 of which are endemic, and 48 species, including the naturalised genus *Annona* from America and Africa. The status of some genera will remain in doubt until further work is done on the southeast Asian and Malesian Annonaceae.

Species and cultivars in the genera *Annona* and *Rollinia* are cultivated commercially for their edible fruit.

While the Annonaceae form a very natural family it is well known that existing classifications of the genera are to some extent artificial. In recent years some provisional tribes have been proposed based on karyological and palynological studies.

G.Bentham, Anonaceae, *Fl. Austral.* 1: 50–53 (1863); E.J.H.Corner, The annonaceous seed and its four integuments, *New Phytol.* 48: 332–364 (1949); J.Sinclair, A revision of Malayan

¹ Queensland Herbarium, Brisbane Botanic Gardens Mt Coot-tha, Mt Coot-tha Road, Toowong, Queensland 4066.

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Annonaceae, *Gard. Bull. Singapore* 14(2): 149–516 (1955); R.E.Fries, Annonaceae, in H.G.A.Engler & K.A.E.Prantl, *Nat. Pflanzenfam.* edn 2, 17a: 1–171 (1959); J.W.Walker, Pollen morphology, phytogeography and phylogeny of the Annonaceae, *Contr. Gray Herb.* 202: 1–131 (1971); M.Leboeuf *et al.*, The phytochemistry of the Annonaceae, *Phytochemistry* 21(12): 2783–2813 (1982); L.W.Jessup, Australian Annonaceae in an Asian-Pacific context, *Proc. Ecol. Soc. Australia* 15: 249–257 (1988); W.Morawetz, Karyosystematics and evolution of Australian Annonaceae as compared with Eupomatiaceae, Himantandraceae and Austro-baileyaceae, *Pl. Syst. Evol.* 159: 49–79 (1988); M.Waha & W.Morawetz, Pollen evolution and systematics in Annonaceae with special reference to the disulcate Australian endemic genera, *Pl. Syst. Evol.* 161: 1–12 (1988); L.W.Jessup, Habitat preferences and distribution of Australian Annonaceae, *Annonaceae Newslett.* 8: 55–65 (1990); P.J.A.Kessler, Annonaceae, in K.Kubitzki J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 93–129 (1993).

KEY TO GENERA

- 1 Climbers or scandent shrubs
 - 2 Flowers borne on leaf-opposed, laterally compressed hook-shaped axes; older stems often with woody spines **1. ARTABOTRYS**
 - 2: Floral axes not hook-shaped; spines absent
 - 3 Indumentum of simple trichomes only
 - 4 Stigma subglobular and sessile with a narrow adaxial slit; apocarps moniliform **2. DESMOS**
 - 4: Stigma and style terete; apocarps not moniliform **3. MITRELLA**
 - 3: Indumentum of stellate, peltate or fasciculate trichomes, may be intermixed with simple trichomes
 - 5 Inner petals clawed at base **4. MELODORUM**
 - 5: Inner petals with a broad base
 - 6 Flowers more than 2 cm wide, petals spreading; trichomes stellate or peltate **5. UVARIA**
 - 6: Flowers less than 1.5 cm wide, petals not widely spreading; trichomes fasciculate or discrete **6. CYATHOSTEMMA**
 - 1: Trees or shrubs, not scandent
 - 7 Fruit syncarpous; carpels with one basal ovule **17. ANNONA**
 - 7: Fruit of free apocarps, few to many; ovules marginal
 - 8 Stigma on an elongate style, usually as long as ovary
 - 9 Apocarps dehiscent **7. XYLOPIA**
 - 9: Apocarps indehiscent
 - 10 Inner petals remaining coherent forming a conical cap; apocarps subsessile, stipe 2–6 mm long **8. GONIOTHALAMUS**
 - 10: All petals free; apocarps stipitate, stipe 10–20 mm long **9. CANANGA**
 - 8: Stigma sessile or subsessile, shorter than ovary
 - 11 Inner petals distinctly clawed for half their length or more
 - 12 Flowers unisexual; inner petals 1–2.3 times length of outer petals **10. PSEUDUVARIA**
 - 12: Flowers bisexual; outer petals 3–4 times length of inner petals **11. MITREPHORA**
 - 11: Inner petals not or only shortly clawed
 - 13 Inner and outer petals shortly connate at base **12. HAPLOSTICHANTHUS**
 - 13: Inner and outer petals free at base

ANNONACEAE

- | | | |
|-----|---|----------------|
| 14 | Outer petals sepaloid, markedly different in shape and colour from inner petals | |
| 15 | Inner petals imbricate; stamens with broad, flat-topped connectives | 13. FITZALANIA |
| 15: | Inner petals valvate; stamens with narrow shortly-produced connectives | 14. MILIUSA |
| 14: | Outer petals not sepaloid, similar in shape and colour but may be larger or smaller than inner petals | |
| 16 | Ovules 1, fruit 1-seeded | 15. POLYALTHIA |
| 16: | Ovules 3–9, fruit mostly several-seeded | |
| 17 | Inner petals imbricate throughout, boat-shaped | 13. FITZALANIA |
| 17: | Inner petals valvate, sometimes imbricate at tips, not boat-shaped | 16. MEIOGYNE |

1. ARTABOTRYS

Artabotrys R.Br., *Bot. Reg.* 5: t. 423 (1820); from the Greek *artao* (to suspend or hang on) and *botrys* (a cluster or bunch of grapes), in reference to the fruit borne on hook-shaped peduncles.

Type: *A. hexapetalus* (L.f.) Bhandari

Woody lianas climbing by hook-shaped inflorescence axes and stout spreading spines on older stems, glabrous. Inflorescence cymose, 2 or 3 flowers developing sequentially on each laterally compressed hook-shaped axis, leaf-opposed by sympodial growth of each axillary shoot; bracts small, often caducous. Flowers bisexual, sometimes fragrant. Sepals valvate, free or shortly connate. Petals of both series valvate, concave inside at base enclosing stamens and carpels, usually spreading in apical portion; outer petals free; inner petals coherent above base, not separating when falling. Stamens with a broad connective concealing anther cells. Pollen grains solitary. Carpels usually numerous with 2 erect collateral ovules; style and stigma elongate. Apocarps indehiscent, frequently obovoid, mostly sessile, 1- or 2-seeded. Seeds longitudinally half-ovoid or oblong, smooth, brown.

A genus of about 85 species in tropical Asia and Africa. One endemic species in Australia.

***Artabotrys carnosipetalus* Jessup, *Fl. Australia* 2: 447 (2007)**

T: Claudie R., Qld, 17 Sept. 1983, *B.Gray* 3240; holo: BRI; iso: BRI (spirit), QRS.

Liana with stout spines on older stems. Shoots appressed-pubescent, glabrescent; branchlets glabrous. Leaves glabrescent; petiole 5–8 mm long; lamina elliptic, 6–20 cm long, 2.2–6 cm wide, shortly attenuate at base, acuminate at apex; secondary veins mostly 5–8 pairs. Flowers solitary; pedicel 12–15 mm long, appressed-pubescent; bracts ovate, 1 mm long. Sepals ovate, 5–7.2 mm long, 3.5–5.5 mm wide, recurved at tip, puberulous. Petals narrowly ovate, 2–3 mm thick, greenish. Outer petals 12–18 mm long, 5.8–8 mm wide; suprabasal portion recurved; tip incurved or not. Inner petals 11–17 mm long, 5–6 mm wide; suprabasal portion reflexed; tip incurved or not. Stamens c. 90, 2.5 mm long; connective tip conical. Carpels 9, glabrous; stigma kidney-shaped, adaxially grooved. Apocarps club-shaped to obovoid, 3.4–4 cm long, 2–2.3 cm wide, apiculate, yellow-orange. Plate 5; Fig. 5A–D.

Occurs in Cape York Penin., Qld, from Iron Ra. to McIlwraith Ra., in mostly semi-deciduous mesophyll vine forest. Flowers Sept.–Dec.; fruits Nov.–Dec. Map 19.

Qld: Claudie R., *B.Gray* 3240 (BRI, QRS); near Ham Hill (Weymouth Holding), *B.Hyland* 6993 (BRI, QRS); 2 km W of Middle Claudie R., *L.W.Jessup* 788 (BRI); Ham Hill, E of Iron Ra., *L.W.Jessup* 797 (BRI, CANB, IBSC, K, L, MO, U); Claudie R., SW of Lockhart River Airfield, *L.W.Jessup* 826 (BRI, K, U).

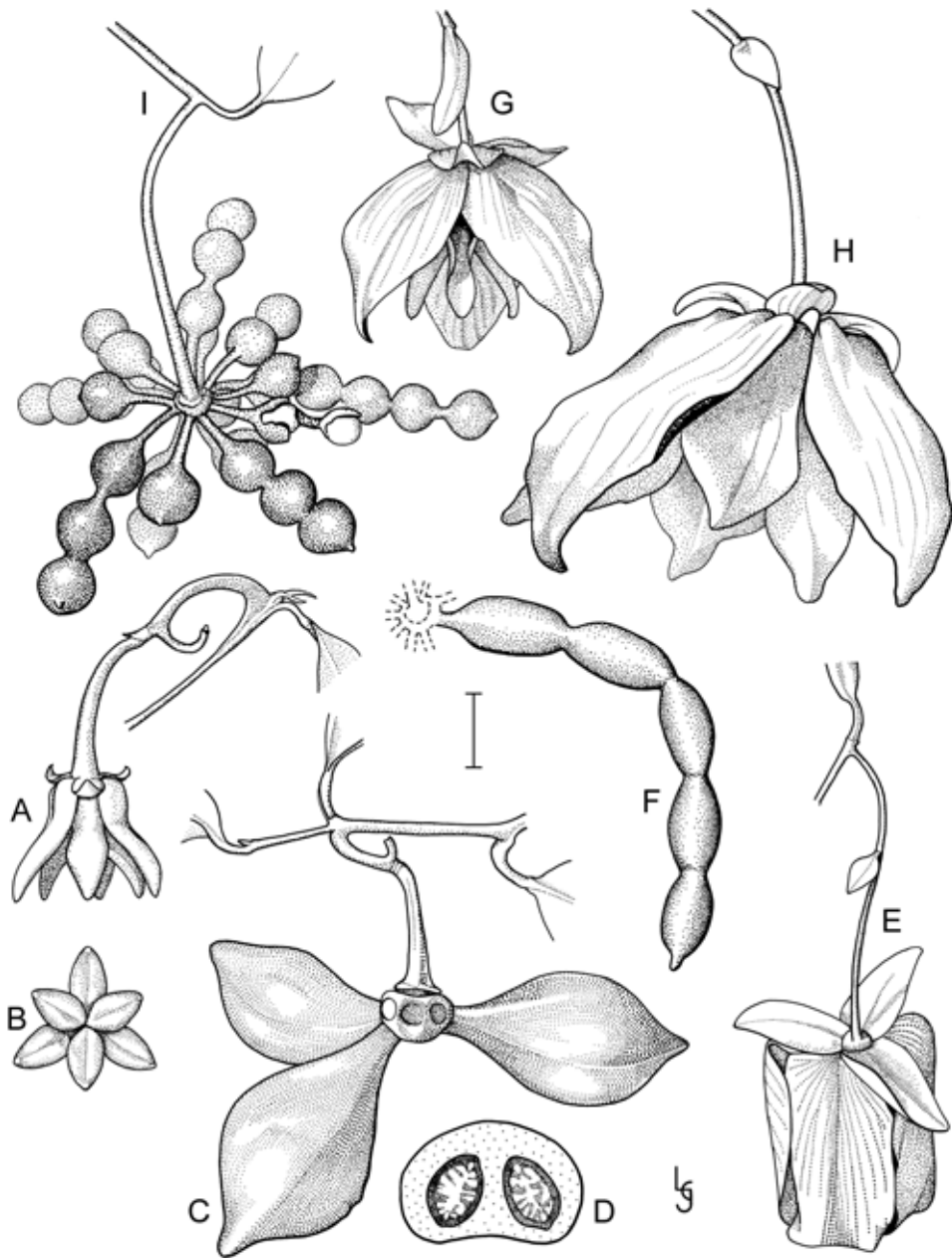


Figure 5. A–D, *Artabotrys carnosipetalus*. A, flower & peduncle; B, flower from below (A–B, B.Gray 3240, BRI); C, fruit; D, fruit & seeds, T.S. (C–D, L.W.Jessup 797, BRI). E–F, *Desmos goezeanus*. E, flower (L.W.Jessup 519, BRI); F, fruit, single apocarp (B.Gray 1469, BRI). G, *Desmos wardianus*, flower (G.Sankowsky 966 & N.Sankowsky, BRI). H–I, *Desmos polycarpus*. H, flower; I, fruit (H–I, G.Sankowsky 483, BRI). Scale bar = 10 mm. Drawn by L.G.Jessup.

ANNONACEAE

2. DESMOS

Desmos Lour., *Fl. Cochinch.* 1: 352 (1790); from the Greek *desmos* (a chain) referring to the shape of the fruit.

Type: *D. chinensis* Lour.

Woody stem-twining lianas or scandent shrubs, sometimes (not in Australia) treelets, unarmed; indumentum of simple trichomes. Flowers bisexual, mostly solitary, terminal, becoming leaf-opposed following growth of axillary shoot, sometimes (not in Australia) axillary, internodal or from old wood, usually fragrant; pedicel frequently with a submedial foliaceous bract. Sepals valvate, free or half-connate. Petals free, valvate, flat, both series similar or the inner ones smaller. Stamens with a broad truncate connective tip concealing anther cells. Pollen grains solitary, spinulose. Carpels numerous, pubescent; ovules several, superposed; stigma subglobular, adaxially grooved. Apocarps moniliform, stipitate, apiculate, indehiscent but often disintegrating into 1–5 or more ellipsoidal segments. Seeds mostly broadly ellipsoidal or subglobular, smooth, light brown.

A genus of about 30 species distributed from India to northern Australia. Three endemic species in Australia.

1 Seeds ellipsoidal, 9–12 mm long, 5.5–6 mm wide **1. *D. goezeanus***

1: Seeds subglobular or broadly ellipsoidal, 6.5–8 mm long, 4.9–6.5 mm wide

2 Carpels c. 30–35; inner petals obspathulate, 17–20 mm long, 8 mm wide **2. *D. wardianus***

2: Carpels c. 80–100; inner petals elliptic, 37–38 mm long, 18–20 mm wide **3. *D. polycarpus***

1. *Desmos goezeanus* (F.Muell.) Jessup, *Austrobaileya* 2(3): 227 (1986)

Uvaria goezeana F.Muell., *Fragm.* 7: 125 (1871). T: Rockingham Bay, Qld, 1870, *J.Dallachy*; holotype: MEL; iso: BRI, K.

Unona queenslandica Domin, *Biblioth. Bot.* 89: 670 (1925). T: Lake Eacham, Qld, 1 Feb. 1910, *K.Domin*; holotype: PR.

Liana. Shoots and branchlets puberulous. Leaves: petiole 5–11 mm long; lamina lanceolate or narrowly ovate, 6–16 cm long, 2–5.5 cm wide, acute at base and apex, appressed-puberulous below; secondary veins 9–13 pairs. Pedicel 3.5–4.5 cm, puberulous; bract 8–12 mm long, 2–4.5 mm wide. Sepals ovate, 22–24 mm long, 12–13 mm wide, acuminate, appressed-puberulous, glaucous. Petals sparsely appressed-puberulous, yellow tinged with red inside near base; outer petals ovate, 45–49 mm long, 27–31 mm wide; inner petals elliptic, 32–38 mm long, 15–18 mm wide. Stamens 80–90, 1.7–2 mm long. Carpels 22–32; ovary 2–2.5 mm long. Apocarps 6 cm long, 0.6–0.8 cm wide, dark red; stipe 8–12 mm long. Seeds 1–5, ellipsoidal, 9–12 mm long, 5.5–6 mm wide. $2n = 16$; *fide* W.Morawetz *loc. cit.* Fig. 5E–F.

Endemic in NE Qld from the Bloomfield R. to the Tully R. in mesophyll vine forest. Flowers Oct.–Nov.; fruits Apr.–June. Map 20.

Qld: Timber Reserve 1230, Boonjee Logging Area, *B.Gray 1124* (BRI, QRS); 12.8 km NW of Kuranda, *B.Hyland 2233* (BRI); Tolga Scrub, *L.W.Jessup 519* (BRI); 3 km S of Malanda on E side of road to Millaa Millaa, *L.W.Jessup 529* (A, BRI, CANB, K, L, MO, NSW); Lower Palmerston Hwy, W of Innisfail, *L.J.Webb & J.G.Tracey 11447* (BRI).

2. *Desmos wardianus* (F.M.Bailey) Jessup, *Austrobaileya* 2(3): 227 (1986)

Unona wardiana F.M.Bailey, *Queensland Fl.* 6: 1996 (1902). T: Mapoon, Qld, 22 May 1901, *J.F.Bailey*; holotype: BRI.

Liana or scandent shrub. Shoots and branchlets sparsely appressed-puberulous. Leaves: petiole 3–6 mm long; lamina elliptic, lanceolate, oblong or narrowly obovate, 3–10.5 cm long, 1–2.7 cm wide, acute at base, rounded or acute at apex, glabrous above, glaucous and sparsely pubescent below; secondary veins 13–18 pairs. Pedicel 2–2.3 cm long, puberulous; bract 6.5–15 mm long, 1.8–3 mm wide. Sepals broadly ovate, 7–14 mm long, 6–10 mm wide, acute, glabrescent. Petals sparsely puberulous, yellowish green; outer petals ovate, 25–35 mm

long, 20–22 mm wide, inner petals obspathulate, 17–20 mm long, 8 mm wide, concave at base, recurved at margins. Stamens c. 120, 1.7 mm long. Carpels c. 30–35; ovary 1.7 mm long. Apocarps to 5 cm long, 0.7 cm wide, yellow; stipe 8–15 mm long. Seeds 1–5, subglobular or broadly ellipsoidal, 6.5–8 mm long, 4.9–5.2 mm wide. Fig. 5G.

Endemic in Arnhem Land, N.T., and Qld from Torres Strait to McIlwraith Ra. in deciduous vine thickets and semi-deciduous vine forest. Flowers Dec.–Mar.; fruits Mar.–July. Map 21.

N.T.: SE of Mt Howship, Arnhem Land, *C.Dunlop* 6625 & *D.L.Jones* (BRI); 6 km S of Mt Gilruth, Arnhem Land, *D.L.Jones* 1546 (BRI); c. 6.4 km NNE of Mudginbarry HS, *M.Lazarides* 7523 (BRI). Qld: c. 3 km S of Cape York, *D.L.Jones* 2237 (BRI, L); Weipa, *G.Sankowsky* 966 & *N.Sankowsky* (BRI).

3. *Desmos polycarpus* Jessup, *Fl. Australia* 2: 447 (2007)

T: Cultivated at Indooroopilly, originally from Mossman River, Qld, Dec. 1994, *L.W.Jessup* 920; holo: BRI.

Tall liana or scandent shrub when young. Shoots and branchlets pubescent, glabrescent. Leaves: petiole 5–7 mm long; lamina lanceolate or narrowly ovate, 7–17 cm long, 2.5–5.5 cm wide, obtuse or rounded or sometimes acute at base, acute at apex, sparsely puberulous, glabrescent; secondary veins 9–11 pairs. Pedicel 5.5 cm long, sparsely puberulous; bract 6.5–12 mm long, 4–5 mm wide. Sepals ovate, 12–14 mm long, 9–10 mm wide, sparsely puberulous. Petals sparsely puberulous, yellow; outer petals ovate, 43–48 mm long, 27 mm wide; inner petals elliptic, 37–38 mm long, 18–20 mm wide, concave inside at base. Stamens c. 150, 1.5–1.7 mm long. Carpels c. 100; ovary 1.5–1.8 mm long. Apocarps 3.5–5 cm long, 1 cm wide, black; stipe 5–9 mm long. Seeds 1–4, subglobular, 6.5–7 mm long, 5.5–6.5 mm wide. Fig. 5H–I.

Occurs from Iron Ra. to Mossman R., Qld, in complex and semideciduous mesophyll vine forest. Flowers Nov.–Feb.; fruits Sept.–Oct. Map 22.

Qld: NE side of Lamond Hill, Iron Ra., *L.W.Jessup* 780 (BRI); near entrance to Mossman Gorge Natl Park, *G.Sankowsky* 483 (BRI); Shipton's Flat, *G.Sankowsky* 1130 & *P.Radke* (BRI); Rocky R. on E foothills of McIlwraith Ra., *L.J.Webb* & *J.G.Tracey* 9385 (BRI).

There may be more than one taxon amongst the specimens cited but flowers are needed for confirmation.

3. MITRELLA

Mitrella Miq., *Ann. Mus. Bot. Lugduno-Batavum* 2: 38 (1865); from the Greek *mitra* (a head dress), alluding to the arrangement of the inner petals, somewhat resembling a bishop's mitre.

Type: *M. kentii* (Blume) Miq.

Woody stem-twining lianas or scandent shrubs with simple hairs, unarmed. Flowers bisexual, axillary, usually solitary or 2 or rarely 3 together; pedicel with several small basal bracts. Sepals valvate, connate, persistent in fruit. Petals deltoid-ovate, valvate along the 2 inner surfaces, trigonous towards apex, concave near base, free; outer petals longer than inner; inner petals mostly fenestrate between. Stamens with linear anthers and round-topped slightly extended connectives concealing anther cells. Pollen grains solitary. Carpels 10–15 with 2–8 ovules; stigma inconspicuous on a terete style. Apocarps mostly subglobular or ellipsoidal, fleshy, indehiscent. Seeds 1–several, broadly lenticular-discoid, pitted or smooth, brown.

A genus of about 6 or 7 species distributed from S E Asia to Australia. One endemic species in Australia.

Mitrella tiwiensis Jessup & Bygrave, *Fl. Australia* 2: 447 (2007)

T: Bathurst Is., 23 km E Rocky Point, N.T., 11 Dec. 1991, *J.Russell-Smith* 8573 & *J.Brock*; holo: BRI; iso: DNA, K, L, MO *n.v.*

Mitrella sp. Melville Island (C.R.Dunlop 6556), I.D.Cowie & D.A.Albrecht (eds), *Checklist N. Terr. Vasc. Pl. Sp.* 5 (2005)

Desmos D24710, D.T.Liddle *et al.*, *Atlas Vasc. Rainforest Pl. N. Terr.* 122 (1994)

Desmos D24170 Melville Island, C.R.Dunlop *et al.*, *Checklist Vasc. Pl. N. Terr.* 18 (1995)

Liana, appressed-pubescent. Leaves: petiole 8–12 mm long; lamina lanceolate or oblanceolate, 4–13 cm long, 2–4.5 cm wide, acute or sometimes obtuse at base, acuminate or acute at apex, glabrous above, sparsely pubescent below; secondary veins 8–12 pairs. Pedicel 5–7 mm long, pubescent; bracts 1–2 mm long. Sepals deltoid, 2.5–3 mm long, 2.5–3.5 mm wide, 1.5 mm thick near base, pubescent outside, flat and glabrous inside. Petals pinkish orange; outer petals 20–25 mm long, 8–8.5 mm wide, densely appressed-pubescent outside, tomentellous inside, grooved and glabrous at base; inner petals 6.3–7 mm long, 3.8–4.2 mm wide, puberulous outside near the rostrate apex, tomentellous on cohering insides, grooved and glabrous at base. Stamens 130–140, 1.2–1.6 mm long. Carpels c. 15; ovary 0.7–0.75 mm long; ovules 3 or 4; style 0.7–0.75 mm long. Apocarps to 1.5 cm long and 1 cm wide (dry), pink-orange; stipe 6–7 mm long. Seeds lenticular, smooth.

Known only from Bathurst and Melville Islands in N.T. These islands are collectively known as the Tiwi Islands. Flowers Dec.; fruits Sept. Map 23.

N.T.: Melville Is, 10 km from Three Ways on Garden Point Rd, *D.L.Jones 1663* (BRI); Jump Up Jungle, Melville Is., *D.L.Jones 1672* (BRI); Melville Is., in general area of Maxwell Ck, *C.P.Mangion 1007* (BRI); Taracumbie Ck, Melville Is., *L.J.Webb & J.G.Tracey 12198* (BRI).

4. MELODORUM

Melodorum Lour., *Fl. Cochinch.* 1: 351 (1790); from the Latin *melleus* (belonging to honey) and *odorus* (fragrant) referring to the fragrance of the flowers.

Type: *M. fruticosum* Lour.

Rauwenhoffia Scheff., *Ann. Jard. Bot. Buitenzorg* 2: 21 (1885). T: *R. siamensis* Scheff.

Woody stem-twining lianas or scandent shrubs, unarmed; nearly all parts bearing stellate or peltate-stellate indumentum, sometimes mixed simple hairs. Flowers bisexual, usually solitary or in pairs, rarely in cymose panicles, terminal or leaf-opposed following growth of adjacent axillary shoot; pedicels with 1 or 2 suprabasal bracts. Sepals valvate at tips, connate, persistent in fruit. Petals very shortly connate at base, not spreading widely at anthesis and then often falling as a unit; outer petals valvate, mostly broadly ovate, convex outside, concave inside; inner petals smaller with glabrous, incurved claw and slightly imbricate tips. Stamens with linear anthers and round-topped connectives concealing anther cells. Pollen grains solitary. Carpels few or numerous; stigma U-shaped with an adaxial slit. Apocarps indehiscent, mostly ellipsoidal or torulose, often apiculate, fleshy. Seeds 1–several, plano-convex, broadly lenticular, rarely broadly ellipsoidal or subglobular, brown, smooth or shallowly undulate.

A genus of about 16 species distributed from Indochina to Australia. Seven species in Australia of which 6 are endemic.

The name *Melodorum* Lour. has been incorrectly applied to species belonging to other genera such as *Fissistigma* by Benthams (1862) and *Sphaerocoryne* by Sinclair (1955), Kessler (1993) and others. The name was correctly applied by Ban (1974).

E.D.Merrill, on the application of the generic name *Melodorum* of Loureiro, *Philipp. J. Sci.* 15: 125–137 (1919); N.T.Ban, Critical notes on the genera *Melodorum* Lour., *Mitrella* Miq. and *Rauwenhoffia* Scheff. (Annonaceae Juss.), *Bot. Žurn. (Moscow & Leningrad)* 59(2): 237–245 (1974) (in Russian).

1 Carpels 60–70 in each flower

2 Flowers 1–8 or more in cymes; ovule 1 per carpel; lamina pubescent above becoming scaberrulous by persistent hair bases

1. *M. uhrii*

2: Flowers solitary; ovules 6 per carpel; lamina glabrous above

2. *M. topazensis*

1: Carpels 5–25 in each flower

- 3 Carpels 18–25 in each flower; ovules 4–8 per carpel
- 4 Outer petals wider than long, or as long as wide, inside not thickened and not shallowly, medially grooved; inner petals with claw longer than blade; ovules 7 or 8; apocarps pubescent with multiradiate-stellate trichomes **4. *M. unguiculatum***
- 4: Outer petals slightly longer than wide, inside thickened and shallowly, medially grooved; inner petals rhombic with claw half as long as blade; ovules 4 or 5; apocarps with scattered peltate-stellate trichomes, glabrescent **3. *M. leichhardtii***
- 3: Carpels 5–9 in each flower; ovules 9–16 per carpel
- 5 Upper surface of leaf persistently scabridulous **6. *M. scabridulum***
- 5: Upper surface of leaf softly pubescent, glabrescent or glabrous
- 6 Venation slightly raised on both leaf surfaces, indistinct; outer petals 18–23 mm long; apocarps 3.5–6.5 cm long, 2.5–3 cm wide **5. *M. crassipetalum***
- 6: Venation sunken on leaf upper surface, prominently raised below; outer petals 11–12.5 mm long; apocarps 2–3.5 cm long, 1.4–1.7 cm wide **7. *M. rupestre***

1. *Melodorum uhrii* F.Muell., *Fragm.* 6: 2 (1867)

Fissistigma uhrii (F.Muell.) Merr., *Philipp. J. Sci.* 15: 137 (1919). T: Rockingham Bay, Qld, *J.Dallachy*; holotype: MEL; isotype: BRI.

Tall liana. Branchlets tomentose. Leaves: petiole 5–7 mm long; lamina obovate, rarely ovate or elliptic, 6–18 cm long, 2–9 cm wide, rounded to shallowly cordate at base, acuminate or acute at apex, pubescent, becoming scabridulous by persistent hair bases above, pubescent below; secondary veins 9–11 pairs. Inflorescence a terminal cyme of 1–8 or more flowers; pedicel 6–19 mm long; bracts suborbicular, amplexicaul. Sepals suborbicular, 9–10 mm long, 9–10 mm wide, tomentose. Petals cream or pale brown; outer petals broadly ovate, 28 mm long, 13 mm wide, tomentose, but glabrous inside at base; inner petals rhombic, 13 mm long (including 6 mm claw), 7.5 mm wide, tomentose except glabrous claw. Stamens 200–250, 2 mm long. Carpels 60–70; ovary 1.5 mm long; ovule 1, mid-marginal; style constricted, 0.5 mm long; stigma subcylindrical, 1 mm long. Apocarps obliquely ellipsoidal, 9–11 mm long, 7–8 mm wide; stipe 9–12 mm long. Seed 1. $2n = 16$; *vide* W.Morawetz *loc. cit.* Fig. 6A–D.

Occurs from Gap Ck near Mt Finnigan to Conway Natl Park near Proserpine, Qld, in several types of mesophyll and notophyll vineforest. Flowers Feb.–May; fruits Oct.–Dec. Map 24.

Qld: S.F.R. 607, Shoteel Logging Area, *B.Gray* 2888 (BRI, QRS); Speewah Rd, Parish of Cairns, *B.Gray* 3998 (BRI, QRS); Mickies Pocket, Clohesy R., *L.W.Jessup* 595 (BRI, K, U); near Wallaman Falls, *G.Sankowsky* 403 & *N.Sankowsky* (BRI); Juara Ck between Kairi and Danbulla, *L.S.Smith* 3341 & *L.J.Webb* (BRI).

2. *Melodorum topazensis* Jessup, *Fl. Australia* 2: 448 (2007)

T: Topaz (cultivated), Qld, 26 Apr 1987, *G.Sankowsky* 625 & *N.Sankowsky*; holotype: BRI.

Tall liana. Branchlets tomentose. Leaves: petiole 3–5 mm long; lamina narrowly ovate, lanceolate or obovate, 6–27 cm long, 1.7–8 cm wide, shallowly cordate or rounded at base, acuminate at apex, glabrous above, pubescent below; secondary veins 10–14 pairs. Flowers solitary; pedicel 12 mm long with 2 broadly ovate bracts 1.5 mm and 9 mm long below sepals. Sepals depressed-ovate, 7.5–8 mm long, 9.5–10 mm wide, pubescent outside. Petals cream with dense reddish brown indumentum; outer petals broadly ovate, 17 mm long, 16 mm wide, pubescent outside; inner petals rhombic with rounded apex, 15 mm long including 7–8 mm long claw, 11 mm wide, puberulous outside, pubescent inside except glabrous claw. Stamens c. 250, 2.3 mm long. Carpels 60–65; ovary 2 mm long; ovules 6; style 1 mm long; stigma cylindrical, 1 mm long. Apocarps not seen.

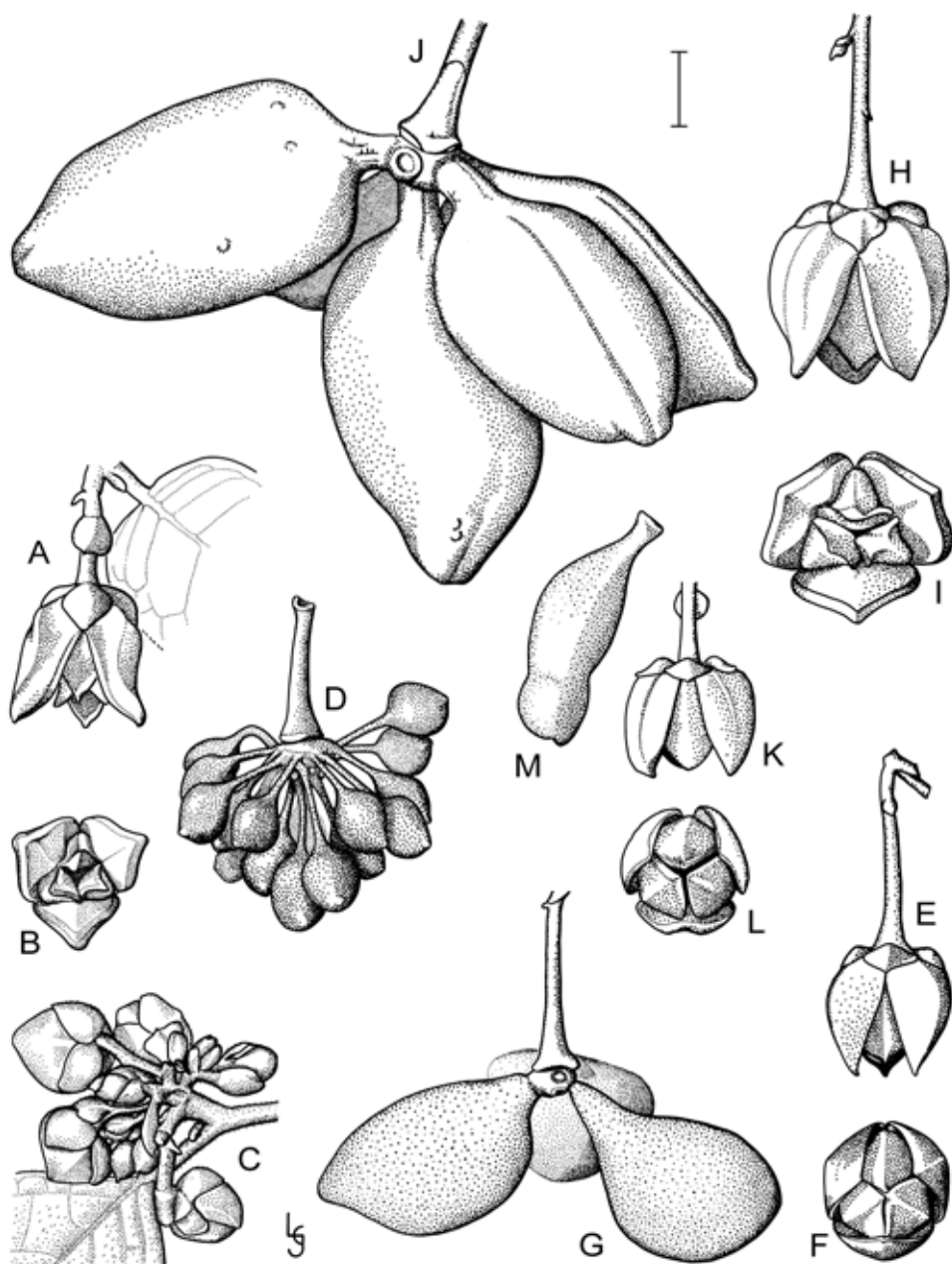


Figure 6. *Melodorum*. A–D, *M. uhrii*. A, flower; B, flower from below (A–B, G.Sankowsky 624 & N.Sankowsky, BRI); C, inflorescence (G.Sankowsky 462 & N.Sankowsky, BRI); D, fruit (B.Gray 2888, BRI). E–G, *M. scabridulum*. E, flower; F, flower from below (E–F, G.Sankowsky 770 & N.Sankowsky, BRI); G, fruit (G.Sankowsky 967 & N.Sankowsky, BRI). H–J, *M. crassipetalum*. H, flower; I, flower from below (H–I, G.Sankowsky 957 & N.Sankowsky, BRI); J, fruit (G.Sankowsky 821 & N.Sankowsky, BRI). K–M, *M. rupestre*. K, flower; L, flower from below (K–L, D.Jones 1729, DNA); M, fruit, single apocarp (C.Dunlop 2815, DNA). Scale bar = 10 mm. Drawn by L.G.Jessup.

Known only from Francis Ra. to Topaz, Atherton Tableland, Qld, in complex mesophyll vine forest. Flowers Apr.; fruits unknown. Map 25.

Qld: S.F.R. 755, Barong Logging Area, Francis Ra., *L.W.Jessup* 722 (BRI); Topaz near Malanda, *G.Sankowsky* 244 & *N.Sankowsky* (BRI).

3. *Melodorum leichhardtii* (F.Muell.) Benth., *Fl. Austral.* 1: 52 (1863)

Unona leichhardtii F.Muell., *Fragm.* 3: 41 (1862); *Fissistigma leichhardtii* (F.Muell.) Merr., *Philipp. J. Sci.* 15: 133 (1919); *Rauwenhoffia leichhardtii* (F.Muell.) Diels, *J. Arnold Arbor.* 20: 74 (1939). T: Clarence R., *M.Beckler*; syn: *n.v.*, Torampa and MacConnell's brush, *L.Leichhardt*; syn: MEL; Ipswich, *J.Nerst*; syn: MEL; Rockhampton, *A.Thozet*; syn: MEL; Clarence River, *J.Wilcox*; syn: MEL.

Tall liana. Branchlets glabrescent. Leaves: petiole 3–5 mm long; lamina ovate, elliptic or narrowly obovate, 4–14 cm long, 1.2–5 cm wide, acute at base and apex, glabrous above, glabrescent below; secondary veins 9–13 pairs. Cyme with 1 or 2 flowers. Pedicel 1.3–2 cm long, sparsely pubescent; bracts 4 mm long. Sepals depressed-ovate, 4 mm long, 5 mm wide, pubescent. Petals yellow-brown. Outer petals broadly ovate, pubescent outside, concave and shallowly, medially grooved inside and glabrous at base, 11–20 mm long, 8–15 mm wide. Inner petals rhombic, 8–15 mm long, 7–12 mm wide; claw half as long as blade. Stamens c. 150, 1.8 mm long. Carpels 18–25; ovary 1.8 mm long; ovules 4 or 5; stigma subcylindrical, minutely warted. Apocarps ellipsoidal or obloid, oblique, often torulose, 0.7–5 cm long, 0.9–1.5 cm wide, glabrescent; stipe 1–2 cm long. Seeds 1–4. $2n = 16$; *cfide* W.Morawetz *loc. cit.*

Occurs from Papua New Guinea and Torres Strait, Qld, to Dorrigo, N.S.W., in most rainforest types, except those at high altitude, and also adjacent eucalypt forest. The fruit is edible. Flowers Sept.–Dec. & Mar.; fruits Sept.–Mar. & May–July. Map 26.

Qld: Rockhampton, *A.Dietrich* 776 (BRI, MEL); Mt Bauple, *S.F.Kajewski* 83 (BRI); 40 Mile Scrub, SW of Mt Garnet, *J.G.Tracey* 15516 (BRI); Woogaroo Ck, S of Goodna, *K.A.Williams* 83029 (BRI, NSW, LAE). N.S.W.: Tintenbar, *W.Bauerlen* 526 (BRI).

4. *Melodorum unguiculatum* Jessup, *Fl. Australia* 2: 448 (2007)

T: Cultivated at Tolga, ex Stone Crossing, Wenlock R., Qld, 8 Dec. 1991, *G.Sankowsky* 1396 & *N.Sankowsky*; holotype: BRI; isotype: BRI (spirit), DNA.

Liana. Branchlets glabrescent. Leaves: petiole 4–6 mm long; lamina ovate, lanceolate or elliptic, 4–14 cm long, 1.5–5.5 cm wide, obtuse, rounded or sometimes acute at base, acuminate or acute at apex, glabrous above, glabrescent below except along midvein; secondary veins 8–11 pairs. Cyme with 1 or 2 flowers. Pedicel 1.5–2.5 cm long, pubescent; bracts caducous. Sepals broadly ovate, 6.8–7.5 mm long, 6.8–7.5 mm wide, pubescent. Petals yellow-brown. Outer petals depressed-ovate, concave inside, 12–14 mm long, 13–15 mm wide, densely yellow-brown stellate-pubescent outside. Inner petals mitriform, 11.5–13 mm long, 10–11.3 mm wide, claw longer than blade. Stamens c. 200, 2.2–2.6 mm long. Carpels c. 18; ovary 2.4 mm long; ovules 7 or 8; stigma subsessile, ovoid, with sparse erect hairs. Apocarps obloid or ellipsoidal, 1.5–2.5 cm long, 0.6–1 cm wide, multiradiate-stellate-pubescent. Seeds 1–3.

Occurs in Cape York Penin., Qld, from Lockerbie Scrub to the Archer R. mostly in semi-deciduous mesophyll or notophyll vine forest. Flowers Dec.–Feb.; fruits Mar.–May. Map 27.

Qld: Archer Bend Natl Park, 122 km WSW of Coen, *D.G.Fell* DGF4381 & *R.Buck* (BRI); Stone Crossing, Wenlock R., *L.W.Jessup* 814 (BRI); S end of Lockerbie Scrub, *G.Sankowsky* 851 (BRI); Shelbourne Bay, 700 km N of Cairns, *E.M.Spencer* 8 (BRI); Archer Bend, Archer R., *J.G.Tracey* 14256 (BRI).

5. *Melodorum crassipetalum* Jessup, *Fl. Australia* 2: 448 (2007)

T: Cultivated at Tolga, ex Font Hills, Bakers Blue Mtn, Qld, 30 Oct. 1988, *G.Sankowsky* 957 & *N.Sankowsky*; holotype: BRI; isotype: BRI (spirit).

Melodorum sp. Font Hills (*G.Sankowsky* 380), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 16 (2002)

Scandent shrub, sometimes climbing, glabrescent. Leaves: petiole 2–4 mm long; lamina elliptic or obovate, 3.5–9.5 cm long, 2–3.5 cm wide, acute at base, acute, obtuse or rounded at apex, glabrous above, glabrescent below; venation slightly raised on both surfaces; secondary veins 5–8 pairs. Flowers solitary or in pairs; pedicel 1.2–1.5 cm long, stellate-tomentulose; bracts ovate, 3.5–4 mm long. Sepals depressed-ovate to suborbicular, 6.5 mm long, 6–8 mm wide, stellate-tomentulose. Petals cream, tinged with red. Outer petals broadly ovate, 18–23 mm long, 18–21 mm wide, red stellate-hispidulous outside, puberulous inside above middle. Inner petals broadly angular-ovate, 14–15 mm long, 11–13 mm wide, stellate-tomentulose outside, pilose inside above middle; claw more than half as long as blade. Stamens 120–130, 2.5–3 mm long. Carpels 5 or 6; ovary 3 mm long; ovules c. 16; stigma depressed-globular, sessile. Apocarps 3.5–6.5 cm long, 2.5–3 cm wide, densely and persistently pubescent; stipe c. 5 mm long. Seeds usually 1–6. Fig. 6H–J.

Known from near Coen to W of Mackay, Qld, mostly in deciduous vine thicket amongst granite outcrops. Flowers Nov.–Dec.; fruits Mar.–June. Map 28.

Qld: Jona Bay, Dingo Beach, Cape Gloucester, *G.N.Batianoff* 9403395 & *H.A.Dillewaard* (BRI); Cape Cleveland, Bowling Green Bay Natl Park, *A.R.Bean* 5309 (BRI); Font Hills, Bakers Blue Mtn, *G.Sankowsky* 986 (BRI); 6.4 km N of Glendon, *L.S.Smith* 4630 (BRI); Coen, *L.J.Webb* & *J.G.Tracey* 7552 (BRI).

6. *Melodorum scabridulum* Jessup, *Fl. Australia* 2: 448 (2007)

T: Bamaga, Qld, 29 Jan. 1988, *G.Sankowsky* 770 & *N.Sankowsky*; holo: BRI; iso BRI (spirit).

Liana. Branchlets pubescent. Leaves: petiole 3–5 mm long; lamina obovate, sometimes elliptic, 4–16 cm long, 1.5–5.5 cm wide, rounded at base, acuminate at apex, scabridulous with simple and stellate hairs; secondary veins 9–11 pairs. Flowers solitary; pedicel 1.6 cm long, stellate-tomentose; bracts orbicular, 4 mm long. Sepals depressed-ovate, 6–7 mm long, 5.5–7.5 mm wide, stellate-tomentose outside. Petals yellow-brown. Outer petals broadly ovate, 12–18 mm long, 12–18 mm wide, red-brown stellate-tomentose outside. Inner petals broadly angular-obovate to rhombic, mitriform, 12–14 mm long, 10–13 mm wide, stellate-tomentose outside, claw nearly as long as blade. Stamens c. 55, 2.2 mm long. Carpels 7–9; ovary 2.5 mm long; ovules 9 or 10; stigma irregularly ovoid, subsessile. Apocarps ellipsoidal, 3.5 cm long, 2.5 cm wide, densely and persistently pubescent, sessile. Seeds c. 4 or 5. Plate 6; Fig. 6E–G.

Occurs from Moa Is., Torres Strait, to the McIlwraith Ra., Qld, in semi-deciduous and deciduous vine forests and thickets. Flowers Dec.–Feb.; fruits Feb.–Apr. Map 29.

Qld: Crusher Ck, Moa Is., *S.Budworth* 978 (BRI); Lockerbie Scrub, 3 km past Lockerbie HS, *P.I.Forster* *PIF6312* (BRI, DNA, QRS); Claudie R., *B.Hyland* 21171V (BRI, QRS); Myerfield to Batavia Downs road, *L.W.Jessup* 818 (BRI); NW fall of McIlwraith Ra. at head of Peach Ck, *L.J.Webb* & *J.G.Tracey* 9863 (BRI).

7. *Melodorum rupestre* Jessup, *Fl. Australia* 2: 448 (2007)

T: N.T., Oenpelli Road, 12 Dec. 1984, *D.L.Jones* 1729; holo: BRI; iso: DNA.

Scandent shrub. Leaves: petiole 2–3 mm long; lamina ovate, obovate or elliptic, 3.5–10 cm long, 2–4 cm wide, rounded or shallowly cordate at base, acute or acuminate at apex; upper surface softly stellate-pubescent, glabrescent; secondary veins 8–10 pairs, sunken and retaining indumentum above, prominently raised below. Flowers solitary; pedicel 9–14 mm long; bracts suborbicular, amplexicaul, 3–4 mm long. Sepals depressed-ovate, 5 mm long, 6 mm wide, stellate-tomentose outside. Petals rusty-yellow or orange-yellow, stellate-tomentose outside. Outer petals broadly ovate, 11–12.5 mm long, 12.5–13.5 mm wide, puberulous inside above glabrous base. Inner petals broadly angular-ovate, 9.5–10 mm long, 8–8.5 mm wide, pubescent inside above glabrous claw. Stamens 110–120, 2–2.2 mm long. Carpels 5; ovary 2 mm long; ovules 11; style 0.5–1 mm long; stigma clavate or obovoid, with a few hairs. Apocarps ellipsoidal or obloid, 2–3.5 cm long, 1.4–1.7 cm wide; stipe c. 1 mm long. Seeds usually 1–4. Fig. 6K–M.

Known only from the catchments of the E and S Alligator Rivers and the headwaters of Katherine R., N.T., usually at the base of sandstone cliffs, often in notophyll vine forest. Flowers Nov.–Apr.; fruits Feb. Map 30.

N.T.: Cannon Hill, *N.Byrnes* 2829 (BRI, DNA); N facing wall in central part of Mt Brockman, *L.A.Craven* 2361 & *E.Eversons* (BRI); E Alligator R., *C.Dunlop* 3202 (BRI); Little Nourlangie Rock, *C.R.Dunlop* 4460 (DNA); Head of Koolpin Ck, W Arnhem Land, *L.J.Webb* & *J.G.Tracey* 12500 (BRI).

5. UVARIA

Uvaria L., *Sp. Pl.* 1: 536 (1753); *Gen. Pl.* 5th edn, 240 (1754); from the Latin *uva* (a grape) in reference to the grape-like apocarps of many species.

Type: *U. zeylanica* L.

Woody stem-twining lianas or sometimes scandent shrubs, unarmed; nearly all parts bearing stellate or peltate indumentum. Flowers bisexual, mostly solitary or paired, rarely (not in Australia) in few-flowered cymes, terminal or leaf-opposed following growth of adjacent axillary shoot; pedicels with a medial bract. Sepals valvate at tips, connate. Petals 6 (–8) in 2 series, subequal, free or shortly connate at base; inner or both whorls imbricate in bud, usually spreading at anthesis. Stamens wedge-shaped or linear, sometimes outermost ones sterile; connectives short or elongate, papillate, concealing anther cells. Pollen grains solitary. Carpels numerous; ovules few–many; stigma secreting mucilage, horseshoe- or funnel-shaped with an adaxial slit. Apocarps mostly ellipsoidal or torulose, dry or succulent, indehiscent. Seeds few to many.

A genus of over 100 species mostly throughout the Asian tropics but also in Africa and Madagascar. Some anomalous species are presently included. Three species in Australia.

C.V.Meade & J.A.Parnell, Revision of *Uvaria* L. in continental southeast Asia: 1. stamen and carpel structure. *Annonaceae Newslett.* 12: 47–55 (1998).

- | | | |
|----|---|----------------------|
| 1 | Sepals fully enclosing bud prior to anthesis; petals incurved; stamens all fertile; apocarps on stipes 2–6 cm long | 1. <i>U. concava</i> |
| 1: | Sepals not fully enclosing bud prior to anthesis; petals flat or recurved; outer stamens with vestigial or no anthers; apocarps on stipes 0.5–2 cm long | |
| 2 | Petals connate at base; apocarps glabrescent or sparsely pubescent | 2. <i>U. holtzei</i> |
| 2: | Petals free; apocarps tomentose | 3. <i>U. rufa</i> |

1. *Uvaria concava* Teijsm. & Binn., *Ned. Kruidk. Arch.* 3: 406 (1855)

T: from Sumatra; holo: *n.v.*

Uvaria membranacea Benth., *Fl. Austral.* 1: 51 (1863). T: Cape York, [Qld], 12 Nov. 1849, *J.McGillivray*; holo: K.

Tall liana. Indumentum of peltate, sometimes multiradiate stellate trichomes. Leaves: petiole 4–6 mm long; lamina elliptic, oblong or obovate, 7–18 cm long, 3–7 cm wide, rounded or obtuse at base, shortly acuminate at apex, glabrescent except on veins below; secondary veins 7–10 pairs. Flowers solitary; pedicel 14–20 mm long; submedial bract ovate, 6–9 mm long. Sepals connate and fully enclosing bud, splitting to mostly 3 lobes, 10–14 mm long, tomentose. Petals 6, both series similar, basally connate, obovate to suborbicular, strongly incurved towards tip, 15–28 mm long, 14–22 mm wide, tomentulose outside, puberulous within, crimson red. Stamens c. 120; 2.5–2.7 mm long, connective short, oblique. Carpels c. 30–40; ovary 2–2.4 mm long; ovules 13–15; stigma sessile, subglobular-obovoid. Apocarps ellipsoidal, 3–5 cm long 2.2–2.7 cm wide, glabrescent; stipe 2–6 cm long. Seeds irregularly lenticular, surface slightly undulate, brown. Plate 9; Fig. 7A.

Occurs in Sumatra, Java, New Guinea and Australia from Torres Strait to near Cairns, Qld, in lowland mesophyll and notophyll vine forests. Flowers Nov.–Feb.; fruits Mar.–June. Map 31.

Qld: Long Scrub, Bamaga, *L.J.Webb* & *J.G.Tracey* 6089 (BRI); Claudie R., *B.Hyland* 2100V (BRI, QRS); Gap Ck, 35 km SE of Cooktown, 19 May 1969, *L.S.Smith* (BRI); near Donovan Ck, Cape Tribulation to Bloomfield road, *L.W.Jessup* 617 (A, BRI, CANB, DNA, K, L, MEL, MO, NSW, QRS, U); Ellis Beach, *G* & *N.Sankowsky* 820 (BRI).

2. *Uvaria holtzei* F.Muell., *S. Sci. Rec.* 3: 175 (1883)T: Port Darwin, N.T., *M.Holtze 1323*; holotype: MEL.

Tall liana. Indumentum of multiradiate and peltate stellate trichomes. Leaves: petiole 5–8 mm long; lamina obovate, sometimes oblong or elliptic, mostly 4–18 cm long, 3–8 cm wide, rounded or shallowly cordate at base, acuminate at apex, glabrescent; secondary veins mostly 8–14 pairs. Flowers solitary or 2 or 3 opening serially with 1 or 2 extra buds in the axil of the lower bract; pedicel 1.4–2.0 cm long, tomentose; bracts suborbicular, amplexicaul, 5–6 mm long. Sepals half-connate in bud, splitting to near base at anthesis, 7–8 mm long; lobes 3, obtuse. Petals 6, both series similar, connate at base, broadly ovate or suborbicular, 12–15 mm long, 10–13 mm wide, tomentose, dull red. Stamens c. 100–200; outer ones anantherous, flat, 4.5–5.5 mm long, 2–3 mm wide; inner ones 4.5–5 mm long, 1.6 mm wide, connective produced, oblong, flattened, 1.5 mm long. Carpels c. 50; ovary 3 mm long; ovules 9–13; style 0.7 mm long. Stigma obovoid. Apocarps subglobose or ellipsoidal, 1–2.5 cm long, 1–1.5 cm wide, glabrescent, black; stipe 0.5–0.7 cm long. Seeds discoid or lenticular, planoconvex, smooth, brown. Fig. 7C.

Occurs in north eastern N.T. in evergreen and semideciduous notophyll vineforest, usually near watercourses or adjacent to mangrove or beach communities. Also occurs in Papua New Guinea, Solomon Is. and probably elsewhere in Malesia. Flowers Oct.–Feb.; fruits Apr. Map 32.

N.T.: Taracumbi Falls, Melville Is., *C.Dunlop 3967* (BRI, DNA); Gunn Point area, *M.O.Rankin 1567* (BRI, DNA); Petherick's Rainforest, *J.Russell-Smith 5966* & *D.Lucas* (BRI); Wagait, Murrenra Ra., Kubiling Spring, *J.Russell-Smith 6381* & *D.Lucas* (BRI); Apsley Strait, Bathurst Is., *G.Wightman 922* & *C.Dunlop* (DNA).

Uvaria holtzei is close to the E Malesian *U. littoralis* (Blume) Blume and *U. ovalifolia* Blume. Specimens from Papua New Guinea under *U. rosenbergiana* Scheff. are conspecific.

3. *Uvaria rufa* Blume, *Fl. Javae (Anonaceae)* 19 (1830)T: Bantam, Java, *C.L.Blume*; holotype: n.v.

Scrambling shrub or liana. Indumentum of multiradiate stellate trichomes. Leaves: petiole 5–9 mm long; lamina obovate, ovate or elliptic, mostly 6–18 cm long, 4–10 cm wide, rounded or shallowly cordate at base, shortly acuminate, acute or obtuse, sometimes rounded at apex, scabrellous or glabrous above, pubescent below; secondary veins mostly 9–13 pairs. Flowers 1–3 developing serially; pedicel 1.7–2 cm long, tomentose; bracts suborbicular or broadly ovate, 8–14 mm long. Sepals connate, tomentose; lobes indistinct or depressed-ovate, 3.5–4 mm long, 9–10 mm wide. Petals 6, free, in 2 distinct whorls, inner slightly smaller, ovate or oblong, 13–17 mm long, 8–11 mm wide, obtuse, tomentose outside, puberulous within, orange-red. Stamens c. 100–120, 2.4–2.6 mm long; outer ones anantherous, oblong, flat; inner ones with oblong, trigonous, rounded connective. Carpels c. 6–20; ovary 2.5 mm long; ovules 16–20; stigma subglobular, sessile or subsessile, pubescent on sides. Apocarps ellipsoidal, 2–4.5 cm long, 1.5–2 cm wide, rufous-tomentose; stipe 1–2 cm long. Seeds irregularly obloid, bilaterally flattened, smooth, brown. Fig. 7B.

Occurs from Thailand to Australia. In Australia it is distributed from Torres Strait to just S of Coen, Qld. Flowers Nov.–Feb.; fruits Mar. Map 33.

Qld: Murray Is., Torres Strait, *M.Lawrie 3* (BRI); Myerfield road from Weipa to Stone Crossing, Wenlock R., *L.W.Jessup 811* (BRI); Natl Park Reserve 8, Parish of Lloyd, *B.Hyland 11749* (BRI, QRS); between Coen and Coen airport, *E.G.Armbrust NQNC 13627* (BRI, QRS); S of Coen, *L.W.Jessup 833* (BRI, IBSC, K, L, MO, QRS, SAN, U).

Specimens from Torres Strait and north of the Olive R. are more typical with persistent scabrellous hairs on the leaf upper surface, while those further south are glabrous on the upper surface.

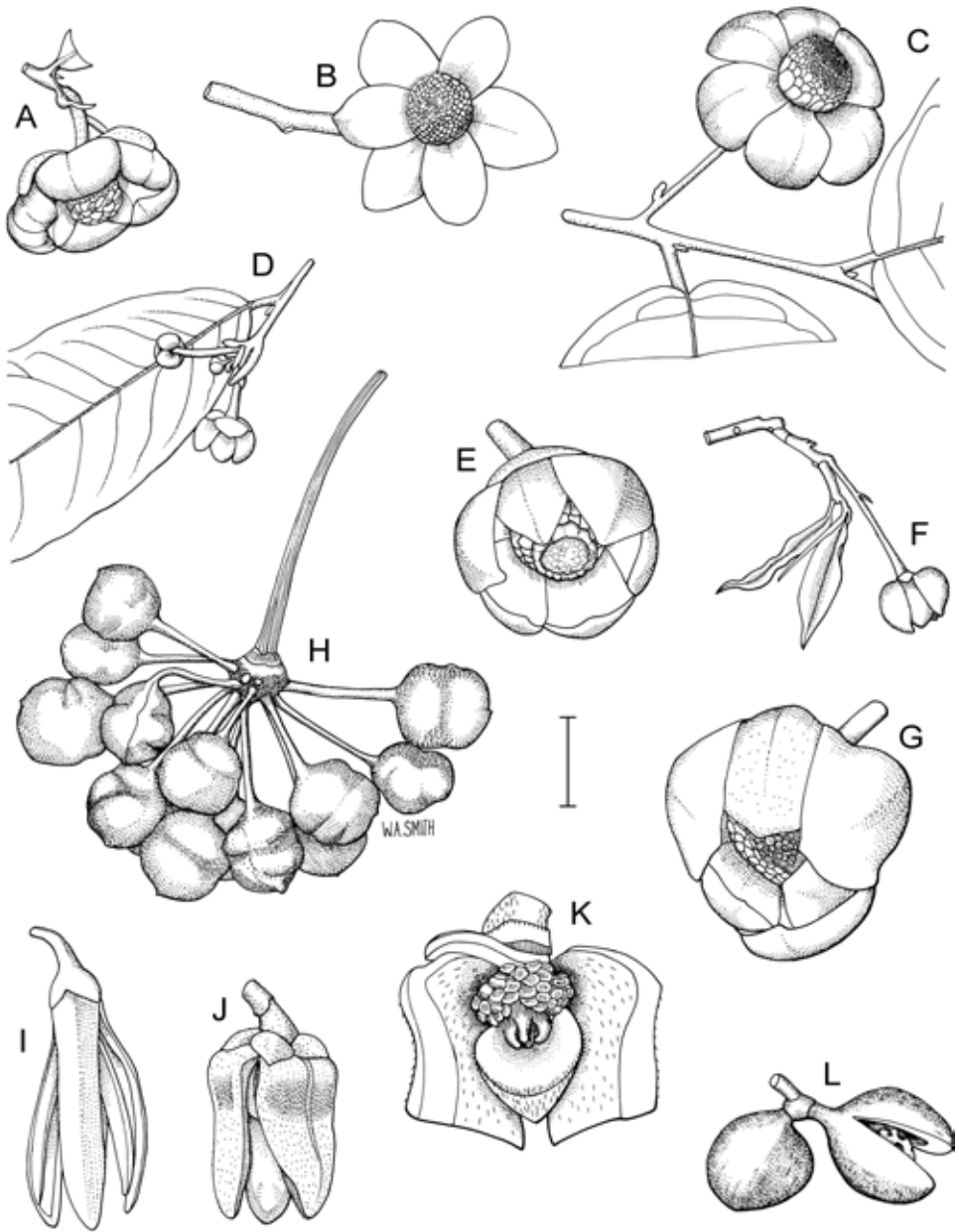


Figure 7. A, *Uvaria concava*, flower (L.W.Jessup 617, BRI). B, *Uvaria rufa*, flower (L.W.Jessup 833, BRI). C, *Uvaria holtzei*, flower (J.Russell-Smith 8129, DNA). D–E, *Cyathostemma micranthum*. D, flowering habit; E, flower (D–E, K.Kenneally 1095, PERTH). F–H, *Cyathostemma glabrum*. F, flowering habit (K.Kenneally 10924, PERTH); G, flower (K.Kenneally 10985, PERTH); H, fruit (J.Russell-Smith 5091 & D.Lucas, DNA). I, *Xylopia maccraea*, flower (G.Sankowsky 293, BRI). J–L, *Xylopia monosperma*. J, flower; K, flower with 1 side removed (J–K, G.Sankowsky 1103 & N.Sankowsky, BRI); L, fruit (L.W.Jessup 825, BRI). Scale bar: A–C, E, F, H, I, L = 12 mm; D, G, J = 4 mm; K = 2 mm. Drawn by W.A.Smith.

6. CYATHOSTEMMA

Cyathostemma Griff., *Not. Pl. Asiat.* 4: 707 (1854); from the Greek *kyathos* (a cup) and *stemma* (a crown) in reference to the shape of the mature flower.

Type: *C. viridiflorum* Griff.

Woody stem-twining lianas or scandent shrubs with fasciculate and simple hairs, unarmed. Flowers bisexual, terminal or leaf-opposed, solitary or in few-flowered cymes, basal and submedial bracts present. Sepals valvate, basally connate. Petals imbricate at tips, valvate at base, coriaceous, incurved; inner and outer whorls similar in shape, the inner slightly smaller. Stamens wedge-shaped, sessile; connective oblique, concealing anther-cells. Pollen grains solitary. Carpels numerous; ovules few or numerous; stigmas secreting mucilage, horseshoe-shaped with adaxial slit. Apocarps ellipsoidal, succulent, indehiscent. Seeds mostly plano-convex, smooth, pale brown.

A genus of about 14 species distributed from Burma and Indochina to Australia. Two species in Australia.

T.M.A.Utteridge, Revision of the genus *Cyathostemma* (Annonaceae), *Blumea* 45: 377–396 (2000).

Pedicle 2–7 mm long; stipe of apocarp 3–10 mm long; midvein of younger leaves pubescent on upper surface

1. *C. micranthum*

Pedicle 18–22 mm long; stipe of apocarp 12–20 mm long; leaf midvein glabrous or nearly so on upper surface

2. *C. glabrum*

1. *Cyathostemma micranthum* (A.DC.) J.Sinclair, *Gard. Bull. Singapore* 14(2): 225–226 (1955)

Guatteria micrantha A.DC., *Mém. Soc. Phys. Genève* 5: 219 (1832) = *Mém. Anon.* 42 (1832). T: Amherst, Martaban province, Burma, *N.Wallich*; holo: K-W; iso: BM.

Stem-twining liana. Leaves: petiole 1.5–3 mm long; lamina elliptic or narrowly ovate, 3–8 cm long, 1.3–2.5 cm wide, rounded or obtuse at base, acuminate or acute at apex, glabrous above except pubescent midvein groove, sparsely pubescent below; secondary veins 8–13 pairs. Inflorescence of 2 flowers; pedicel 2–7 mm long, stellate-tomentulose; bracts ovate, 2 mm long, 3.5–4 mm wide. Sepals broadly ovate-rounded, 2–2.5 mm long, 2.5 mm wide, obtuse, pubescent outside. Petals ovate, tomentose, orange to brown; margins incurved; outer petals 4 mm long, 3 mm wide; inner petals 4.8 mm long, 3 mm wide. Stamens c. 110–120, 0.8 mm long, 0.4 mm wide; connective rounded. Carpels 25–30; ovary 1 mm long; ovules 4; stigma lobed on each side of slit. Apocarps 12–20 mm long, 12–15 mm wide, glabrous, yellow to black; stipe 3–10 mm long. Seeds 1–4. Fig. 7D–E.

Occurs from Burma to Australia. In Australia it occurs in the Kimberley, W.A., and Cape York Penin., Qld, in evergreen, semi-evergreen and deciduous vine thickets and forests. Flowers Jan.–Feb. & June; fruits Jan.–Sept. Map 34.

W.A.: Tributary of Camp Ck, Mitchell Plateau, N Kimberley, *K.F.Kenneally 7787* (BRI, PERTH); 13.5 km NE of Crystal Mead, SW Osborne Is., Kimberley Coast, *K.F.Kenneally 10856* and *B.P.M.Hyland* (BRI, PERTH). Qld: Claudie R., *B.Hyland 6634* (BRI, QRS); 4 km S of Cape York, *D.L.Jones 2236* (BRI, CBG, DNA, L, MEL, NSW); Galloways Ck, *L.J.Webb* & *J.G.Tracey 6082* (BRI).

2. *Cyathostemma glabrum* (Span.) Jessup ex Utteridge, *Blumea* 45: 385 (2000)

Uvaria glabra Span., *Linnaea* 15: 162 (1841). T: Timor, *J.B.Spanoghe*; holo: L.

Stem-twining liana. Leaves: petiole 3–5 mm long; lamina elliptic, ovate or obovate, 6–17 cm long, 2.5–6 cm wide, rounded or obtuse at base, acuminate at apex, nearly glabrous above, glabrescent below; secondary veins 8–12 pairs. Flower solitary; pedicel 18–22 mm long, pubescent, glabrescent; bracts narrowly ovate or obovate, 2–3 mm long, 1–1.5 mm wide. Sepals broadly ovate, 3.8–4 mm long, 3.3–3.5 mm wide, acute or obtuse, pubescent outside, glabrous inside. Petals broadly or depressed-ovate, puberulous, greenish; margins incurved;

outer petals 6 mm long, 7 mm wide; inner petals 5–7 mm long, 4.5 mm wide. Stamens c. 100–110, 1.5 mm long, 0.6 mm wide; connective rounded. Carpels c. 35; ovary 1.7 mm long; ovules 5; stigma lobed on each side of slit. Apocarps 10–16 mm long, 10–15 mm wide, glabrous, purple-black; stipe 12–20 mm long. Seeds 1–3. Fig. 7F–H.

Occurs on Timor and in the Kimberley, W.A., and in N.T., in mostly coastal semideciduous notophyll vine forests and deciduous vine thickets. Flowers Jan.–Feb.; fruits Apr.–May. Map 35.

W.A.: Mt Trafalgar, NW Kimberley coast, *K.F.Kenneally 10763* & *B.P.M.Hyland* (BRI, PERTH); 2.4 km N of Augustus Point, Augustus Is., Bonaparte Archipelago, *K.F.Kenneally 10924* & *B.P.M.Hyland* (BRI, PERTH). N.T.: Carpentaria Is h (North Is., Sir Edward Pellew Group), *R.Brown iter Austral. 4922* (BM); Condor Point, Melville Is., *J.Russell-Smith 2389* & *D.Lucas* (BRI, DNA); 20 km S of Ramingining, Arnhem Land, *J.Russell-Smith 2663* & *D.Lucas* (DNA).

7. XYLOPIA

Xylopia L., *Syst. Nat.* 10th edn, 1241, 1250, 1378 (1759), *nom. cons.*; from the Greek *xylopikron* (bitter wood), referring to the wood of some species.

Type: *X. muricata* L.

Trees or shrubs, unarmed, with simple hairs. Flowers bisexual, axillary, solitary or in pairs or (not in Australia) in multiflowered cymes or fascicles. Sepals valvate in bud, shortly or largely connate at base. Petals 6, both series valvate in bud, concave inside above base; inner series shorter and narrower than outer. Stamens mostly linear-oblong with connective above dilated; anther cells transversely septate. Pollen grains united in tetrads. A few staminodes present adjacent to the carpels. Carpels few to many, ovules 1–many; style and stigma linear to clavate. Apocarps follicular, dehiscent on one side, or (not in Australia) indehiscent, stipitate. Seeds 1–several, arillate.

The only pantropical genus in the family, it includes about 160 species with at least 60 in Africa, more than 50 in America and about 42 in Asia. Two endemic species in Australia.

L.S.Smith, New species of and notes on Queensland plants, *Proc. Roy. Soc. Queensland* 67: 29–30 (1956).

Branchlets and midvein of leaf on upper surface villous; outer petals 28–32 mm long; apocarps tomentose outside; seeds mostly 6–8

1. *X. macleayae*

Branchlets puberulous; midvein of leaf glabrous on upper surface; outer petals 7.5–8.5 mm long; apocarps glabrous outside; seed 1

2. *X. monosperma*

1. *Xylopia macleayae* (F.Muell.) L.S.Sm., *Proc. Roy. Soc. Queensland* 67: 29 (1956)

Melodorum macleayae F.Muell., *Fragm.* 6: 176 (1868), as *macleayi*; *Fissistigma macleayae* (F.Muell.) Merr., *Philipp. J. Sci. Bot.* 15: 133 (1919). T: Rockingham Bay, Qld, *J.Dallachy*; holotype: MEL; iso: BRI.

Tree to 10 m high. Shoots with silky hairs; branchlets villous with long and short hairs. Leaves: petiole 1–2 mm long; lamina ovate or elliptic, 3–11 cm long, 1.2–3.8 cm wide, rounded at base, acute or acuminate at apex, glabrous above except villous midvein, pubescent below; secondary veins 11–14 pairs. Flowers solitary or paired; peduncle 8–10 mm long; pedicel 6 mm long; bracts broadly ovate, pubescent. Sepals depressed-ovate, 4 mm long, 5 mm wide, pubescent. Petals yellowish green. Outer petals oblong to linear, trigonous but channelled inside, 28–32 mm long, 5–6 mm wide. Inner petals oblong, trigonous above basal concavity, 25–28 mm long, 3.5 mm wide. Stamens 130–140, 2 mm long, 1 mm wide; connective apiculate. Carpels 6 or 7; ovary 2 mm long; ovules 9–11; style and stigma 2.8 mm long. Apocarps up to 7, ellipsoidal, 3–3.5 cm long, 2.2–2.5 cm wide, brown-tomentose outside, mesocarp-endocarp red, surrounding seeds; stipe 10 mm long. Seeds mostly 6–8, transverse, ovoid, smooth, dark brown; aril white. $2n = 16$, *fide* W.Morawetz *loc. cit.* Plate 5; Fig. 7I.

Occurs from the Nesbit R. to S of Proserpine, Qld, in several types of notophyll and mesophyll vine forest at low and medium altitudes. Flowers Mar.; fruits Dec.–Jan. Map 36.

Qld: S.F.R. 1073, Kuranda, *S.J.Dansie 1918* (BRI); S.F.R. 933, *B.Hyland 3484 R.F.K.* (BRI, QRS); Daintree R., *S.F.Kajewski 1470* (BRI); Conway State Forest, 9 km SE of Airlie Beach, *W.J.F.McDonald 5847 & I.G.Champion* (BRI); Mickies Pocket, Clohesy R., *G.Sankowsky 250* (BRI).

2. *Xylopia monosperma* Jessup, *Fl. Australia* 2: 448 (2007)

T: Grown in cultivation, Tolga, collected Weipa, near Andoom Ck, Qld, 17 Sept. 1990, *G.Sankowsky 1103 & N.Sankowsky*; holotype: BRI.

Xylopia sp. Melville Island (J.Russell-Smith 2148), I.D.Cowie & D.A.Albrecht (eds), *Checklist N. Terr. Vasc. Pl. Sp.* 5 (2005)

Miliusa D30127, D.T.Liddle *et al.*, *Atlas Vasc. Rainforest Pl. N. Terr.* 122 (1994)

Miliusa D30127 Melville Island, C.R.Dunlop *et al.*, *Checklist Vasc. Pl. N. Terr.* 18 (1995)

Xylopia sp. Bertiehaugh Homestead (C.Dalliston CC173), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 16 (2002)

Tree to 10 m high. Shoots puberulous; branchlets puberulous, glabrescent. Leaves: petiole 3–4.5 mm long; lamina ovate or elliptic, 4–9 cm long, 1.4–3.8 cm wide, acute or obtuse at base, acute at apex, glabrous above, sparsely appressed-puberulous below; secondary veins 9–12 pairs. Flowers mostly solitary; peduncle 1 mm long; pedicel 2–2.5 mm long; bracts depressed-ovate, pubescent. Sepals depressed-ovate, 2 mm long, 2.3 mm wide, pubescent. Petals yellowish green. Outer petals triangular or ovate, incurved at base, 7.5–8.5 mm long, 4.5–5 mm wide. Inner petals elliptic with a concave or saccate base, 3.2 mm long, 2.2 mm wide. Stamens 45–55, 0.6 mm long, 0.3 mm wide; connective rounded. Carpels 6; ovary 0.5 mm long; ovule 1; style and stigma incurved, 0.5–0.6 mm long. Apocarps usually 2–5, obliquely obovoid, 2–2.4 cm long, 1.4–1.8 cm wide, glabrous, red inside and out. Seed 1, ellipsoidal, smooth, black, attached near base of carpel; aril white. Fig. 7J–L.

Occurs on Cape York Penin. S to near Mt Tozer, Qld, in evergreen and semideciduous notophyll vine forest and open forest and on Melville Island, N.T. (single sterile specimen). Flowers June–Sept.; fruits July–Nov. Map 37.

N.T.: Hangrana Jungle, Melville Is., *J.Russell-Smith 8143 & D.Lucas* (BRI). Qld: 6 km upstream from McHenry R. confluence, Jardine River Natl Park, *D.G.Fell, DF 521* (BRI); Heathlands, *B.Hyland 3981 R.F.K.* (BRI, QRS); Puffdelooney Ridge, *B.Hyland 2741 R.F.K., 10823* (BRI, QRS); Brown Ck crossing, Portland Roads road, *L.W.Jessup 825* (BRI).

8. GONIOTHALAMUS

Goniothalamus (Blume) Hook.f. & Thomson, *Fl. Ind.* 1: 105 (1855); from the Greek *gonia* (a corner or angle) and *thalamus* (an inner room or chamber) referring to the cap formed by the coherent inner petals.

Polyalthia sect. *Goniothalamus* Blume, *Fl. Javae (Anonaceae)* 71 & 79 (1830). T: *G. macrophyllus* (Blume) Hook.f. & Thomson

Small or sometimes tall trees, unarmed, with simple hairs. Inflorescence axillary, ramal or cauline, internodal or terminal, cymose, flowers often solitary. Flowers bisexual, pedicellate; bracts basal. Sepals valvate in bud, free or shortly connate at base. Petals 6, in 2 dissimilar series, valvate in bud; outer petals flat, free, spreading; inner petals smaller, coherent along broad distal margins, free and clawed shortly above base, forming a vaulted cap or cone, falling intact at anthesis. Stamens linear, oblong or slightly tapered; connectives broad, convex or (not in Australia) truncate or conical; anthers transversely septate. Pollen in polyads. Carpels several; style distinct; stigma funnel-shaped or (not in Australia) bifid; ovules usually 1 or 2. Apocarps sessile or shortly stipitate, indehiscent. Seeds 1 or 2, puberulous.

A genus of about 105 species from India and Ceylon to Melanesia and Australia. One endemic species in Australia.

N.T.Ban, on the taxonomy of the genus *Goniothalamus* (Blume) Hook.f. & Thomson (Annonaceae) [part] 1. *Bot. Žurn. (Moscow & Leningrad)* 59(4): 547–555 (1974); [part] 2. *Bot. Žurn. (Moscow & Leningrad)* 59(5): 660–672 (1974) (in Russian).

***Goniothalamus australis* Jessup, *Austrobaileya* 2(3): 224–226 (1986)**

T: Lamins Hill, c. 12 km E of Malanda, Atherton Tableland, Qld, 12 Dec. 1984, *L.W.Jessup* 764; holo: BRI; iso: A, BRI, K, L, MO, P, QRS, U.

Illustration: Jessup *loc. cit.* fig 1.

Tree to 30 m. Shoots appressed-pubescent; branchlets glabrescent. Leaves: petiole 3–10 mm long; lamina elliptic to narrowly obovate, 5–12 cm long, 2–5 cm wide, shortly attenuate, slightly recurved on margins, obtuse or acute, glabrous above, glabrescent below; secondary veins 9–12 pairs. Flowers solitary, rarely paired, axillary or ramal; pedicel 15–20 mm long, glabrescent; bracts 3–5, ovate, 1 mm long, caducous. Sepals triangular, 7–8 mm long, 6–6.5 mm wide, acute, glabrescent. Petals green to orange. Outer petals ovate, laterally recurved, apically incurved, 25–35 mm long, 16–21 mm wide, appressed-puberulous. Inner petals rhombic, 10–12 mm long, 7–9 mm wide, concave and glabrous inside, appressed-puberulous outside. Stamens c. 75–80, 1.4 mm long. Carpels 9–13; ovary 2.5–2.7 mm long, glabrous; ovules 5–7; stigma with adaxial slit, hispid. Apocarps ellipsoidal or obloid, 3–6 cm long, 1.5–2.5 cm wide obtuse or apiculate, green; stipe 2–6 mm long. Seeds usually 2–4, obloid or ovoid, red-brown. $2n = 16$; *fide* W.Morawetz *loc. cit.* Fig. 8B.

Occurs in NE Qld from Mt Finnigan to Malanda, Atherton Tableland, in upland mesophyll and submontane notophyll vine forest. Flowers Nov.–Mar.; fruits Aug.–Nov. Map 38.

Qld: end of Mt Lewis road, *L.S.Smith* 10076 (BRI); S.F.R. 143, South Mary L.A., near Mt Lewis, *B.Gray* 1264 (BRI, QRS); Timber Reserve 1230, Boonjee, *A.K.Irvine* 425 (BRI, QRS); Lamins Hill, c. 12 km E of Malanda, *G.Sankowsky* 291 (BRI); along road SE of Tarzali and S of Bartletts Hill, *J.G.Tracey* 14973 (BRI, QRS).

9. CANANGA

Cananga (DC.) Hook.f. & Thomson, *Fl. Ind.* 1: 129 (1855), *nom. cons.*; after the native name for *C. odorata* in Malesia.

Unona L. sect. *Unonaria* DC. ser. *Cananga* DC., *Prodr.* 1: 90 (1824). T: *C. odorata* (Lam.) Hook.f. & Thomson

Canangium Baill., *Hist. Pl.* 1: 213 (1868), orth. var.

Fitzgeraldia F.Muell., *Fragm.* 6: 1 (1867). T: *F. mitrastigma* F.Muell.

Medium to tall trees, unarmed, with simple hairs. Flowers bisexual in axillary cymes terminating a branchlet. Sepals valvate in bud, connate at base, reflexed. Petals 6, in 2 similar series, spreading or drooping, free. Stamens linear; connective broad, concealing anther cells and produced into an acute or apiculate cone bearing minute erect emergences. Pollen grains coherent in loose tetrads. Carpels to 15; ovules to 14, biseriate; style slender with clavate stigma; stigmas conglutinated at anthesis. Apocarps indehiscent, stipitate, obloid. Seeds up to 12, transversely compressed.

A genus of 2 species, 1 distributed from Burma to Indo-China, the other from Burma to Melanesia and Australia.

***Cananga odorata* (Lam.) Hook.f. & Thomson, *Fl. Ind.* 1: 130 (1855)**

Uvaria odorata Lam., *Encycl.* 1: 595 (1785); *Canangium odoratum* (Lam.) King, *J. Asiat. Soc. Bengal, Pt 2, Nat. Hist.* 61: 41 (1892). T: China, *P.Sonnerat*; syn: *P n.v.*

Fitzgeraldia mitrastigma F.Muell., *Fragm.* 6: 1 (1867); *Canangium mitrastigma* (F.Muell.) Domin, *Biblioth. Bot.* 89: 670 (1925). T: Rockingham Bay, Qld, *J.Dallachy*; not located.

Tree to 30 m high. Shoots pubescent with pale brown hairs; branchlets glabrescent. Leaves: petiole 1–1.7 cm long; lamina ovate, sometimes oblong, 8–20 cm long, 3.5–9 cm wide, rounded, truncate or obtuse, and slightly asymmetrical at base, acuminate or acute at apex, glabrescent; secondary veins 8–11 pairs. Cymes of few to c. 20 flowers. Pedicel 2.5–5 cm long; bracts narrowly ovate, 1.5–3 mm long. Sepals broadly ovate, 4–6 mm long, 5 mm wide, tomentellous; margins recurved. Petals linear, flat, tomentellous near base, elsewhere

puberulous, pale greenish yellow; outer petals mostly 60–90 mm long, 4–7 mm wide; inner petals slightly smaller. Stamens c. 130–170, 1.8–3 mm long. Carpels c. 10–15; ovary nearly glabrous; ovules 10–14; stigma puberulous. Apocarps ovoid or subglobose, 1.5–2.5 cm long, 1.5 cm wide, black; stipe 1–2 cm long. Seeds 2–12, irregularly discoid, rugulose, pitted, brown. $2n = 16$; *vide* W.Morawetz *loc. cit.* Fig. 8A.

Occurs from Burma to Melanesia and in Australia from Torres Strait to the Tully R., Qld, mostly on the margins of lowland rainforest and in secondary forest. Flowers Sept.–May; fruits Mar.–June. Map 39.

Qld: Iron Ra., *L.J.Brass 19152* (BRI); Rocky R. (lower reaches), *B.Hyland 6859* (BRI, QRS); Goldsborough State Forest, *L.W.Jessup 605* (BRI, DNA, L, MO, U); 2 km W of Middle Claudie R. on Portland Roads road, *L.W.Jessup 789* (BRI, MO, IBSC, SAN, U); Daintree R. bank, *L.S.Smith 14517* (BRI).

Widely cultivated in tropical regions as a perfume plant ‘ylang-ylang’. An aromatic oil is distilled from the flowers and used in perfumes.

10. PSEUDUVARIA

Pseuduvaria Miq., *Fl. Ned. Ind.* 1(2): 32 (1858); from the Greek *pseudes* (false) and *Uvaria*, a genus of Annonaceae.

Type: *P. reticulata* (Blume) Miq.

Trees or shrubs, unarmed, with simple hairs. Flowers unisexual, plants dioecious or (not usually in Australia) monoecious, axillary, cauline or ramal, solitary or many in fascicles or contracted cymes, mostly on slender pedicels, with basal and suprabasal bracts. Sepals valvate in bud, connate at base. Petals 6, valvate, in 2 strongly dissimilar series; outer petals spreading; inner petals coherent at anthesis by the margins of a rhombic or trowel-shaped blade above a narrow claw and forming a vaulted cap or dome. Male flowers: stamens c. 60 (in Australia), wedge-shaped; connective flat-topped, concealing anthers; pollen in tetrads; carpels absent. Female flowers: staminodes 6–18 (in Australia); carpels numerous; ovules few; stigma sessile, depressed-capitate with adaxial radial slit. Apocarps sessile (in Australia), indehiscent. Seeds 1–few, transverse, ellipsoidal with a medial groove. $2n = 18$ (3 Australian species studied); *vide* W.Morawetz *loc. cit.*

A genus of about 38 species distributed through Burma, Indo-China and Malesia to Australia. Four species in Australia, all endemic.

L.W.Jessup, The genus *Pseuduvaria* Miq. (Annonaceae) in Australia, *Austrobaileya* 2(4): 307–313 (1987); Y.C.F.Su & R.M.K.Saunders, Pollen structure, tetrad cohesion, and pollen-connecting threads in *Pseuduvaria* (Annonaceae), *Bot. J. Linn. Soc.* 143: 69–78 (2003).

1 Pedicels 7–32 mm long; submedial bract 1.2–3 mm long; seed testa rugose

2 Flowers numerous in cauline or ramal fascicles, sometimes 1–few in axils; pedicels 15–32 mm long; glands on inner petals prominently raised, discrete

2: Flowers ramal and axillary, solitary or up to 4 per fascicle; pedicels 7–11 mm long; glands on inner petals slightly raised, contiguous

1: Pedicels 30–50 mm long; submedial bract 0.5–1 mm long; seed testa scrobiculate

3 Sepals broadly ovate to depressed-ovate, 1.5–2.2 mm long; outer petals obovate, suborbicular or depressed-obovate, obtuse or very shortly acuminate, 6–8 mm long and wide; leaf undersurface and petiole puberulous, glabrescent

3: Sepals ovate or triangular, 2.5–4 mm long; outer petals broadly ovate, acute or acuminate, 10–15 mm long, 8–10 mm wide; leaf undersurface and petiole villous

1. *P. froggattii*

2. *P. hylandii*

3. *P. mulgraveana*

4. *P. villosa*

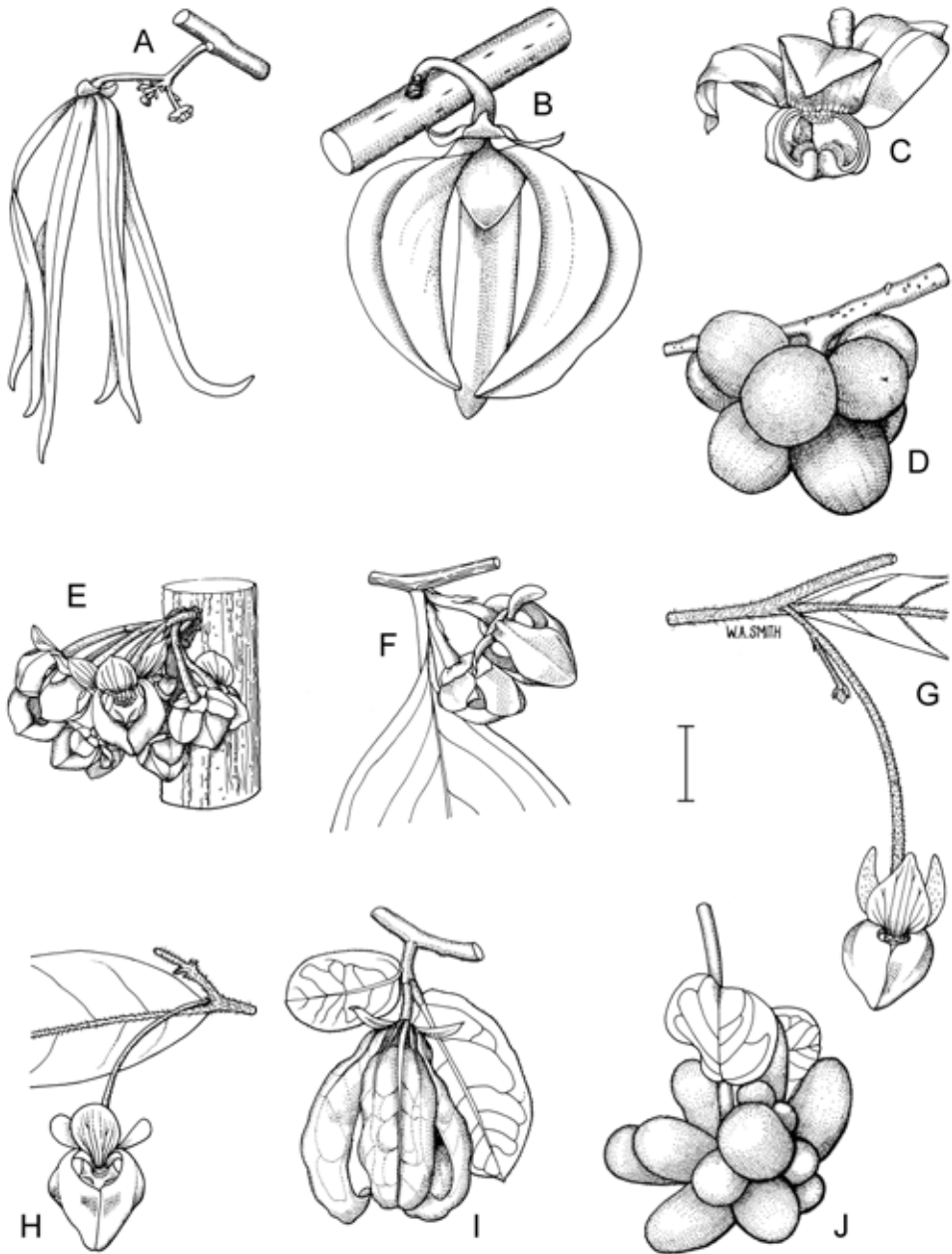


Figure 8. A, *Cananga odorata*, inflorescence (L.W.Jessup 764, BRI). B, *Goniothalamus australis*, flower (L.W.Jessup 605, BRI). C–D, *Mitrephora diversifolia*. C, flower (L.W.Jessup 809, BRI); D, fruit (D.Jones 2310, BRI). E, *Pseuduvaria froggattii*, inflorescence (L.W.Jessup 546, BRI). F, *Pseuduvaria hylandii*, inflorescence (B.Gray 731, BRI). G, *P. villosa*, inflorescence (L.W.Jessup 472, BRI). H, *P. mulgraveana* var. *mulgraveana*, flower (L.W.Jessup 746, BRI). I–J, *Fitzalania bidwillii*. I, flower (L.W.Jessup 586, BRI); J, fruit (G.Batianoff 11683, BRI). Scale bar: A–C, E–I = 10 mm; D, J = 20 mm. Drawn by W.A.Smith.

1. *Pseuduvaria froggattii* (F.Muell.) Jessup, *Austrobaileya* 2(3): 227 (1986)

Mitrephora froggattii F.Muell., *Australas. J. Pharm.* 2: 3 (1887). T: Mossman River, Qld, 1886, *W.Sayer 145* & *W.Froggatt*; syn: MEL.

Illustration: L.W.Jessup, *Austrobaileya* 2 (4): 309 fig 1. (1986).

Tree to 8 m high. Shoots pubescent, glabrescent. Leaves: petiole 4–10 mm long; lamina elliptic to lanceolate, 10–30 cm long, 3–9 cm wide, obtuse or rounded, rarely acute at base, acuminate at apex, glabrous; secondary veins 7–10 pairs. Flowers numerous in cauline or ramal fascicles, sometimes 1–few in axils; pedicel 15–32 mm long; bracts 1.2–2 mm long, puberulous. Sepals broadly ovate or suborbicular, 2–3 mm long, obtuse or acuminate. Outer petals broadly obovate to suborbicular, 9–9.5 mm long, 7.5–8 mm wide, obtuse or rounded, puberulous outside, white. Inner petals 8.5–12 mm long; dome 9–12 mm diam.; blade 7–12 mm wide, puberulous outside, crimson, fading towards base; glands prominently raised. Male flowers: stamens 0.6–1.1 mm long. Female flowers: carpels c. 38, pilose; ovules 2 or 3. Apocarps obovoid, ellipsoidal or ovoid, 15–20 mm long, puberulous, orange-yellow. Seeds 1 or 2; testa rugose, brown. Fig. 8E.

Occurs from Melissa Ck, N of Cape Tribulation to Black Mtn, N of Kuranda, Qld, in mesophyll vine forest of lowlands and foothills. Flowers Sept.–Dec.; fruits Dec.–Jan. Map 40.

Qld: Oliver Ck, *B.Gray 1540* (BRI, QRS); near entrance to Mossman Gorge Natl Park, near Mossman R., *L.W.Jessup 543* (BRI, U); Pilgrim Sands, NW of Cape Tribulation, *L.W.Jessup 611* (BRI, K, L, MEL, MO); *loc. id.* *L.W.Jessup 612* (BRI, K, L, MO, QRS, U); Stewart Ck, upper Daintree, *G.Sankowsky 248* & *N.Sankowsky* (BRI).

2. *Pseuduvaria hylandii* Jessup, *Austrobaileya* 2(4): 308–310 (1987)

T: Timber Reserve 1230, Boonjee Logging Area, Qld, 6 Oct. 1977, *B.Gray 731*; holo: BRI; iso: QRS.

Illustration: L.W.Jessup *loc. cit.* fig 1.

Tree to 13 m high. Shoots puberulous, glabrescent. Leaves: petiole 4–15 mm long; lamina lanceolate, elliptic or oblanceolate, 6–20 cm long, 2–6 cm wide; acute, sometimes obtuse at base, acuminate or acute at apex, glabrous; secondary veins 7–10 pairs. Flowers ramal and axillary, solitary or up to 4 per fascicle. Pedicel 7–11 mm long; bracts 2–3 mm long, puberulous. Sepals depressed-ovate, 2–3.5 mm long, shortly acuminate, puberulous outside. Petals pink to purple or red. Outer petals broadly or depressed-ovate or suborbicular, 5.5–6 mm long, 6–7 mm wide, obtuse or rounded, pubescent outside. Inner petals 9.5–14 mm long; dome 8–10 mm diam; blade 6.5–8 mm wide; glands slightly raised, contiguous. Male flowers: stamens 0.7–1 mm long. Female flowers: carpels c. 28, pilose; ovules 2. Apocarps obovoid or subglobular, 17–23 mm long, puberulous, orange yellow. Seeds 1 or 2; testa rugose, brown. Fig. 8F.

Occurs only in the upper catchments of the Russell and Mulgrave Rivers, NE Qld, in mesophyll vine forest. Flowers Sept.–Oct.; fruits Dec.–Feb. Map 41.

Qld: Timber Reserve 1230, Boonjee Logging Area, *B.Hyland 3443 RFK* (BRI, QRS); W Mulgrave R., 13.3 km S of Goldsborough State Forest picnic area, *L.W.Jessup 536* (BRI); Mt Bartle Frere, E side, *G.Sankowsky 457* & *N.Sankowsky* (BRI).

3. *Pseuduvaria mulgraveana* Jessup, *Austrobaileya* 2(4): 310–312 (1987)

T: Goldsborough State Forest, Mulgrave R., Qld, 11 Dec. 1984, *L.W.Jessup 746*; holo: BRI; iso: K, L, QRS.

Illustration: L.W.Jessup, *loc. cit.* fig 2.

Tree to 7 m high. Shoots puberulous or villous with light brown hairs. Leaves: petiole 2–4 mm long; lamina lanceolate, oblanceolate, obovate or elliptic, 5–16 cm long, 2–7 cm wide, rounded or slightly cordate and asymmetric at base, acuminate or acute at apex, puberulous or glabrous above, sparsely puberulous below; secondary veins 7–10 pairs. Flowers solitary, axillary; pedicel 30–40 mm long, puberulous; bract 0.5–1 mm long. Sepals broadly ovate to depressed-ovate, 1.5–2.2 mm long, obtuse, acute or shortly acuminate, puberulous outside. Petals white tinged pink. Outer petals obovate, depressed-obovate or suborbicular, 6–8 mm long and wide, obtuse or very shortly acuminate, puberulous outside. Inner petals 10–14 mm

long; dome 8–10 mm diam.; blade 10–12 mm wide; glands discrete, crimson. Male flowers: stamens 1.1–1.3 mm long. Female flowers: carpels c. 28, pilose; ovules 1 or 2. Apocarps obovoid, 15–22 mm long, rounded or shortly pointed, puberulous, orange. Seeds 1 or 2; testa scrobiculate, red-brown.

Occurs from N of Kuranda to Miriwinni, near Mt Bartle Frere, N Qld. There are 2 varieties.

Branchlets and petioles villous; leaf lamina sparsely puberulous on both surfaces and densely pubescent along veins on lower surface

3a. var. *mulgraveana*

Branchlets and petioles sparsely puberulous; leaf lamina glabrescent

3b. var. *glabrescens*

3a. *Pseuduvaria mulgraveana* Jessup var. *mulgraveana*

Shoots, branchlets and petioles villous. Leaf lamina sparsely puberulous on upper surface, slightly more densely so on intervenium of lower surface and densely pubescent along veins of lower surface. Fig. 8H.

Occurs from the Mulgrave R. to Miriwinni, Qld, in mesophyll vine forest on alluvial terraces and footslopes. Map 42.

Qld: Natl Park Reserve 226 (Harvey Ck), *B.Hyland* 5787 (BRI, QRS); Goldsborough State Forest, Mulgrave R., *L.W.Jessup* 607 (BRI, CANB, K, L, MO, QRS); Miriwinni, near Mt Bartle Frere, *L.J.Webb* & *J.G.Tracey* 6680 (BRI).

3b. *Pseuduvaria mulgraveana* var. *glabrescens* Jessup, *Austrobaileya* 2(4): 312 (1987)

T: near Shoteel Ck, Clohesy R., Qld, 27 Nov. 1984, *L.W.Jessup* 590; holotype: BRI; isotype: A, BRI, CANB, K, L, MEL, MO, NSW, QRS, U.

Shoots puberulous; branchlets and petioles sparsely puberulous. Leaf lamina nearly glabrous on upper surface, glabrescent on lower surface. Plate 7.

Occurs from N of Kuranda to the Little Mulgrave R., Qld, along the footslopes to midslopes of the Lamb Ra. and around L. Tinaroo in notophyll vine forest. Flowers Nov.–Mar.; fruits June–Dec. Map 43.

Qld: S.F.R. 607, *B.Hyland* 3795 (BRI, QRS); S.F.R. 675, E Mulgrave Logging Area, *B.Hyland* 9253 (BRI, QRS); State Forest 185, Danbulla, *L.W.Jessup* 538 (BRI); Black Mountain road, N of Kuranda, *G.Sankowsky* 546 (BRI); Davies Ck, *L.J.Webb* & *J.G.Tracey* 7382 (BRI, CANB, QRS).

4. *Pseuduvaria villosa* Jessup, *Austrobaileya* 2(4): 312–313 (1987)

T: Crawford's Lookout to Tchupalla Falls track, Palmerston Natl Park, N Johnstone R., Qld, 15 Feb. 1982, *L.W.Jessup* 472 & *J.G.Tracey*; holotype: BRI.

Illustration: *L.W.Jessup loc. cit.* fig 2.

Shrub or small tree to 4 m high. Shoots villous with pale brown hairs. Leaves: petiole 2–4 mm long; lamina oblanceolate or obovate, 8–20 cm long, 2–7 cm wide, rounded or slightly cordate at base, acuminate, obtuse or acute at apex, villous or pubescent above, villous below; secondary veins 8–10 pairs. Flowers solitary or 2 or 3 maturing successively, axillary; pedicel 30–58 mm long, villous; bract 0.8–1 mm long. Sepals ovate or triangular, 2.5–4 mm long, acute or acuminate, pubescent outside. Petals white tinged pink. Outer petals broadly ovate, 10–15 mm long, 8–10 mm wide, acute or acuminate, pubescent outside. Inner petals 11–15 mm long; dome 13–16 mm diam.; blade 12–16 mm wide; glands discrete, crimson. Male flowers: stamens 1.1–1.3 mm long. Female flowers: carpels c. 40, pilose; ovules 1 or 2. Apocarps obovoid or ellipsoidal, 15–20 mm long, puberulous, orange. Seeds 1 or 2; testa scrobiculate, red-brown. Fig. 8G.

Occurs from the N Johnstone R. to Liverpool Ck, N Qld, in complex mesophyll vine forest. Flowers Dec.–May; fruits June–Feb. Map 44.

Qld: Mena Ck, adjacent to Donkin Rd, *S.Gleed* SG100 (BRI); Earls Court, Jarra Ck, Land Command Battle School, Tully, *R.L.Jago* 6251 (BRI); Liverpool Ck, W of Silkwood, *L.W.Jessup* 733 (BRI); Palmerston Natl Park, N Johnstone R., *L.W.Jessup* 745 (BRI); Gregory Falls, lower Palmerston Hwy via Innisfail, *L.J.Webb* & *J.G.Tracey* 6595 (BRI).

ANNONACEAE

11. MITREPHORA

Mitrephora (Blume) Hook.f. & Thomson, *Fl. Ind.* 1: 112 (1855); from the Greek *mitra* (a head dress) and *phoretos* (to bear or to wear) in reference to the shape and presentation of the inner petals.

Uvaria sect. *Mitrephorae* Blume, *Fl. Javae (Anonaceae)* 13 (1830). T: *M. obtusa* (Blume) Hook.f. & Thomson

Trees or shrubs, unarmed, with simple hairs. Shoots with shining reddish brown hairs, soon glabrescent. Flowers bisexual, solitary or few on simple bracteate leaf-opposed axes, sometimes (not in Australia) internodal or terminal; peduncle sometimes persistent and woody; pedicel with medial bract. Sepals valvate, shortly connate at base. Petals valvate; outer petals broad-based, flat, spreading; inner petals connivent with a broad angular-obovate or spade-shaped blade and long narrow basal claw; blade margins coherent. Stamens wedge-shaped with a broad truncate connective concealing anther cells; pollen grains solitary. Carpels mostly numerous; stigma sessile or subsessile, obovoid or subglobose; ovules several. Apocarps fleshy, indehiscent, subglobose, obovoid or oblong, pubescent, yellow. Seeds several, lozenge-shaped or plano-convex.

A genus of about 40–50 species throughout SE Asia from India and Sri Lanka to Australia. One species in Australia.

***Mitrephora diversifolia* (Span.) Miq., *Fl. Ned. Ind.* 1(2): 32 (1858)**

Uvaria diversifolia Span., *Linnaea* 15: 163 (1841). T: Timor, *J.Spanoghe*; isolecto: L, MEL.

Mitrephora zippeliana Miq., *Ann. Mus. Bot. Lugduno-Batavum* 2: 27 (1865). T: Amboina [Ambon], *A.Zipelius*; lecto: L; isolecto: L.

Tree to 15 m high. Leaves: petiole 4–6 mm long; lamina ovate, 8–30 cm long, 3–9 cm wide, rounded or obtuse, sometimes acute and asymmetrical at base, acuminate at apex, glossy above, glabrescent below; secondary veins mostly 9–11 pairs. Flowers solitary; peduncles persistent, up to 15 mm long; pedicel 4–6 mm long. Sepals depressed-ovate, 4 mm long, 5 mm wide, acuminate, densely pubescent. Outer petals obovate, 18–22 mm long, 13–15 mm wide, acute or obtuse, pubescent outside, nearly glabrous inside, cream. Inner petals puberulous outside; blade spade-shaped or hastate with incurved margins, 5 mm long, 7 mm wide, densely pilose and 3–5-channelled inside, mauve-pink on blade, fading to cream on claw; claw 9–10 mm long, 2.5–3.5 mm wide, sparsely pilose inside. Stamens 70–85, 1 mm long, 0.7 mm wide. Carpels 10–14; ovary 1.5 mm long; ovules 10; stigma granulate. Apocarps sessile, obovoid, 2–3 cm long, 1.2–2 cm wide. Seeds 1–8. Fig. 8C–D.

Occurs on Cape York Penin., Qld, S to McIlwraith Ra. in complex and semi-deciduous mesophyll vine forests. Also occurs on Ambon and probably also New Guinea. Flowers mostly Oct.–Mar., also July, Sept.; fruits Feb. Map 45.

Qld: NE side of Lamond Hill, Iron Ra., *L.W.Jessup* 809 (BRI); beside Cape York Track, c. 1 km S of Rona Flats, *D.L.Jones* 2310 (BRI); Lockerbie, Cape York Penin., *B.Hyland* 2527 (BRI); Scrubby Ck, 6 miles [9.6 km] N of Rocky R., *B.Hyland* 5466 (BRI, QRS); Gordon Ck, *B.Hyland* 12453 (BRI, QRS).

12. HAPLOSTICHANTHUS

Haplostichanthus F.Muell., *Victorian Naturalist* 7: 180 (1891); from the Greek *haploos* (single or simple), *stichos* (a row of things) and *anthos* (flower), referring to the petals of the flower being combined in a single whorl.

Type: *H. johnsonii* F.Muell.

Shrubs, unarmed, with simple hairs. Flowers bisexual, axillary, supra-axillary or leaf-opposed, solitary, sometimes ramal or cauline in cymose fascicles. Sepals valvate in bud, connate at base. Petals valvate in 2 similar or slightly dissimilar series, both series shortly connate at base into a single whorl, convex outside, flat inside; outer petals spreading; inner

petals remaining connivent after anthesis or rarely spreading. Stamens wedge-shaped with a truncate connective. Pollen grains solitary. Carpels few or numerous; ovules 1 or few; stigma sessile or subsessile. Apocarps indehiscent, globose to obloid, fleshy. Seeds 1–few, discoid to subglobular, brown, surface variously undulate to rugose. $2n = 18$ (4 species studied), *vide* W.Morawetz *loc. cit.*

A genus of 5 species in Australia (all endemic) and at least 10 in Malaysia.

- | | | |
|-----------|---|---------------------------------|
| 1 | Flowers supra-axillary or opposite leaves or leaf scars; ovule 1; fruit red | 1. <i>H. fruticosus</i> |
| 1: | Flowers axillary, cauline or ramal; ovules 2 or 3; fruit black or yellow | |
| 2 | Leaves mostly bullate, reddish brown hirsute on both surfaces; fruit hirsute, black | 2. <i>H. rufescens</i> |
| 2: | Leaves not bullate, not hirsute; fruit glabrous or with a few appressed hairs | |
| 3 | Flowers cauline, ramal and axillary, solitary or in fascicles; fruit yellow | 3. <i>H. ramiflorus</i> |
| 3: | Flowers mostly axillary, solitary; fruit black | |
| 4 | Pedicle stout, c. 1.5 mm wide at midlength or flower sessile; open flower 10–15 mm between outer petal tips, outer petals 5.2–7.2 mm long | 4. <i>H. submontanus</i> |
| 4: | Pedicle slender, c. 0.8 mm wide at midlength; open flower 7–9 mm between outer petal tips, outer petals 2.5–4 mm long | 5. <i>H. johnsonii</i> |

1. *Haplostichanthus fruticosus* Jessup, *Fl. Australia* 2: 449 (2007)

T: Williams Spring, Head of Big Ck, 22.4 km NE of Bamaga, Qld, 17 Feb. 1994, *D.G.Fell DGF3784*, *J.P.Stanton & C.Roberts*; *holo*: BRI.

Haplostichanthus sp. Rocky River Scrub (P.I.Forster+ PIF10617), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 16 (2002)

[*Haplostichanthus longirostris* auct. non (Scheff.) Heusden: E.C.H. van Heusden, *Blumea* 39: 215–234 (1994), *p.p.*]

Shrub to 2 m high. Shoots and branchlets puberulous. Leaves: petiole 1–3 mm long; lamina elliptic or narrowly obovate, 4.5–15 cm long, 1.7–5 cm wide, rounded or obtuse and slightly asymmetric at base, acute, obtuse or acuminate at apex, glabrous above, sparsely appressed-pubescent, glabrescent below; secondary veins 7–12 pairs. Flowers supra-axillary or leaf-opposed, solitary or paired; peduncle 1–2 mm long; pedicel 12–16 mm long, appressed-pubescent; bracts ovate, 1 mm long. Sepals broadly ovate, 2.5–3 mm long, 3–3.5 mm wide, pubescent outside. Petals cream. Outer petals triangular, 5 mm long, 5 mm wide, sparsely pubescent outside. Inner petals oblong or angular-obovate, convex outside, slightly concave inside, 4.5–5.5 mm long, 3.2–3.5 mm wide, puberulous outside, glabrous inside. Stamens 38–40, 1.2 mm long. Carpels 9; ovary 0.8 mm long; ovule 1; stigmas coherent, angular obconical. Apocarps globular, 7–8 mm diam., red; stipe 1–3 mm long. Seed 1. Fig. 9A–D.

Occurs from Moa Is., Torres Strait, to McIlwraith Ra., Qld, in mesophyll, notophyll and microphyll vine forests and thickets. Flowers Jan.–Aug.; fruits Apr.–Oct. Map 46.

Qld: head of Hann Ck, 46.5 km from Moreton Telegraph Stn, *P.I.Forster PIF4564 & M.C.Tucker* (BRI); Tagen Hill, Moa Is., *B.Gray 5010* (QRS); Rocky R., *A.Irvine 73* (BRI, QRS); SE of Cape York, near 'Somerset', *A.Kanis 2060* (BRI, CANB); Iron Ra., *G.Sankowsky 258 & N.Sankowsky* (BRI).

2. *Haplostichanthus rufescens* Jessup, *Fl. Australia* 2: 449 (2007)

T: Crawford's Lookout to Tchupalla Falls Track, Palmerston Natl Park, N Johnstone R., Qld, 15 Feb. 1982, *L.W.Jessup 471 & J.G.Tracey*; *holo*: BRI.

Shrub or small tree to 12 m high. Shoots and branchlets reddish brown hirsute. Leaves: petiole 2–4 mm long; lamina bullate, oblanceolate or elliptic, 6–18 cm long, 1.8–5.5 cm wide, rounded and slightly asymmetric at base, acuminate or obtuse at apex, hirsute; secondary veins 6–8 pairs. Flowers axillary, solitary; pedicel 7–9 mm long, hirsute; bract 2.5–3.5 mm long. Sepals triangular, 2.5–2.8 mm long, 2.7–3 mm wide, hirsute and puberulous. Petals cream, tinged crimson on inside. Outer petals broadly ovate, 5 mm long,

4 mm wide, hirsute outside. Inner petals narrowly obovate, 5–5.5 mm long, 2.8–3 mm wide, pubescent outside; margins tomentose. Stamens c. 40, 1.2 mm long. Carpels mostly 5; ovary 1–1.2 mm long; ovules 2; stigma capitate. Apocarps subglobose or shortly obloid, 14–17 mm long, hirsute, black; stipe 4–7 mm long. Seeds 1 or 2. Plate 8; Fig. 9Q–S.

Occurs from the Mulgrave R. to Downey Ck, NE Qld, in complex mesophyll vine forest. Flowers Dec.–Feb. & June; fruits Aug.–Dec. Map 47.

Qld: S.F.R. 755, N Johnstone Logging Area, *B.Gray* 988 (BRI, QRS); Palmerston Natl Park, *G.P.Guymer* 2015 (BRI); S.F.R. 755, Elinjaa Logging Area, *B.Hyland* 3016 *R.F.K.* (BRI, QRS); Topaz, SE of Malanda, *L.W.Jessup* 521 (BRI); Goldsborough State Forest, Mulgrave R., *L.W.Jessup* 747 (BRI, QRS, L).

3. *Haplostichanthus ramiflorus* Jessup, *Fl. Australia* 2: 449 (2007)

T: 'Pilgrim Sands', NW of Cape Tribulation, Qld, 29 Nov. 1984, *L.W.Jessup* 610; holo: BRI; iso: K, L, U.

Shrub to 4 m high. Shoots pubescent; branchlets puberulous, glabrescent. Leaves: petiole 2–6 mm long; lamina lanceolate, 8–28 cm long, 2–6.5 cm wide, rounded or obtuse, asymmetric, sometimes slightly auriculate at base, acuminate at apex, glabrous; secondary veins 10–16 pairs. Flowers in cymose fascicles or sometimes solitary, cauline, ramal or axillary. Peduncle 1–10 mm long, persistent; pedicel 6–9 mm long, puberulous; bracts ovate. Perianth puberulous or tomentulose outside, glabrous inside. Sepals broadly ovate, 2.8–3.2 mm long, 3.8–4.2 mm wide. Petals cream, tinged pink on inside. Outer petals broadly ovate, 5–8 mm long, 4–6 mm wide. Inner petals oblong, 7–10 mm long, 3–4.8 mm wide, obtuse. Stamens c. 50, 1–1.3 mm long. Carpels 9–16; ovary 1.3–1.5 mm long; ovules 2 or 3; stigma capitate. Apocarps subglobose, 16–20 mm long, 10–13 mm wide, glabrescent, yellow; stipe 0–3 mm long. Seeds 1 or 2. Fig. 9M–P.

Occurs from Emmagen Ck near Cape Tribulation to Stewart Ck S of Daintree, NE Qld, in lowland complex mesophyll vine forest. Flowers Aug.–May; fruits Nov.–June. Map 48.

Qld: Reserve 79 Coopers Ck, Parish of Alexandra, *B.Gray* 2433 (BRI, QRS); 'Pilgrim Sands', NW of Cape Tribulation, *L.W.Jessup* 614 (BRI); Cape Tribulation, *W.Ryker* 1 (BRI); Stewart Ck, Upper Daintree R., *G.Sankowsky* 221 (BRI); Oliver Ck, *L.J.Webb* & *J.G.Tracey* 10895 (BRI, QRS).

4. *Haplostichanthus submontanus* Jessup, *Fl. Australia* 2: 449 (2007)

T: Catchment of Gap Creek NE of Mt Finnigan, Qld, 30 Nov. 1984, *L.W.Jessup* 632; holo: BRI.

Shrub or small tree to 7 m high. Shoots and branchlets appressed-pubescent, glabrescent. Leaves: petiole 1–3.5 mm long; lamina lanceolate, oblanceolate or ovate, 3.5–19 cm long, 0.9–6 cm wide, rounded or shortly auriculate and asymmetric at base, long acuminate at apex, glabrous above, glabrescent below; secondary veins 7–9 pairs. Flowers solitary, axillary, sessile or with stout pedicels 1.5 mm wide; bracts broadly ovate, 1.5–2 mm long. Sepals very broadly ovate, 2.5–3 mm long, 3–4 mm wide, acuminate or broadly acute, appressed-pubescent. Petals white-cream, crimson inside near base. Outer petals ovate or obovate, 5.2–7.2 mm long, 4.2–6 mm wide, obtuse. Inner petals narrowly ovate, obovate or oblong, 6.5–7.1 mm long, 3.2–4 mm wide. Stamens 35–70, 1.5 mm long. Carpels 9–15; ovary 1.2–1.5 mm long; ovules 2; stigma capitate. Apocarps ellipsoidal, 12–16 mm long, 10–13 mm wide, black, glabrous or nearly so; stipe 1–5 mm long. Seeds 1 or 2.

Occurs in NE Qld from Big Tableland S of Cooktown to Cardwell Ra. near Ravenshoe, in mesophyll and notophyll vine forest from 60–900 m altitude. There are 2 subspecies.

Flowers on pedicels 3–5 mm long

4a. subsp. **submontanus**

Flowers sessile or on pedicels to 1.5 mm long

4b. subsp. **sessiliflorus**

4a. *Haplostichanthus submontanus* Jessup subsp. **submontanus**

Shrub or tree to 7 m high. Pedicels 3–5 mm long. Outer petals puberulous outside, tomentulose on margins, glabrous inside except for a few hairs near base. Inner petals tomentulose outside and on margins, glabrous inside except for a few hairs near base. Apocarp stipe 3–5 mm long. Fig. 9E–G.

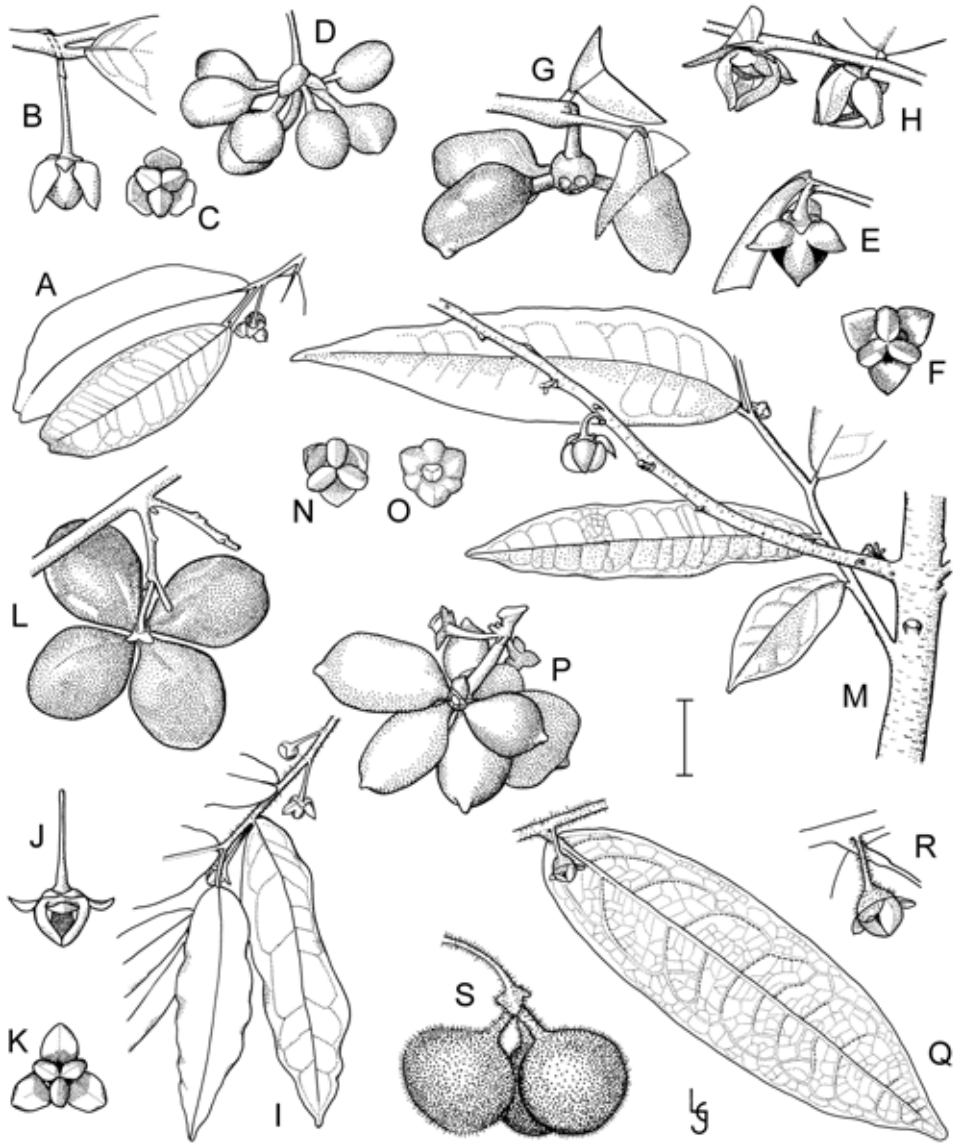


Figure 9. *Haplostichanthus*. **A–D**, *H. fruticosus*. **A**, habit; **B**, flower; **C**, flower from below (**A–C**, G.Sankowsky 1095 & N.Sankowsky, BRI); **D**, fruit (G.Sankowsky 258 & N.Sankowsky, BRI). **E–G**, *H. submontanus* subsp. *submontanus*. **E**, flower; **F**, flower from below (**E–F**, L.W.Jessup 632, BRI); **G**, fruit (L.W.Jessup 631, BRI). **H**, *H. submontanus* subsp. *sessiliflorus*, flowers (L.W.Jessup 695, BRI). **I–L**, *H. johnsonii*. **I**, habit; **J**, flower; **K**, flower from below (**I–K**, L.W.Jessup 482, BRI); **L**, fruit (L.W.Jessup 537, BRI). **M–P**, *H. ramiflorus*. **M**, habit; **N**, flower from below; **O**, corolla detached (**M–O**, L.W.Jessup 610, BRI); **P**, fruit (G.Sankowsky 345 & N.Sankowsky, BRI). **Q–S**, *H. rufescens*. **Q**, habit; **R**, flower (**Q–R**, G.Guymer 2015, BRI); **S**, fruit (B.Gray 2857, BRI). Scale bar: **A**, **I**, **M**, **Q** = 20 mm; **B–H**, **J–L**, **N–P**, **R**, **S** = 10 mm. Drawn by L.G.Jessup.

Occurs as scattered populations at Big Tableland, Mt Finnigan, Cedar Bay and from Daintree to Mossman Gorge, Qld. Flowers Nov.–May; fruits Sept.–Oct. Map 49.

Qld: Cedar Bay, *J.G.Tracey 14775* (BRI); Mt Finnigan, S of Cooktown, *L.J.Webb & J.G.Tracey 12121* (BRI); Mossman Gorge Natl Park, *L.W.Jessup 700* (BRI).

4b. *Haplostichanthus submontanus* subsp. *sessiliflorus* Jessup, *Fl. Australia* 2: 449 (2007)

T: near Curtain Fig tree, c 2 km SSW of Yungaburra, Qld, 5 Dec. 1984, *L.W.Jessup 695*; holo: BRI.

Shrub to 3 m. Pedicels 0.7–1.5 mm long. Outer petals pubescent outside, tomentulose on margins, glabrous inside or with a few hairs near base. Inner petals puberulous outside, tomentulose near tip and on margins, glabrous inside or with a few hairs near base. Apocarp stipe 1–3 mm long. Fig. 9H.

Occurs from the Mulgrave R. to the Cardwell Ra. SE of Ravenshoe, Qld. Flowers Sept.–Dec.; fruits Feb.–Aug. Map 50.

Qld: S.F.R. 191, *B.Hyland 7142* (BRI, QRS); Topaz, SE of Malanda, *L.W.Jessup 520* (BRI, K, L, MEL, QRS); Liverpool Ck, W of Silkwood, *L.W.Jessup 734* (BRI); Mt Bartle Frere, E side, *G.Sankowsky 455 & N.Sankowsky* (BRI).

5. *Haplostichanthus johnsonii* F.Muell., *Victorian Naturalist* 7: 180 (1891)

T: Mt Bartle Frere, Qld, 1891, *S.Johnson*; holo: MEL; iso: BRI, NSW.

Shrub to 4 m high. Shoots appressed-pubescent, glabrescent; branchlets hirsutellous or puberulous, glabrescent. Leaves: petiole 0.5–1.5 mm long; lamina narrowly ovate to lanceolate, 3–8 cm long, 1–2.5 cm wide, rounded and slightly asymmetric at base, acuminate at apex, glabrous above, glabrescent below; secondary veins mostly 6–9 pairs, inconspicuous. Flowers solitary, axillary; pedicel 3–11 mm long, c. 0.8 mm wide, appressed-puberulous, sometimes with a few erect hairs; bracts ovate, 0.8 mm long. Sepals triangular, incurved, 1.2–1.5 mm long, acute or acuminate, puberulous outside. Petals cream. Outer petals broadly ovate, 2.5–4 mm long, 2.5–3.5 mm wide, puberulous outside. Inner petals oblong, 3.5–5 mm long, 1.8–2.3 mm wide, obtuse, puberulous outside. Stamens c. 35–45, 0.8–1 mm long. Carpels 2–6; ovary 1 mm long; ovules 2; stigma capitate. Apocarps subglobose, 1.5–1.7 cm long, 1.2–1.5 cm wide, shiny black, glabrous or nearly so; stipe 0.5–1.5 mm long. Seeds 1 or 2. Fig. 9I–L.

Occurs on the foothills and lowlands around Mt Bellenden Kerr and Mt Bartle Frere, Qld, in complex mesophyll vine forest. Flowers Nov.–Feb.; fruits May–Dec. Map 51.

Qld: S.F.R. 755, Barong Logging Area, *B.Hyland 9289* (BRI, QRS); Portion 140, Bellenden Kerr, *B.Hyland 11391* (BRI, QRS); Goldsborough Forestry Rd, Mulgrave R. valley, *L.W.Jessup 482* (BRI, CBG, L); 1 km W of Garradunga and 14 km N of Innisfail, *L.W.Jessup 507* (BRI, K, MEL); Woopen Creek road, c. 4.5 km W of Bruce Hwy near Russell R., *L.W.Jessup 537* (BRI).

Excluded species

Haplostichanthus longirostris (Scheff.) Heusden, *Blumea* 39 (1/2): 215–234 (1994)

Goniothalamus longirostris Scheff., *Ann. Jard. Bot. Buitenzorg* 1: 4 (1876). T: Doré, Nova Guinea [W Papua], *J.E.Teijsmann s.n.* holo: BO n.v.; iso: MEL.

Some Australian specimens cited by Heusden and tentatively determined as this species are actually *H. fruticosus* and others are *H. rufescens*.

13. FITZALANIA

Fitzalania F.Muell., *Fragm.* 4: 33 (1863); after Eugene F.A.Fitzalan (1830–1911), a gardener and plant collector who sent many specimens to Mueller.

Type: *F. heteropetala* (F.Muell.) F.Muell.

Shrubs or small trees, unarmed. Shoots and branchlets densely hirsute or pubescent. Flowers bisexual, axillary, sometimes terminal, solitary. Sepals valvate, free or 2 partially connate, caducous or persistent to near mature fruit. Petals free; outer petals imbricate or not; inner petals imbricate, saccate towards tip, shortly clawed at base. Stamens wedge-shaped, incurved; connectives broad, truncate but not concealing anther cells due to high profile of receptacle. Pollen grains solitary. Carpels 5–10; ovules 5 or 6; stigma depressed-subglobular, sessile. Apocarps ellipsoidal, sessile, pubescent, orange-yellow. Seeds up to 6, transverse, ellipsoidal, or discoid, brown, shallowly punctate and undulate. $2n = 18$; *vide* W.Morawetz *loc. cit.*

A genus of two species restricted to E Qld.

Recent molecular evidence (J.B.Mols pers. comm.) suggests that *Fitzalania* is nested within *Meiogyne*. However the distinctive perianth of *Fitzalania* has prompted the decision to continue to recognise the genus.

Sepals narrowly ovate, boat-shaped, 6–11 mm long; outer petals indigo-black, ovate, boat-shaped, larger than inner petals; inner petals 13–15 mm long; indumentum on shoots and branchlets pale brown

1. *F. heteropetala*

Sepals triangular, 3.5–5.5 mm long; outer petals sepaloid, green, flat, narrowly ovate or oblong-lanceolate, smaller than inner petals; inner petals 25–36 mm long; indumentum on shoots and branchlets reddish brown

2. *F. bidwillii*1. *Fitzalania heteropetala* (F.Muell.) F.Muell., *Fragm.* 4: 33 (1863)

Uvaria heteropetala F.Muell., *Fragm.* 3: 1 (1862). T: Cumberland Islands, Qld, *E.Fitzalan*; syn: MEL *n.v.*

Shrub or tree to 5 m high. Twigs pale brown pubescent. Leaves: petiole 2.5–4 mm long; lamina elliptic, ovate or obovate, 3.5–11 cm long, 1.5–5.5 cm wide, rounded or slightly cordate at base, glabrescent above, pale brown hirsute or pubescent below; secondary veins 8–12 pairs. Pedicel 2–5 mm long, pubescent. Sepals narrowly ovate, shallowly boat-shaped, 6–11 mm long, 4–5 mm wide, pubescent outside. Outer petals ovate, boat-shaped, shortly clawed, 27–32 mm long, 18–23 mm wide, pubescent inside and outside, indigo-black. Inner petals boat-shaped, 13–15 mm long, 8–10 mm wide, pubescent outside and inside, glandular-rugose inside above clawed base, indigo-black. Stamens 30–60, 1.5–2 mm long. Ovaries 2–2.4 mm long.

Occurs from Orpheus Is. NE of Ingham to St Bees Is. N of Mackay, Qld, in coastal and subcoastal notophyll vine forests and thickets. Flowers Oct.–July; fruits Nov.–June. Map 52.

Qld: Homestead Bay, St Bees Is., 36 km NE of Mackay, *G.N.Batianoff 11132* (BRI); Mt Elliott, near Spur Ck, *S.T.Blake 18701* (BRI, CANB); James Cook University campus, Townsville, *W.Cooper 1520 & W.Cooper* (BRI).

2. *Fitzalania bidwillii* (Benth.) Jessup, Kessler & Mols, *Fl. Australia* 2: 449 (2007)

Saccopetalum bidwillii Benth., *Fl. Austral.* 1: 53 (1863); *Miliusa bidwillii* (Benth.) R.E.Fries, *Ark. Bot.* n. ser. 3: 42 (1955). T: Wide Bay, Qld, *J.C.Bidwill*; *holo: n.v.*

Shrub or tree to 5 m high. Twigs rusty-pubescent. Leaves: petiole 2.5–4 mm long; lamina obovate, elliptic or ovate, 5–13 cm long, 2.5–7 cm wide, rounded at base, glabrescent above, rusty hirsute or pubescent below; secondary veins 6–10 pairs. Pedicel 3–8 mm long, pubescent. Sepals triangular, 3.5–5.5 mm long, 2.8–3 mm wide, pubescent outside. Outer petals sepaloid, flat, narrowly ovate or oblong-lanceolate, 7.5–21 mm long, 2–7.5 mm wide, pubescent outside, green. Inner petals deeply boat-shaped, 25–36 mm long, 11–15 mm wide, pubescent outside and inside, grooved inside above clawed base, indigo. Stamens 50–90, 1.2–1.7 mm long. Ovaries 1.5–2 mm long. Plate 10; Fig. 8I–J.

Occurs from Percy Islands to the Mary R., Qld, in coastal and subcoastal notophyll vine forests and thickets. Flowers recorded throughout the year; fruits Apr.–Nov. Map 53.

Qld: 1 km SW of Booyal, *P.I. Forster PIF3290* (BRI); 1.8 km WSW of Eurimbula Beach, *G.P. Guymer 1535 & L.W. Jessup* (BRI, CANB, K, NOU, NSW, QRS); Gregory R. crossing on Childers–Goodwood road, *J. Randall 624* and *P. Young* (BRI, L).

14. MILIUSA

Miliusa Lesch. ex A.DC., *Mém. Soc. Phys. Genève* 5: 213 (1832); after Josephus Milius Vottolinus, 16th century author of *De Hortorum Cultura*.

Type: *M. indica* Lesch. ex A.DC.

Saccopetalum Benth., *Pl. Jav. Rar.* 165 (1840). T: *S. horsfieldii* Benth.

Trees, usually deciduous in dry season and with axillary buds protected by scales, unarmed, with simple hairs. Flowers bisexual, solitary or a few in cymose fascicles terminating short axillary or internodal shoots. Sepals 3, valvate, free. Petals valvate, free; outer petals 3, sepaloid; inner petals 3, much larger than sepals and outer petals, variously saccate near base, frequently remaining lightly coherent near base until falling separately after anthesis. Stamens few or numerous; filament short and broad; connective narrow and produced above but not concealing anther cells. Pollen grains solitary. Carpels mostly numerous, ovules up to 12; stigma capitate, sessile. Apocarps subglobular to obloid, indehiscent, obliquely placed on stipe. Seeds 1–several, transverse, ellipsoidal with a longitudinal groove, brown, nearly smooth.

A genus of about 40–50 species distributed through SE Asia from India to Australia. Three species in Australia (2 endemic).

L.W. Jessup, The genus *Miliusa* Leschen. ex A.DC. (Annonaceae) in Australia, *Austrobaileya* 2(5): 517–523 (1988).

- | | | |
|----|--|---------------------------------|
| 1 | Inner petals mostly 30–38 mm long; pedicels at flowering less than 15 mm long; apocarps 15–35 mm long, 15–20 mm wide | 1. <i>M. horsfieldii</i> |
| 1: | Inner petals mostly 13–25 mm long; pedicels at flowering more than 15 mm long; apocarps 7–18 mm long, 7–14 mm wide | |
| 2 | Inner petals ovate, 6–8 mm wide; stamens about 36; carpels about 26 | 2. <i>M. brahei</i> |
| 2: | Inner petals oblong to narrowly ovate, 4–6 mm wide; stamens about 12; carpels about 12 | 3. <i>M. traceyi</i> |

1. *Miliusa horsfieldii* (Benth.) Baill. ex Pierre, *Fl. Forest. Cochinch.* sub pl. 38 (1881)

Saccopetalum horsfieldii Benth., *Pl. Jav. Rar.* 165, pl. 35 (1840). T: province of Banyumas, Java, 1814, *T. Horsfield*; holo: BM; photo: BRI.

Tree to 30 m high. Shoots and branchlets appressed-pubescent, glabrescent. Leaves: petiole 2–4 mm long; lamina lanceolate or oblanceolate, 4–22 cm long, 2.5–6 cm wide, obtuse or rounded at base, acute or acuminate at apex, glabrescent; secondary veins mostly 6–9 pairs. Flowers solitary or paired; pedicel 5–15 mm long, pubescent. Sepals ovate, 4–5 mm long, 2 mm wide, acuminate, pubescent. Outer petals narrowly ovate to oblong, 5–6 mm long, 1–1.5 mm wide, acute, pubescent, green. Inner petals lanceolate, broadly saccate, twisted near tip, 30–42 mm long, 12–18 mm wide, puberulous outside and inside near tip; margins recurved; base with short 2.5–3 mm wide claw, green with streaks of red outside, densely mottled red inside with a medial pink stripe. Stamens c. 48, 1.2–1.3 mm long, incurved. Carpels c. 23; ovary 1.5 mm long; ovules 2–10. Apocarps ellipsoidal or subglobular, 15–35 mm long, 15–20 mm wide; stipe 10–20 mm long. Seeds 2–5. Fig. 10C.

Occurs in Java and N Qld where it is distributed from Cape York to Cairns in lowland semideciduous mesophyll and complex notophyll vine forest. Flowers Sept.–Nov.; fruits Jan.–Feb. Map 5A.

Qld: Claudie R., *B. Hyland 6408* (BRI, QRS); McIvor R., *B. Hyland 6563* (BRI, QRS); Carol Ck crossing, NW of Hopevale Mission, *L.W. Jessup 644* (BO, BRI, CAL, CBG, IBSC, SAN, U, W); headwaters of Woobadda R. on Cape Tribulation to Bloomfield road, *L.W. Jessup 622* (A, BRI, CANB, DNA, K, L, MEL, MO, NSW, QRS, U); Lockerbie Scrub, Bamaga, *L.J. Webb & J.G. Tracey 13365* (BRI).

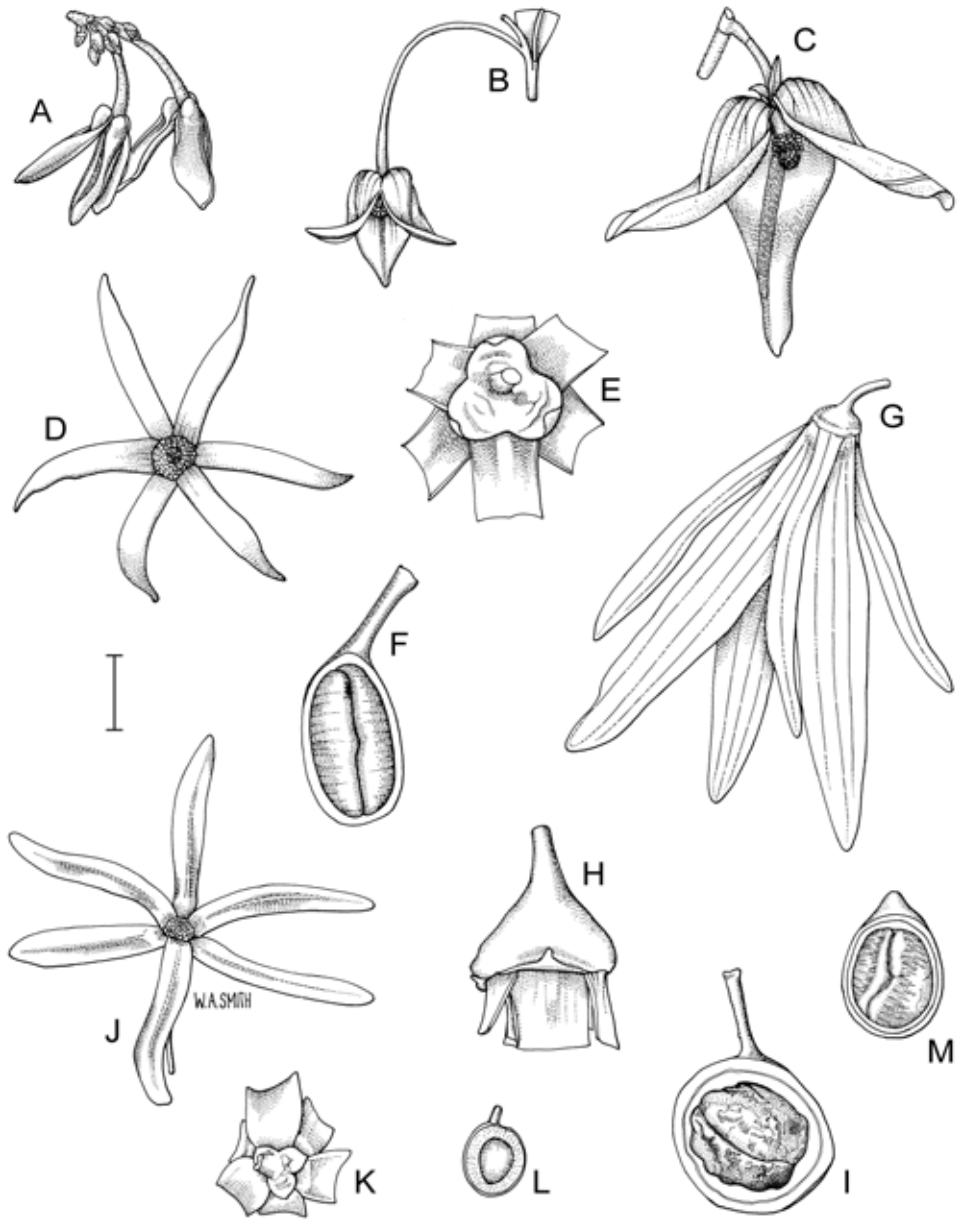


Figure 10. A, *Miliusa traceyi*, inflorescence (L.W.Jessup 820, BRI). B, *Miliusa brahei*, flower (L.W.Jessup 551, BRI). C, *Miliusa horsfieldii*, flower (L.W.Jessup 622, BRI). D–F, *Polyalthia australis*. D, flower; E, calyx (D–E, K.Kenneally 8137, PERTH); F, apocarp with carpel wall removed (B.Hyland 3964RFK, BRI). G–I, *Polyalthia michaelii*. G, flower; H, calyx (G–H, L.W.Jessup GJM1732, BRI); I, apocarp with carpel wall removed (L.W.Jessup 477, BRI). J–L, *Polyalthia nitidissima*. J, flower; K, calyx (J–K, L.W.Jessup 470, BRI); L, apocarp with carpel wall removed (B.Gray 3771, BRI). M, *Polyalthia patinata*, apocarp with carpel wall removed (G.Sankowsky 292, BRI). Scale bar: A–D, F, G, J, L, M = 10 mm; E, H, K = 5 mm; I = 20 mm. Drawn by W.A.Smith.

2. *Miliusa brahei* (F.Muell.) Jessup, *Austrobaileya* 2(3): 227 (1986)

Saccopetalum brahei F.Muell., *Fragm.* 8: 159 (1874). T: near Port Denison, Qld, *E.Fitzalan*; holo: MEL; iso: BRI, K, NSW.

Tree to 15 m high. Shoots and branchlets pubescent, glabrescent. Leaves: petiole 1–3 mm long; lamina elliptic or ovate, 4–14 cm long, 1.5–5 cm wide, acute or obtuse to rounded at base, acute or acuminate, rarely obtuse at apex, glabrescent except for midvein below; secondary veins mostly 7–10 pairs. Flowers solitary or paired; pedicel 2–6 cm long. Sepals ovate, 1.7–2 mm long, pubescent outside. Outer petals narrowly boat-shaped, 2.8–3 mm long, 0.3–0.4 mm wide, pubescent, green. Inner petals ovate, 13–15 mm long, 6–8 mm wide, glabrescent and brownish green outside; margins puberulous, greenish yellow mottled red inside with a medial pink stripe. Stamens c. 36, 0.7–1 mm long. Carpels c. 26; ovary c. 0.8 mm long; ovules 4–6. Apocarps subglobose, 7–15 mm long, 7–11 mm wide; stipe 5–15 mm long. Seeds 4–6. $2n = 16$; *fide* W.Morawetz *loc. cit.* Fig. 10B.

Occurs across N Australia from the Kimberley, W.A., to Mackay, Qld, in coastal and subcoastal semi-evergreen and semi-deciduous notophyll vine forest. Flowers Sept.–Dec.; fruits Nov.–May. Map 55.

W.A.: 4 km S of junction of Neville Ck and Calder R., E Walcott Inlet, *K.F.Kenneally* 8748 (BRI). N.T.: Whitestone Ck, 2 km W of Woolner Rd, *M.O.Rankin* 1515 (BRI, DNA); Mindil Beach, Darwin, *G.Wightman* 1674 (BRI, DNA). Qld: 1 km S of village at 4 Mile Beach, S of Port Douglas, *L.W.Jessup* 551 (BRI, CAL, IBSC, L, MO, U, PERTH); Airlie Beach, *P.Young* 437 (BRI, K, L, PERTH, U).

3. *Miliusa traceyi* Jessup, *Austrobaileya* 2(5): 521–523 (1988)

T: Massy Ck, Qld, 14 Nov. 1980, *B.Hyland* 10927; holo: BRI; iso: QRS.

Illustration, L.W.Jessup, *loc. cit.*

Tree to 12 m high. Shoots and branchlets pubescent, glabrescent. Leaves: petiole 1–4 mm long; lamina ovate or elliptic, 4–13 cm long, 2–6.5 cm wide, obtuse or rounded, rarely slightly cordate at base, obtuse or rounded, sometimes acute or slightly acuminate at apex, puberulous above, pubescent below, glabrescent; secondary veins mostly 6–8 pairs. Flowers in fascicles, 1 or 2 maturing at a time; pedicel 1.5–3 cm long. Sepals ovate, 2–2.7 mm long, 1.5–1.8 mm wide, pubescent outside. Outer petals narrowly ovate, boat-shaped, 2.5–3 mm long, 0.8–1 mm wide, pubescent, green. Sepals and outer petals falling before anthesis. Inner petals oblong to narrowly ovate, 13–25 mm long, 4–6 mm wide, acute, greenish yellow, sparsely pubescent outside, sparsely puberulous inside. Stamens c. 12, 0.7–0.8 mm long. Carpels 11 or 12; ovary c. 0.7 mm long, glabrous; ovules 2 or 3. Apocarps subglobose, 9–15 mm long, 10–14 mm wide; stipe 5–7 mm long. Seeds 1 or 2. Fig. 10A.

Occurs in N.T., Torres Strait Islands and Cape York Penin., Qld, S to Lakeland Downs, in semi-evergreen and semideciduous mesophyll and notophyll vine forests and deciduous vine thickets. Flowers Sept.–Dec.; fruits Dec.–May. Map 56.

N.T.: 5 km N of Mann R. gorge on tributary off Mann R., *G.Leach & C.Dunlop* 1603 (BRI); 35 km N along Pine Creek–Jabiru road, *J.Russell-Smith* 868 (BRI). Qld: Timber Reserve 14, Massy, *B.Hyland* 10908 (BRI, QRS); 1 km S of Cape Keerweer, *D.Smyth* AK 52.1 (BRI); Laura R. crossing just S of old Laura Stn HS, *J.G.Tracey* 14040 (A, BRI, DNA, K, MEL, PERTH, QRS, U).

15. POLYALTHIA

Polyalthia Blume, *Fl. Javae* (Anonaceae) 68 (1830); from the Greek word *polyalthes*, which appears in Dioscorides' *De Materia Medica* (iii: 146) and means 'curing many diseases'. Some species in the genus are reputed to have such properties.

Type: *P. subcordata* (Blume) Blume

Trees, unarmed, with simple hairs. Flowers bisexual, axillary or ramal or (not in Australia) internodal or leaf-opposed, solitary or in few-many-flowered cymes, pedicel bract present in Australian species. Sepals valvate in bud, free or connate. Petals 6, in 2 similar series,

valvate in bud, free, mostly flat and spreading or pendulous. Stamens cuneate; connective broad above and concealing anther cells, flat or slightly convex at tip; anther cells not septate; pollen grains solitary. Carpels few to many; stigma sessile or subsessile. Ovule 1 or (not in Australia) 2–several. Apocarps indehiscent, short or long-stipitate, subglobular. Seed 1 in Australia, ellipsoidal or subglobular, smooth or not, brown.

A genus of about 100 species ranging from Africa through SE Asia to Fiji and Australia. Four species in Australia (3 endemic). The only formal classification recognises 2 sections, based on ovule number. These are section *Polyalthia* with 2 to several ovules per carpel, and section *Monoon* (Miq.) Hook.f. & Thomson with 1 ovule per carpel. This segregation is now regarded as being artificial. Huber (1985) produced an informal classification of the Asian species and this has been supported by the seed anatomy studies of Christmann (1987).

H.Huber, *Polyalthia*, *Revised Handb. Fl. Ceylon* 5: 31 (1985); M.Christmann, *Samen-anatomische Untersuchungen an den Gattungen Polyalthia Blume und Greenwayodendron* (Engl. & Diels) Verdc. (Annonaceae), *Feddes Repert.* 98 (11–12): 617–622 (1987).

- | | | |
|----|---|---------------------------------|
| 1 | Calyx tube hemispherical, obconical or pan-shaped, longer than the 3 reflexed lobes; apocarps 3–4.5 cm diam. | |
| 2 | Calyx lobes obtuse, 0.5 mm long; inner petals longer and wider than outer petals; stipe mostly more than 1.8 cm long; seed testa shallowly rugose | 1. <i>P. michaelii</i> |
| 2: | Calyx lobes mostly acute, 2–2.5 mm long; inner and outer petals similar in length and width. Stipe less than 1.8 cm long; seed testa slightly striate | 2. <i>P. patinata</i> |
| 1: | Calyx tube indistinct, shorter than the flat or slightly recurved lobes; apocarps less than 3 cm long or wide | |
| 3 | Most leaves bearing domatia on undersurface; apocarps subglobular, 0.9–1 cm long | 3. <i>P. nitidissima</i> |
| 3: | Domatia absent; apocarps obloid or ellipsoidal, 1.8–2.3 cm long | 4. <i>P. australis</i> |

1. *Polyalthia michaelii* C.T.White, *Queensland Dept. Agric. Bot. Bull.* 20: 5 (1918)

T: Johnstone R., Qld, June 1917, *N.Michael* 65; holo: BRI.

Tree to 30 m high. Shoots and branchlets pubescent or puberulous. Leaves: petiole 4–9 mm long; lamina ovate, narrowly ovate, elliptic or lanceolate, 5–19 cm long, 2–7 cm wide, acute, obtuse or decurrent at base, acuminate or acute at apex, glabrous above, glabrous below except for appressed hairs on main veins; secondary veins 5–10 pairs. Inflorescence axis ramal or axillary, bearing 1–6 flowers. Pedicel 1–3 cm long, puberulous; bract ovate, 1.2–1.4 mm long. Calyx hemispheric or obconic, 3-lobed, sparsely puberulous; lobes reflexed, 0.5 mm long, obtuse. Petals mostly flat, puberulous, cream-yellow; outer petals oblong, 20–30 mm long, 3.7–5 mm wide; inner petals narrowly elliptic, 30–65 mm long, 7–11 mm wide. Stamens c. 50–60, 0.8–1 mm long. Carpels 17–23; ovary 0.7 mm long, glabrous; style and stigma 0.8 mm long; stigma puberulous. Apocarps subglobular, 4–4.5 cm long, 4–4.5 cm wide, orange-yellow; stipe 1.8–2.2 cm long. Seed testa shallowly rugose. $2n = 18$; *fide* W.Morawetz *loc. cit.* Fig. 10G–I.

Occurs from the Mulgrave R. to Downey Ck, Qld, in complex mesophyll vine forest at low and medium altitudes. Flowers Nov.–Mar.; fruits May–Dec. Map 57.

Qld: S.F.R. 310, Goldfield Logging Area, *B.Gray* 1868 (BRI, QRS); S.F.R. 755, Gosschalk Logging Area, *B.Gray* 2337 (BRI, QRS); S.F.R. 756, N McNamee Logging Area, *B.Hyland* 5622 (BRI, QRS); Wyvuri Holding, *B.Hyland* 7894 (BRI, QRS); W Mulgrave R., 13.3 km S of Goldsborough State Forest picnic area, *L.W.Jessup* 535 (BRI).

2. *Polyalthia patinata* Jessup, *Fl. Australia* 2: 450 (2007)

T: Malbon Thompson Forest Reserve, off Gordonvale–Yarrabah road, Qld, 12 Apr. 2006, *A.Ford* AF4811 & *M.Bradford*; holo: BRI; iso: BRI (including spirit-preserved material).

Tree to 20 m high. Shoots pubescent; branchlets glabrous. Leaves: petiole 5–10 mm long; lamina elliptic or narrowly ovate, 4.5–22 cm long, 2–7 cm wide, acute or shortly decurrent at

base, acuminate, acute or obtuse at apex, glabrous; secondary veins 8–12 pairs. Inflorescence axis mostly ramal, bearing 1–4 flowers. Pedicel 2.5–5.5 cm long, glabrous; bract broadly ovate, 1.7–2.5 mm long. Calyx pan-shaped, 3-lobed, glabrous except for tips of lobes; lobes reflexed, 2–2.5 mm long, acute or sometimes obtuse. Outer and inner petals similar, flat or margins recurved near base, 35–47 mm long, 3–5 mm wide, glabrous. Stamens 32–45, 1–1.2 mm long. Carpels 21–24; ovary 1.8–2 mm long, glabrous; style and stigma 1–1.5 mm long; stigma pubescent. Apocarps subglobular, 3–4 cm long, 3 cm wide, red; stipe c. 0.5 cm long (to 1 cm in dried material). Seed testa slightly striate. Fig. 10M.

Occurs from the Mulgrave R. to the Johnstone R., Qld, in complex mesophyll vine forest at low and medium altitudes. Flowers Apr.; fruits Aug. Map 58.

Qld: Wyvuri, *B.Hyland* 2632 *R.F.K.* (BRI, QRS); Berner Ck, Innisfail, *W.R.Petrie* 29 (BRI); Gadgarra State Forest, 5 May 1980, *G.Sankowsky* s.n. (BRI); Pine Ck, *G.Sankowsky* 292 (BRI); Fishery Falls between Gordonvale and Babinda, *L.J.Webb* & *J.G.Tracey* 7489 (BRI).

3. *Polyalthia nitidissima* (Dunal) Benth., *Fl. Austral.* 1: 51 (1863)

Unona nitidissima Dunal, *Monogr. Anonac.* 109 (1817). T: New Caledonia, *E.P.Ventenat*; holotype: G n.v. (photo BRI).

Unona nitens F.Muell., *Fragm.* 3: 2 (1862). T: Port Denison, Qld, *D.Henne*; holotype: MEL.

Tree to 12 m high. Shoots and branchlets puberulous, glabrescent. Leaves: petiole 2.5–6 mm long; lamina elliptic, lanceolate or oblanceolate, 4–14 cm long, 1.4–5.5 cm wide, decurrent or acute at base, acuminate or rarely obtuse at apex, glabrous and shiny above, glabrous below except in 1–10 domatia on most leaves; secondary veins mostly 6–9 pairs. Flowers solitary or paired; pedicel 1–2.5 cm long, sparsely puberulous; bract basal, ovate, 2 mm long. Sepals free, depressed-ovate, 0.8–1.3 mm long, 2–2.3 mm wide, glabrous except puberulous margins. Inner and outer petals similar, yellowish green, oblong, recurved or flat with slight medial ridge inside, 20–26 mm long, 4–4.5 mm wide, glabrescent. Stamens c. 40, c. 1 mm long. Carpels 7–18; ovary 2–2.2 mm long, pubescent; stigma sessile, subglobular, puberulous. Apocarps subglobular, 9–10 mm long, 8–9 mm wide, red; stipe 2.5–5 mm long. Seed testa smooth. $2n = 18$; *fide* W.Morawetz *loc. cit.* Fig. 10J–L.

Occurs in Melanesia from New Guinea to New Caledonia and in Australia in N.T. and from Torres Strait, Qld, to Iluka, N.S.W. Flowers Nov.–Mar.; fruits Nov.–Sept. Map 59.

N.T.: Lameroy Beach, Darwin, *M.O.Rankin* 1860 (BRI, DNA); upper East Alligator R., *J.Russell-Smith* 4548 & *D.Lucas* (BRI, DNA). Qld: S.F.R. 191 (S of Atherton), *B.Gray* 235 (BRI, QRS); Pullen Ck, Moggill State Forest, *L.W.Jessup* 470 (A, B, BO, BRI, CANB, K, L, MO, MPU, NSW, PERTH, QRS, SING, UNE). N.S.W.: Cudgen, 1.6 km S of Kingscliff, *E.F.Constable* 4842 (BRI).

4. *Polyalthia australis* (Benth.) Jessup, *Austrobaileya* 2: 227 (1986)

Popowia australis Benth., *Fl. Austral.* 1: 52 (1863). T: Barrow Bay, Port Essington [N.T.], May 1840, *J.Armstrong* 623; holotype: K.

Polyalthia holtzeana F.Muell., *S. Sci. Rec.* 2: 230 (1882). T: near Port Darwin, N.T., 1882, *M.Holtze* 181; holotype: MEL; isotype: NSW.

Polyalthia armitiana F.Muell., *Second Syst. Census Austral. Pl.* 5 (1889), *nom. inval.*

Polyalthia armitiana F.Muell. ex F.M.Bailey, *Syn. Queensland Fl. 3rd Suppl.* 6 (1890). T: Tributaries of the Gilbert R., Qld, *W.E.Armit* 573; holotype: MEL.

Tree to 25 m high. Shoots appressed-pubescent with straight hairs; branchlets with minute curled hairs. Leaves: petiole 4–8 mm long; lamina lanceolate, oblanceolate or narrowly ovate, 4.5–25 cm long, 2–11 cm wide, obtuse, rounded or shallowly cordate at base, acuminate at apex, glabrous above, glabrous below except on main veins; secondary veins 5–12 pairs. Flowers in axillary or ramal fasciculate cymes. Pedicel 2–4.5 cm long, minutely curled-papillose. Sepals shortly connate at base, crescent-shaped or triangular, 2–2.5 mm long, 3.5–4.2 mm wide, puberulous outside. Inner and outer petals similar, pale yellow or yellowish green, linear, strap-shaped, recurved or flat, 25–30 (–50) mm long, 3.5–5.5 mm wide, puberulous. Stamens c. 40–45, 1.2 mm long. Carpels 16–30; ovary 0.7 mm long, pubescent; style and stigma 1 mm long; stigma puberulous. Apocarps obloid or ellipsoidal,

1.8–2.3 cm long, 1.2–1.4 cm wide, red; stipe 1.1–1.3 cm long. Seed testa smooth, faintly ridged. $2n = 18$; *vide* W.Morawetz *loc. cit.* Fig. 10D–F.

Occurs from Walcott Inlet, Kimberley, W.A., through N and coastal parts of N.T. and from Torres Strait to Herbert R., Qld, mostly in lowland gallery forests. Flowers Nov.–June; fruits Oct.–Feb. Map 60.

W.A.: 13 km S of Kalumburu, at junction of Carson and King Edward Rivers, *K.F.Kenneally 10382 & B.P.M.Hyland* (BRI). N.T.: Lemon Spring, 10 km S of Tipperary, *G.J.Leach 2542 & C.Dunlop* (BRI); Wildman Springs Jungle, Brian Ck, *G.M.Wightman 3672* (BRI). Qld: near Lockerbie, *B.Hyland 10234* (BRI, QRS); Little Mulgrave Ck, *K.J.White 675* (BRI).

16. MEIOGYNE

Meiogyne Miq., *Ann. Mus. Bot. Lugduno-Batavum* 2: 12 (1865); from Greek *meion* (fewer or smaller in number) and *gyne* (female), referring to the small number of female parts (ovaries or carpels) in the flower.

Type: *M. virgata* (Blume) Miq.

Ancana F.Muell., *Fragm.* 5: 27, t. 35 (1865). T: *A. stenopetala* F.Muell.

Polyaulax Backer, *Blumea* 5: 492 (1945). T: *P. cylindrocarpa* (Burck) Backer

Shrubs or small trees, unarmed, with simple hairs. Flowers bisexual, mostly axillary, solitary or a pair, or (not in Australia) in few-flowered cymes. Bracts 2–4. Sepals mostly valvate in bud, free or shortly connate at base, usually persistent in fruit. Petals mostly 6 in 2 similar series of 3 or inner ones slightly smaller, free, valvate or shortly imbricate at apex in bud; inner petals grooved or warted on inner surface near base, often not as widely spreading at maturity as outer petals. Stamens broadly wedge-shaped with a broad, truncate, oblique, shield-like connective tip concealing anther cells and more elongated near carpels. Pollen grains solitary. Carpels up to 16; ovules 3–16, superposed; stigma sessile or subsessile, mostly subglobular, obconical, or obovoid, obliquely attached, sparsely hairy or glabrous. Apocarps obloid, ellipsoidal or subglobular, shortly stipitate, sometimes umbonate at apex, usually not constricted between seeds when fresh, indehiscent. Seeds ellipsoidal or discoid to subglobose with a medial groove, 1–9, brown, surface variously undulate to rugulose.

A genus of 15 or more species in SE Asia, Malesia, Micronesia, Melanesia, Polynesia and Australia. Four species in Australia, 3 endemic.

Ancana was incorrectly placed under *Fissistigma* by Fries (1953) and Kessler (1993).

E.C.H. van Heusden, Revision of *Meiogyne* (Annonaceae), *Blumea* 38 (2): 487–511 (1994); L.W.Jessup, The genus *Ancana* F.Muell. (Annonaceae) in Australia, *Austrobaileya* 3(1): 63–67 (1989).

1 Petal length approximately 4–10 times width

2 Outer petals 5–5.5 mm wide; inner petals 3.5–4 mm wide; mature apocarps glabrous

1. *M. stenopetala*

2: Outer petals 8–9 mm wide; inner petals 7–9 mm wide; mature apocarps hirsute

2. *M. hirsuta*

1: Petal length approximately 1–2 times width

3 Apocarps smooth; inner petals separating at least at tips at maturity

3. *M. cylindrocarpa*

3: Apocarps warted and wrinkled; inner petals loosely connivent at maturity

4. *M. verrucosa*

1. *Meiogyne stenopetala* (F.Muell.) Heusden, *Blumea* 38(2): 506 (1994)

Ancana stenopetala F.Muell., *Fragm.* 5: 27 (1865); *Unona ancana* F.Muell., *Fragm.* 5: 27 (1865), *nom. inval.* in synon. under *A. stenopetala*; *Unona ancana* F.Muell. ex F.M.Bailey, *Syn. Queensland Fl.* 3rd Suppl. 5 (1890), *nom. illeg.*; *Fissistigma stenopetala* (F.Muell.) R.E.Fries, *Ark. Bot.* 3 (2): 36–37 (1953). T: Tweed River, Qld, *C.Moore*; ?syn: K.

Shrub to 5 m high. Shoots and branchlets appressed-pubescent, glabrescent. Leaves: petiole 2.5–3 mm long; lamina lanceolate to oblanceolate, 5–14 cm long, 1.5–4 cm wide, obtuse, rounded or broadly acute at base, acuminate at apex, glabrous above, sparsely appressed-pubescent, glabrescent below; secondary veins 12–18 pairs. Flowers solitary, axillary. Pedicel 3–4 mm long; bracts ovate, 1.5–2.5 mm long. Sepals broadly ovate or triangular, 4–4.5 mm long, 3 mm wide, acuminate or acute, appressed-pubescent outside. Petals pale brownish yellow. Outer petals very narrowly ovate-attenuate, 30–45 mm long, 5–5.5 mm wide, pubescent. Inner petals nearly linear, 30–48 mm long, 3.5–4 mm wide, pubescent, grooved, glabrous and sometimes pink at base inside. Stamens 35–45, 1.5–2 mm long. Carpels 5; ovary 1.5 mm long; ovules 5 or 6. Apocarps obloid, to 4.5 cm long, 2 cm wide, warted, glabrous; stipe to 5 mm long. Seeds 2–5. $2n = 18$; *fide* W.Morawetz *loc. cit.* Fig. 11C–D.

Occurs from Tambourine Mtn, Qld, to near Coffs Harbour, N.S.W., in upland, lowland and littoral types of complex notophyll vine forest. Flowers Nov.–Apr.; fruits Apr.–Dec. Map 61.

Qld: Tambourine Mtn, *S.T.Blake 15822* (BRI); Burleigh Heads, Dec 1917, *C.T.White* (BRI). NSW: North Ck, Ballina, *W.Baeuerlen 737* (BRI); Terania Ck, 10 km NNE of The Shannon, *R.Coveny 10627* (BRI); Mt Warning, *L.W.Jessup 457* (BRI).

Inclusion by Heusden (*loc. cit.*) of a taxon from Fiji as a subspecies under *M. stenopetala* is not accepted here.

2. *Meiogyne hirsuta* (Jessup) Jessup, *Fl. Australia* 2: 450 (2007)

Ancana hirsuta Jessup, *Austrobaileya* 3 (1): 65 (1989). T: Henrietta Ck, Palmerston Hwy, Qld, 27 Nov. 1982, *L.W.Jessup 512*; holo: BRI; iso: BRI, CBG, K, L, MEL, NSW, QRS, U.

Shrub to 2.5 m high. Shoots and branchlets appressed-pubescent and hirsute. Leaves: petiole 2–2.5 mm long; lamina lanceolate, oblanceolate or elliptic, 5–14 cm long, 1.3–5 cm wide, obtuse, rounded or broadly acute at base, acuminate at apex, glabrous above except pilose midvein, sparsely appressed-pubescent below; secondary veins 13–16 pairs. Flowers solitary, axillary. Pedicel 2–4 mm long; bracts ovate, 1.5–2.2 mm long. Sepals broadly ovate, 4.5–5.5 mm long, 4–4.8 mm wide, abruptly acuminate, pubescent outside. Petals pale yellow. Outer petals very narrowly ovate, 30–40 mm long, 8–9 mm wide, attenuate, pubescent. Inner petals very narrowly ovate, 30–48 mm long, 7–9 mm wide, attenuate, pubescent, grooved, glabrous and crimson at base inside. Stamens 45–60, 1.2–2 mm long. Carpels 5–16; ovary 1.8–2 mm long; ovules 4–6. Apocarps obloid or subglobose, to 2 cm long, 1 cm wide, hirsute; stipe c. 1 mm long. Seeds 1–5. Fig. 11A–B.

Known only from Cedar Bay, Mossman R. and N Johnstone R., Qld, in complex mesophyll vine forest on lowlands and footslopes. Flowers Nov.–Dec.; fruits Jan. Map 62.

Qld: Cedar Bay, N of Bloomfield, *L.J.Webb & J.G.Tracey 13359* (BRI); near entrance to Mossman Gorge Natl Park, near Mossman R., *L.W.Jessup 544* (BRI); Crawfords Lookout to Tchupalla Falls track, Palmerston Natl Park, *L.W.Jessup 478 & J.G.Tracey* (BRI, QRS).

3. *Meiogyne cylindrocarpa* (Burck) Heusden, *Blumea* 38(2): 499 (1994)

Mitrephora cylindrocarpa Burck, *Nova Guinea* 8: 433, 1036 (1911), as *M. cilindrocarpa* (except index); *Polyaulax cylindrocarpa* (Burck) Backer, *Blumea* 5: 493 (1945). T: Niederl. Neu-Guinea an der Sudkuste bei Merauke, 30 Aug. 1904, *J.W.R.Koch 512*; syn: BO, L; an der Sudkuste bei Okaba, 27 Sept. 1907, *B.Branderhorst 107*; syn: BO, L.

Shrub or small tree to 10 m high. Shoots and branchlets appressed-pubescent, glabrescent. Leaves: petiole 1.5–5 mm long; lamina ovate or elliptic, 2.5–12 cm long, 0.9–5 cm wide, acute or obtuse at base, glabrous or glabrescent; secondary veins 7–14 pairs. Flowers solitary, rarely a pair, axillary. Pedicel 7–13 mm long; bracts basal, ovate, 1.5–2 mm long. Sepals depressed-ovate to hemispherical. Petals pale yellow to creamy yellow. Outer petals ovate, flat, puberulous. Inner petals ovate, slightly recurved at tip, puberulous outside and near tip inside, elsewhere on inside glabrous. Stamens c. 1.5 mm long. Carpels mostly 3–20; ovary 1.8–2 mm long; ovules up to 9. Apocarps obloid, ellipsoidal or subglobose, 2–3.5 cm long, 1–1.5 cm wide, puberulous or glabrescent, smooth, orange; stipe 1–4 mm. Seeds 1–9.

Occurs along the S coast of West Papua, other coastal areas in East Malesia and in Australia in coastal areas in the Kimberley, W.A., N.T., and Cape York Penin., Qld. Two subspecies are recognised.

Leaves narrowly ovate, acuminate or acute; apocarps glabrescent

3a. subsp. *cylindrocarpa*

Leaves broadly ovate or elliptic, obtuse, rounded or acute; apocarps persistently puberulous

3b. subsp. *trichocarpa*

3a. *Meiogyne cylindrocarpa* (Burck) Heusden subsp. *cylindrocarpa*

Leaves: petiole 1.5–3 mm long; lamina narrowly ovate, 2.5–9.6 cm long, 0.9–4.3 cm wide, obtuse at base, acuminate or acute at apex, glabrous above, glabrescent below; secondary veins 7–13 pairs. Pedicel 7–8 mm (11 mm spirit preserved) long, sparsely puberulous. Sepals depressed-ovate, 1.8–2.3 mm long, 2.5–3.7 mm wide, sparsely puberulous outside. Outer petals spreading or recurved, 9–9.5 mm (14–18 mm spirit preserved) long, 6.6–7.2 mm (8–11 mm spirit preserved) wide. Inner petals slightly recurved at tip, 8–8.5 mm (11–14 mm spirit preserved) long, 6–6.5 mm (7–9 mm spirit preserved) wide, puberulous outside and near tip inside, elsewhere on inside, concave, grooved, warted and glabrous. Stamens 50–55. Carpels mostly 3 or 4; ovary 2 mm long; ovules up to 9. Apocarps obloid or subglobose, 2.5–3.5 cm long, 1.2–1.5 cm wide, smooth, glabrescent; stipe 1–4 mm. Seeds 1–9. Fig. 11G–H.

Occurs in coastal areas in the Kimberley, W.A., N.T., and northern Cape York Penin., Qld; also along the coast of West Papua, and other coastal areas in East Malesia. Flowers Jan.–Apr.; fruits Feb.–Nov. Map 63.

W.A.: Lone Dingo, c. 25 km NNW of mining campsite, Mitchell Plateau, *K.F.Kenneally 8124* (BRI, PERTH); Bent Orchid Falls, 4 km E of mining campsite, Mitchell Plateau, *K.F.Kenneally 8149* (BRI, PERTH). N.T.: 1.5 km NW of Yirrkala, *P.I.Forster PIF5968* (BRI); Groote Eylandt, 4 km W of Umbakumba, *J.Russell-Smith 2744* & *D.Lucas* (BRI). Qld: Galloway's Scrub, N of Red Island Point, *L.J.Webb & J.G.Tracey 6028* (BRI, QRS).

3b. *Meiogyne cylindrocarpa* subsp. *trichocarpa* Jessup, *Fl. Australia* 2: 450 (2007)

T: 8 km past Pascoe R. crossing on road to Portland Roads, Qld, 14 July 1993, *P.I.Forster PIF13600*, *G.Sankowsky & M.C.Tucker*, holo: BRI; iso: BRI (spirit).

Meiogyne sp. Tingle Scrub (D.G.Fell+ DGF2676), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 16 (2002)

Leaves: petiole 3–5 mm long; lamina elliptic or broadly ovate, 3.5–12 cm long, 1.5–5 cm wide, acute or sometimes obtuse at base, obtuse or acute with a blunt tip, glabrous; secondary veins 10–14 pairs. Pedicel 10–13 mm long, appressed-pubescent. Sepals depressed-ovate to hemispherical, sometimes recurved, 2.5–3 mm long, 4–5 mm wide, appressed-puberulous. Outer petals sometimes recurved, 12–13 mm long, 8.5–9 mm wide, acute. Inner petals 9–13 mm long, 6.5–8.5 mm wide, thickened, puberulous, slightly ridged inside near base. Stamens 85–100. Carpels 4–20; ovary 1.8–2 mm long; ovules 4 or 5. Apocarps ellipsoidal or obloid, 2–3.5 cm long, 1–1.4 cm wide, puberulous; stipe c. 2 mm long. Seeds 1–5. Plate 12; Fig. 11I–J.

Occurs on E Cape York Penin. S to Cairns, Qld, in mostly coastal evergreen and semi-evergreen notophyll vine forest. Flowers Dec.–July; fruits July–Mar. Map 64.

Qld: Altanmoui Ra., Cape Melville Natl Park, 1.6 km E of Flat Hill, 62.6 km NE of Lakefield Ranger Base, *D.G.Fell DGF4347A & K.McDonald* (BRI); Natl Park Reserve 8, Parish of Weymouth, *B.Hyland 11562* (BRI, QRS); Chili Beach, *B.Hyland 11599* (BRI, QRS); Barron Gorge, *R.L.Jago 2025* (BRI); Quoin Hill, E of Hopevale Mission, *L.W.Jessup 639* (BRI).

4. *Meiogyne verrucosa* Jessup, *Fl. Australia* 2: 450 (2007)

T: near Shoteel Ck, tributary of Clohesy R., Qld, 27 Nov. 1984, *L.W.Jessup 591*; holo: BRI; iso: CANB.

Meiogyne sp. Mt Lewis (L.W.Jessup 554), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 16 (2002)

Shrub or small tree to 3 m high. Shoots and branchlets appressed-pubescent, glabrescent. Leaves: petiole 2–3 mm long; lamina narrowly ovate or lanceolate, 6.5–17.5 cm long, 2–5.5 cm

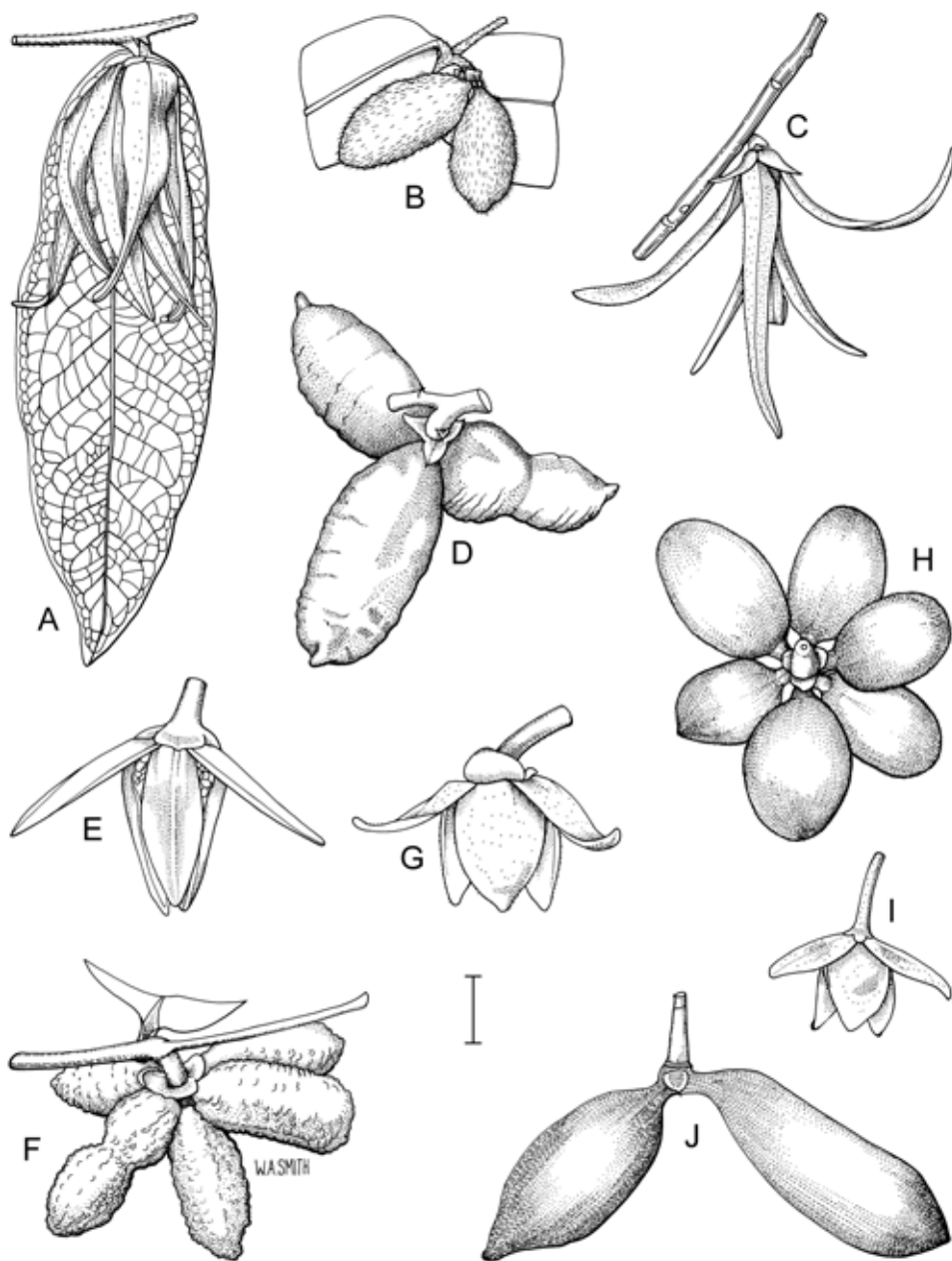


Figure 11. *Meiogyne*. **A–B**, *M. hirsuta*. **A**, flower and leaf (L.W.Jessup 706, BRI); **B**, fruit (L.W.Jessup 478, BRI). **C–D**, *M. stenopetala*. **C**, flower; **D**, fruit (C–D, L.W.Jessup 838, BRI). **E–F**, *M. verrucosa*. **E**, flower; **F**, fruit (E–F, L.W.Jessup 591, BRI). **G–H**, *M. cylindrocarpa* subsp. *cylindrocarpa*. **G**, flower (G.Sankowsky 1093 & N.Sankowsky, BRI); **H**, fruit (L.W.Jessup 639, BRI). **I–J**, *M. cylindrocarpa* subsp. *trichocarpa*. **I**, flower (J.Russell-Smith 4908 & D.Lucas, DNA); **J**, fruit (J.Russell-Smith 2744 & D.Lucas, DNA). Scale bar: **A–F**, **H**, **J** = 9 mm; **G**, **I** = 6 mm. Drawn by W.A.Smith.

wide, obtuse or rounded at base, acuminate at apex, glabrous above, glabrescent below; secondary veins 15–20 pairs. Flowers solitary, axillary. Pedicel 2–5 mm long, sparsely appressed-pubescent; bracts basal, depressed-ovate, 1–1.5 mm long. Sepals depressed-ovate, 3.5–4 mm long, 4.5–5 mm wide, appressed-pubescent. Petals pale yellow. Outer petals ovate, nearly flat, spreading, 12–18 mm long, 6.5–9 mm wide, acute, pubescent. Inner petals loosely connivent at maturity, narrowly ovate, incurved near base, 9.5–16 mm long, 5.5–7 mm wide, slightly ridged outside, puberulous except inside near base. Stamens 70–80, c. 1.7 mm long. Carpels 4–9; ovary 1.8 mm long; ovules 6. Apocarps obloid or ellipsoidal with an adaxial ridge, warted and wrinkled, 1.5–2.5 cm long, 1–1.3 cm wide, puberulous, orange; stipe c. 1 mm long. Seeds 1–4. Fig. 11E–F.

Occurs from Mt Finnigan to the Lamb Ra., Qld, in mostly upland mesophyll and notophyll vine forest from 300–1200 m altitude. Flowers July–Nov.; fruits Oct.–Nov. Map 65.

Qld: Catchment of Gap Ck, NE of Mt Finnigan, *L.W. Jessup 630* (BRI); McDowall Ra., *G. Sankowsky 374* & *N. Sankowsky* (BRI); Annan R., *G. Sankowsky 1115* & *N. Sankowsky* (BRI); on creek draining into Bargoo Ck, Mt Windsor Tableland, *J.G. Tracey 14952* (BRI); Bunya site, Mt Lewis, *L.J. Webb* & *J.G. Tracey 13731* (BRI).

17. ANNONA

Annona L., *Sp. Pl.* 1: 536 (1753); *Gen. Pl.* 5th edn, 241 (1754); originally derived from *Anon*, the Hispaniola name for *Annona squamosa* but changed by Linnaeus to *Annona*.

Type: *A. muricata* L.

Small or medium trees, unarmed, with simple hairs. Flowers bisexual, solitary or several in leaf-opposed, terminal or internodal cymes. Submedial and basal bracts present. Sepals valvate in bud, free or shortly connate. Petals free or rarely (not in Australia) connate, 6 in two series or inner series absent or rudimentary; outer petals valvate; inner petals when present valvate or imbricate in bud. Stamens mostly linear; filament short; connective truncate, flat or convex at apex. Pollen grains in tetrads. Carpels numerous, free or connate at anthesis; ovule 1, basal; stigma oblong or conical, sometimes nearly as long as ovary. Fruit a syncarpium, fleshy, indehiscent, many-seeded, mostly ovoid to globose. Seeds mostly obloid, sometimes bilaterally flattened, mostly brown, smooth or slightly undulate.

A genus of about 130 species, mostly tropical and subtropical America but also a few in Africa. Several species are naturalised elsewhere in the tropics and some are cultivated for the edible fruit. Four species are naturalised either extensively or locally in N Australia. The commercially grown custard apple in Australia is *A. x atemoya* Mabb., which is a hybrid of *A. cherimola* Mill. and *A. squamosa* L. There are several cultivars. It is widely known as atemoya in other countries.

Fries (1931) recognised 17 sections within the genus. Species found in Australia represent 3 of these sections.

W.E. Safford, Classification of the genus *Annona*, with descriptions of new and imperfectly known species, *Contr. U.S. Natl. Herb.* 18: 1–68 (1914); R.E. Fries, Revision der Arten einiger Anonaceen - Gattungen, *Acta Horti Berg.* 10 (2): 197–315 (1931); I.H. Burkill, *Dict. Econ. Products Malay Penin.* edn 2, 1: 165–170 (1966); W. Popenoe, *Man. Trop. Subtrop. Fruits*, 161–195 (1974) [facsimile of 1920 edition].

1 Petals 6, similar, broadly ovate

2 Axillary buds narrowly conical; leaves with domatia; fruit with soft spines

1. ***A. muricata***

2: Axillary buds ovoid, obtuse; leaves without domatia; fruit smooth

2. ***A. glabra***

1: Petals 3 or inner whorl reduced to scales, outer ones narrowly ovate to oblong

3 Fruit deeply furrowed between areoles

3. ***A. squamosa***

3: Fruit smooth, shallowly furrowed or ridged between areoles

4. ***A. reticulata***

1. **Annona muricata* L., *Sp. Pl.* 1: 536 (1753)

T: lecto: illustration in H.Sloane, *Voy. Jamaica*, 2: 166, t. 225, (1725), *fide* S.Khattoon, in Y.J.Nasir & S.I.Ali (eds), *Fl. Pakistan* 167: 11 (1985).

Tree to 8 m high. Shoots pubescent. Axillary buds narrowly conical, acute. Leaves: petiole 3–7 mm long; lamina obovate to elliptic, 8–15 cm long, 3–6 cm wide, acute to rounded at base, acuminate at apex, glabrous above, sparsely pubescent beneath; secondary veins 8–12 pairs; domatia in some vein axils. Flowers solitary, terminal or leaf-opposed; pedicel 1.5–2 cm long, pubescent. Sepals depressed-ovate, 3–4 mm long. Petals 6, similar, broadly ovate, greenish yellow. Outer petals ovate, acuminate or acute at apex, cordate at base, 2–4 cm long, 2–3.5 cm wide, medially ridged, sparsely pubescent outside, densely puberulous inside. Inner petals ovate, 1.8–3.2 cm long, obtuse, puberulous, shortly clawed. Stamens 4–5 mm long. Carpels free at anthesis. Syncarpium ovoid, 10–25 cm long, 12–15 cm wide, with soft, curved spines 6 mm long, dark green. Seeds 15–17 mm long, 9–10 mm wide. *Sour Sop*.

Originally from central America to Peru, now grown throughout the tropics for the edible fruit. A garden remnant or apparently naturalised in E Qld. Flowers July & Jan.–Apr. (in cultivation); fruits (immature) Sept. Map 66.

Qld: Newry Is., Mackay, July 1963, *P.M.Scanlan* (BRI).

2. **Annona glabra* L., *Sp. Pl.* 1: 537 (1753)

T: 'Carolina'; lecto: illustration in M.Catesby, *Nat. Hist. Carolina* 2: 64, t. 64 (1738), *fide* J.E.Dandy, *Sloane Herbarium* 112 (1958).

Tree to 10 m high. Axillary buds ovoid, obtuse, pubescent; shoots glabrescent. Leaves: petiole 9–18 mm long; lamina elliptic or ovate, 7–15 cm long, 3–8 cm wide, obtuse or shortly decurrent at base, acuminate at apex, glabrous; secondary veins 8–12 pairs. Flowers solitary, internodal or terminal; pedicel 15–20 mm long. Sepals very broadly to depressed ovate, 3–4 mm long and wide, acuminate. Petals 6, broadly ovate, greenish yellow. Outer petals 15–30 mm long, 13–25 mm wide, puberulous inside. Inner petals 12–25 mm long, 7–15 mm wide, puberulous, red inside. Stamens 3–4 mm long. Carpels connate. Syncarpium ovoid, 5–12 cm long, 5–8 cm wide, smooth, dull brownish yellow. Seeds 13–15 mm long, 9–10 mm wide. *Pond Apple*, *Alligator Apple*.

Originally from tropical and subtropical America and W Africa, now naturalised in many tropical coastal lowland areas. In Australia naturalised along the E coast of Qld, from Torres Strait to Ingham, with an outlier at Mackay. Flowers Sept.–Nov.; fruits May–Dec. Map 67.

Qld: Endeavour R. flats, Cooktown, 13 Nov. 1957, *B.Linnet* (BRI); Bailey's Ck, N of Daintree R., *J.Wrigley & I.Telford* 956 (BRI, CBG); Liverpool Ck, W of Silkwood, *L.W.Jessup* 739 (BRI); Bingil Bay, *L.S.Smith* 4912 (BRI); Palm Ck, Ingham, 16 Nov 1970, *F.B.Bosworth* (BRI).

The fruit is reported to be edible but is insipid. It was introduced for root stock for the custard apple.

3. **Annona squamosa* L., *Sp. Pl.* 1: 537 (1753)

T: not designated.

Illustration: W.Curtis, *Bot. Mag.* 58: t. 3095 (1831)

Tree to 5 m high. Shoots and branchlets pubescent with grey hairs, glabrescent. Leaves: petiole 7–15 mm long; lamina lanceolate, elliptic or obovate, 3.5–15 cm long, 1.8–6 cm wide, acute, obtuse or rounded at base, acute or obtuse at apex, glabrescent; secondary veins usually 5–10 pairs. Flowers few in leaf-opposed cymes; pedicel 10–20 mm long; bracts 0.5 mm long. Sepals very broadly triangular, 1.5–2 mm long and wide, sparsely pubescent, glabrescent. Petals greenish yellow, yellowish with a crimson base inside. Outer petals narrowly ovate to oblong, 20–25 mm long, 6–7 mm wide, obtuse, puberulous or tomentellous, concave inside at base, keeled towards apex. Inner petals minute or absent. Stamens 1.5 mm long. Carpels partially connate. Syncarpium broadly ovoid to subglobular, 6–10 cm long, 5–9 cm wide, somewhat glaucous green; areoles rounded, separated by deep grooves. Seeds 14 mm long, 8 mm wide. *Sweet Sop*, *Sugar Apple*.

Probably native of the West Indies, now cultivated and naturalised in tropical and subtropical areas particularly the seasonally dry climate zone. Scattered local naturalisations in Australia in N.T. and Qld. Flowers Sept.–Jan.; fruits May–July. Map 68.

N.T.: Timber Ck, *P.G.Wilson* 196 & *S.Jacobs* (BRI). Qld: Chillagoe Caves Natl Park, Royal Archway section, Mungana, *P.I.Forster* PIF28142, *R.Booth* & *R.Jensen* (BRI); Mornington Is., between settlement Lelgamatin and airport, *F.R.Fosberg* 62161 (BRI); beach between boat port and Coconut Bay, Lindeman Is., *C.Warrian* CW 619 (BRI); 2 km N of Yeppoon on road to Byfield, *P.R.Sharpe* 2522 (BRI).

4. **Annona reticulata* L., *Sp. Pl.* 1: 537 (1753)

T: not designated.

Illustration: W.Curtis, *Bot. Mag.* 56: t. 2911, 2912 (1829)

Tree to 8 m high. Shoots and branchlets pubescent, glabrescent. Leaves: petiole 8–12 mm long; lamina narrowly elliptic to lanceolate, 10–20 cm long, 2–5 cm wide, acute or obtuse, shortly decurrent at base, acuminate at apex, glabrescent; secondary veins 10–15 pairs. Flowers several from internodal cymes, rarely leaf-opposed; pedicel 1.5–2.5 cm long, pubescent; submedial bract 1–1.5 mm long. Sepals depressed-ovate, 2–3 mm long, acuminate, pubescent. Petals pale green outside, yellowish with a crimson base inside. Outer petals narrowly ovate or oblong, 15–20 mm long, 10–12 mm wide, pubescent with pale brown hairs; inner petals minute scales or absent. Stamens 1–1.3 mm long. Carpels partially connate. Syncarp ovoid or subglobular, to 10 cm long and wide, yellow brown to reddish brown; surface reticulately ridged around flat areoles or nearly smooth. Seeds 8–11 mm long, 5–6 mm wide. *Bullocks Heart*.

Probably native of the West Indies, now cultivated and frequently naturalised in tropical areas. Naturalised in N.T. around Darwin and in Qld from S of Cooktown to Townsville. Flowers Nov.–Dec.; fruits Sept.–Oct. Map 69.

N.T.: Fogg Dam Nature Walk, *R.Booth* 167 (DNA). Qld: Ross R., Douglas, Townsville, *R.J.Cumming* 20087 (BRI); Bloomfield Beach, ca. 1 km N of Bloomfield R. mouth, *L.S.Smith* 11070 A (BRI); Woobadda R., tributary of Bloomfield R., *L.W.Jessup* 623 (BRI).

MYRISTICACEAE

*L.W.Jessup*¹

Trees or rarely shrubs, dioecious or rarely (not in Australia) monoecious. Indumentum of sympodially branched uniseriate trichomes. Leaves simple, alternate, exstipulate. Inflorescences mostly axillary. Bracts small, caducous. Flowers small, hypogynous, unisexual. Calyx gamophyllous, becoming 2–5-cleft. Petals absent. Male flowers: vestigial gynoecium absent; stamens 2–many; connectives and filaments united into a column or connate only at base; anthers partially or completely connate or (not in Australia) free, extrorse, dehiscent longitudinally. Female flowers: staminodes absent; ovary a single, conduplicate, unsealed carpel usually with a simple or bilobed, sessile or subsessile stigma, rarely (not in Australia) on a long style; ovule solitary, nearly basal, anatropous. Fruit with thick pericarp, usually dehiscent by longitudinal sutures into 2 valves. Seed with a well-developed aril; endosperm abundant, ruminant or not; cotyledons sometimes connate at base; embryo small.

A pantropical family of up to 19 genera and about 440 species; 2 genera and 4 species in Australia.

¹ Queensland Herbarium, Brisbane Botanic Gardens Mt Coot-tha, Mt Coot-tha Road, Toowong, Queensland 4066.

MYRISTICACEAE

The most important species economically is *Myristica fragrans* Houtt. which is the source of nutmeg and mace. A native of the islands of Banda and Amboina in the Moluccas, it was cultivated only there and its trade monopolised by the Portuguese and later the Dutch until the late eighteenth century. It is now cultivated elsewhere, particularly the West Indies. Nutmeg is the ground or grated seed used as a flavouring for sweet dishes. Mace is the scarlet fleshy aril covering the seed. It is dried and used in the preparation of savoury dishes.

G.Bentham, Myristicaceae, *Fl. Austral.* 5: 281–282 (1870); O.Warburg, Monographie der Myristicaceen, *Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur.* 68: 1–680 (1897); J.Sinclair, A revision of the Malayan Myristicaceae, *Gard. Bull. Singapore* 16: 205–472 (1958); J.Koster & P.Baas, Comparative leaf anatomy of the Asiatic Myristicaceae, *Blumea* 27: 115–173 (1981); E.J.H.Cornier, The Myristicaceous Seed, *Blumea* 28: 419–420 (1983); U.Kühn & K.Kubitzki, Myristicaceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 457–469 (1993).

KEY TO GENERA

Male and female flowers in axillary, subumbellate cymes, axis of male flowers often persisting as a short, woody tubercle with pedicel scars of previous flowers; anthers on a distinct column; bracteoles present at base of perianth; aril lacinate or cleft to near base

1. MYRISTICA

Male and female flowers in axillary panicles; anthers sessile or subsessile; bracteoles absent; aril entire or shortly lobed

2. HORSFIELDIA

1. MYRISTICA

Myristica Gronov., *Fl. Orient.* 141 (1755) *nom. cons.*; from the Greek *myristicos* (fit for anointing), in reference to the sweet-smelling oil in some species.

Type: *M. fragrans* Houtt.

Palala Kuntze, *Revis. Gen. Pl.* 2: 567 (1891). T: *P. insipida* (R.Br.) Kuntze

Trees, dioecious. Leaves mostly distichous. Inflorescence axillary, subumbellate cymes or fascicles; axis sometimes persistent as short, woody tubercles bearing the scars of pedicels of flowers of previous years. Bracteoles persistent. Flowers ±pedicellate; calyx 3-cleft, caducous. Male flowers: stamens 8–30; filaments connate into an androphore; anthers connate by backs and sides and adnate to the column forming a synandrium. Female flowers: ovary subglobose, glabrous or not; stigma sessile, minutely bilobed. Fruit subglobose to oblong; pericarp thick, leathery. Seed ellipsoidal, usually shining and covered with a red or orange aril, fimbriate and cleft to near base. Endosperm ruminant, containing oil and starch.

A genus of about 80 species distributed from Ceylon through SE Asia to Samoa, Caroline Islands and Australia; 3 species in Australia, 1 endemic.

J.Sinclair, *Florae Malesianae Precursores* - XLII, The genus *Myristica* in Malesia and outside Malesia, *Gard. Bull. Singapore* 23: 1–540 (1968); W.J.J.O. de Wilde, *Conspectus of Myristica* (Myristicaceae) indigenous in the Moluccas, *Blumea* 35: 233–260 (1990); W.J.J.O. de Wilde, *Conspectus of Myristica* (Myristicaceae) in Australia, with the description of a new species from Queensland, *Blumea* 36: 183–190 (1991).

- 1 Abaxial leaf epidermis not or scarcely papillate and the reticulate venation brown, usually contrasting in colour and distinct; male flower with pedicel 3–4.5 mm long, calyx 5–6 mm long, androphore pubescent at base; female flowers in fascicles of up to 6

1. *M. globosa*

- 1: Abaxial leaf epidermis minutely papillate and the reticulate venation usually not contrasting in colour; male flower with pedicel 1.5–3 mm long, calyx 4.5–5 mm long, androphore glabrous; female flowers in fascicles of up to 3

- 2 Secondary veins usually 6–13 pairs; male flower calyx ellipsoidal in bud; female flower with pedicel 0.5–1 mm long, ovary densely tomentose; fruit 2.7–3.5 cm long, 1.7–2 cm wide

2. ***M. insipida***

- 2: Secondary veins usually 10–18 pairs; male flower calyx oblong in bud; female flower with pedicel 3–4 mm long, ovary appressed-puberulous; fruit 2–3 cm long, 1.3–1.7 cm wide

3. ***M. lancifolia***

1. *Myristica globosa* Warb., *Nova Acta Acad. Leop.-Carol. German. Nat. Cur.* 68: 540 (1897)

subsp. ***muelleri*** (Warb.) W.J.de Wilde, *Blumea*, 38(2): 367 (1994)

Myristica muelleri Warb., *Nova Acta Acad. Leop.-Carol. German. Nat. Cur.* 68: 502 (1897); *Myristica cimicifera* var. *muelleri* (Warb.) Domin, *Biblioth. Bot.* 89: 118 (1926). T: Rockingham Bay, Qld, *J.Dallachy*; syn: *n.v.*; Cooktown, Mt Cook, Qld, *O.Warburg 19500*; syn: *n.v.*; Rockingham Bay, Qld, *Wilhelmi*; syn: *n.v.*, *fide* W.J.J.O. de Wilde, *Blumea* 36: 185 (1991).

Illustrations: O.Warburg, *op. cit.* t. 18; W.J.J.O. de Wilde, *Blumea* 36: 184 (1991).

Tree to 25 m. Leaves: petiole 6–15 mm long; lamina oblanceolate, elliptic or lanceolate, usually 7–20 cm long, 2–8 cm wide, obtuse or acute at base, acute or acuminate apically, glabrous above, glaucous and glabrescent below; secondary veins usually 11–16 pairs. Male flowers in fascicles or on woody tubercles; pedicel 3–4.5 mm long; calyx oblong or narrowly ellipsoidal in bud, 5–6 mm long, 2.2–2.5 mm wide, densely brown tomentose on outside, glabrescent; calyx lobes 1.2–2 mm long, erect or spreading; androphore pubescent at base. Female flowers in fascicles of up to 6; pedicel 0.7–1.5 mm long; calyx ovoid, 3.5–4.5 mm long, 2.5–3.5 mm wide, brown-tomentose outside; calyx lobes 1.2–1.7 mm long, spreading or recurved; ovary densely tomentose. Fruit ellipsoidal, 2–3 cm long, 1.5–2 cm wide, tomentose becoming puberulous; stalk 4–6 mm long, 2.5–3.5 mm wide. Plate 13.

Occurs in eastern Qld from Cape York Penin. to Byfield, in mesophyll and notophyll vine forest. Flowers Oct.–Feb. and fruits throughout the year. Map 70.

Qld: Daintree R., *L.J.Brass 2186* (BRI); Tully, Jan. 1950, *M.S.Clemens* (BRI); Sarina, *C.E.Hubbard & C.W.Winders 6510* (BRI); S.F.R. 756, West Downey logging area, *B.Hyland 5595* (BRI); Claudie R., *B.Hyland 6636* (BRI).

2. *Myristica insipida* R.Br., *Prodr.* 1: 400 (1810)

Palala insipida (R.Br.) Kuntze, *Revis. Gen. Pl.* 2: 567 (1891); *Myristica cimicifera* var. *insipida* (R.Br.) Warb., *Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur.* 68: 501 (1897). T: Carpentaria Islands, *R.Brown iter Austral. 3012*; lecto: K *n.v.*, *fide* W.J.J.O. de Wilde, *Blumea* 35: 245 (1990).

Myristica cimicifera var. *acutifolia* Warb., *Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur.* 68: 502 (1897). T: NW coast of Australia, Swan River, *P.King*; syn: BR *n.v.*, G *n.v.*, *fide* W.J.J.O. de Wilde, *loc. cit.*

Illustration: W.J.J.O. de Wilde, *Blumea* 36: 186 (1991).

Tree to 16 m. Leaves: petiole 8–15 mm long; lamina lanceolate, narrowly ovate or elliptic, usually 7–25 cm long, 2–10.5 cm wide, obtuse, rounded or decurrent at base, acute or acuminate apically, glabrous above, pubescent below with red-brown multi-branched trichomes, soon glabrescent, with only scattered appressed bifid hyaline trichomes persisting; secondary veins mostly 6–13 pairs. Male flowers in axillary fascicles or on woody tubercles; pedicel 1.5–3 mm long; calyx ellipsoidal in bud, 4.5–5 mm long, 2.5–3 mm wide, brown-tomentose on outside; calyx lobes 1.2–1.5 mm long, erect or spreading; androphore glabrous. Female flowers in fascicles of up to 3; pedicel 0.5–1.5 mm long; calyx ovoid or urceolate, 3.8–4.2 mm long, 2.5–3 mm wide, brown-tomentose outside; calyx lobes 1.5–1.7 mm long, spreading; ovary densely tomentose. Fruit ellipsoidal, oblong-ellipsoidal or ovoid, 2.5–4.5 cm long, 1.7–2.2 cm wide, tomentose becoming puberulous; stalk 2–3.5 mm long, 2–2.5 mm wide.

Occurs in New Guinea, south-eastern Moluccas and in northern Australia. There are 2 varieties.

Leaf length 2.5–3.5 times width; fruit 2.5–3.8 cm long

2a. **var. *insipida***

Leaf length 2–2.5 times width; fruit 3.5–4.2 cm long

2b. **var. *cimicifera***

2a. *Myristica insipida* R.Br. var. *insipida*

Lamina lanceolate, narrowly ovate or elliptic, usually 7–18 cm long, 2–7 cm wide, obtuse, acute or decurrent at base, acute or acuminate apically. Female flowers: pedicel 0.5–1 mm long; calyx ovoid, 2.5–3 mm wide. Fruits ellipsoidal or ovoid, 2.5–3.8 cm long, 1.7–2 cm wide. Fig. 12D–F.

Found in northern Australia from the Kimberley, W.A., to north-eastern Qld, in coastal and subcoastal rainforest, gallery forest and semi-deciduous vine forest and thickets in gorges and at the base of escarpments. Flowers May–June; fruits Apr.–Dec. Map 71.

W.A.: N end of Bougainville Penin. separating Admiralty Gulf and Vansittart Bay, *K.F.Kenneally 8616* (BRI). N.T.: Grootte Eylandt, gorge above Delumba Bay, *P.K.Latz 10871* (DNA); Berry Springs, *M.O.Parker 696* (DNA). Qld: Gomberg Point, Weipa, *M.R.O'Reilly 396* (BRI); Nesbit R., Silver Plains Holding, *G.C.Stocker 1057* (BRI).

2b. *Myristica insipida* var. *cimicifera* (Sol. ex R.Br.) Jessup, *Fl. Australia* 2: 450 (2007)

Myristica cimicifera Sol. ex R.Br., *Prodr.* 1: 400 (1810); *M. cimicifera* var. *typica* Warb., *Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur.* 68: 501 (1897), *nom. inval.* T: Endeavour River, [Qld], 1770, *J.Banks & D.Solander*; holotype: K n.v. (photo BRI); isotype: BM n.v. (photo BRI).

Myristica ampliata W.J.de Wilde, *Blumea* 36: 187–190 (1991). T: Clump Point, Nov. 1951, *L.S.Smith 4969*; holotype: L n.v., *fide* W.J.J.O. de Wilde, *loc. cit.*; isotype: BRI.

Illustration: W.J.J.O. de Wilde, *op. cit.* 188.

Lamina elliptic or oblong-elliptic usually 10–25 cm long, 5–10.5 cm wide, rounded, decurrent or slightly cordate at base, obtuse, acute or rounded apically. Female flowers: pedicel 1–1.5 mm long; calyx ovoid or urceolate, 2.8–3.2 mm wide. Fruits ellipsoidal or oblong-ellipsoidal, 3.8–4.5 cm long, 2–2.2 cm wide.

Occurs in north-eastern Qld from Mission Beach to Lizard Is., in coastal vine forest. Flowers Apr. & Nov.; fruits Aug. & Nov. Map 72.

Qld: Green Is., *G.Bates 524* (BRI); Clump Point, *B.Jackes 9049* (BRI); Mission Beach, *R.F.Thorne & W.T.Jones 2.627* (BRI); Palfrey Is., *G.N.Batianoff 12155 & D.Tarte* (BRI); Coreen Is., *R.F.Thorne 27290* (BRI).

3. *Myristica lancifolia* Poir. in J.B.A.P.M de Lamarck, *Encycl. Suppl.* 4(1): 35 (1816)

subsp. *australiana* Jessup & W.J.de Wilde, *Blumea* 38: 40–43, fig. 1 (1993)

T: headwaters of Florence Ck, N.T., 25 May 1989, *G.J.Leach 2589 & C.Dunlop*; holotype: DNA.

Illustration: L.W.Jessup & W.J.J.O. de Wilde, *loc. cit.*

Tree to 15 m. Leaves: petiole 6–17 mm long; lamina lanceolate to nearly elliptic, 6–20 cm long, 2–8 cm wide, usually acute at base, acute or slightly acuminate apically, glabrous above, glabrescent below; secondary veins mostly 10–18 pairs. Male flowers 1–several in axils or on woody tubercles; pedicel 2–3 mm long; calyx oblong in bud, 4.5–5 mm long, sparsely appressed puberulous outside and with red glandular dots; calyx lobes c. 1 mm long, erect or slightly reflexed; androphore glabrous. Female flowers in fascicles of up to 3; pedicel 3–4 mm long; calyx ovoid in bud, 4–4.8 mm long, 2.3–2.8 mm wide, sparsely appressed puberulous outside; calyx lobes 1.2–1.8 mm long, spreading; ovary appressed-puberulous. Fruit ovoid, 2–3 cm long, 1.3–1.7 cm wide, sparsely puberulous, glabrescent; stalk 2–5 mm long, c. 2 mm wide.

Occurs in N.T., on Melville Is. and in coastal and subcoastal areas of the W coast, in rainforest. Flowers Mar.–June; fruits June–Nov. Map 73.

N.T.: Melville Is., E side of Tjiripu Ck, *R.Fensham 93* (BRI); Buffalo Ck, *D.Lucas 10 & B.Wilson* (DNA); catchment of Minaeula Ck, Central Melville Is., *J.Russell-Smith 832 & D.Lucas* (DNA); Jump Up Jungle, Melville Is., *G.Wightman 948 & C.Dunlop* (DNA).

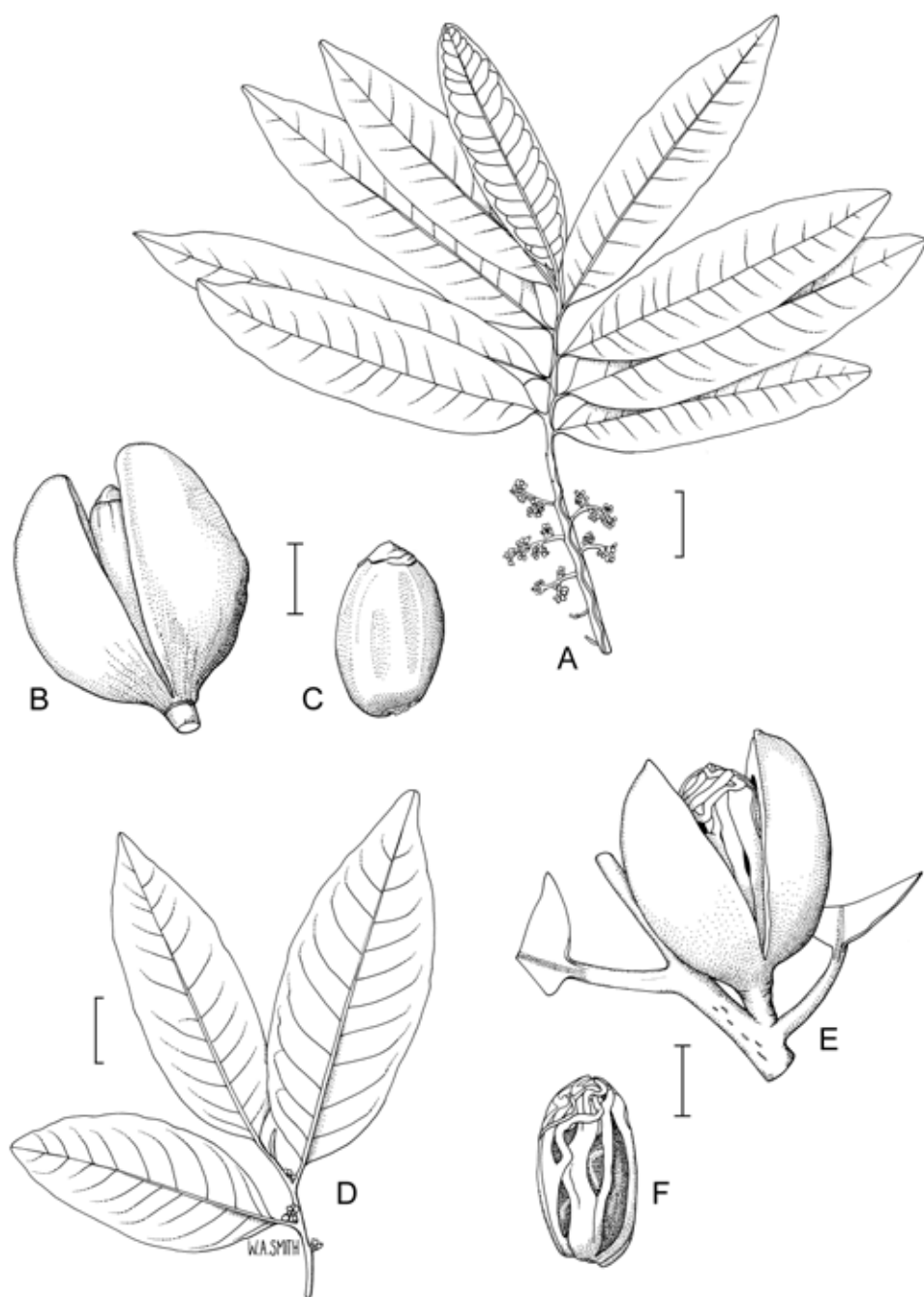


Figure 12. A–C, *Horsfieldia australiana*. A, flowering twig (L.Smith 11913, BRI); B, fruit; C, seed (B–C, B.Hyland 6629, BRI). D–F, *Myristica insipida* var. *insipida*. D, flowering twig (A.Gunness 2025, BRI); E, fruit; F, seed (E–F, L.W.Jessup *et al.* GJD3060, spirit, BRI). Scale bars: A, D = 30 mm; B, C, E, F = 10 mm. Drawn by W.A.Smith.

MYRISTICACEAE

2. HORSFIELDIA

Horsfieldia Willd., *Sp. Pl.* 4: 872 (1806); after Thomas Horsfield (1773–1859) who studied and published works on the natural history of Java and neighbouring islands while stationed there from 1802 to 1818.

Type: *H. odorata* Willd.

Dioecious trees. Leaves mostly distichous. Inflorescence axillary, paniculate with flowers in loose clusters. Bracteoles absent. Flowers pedicellate; calyx 2–4-cleft. Male flowers: stamens 2–c. 25; filaments connate into short columnar androphore with central apical depression; anthers free or connate into synandrium and adaxially adnate to column. Female flowers: ovary globose or ovoid, glabrous or pubescent; stigma sessile, 2-lobed. Fruit globose or ellipsoidal, with or without persistent calyx beneath; pericarp fleshy. Seed ellipsoidal, completely covered by aril. Endosperm ruminate, containing oil but no starch.

A genus of about 100 species distributed throughout SE Asia from Sri Lanka to southern China as well as Malesia, Caroline Islands, Solomon Islands and northern Australia; 1 endemic species in Australia.

W.J.J.O. de Wilde, A new account of the genus *Horsfieldia* (Myristicaceae), parts 1–4, *Gardens Bull. Singapore* 37(2): 115–179 (1984); 38(1): 55–144 (1985); 38(2): 185–225 (1985); 39(1): 1–65 (1986).

***Horsfieldia australiana* S.T.Blake, *Austral. J. Bot.* 2: 124 (1954)**

T: about 12°30'S, 131°35'–40'E (c. 80 km E of Darwin), 16 Sept. 1946, *S.T.Blake 17019*; holo: BRI.

Illustration: W.J.J.O. de Wilde, *op. cit.* 38(1): 88, fig. 12.

Tree to 25 m. Leaf bud 8–15 mm long, stellate-puberulous. Leaves: petiole 3–7 mm long; lamina elliptic or oblong, 10–24 cm long, 3–7 cm wide, acute or decurrent at base, obtuse or acute apically with a blunt tip, glabrescent or glabrous; secondary veins 10–17 pairs. Inflorescence to 8 cm long, stellate-puberulous; bracts 2–6 mm long, caducous. Flowers in loose clusters of 2–6 in males, 1–3 in females; buds ellipsoidal or subglobose, 2.5–3 mm long; pedicel 1–2 mm long; calyx 2-cleft in apical half. Male flowers: androecium broadly obovoid or ellipsoidal, laterally compressed, 1.8–2 mm long, 1.5–2 mm wide; apex hollow with protruding central column; anthers 12–14, slightly incurved; androphore 0.1–0.2 mm long. Female flowers: ovary ovoid, 2 mm long, tomentulose at base. Fruit ellipsoidal, granulate, 1.8–2.2 cm long (spirit preserved 3.7 cm), 1.1–1.4 cm wide (spirit preserved 2.7 cm); pericarp c. 2 mm thick (spirit preserved 5 mm). Fig. 12A–C.

Occurs in northern N.T. and in northern Qld from Cape York Penin. to the McIlwraith Ra., in evergreen and semi-deciduous mesophyll and notophyll vine forest. Flowers Aug.–Oct.; fruits Sept.–Jan. Map 74.

N.T.: Walker Ck, Wangi Rd, *M.Clark 23* & *G.Wightman* (BRI); 3 km S of Litchfield Stn, *J.Russell-Smith 6028* & *D.Lucas* (BRI). Qld: Rocky R., *B.Hyland 2551 R.F.K.* (BRI); Alligator Ck catchment on the Pascoe River road, *B.Hyland 2724 R.F.K.* (BRI); between Lockerbie and Somerset, *B.Hyland 13154* (BRI).

TRIMENIACEAE

*T. Whiffin*¹

Small polygamous, monoecious or dioecious trees, shrubs or lianes, the younger parts often with small, simple hairs. Leaves opposite, simple, petiolate, exstipulate, with numerous small oil dots. Inflorescence terminal or axillary, cymose, racemose or paniculate. Flowers

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TRIMENIACEAE

unisexual or bisexual, actinomorphic. Perianth of 2–38 spirally arranged tepals, the outermost sometimes appearing decussate, grading from ovate to orbicular below to longer, narrower and spatulate above. Stamens 6–25, spirally arranged; connective prolonged at apex; anthers dehiscent by 2 longitudinal slits. Carpels solitary (rarely 2), superior, rudimentary or absent in male flowers; ovule solitary, pendulous, anatropous; stigma sessile, tufted-papillose. Fruit fleshy, small, spherical. Seed stony, smooth or ridged; embryo small, apical; endosperm abundant.

A single genus *Trimenia* with 5 species occurring from Malaysia to the SW Pacific; 1 species in Australia.

The Trimeniaceae, or its constituent genera, have been placed in the Monimiaceae by workers including Bentham (1870) and J.Perkins & E.Gilg (1901). However, a detailed study by L.L.Money *et al.* (1950) firmly established the group as distinct from the Monimiaceae, in both morphological and anatomical characters. In the past *Trimenia* (with 3 species) and *Piptocalyx* (with 2) have both been accepted in the Trimeniaceae. Detailed studies by P.K.Endress and F.B.Sampson (1983) indicated that only habit (climbing in *Piptocalyx* and shrubby in *Trimenia*) and the number of tepals (less than 11 in *Piptocalyx* and more in *Trimenia*) were consistent in distinguishing between the two genera. They concluded that these differences were not large, but decided to maintain the two genera so as to avoid nomenclatural changes. Subsequently, Philipson (1986) transferred the two species of *Piptocalyx* to *Trimenia*. Philipson has been followed in this treatment.

G.Bentham, Monimiaceae *p.p.*, *Fl. Austral.* 5: 282–293 (1870); J.Perkins & E.Gilg, Monimiaceae tribus II Trimenieae, in H.G.A.Engler (ed.), *Pflanzenr.* 4: 21–24 (1901); L.L.Money, I.W.Bailey & B.G.L.Swamy, The morphology and relationships of the Monimiaceae, *J. Arnold Arbor.* 31: 372–404 (1950); P.K.Endress & F.B.Sampson, Floral structure and relationships of the Trimeniaceae (Laurales), *J. Arnold Arbor.* 64: 447–473 (1983); W.R.Philipson, Trimeniaceae, *Fl. Males.* ser. I, 10: 327–333 (1986); W.R.Philipson, Proposal to conserve 2758 *Trimenia* against *Piptocalyx* (Trimeniaceae), *Taxon* 36: 169 (1987); W.R.Philipson, Trimeniaceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 596–599 (1993).

TRIMENIA

Trimenia Seem., *Fl. Vit.* 425, t. 99 (1871); named for the English botanist Henry Trimen (1843–1896).

Type: *T. weinmanniifolia* Seem.

Piptocalyx Oliv. ex Benth., *Fl. Austral.* 5: 292 (1870). T: *P. moorei* Oliv. ex Benth.

Trimenia moorei (Oliv. ex Benth.) Philipson, *Fl. Males.* ser. I, 10: 330 (1986)

Piptocalyx moorei Oliv. ex Benth., *Fl. Austral.* 5: 292 (1870). T: Hastings River, N.S.W., *C. Moore*; holo: K. Illustrations: B.D.Morley and H.R.Toelken (eds), *Fl. Pl. Australia*, figs 13a & b (1983); N.C.W.Beadle, *Students Fl. NE New South Wales* 2: fig. 44 (1982).

Woody climber (liane) or scandent shrub, densely rusty-pubescent on young branches, leaves and inflorescences. Leaves: petiole c. 4–12 mm long; lamina ovate to elliptic, cuneate at base, acute to acuminate, entire or obscurely crenate, c. 5–12 cm long, 2–5 cm wide. Inflorescence a terminal or axillary raceme, with bisexual and male flowers in no consistent pattern. Tepals usually 6, often appearing as in 2 whorls, c. 2–4 mm long, caducous. Stamens 6–15 in both male and bisexual flowers, c. 3–4 mm long; connective prolonged into a short, acute appendage. Ovary superior, c. 2–3 mm long, glabrous; ovule 1 in bisexual flowers; stigma sessile, tufted. Fruit a 1-seeded berry. Fig. 13.

Occurs in north-eastern N.S.W. and adjacent southern Qld; in rainforest and on its margins, mostly at higher altitudes. Flowers (young buds Mar.) June–Oct.; fruits Dec. Map 75.

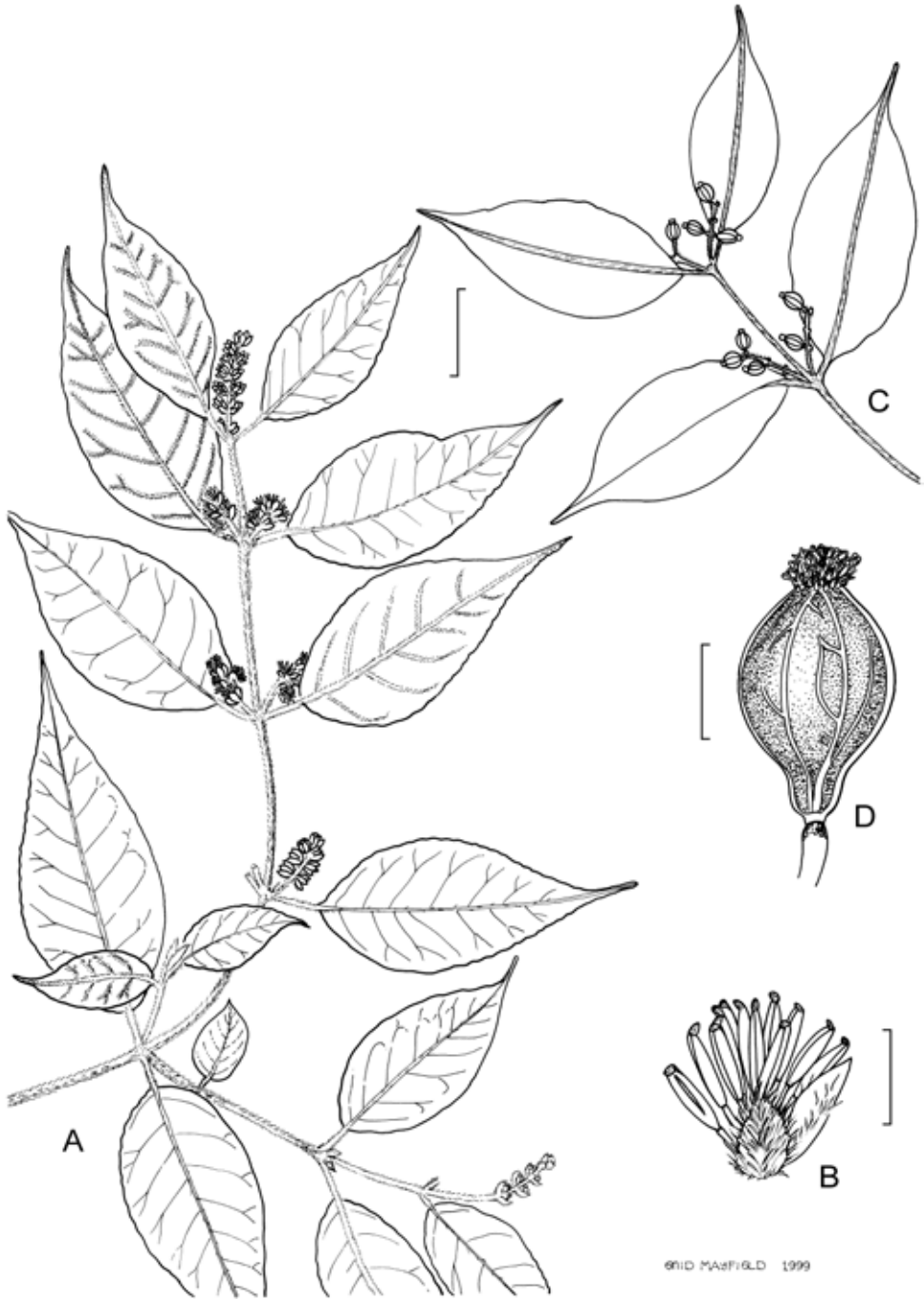


Figure 13. *Trimenia moorei*. **A**, branchlet with male flowers; **B**, male flower (**A–B**, I.R.Telford 040754, CANB); **C**, fruiting branchlet; **D**, fruit (**C–D**, J.G.Tracey 2447, CANB). Scale bars: **A**, **C** = 20 mm; **B**, **D** = 2 mm. Drawn by E.Mayfield.

Qld: Nothofagus Natl Park, *A.Floyd AGF781* (BRI); State Forest 735, Burnett Ck, Valley Forestry Track, E of old sawmill, *P.Grimshaw PG990* (BRI). N.S.W.: 3 km E of Coramba, 13 Oct. 1990, *R.Schodde s.n.* (BRI, CANB, NSW); near junction of Kunderang and Spokes Trails, Carrai State Forest, *A.G.Floyd 1125* (BRI, CANB); Dingo State Forest, c. 24 km W of Wingham, *R.Schodde 5119* (CANB, NSW).

MONIMIACEAE

*T.Whiffin*¹ and *D.B.Foreman*²

Evergreen shrubs, trees or lianas, monoecious or dioecious. Plants glabrous to densely pubescent with unicellular, simple or stellate hairs. Leaves simple, exstipulate, opposite or rarely (not in Australia) whorled, entire to toothed, pinnately veined with conspicuous midrib; lamina with small translucent oil dots; petiole well-developed to almost absent. Inflorescence terminal or axillary, occasionally ramiflorous, in racemes, panicles, cymes or fasciculate, or occasionally flowers solitary. Bracts and bracteoles present or absent. Flowers unisexual, actinomorphic, pedicellate, with a well-developed receptacle. Perianth of 1 or more whorls; tepals indistinct to distinct and \pm sepaloid, in pairs around an ostiole or irregularly arranged. Male flowers with few to many stamens, regularly arranged in 1–5 pairs (occasionally more), or numerous (to 60) and more irregularly arranged. Stamen filaments present to absent. Anthers basifixed, not versatile, dehiscing by horizontal or longitudinal slits; the connective not or sometimes distinctly prolonged and enlarged into an apical appendage. Female flowers often opening after anthesis by upper part falling as a calyptra. Carpels 4–50 (\sim 100), superior, free; style single, terminal, unbranched, or absent and stigma \pm sessile; ovary 1-locular, with a solitary ovule; placentation basal or apical; rarely outer carpels appearing sterile (staminodes). Fruit of separate or (less commonly) clustered drupes, borne on or within persistent and often expanded receptacle. Drupes \pm smooth, stipitate or sessile.

A family of about 27 genera and 440 species, mostly in the Southern Hemisphere. In Australia 8 genera with 26 species, with several poorly known taxa from N Qld awaiting description. Occurs from Cape York Penin. S to Tasmania.

As treated by Cronquist (1981) and Philipson (1993), the Monimiaceae is a broadly circumscribed family of 34 genera and about 450 species. In this Flora the Atherospermataceae have been recognised as a separate family (see notes under that family).

The family classification has been a matter of some discussion, due in part to the great variation in characters in the family, and the reticulate nature of that variation. While some authors recognise a series of subfamilies (including Atherospermatoideae), others elevate many of these to the family level. In a recent family classification (Philipson 1987, 1993) the Australian genera were placed as follows: Subfamily Mollinedioideae, tribe Hedycaryae with *Hedycarya* and *Levieria* and tribe Mollinedieae with *Austromatthaea*, (*Kibara*), *Stegathera*, (*Tetrasynandra*), and *Wilkiea*; Subfamily Monimioideae, tribe Palmerieae with *Palmeria*. In this current treatment, the genera *Kibara* and *Tetrasynandra* are not recognised as distinct, at least as regards the Australian taxa in the case of *Kibara*.

The presence of a hyperstigma has been reported in a number of unrelated genera (Endress, 1980). Within the Australian region, these include *Wilkiea* and *Kibara* (if recognised as distinct). In these latter taxa, the tepals of the female flower double internally, and become glandular. This forms a receptive region for pollen, transmitting it to the stigmas.

In all Australian species examined, there is not a clear distinction of the stigmatic surface on the style. The combined structure varies in shape from shortly conical to elongate and subulate. For convenience in this treatment, the structure is referred to as the stigma throughout.

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² Deceased, formerly of 50 Benjamin Drive, Lara, Victoria 3212.

MONIMIACEAE

R.Brown, in M.Flinders, *Voy. Terra Austral.* 3: 533–613 (1814); A.L.P.P. de Candolle, Monimiaceae, in *Prodr.* 16: 640–676 (1868); G.Bentham, Monimiaceae, in *Fl. Austral.* 5: 282–293 (1870); F.Pax, Monimiaceae, in H.G.A.Engler & K.A.E.Prantl, *Nat. Pflanzenfam.* 3(2): 94–105 (1888); J.R.Perkins, Beiträge zur Kenntnis der Monimiaceae 1. Über die Gattungen der Mollinedieae, *Bot Jahrb. Syst.* 25: 547–577 (1898); J.R.Perkins & E.Gilg, Monimiaceae, in H.G.A.Engler (ed.), *Pflanzenr.* 4: 1–122 (1901); L.L.Money, I.W.Bailey & B.G.L.Swamy, The morphology and relationships of the Monimiaceae. *J. Arnold Arbor.* 31: 372–404 (1950); F.Ehrendorfer *et al.*, Chromosome numbers and evolution in primitive angiosperms. *Taxon* 17: 337–353 (1968); P.K.Endress, Ontogeny, function and evolution of extreme floral construction in Monimiaceae, *Pl. Syst. Evol.* 134: 79–120 (1980); A.Cronquist, Monimiaceae, in *Integrated Syst. Classif. Fl. Pl.* 66–69 (1981); T.D.Stanley & E.M.Ross, Monimiaceae, in *Fl. SE Queensland* 1: 150–152 (1983); I.R.Telford, Monimiaceae, in B.D.Morley & H.R.Toelken (eds), *Fl. Pl. Australia* 39–41 (1983); D.B.Foreman, The morphology and phylogeny of some Monimiaceae (*sensu lato*) in Australia, unpubl. PhD thesis, Univ. New England (1985); W.R.Philipson, Monimiaceae, *Fl. Males.* Ser. 1, 10: 255–326 (1986); W.R.Philipson, A classification of the Monimiaceae. *Nordic J. Bot.* 7: 25–29 (1987); W.R.Philipson, A classification of the Monimiaceae—an additional note. *Nordic J. Bot.* 8: 24 (1988); G.J.Harden, Monimiaceae, in G.J.Harden (ed.), *Fl. New South Wales* 1: 128–133 (1990); W.R.Philipson, Monimiaceae, in K.Kubitzki, J.G.Rohwer & V.Bitttrich (eds), *Fam. Gen. Vasc. Pl.* 2: 426–437 (1993); S.S.Renner, Phylogenetic affinities of Monimiaceae based on cpDNA gene and spacer sequences, *Perspect. Pl. Ecol. Evol. Syst.* 1: 61–67 (1998); S.S.Renner, Circumscription and phylogeny of the Laurales: evidence from molecular and morphological data, *Amer. J. Bot.* 86: 1301–1315 (1999).

KEY TO GENERA

- | | |
|--|--------------------------|
| 1 Woody vines climbing by recurved branches | 8. PALMERIA |
| 1: Trees or shrubs | |
| 2 Female flowers cupuliform or globose, opening by tepals folding back | |
| 3 Male and female flowers ±flat, rim entire or with several small tepals; carpels numerous (30–50); drupelets yellow, orange or bright red | 1. HEDYCARYA |
| 3: Male and female flowers ±globose; male flowers with 8 rounded tepals, female flowers with 4 small tepals, carpels fewer (c. 15–20); drupelets black | 2. LEVIERIA |
| 2: Female flowers globose to turbinate or ovoid, with upper part falling away as a calyptra after anthesis | |
| 4 Male inflorescence of 1–3 flowers; anthers dehiscing by two lateral slits that may become confluent over the stamen apex | |
| 5 Male flowers turbinate to ovoid, thick-walled and hard, stamens numerous | 3. AUSTROMATTHAEA |
| 5: Male flowers urceolate to campanulate, thin-walled and papery, stamens 2 | 4. HEMMANTIA |
| 4: Male inflorescence usually of 3 or more flowers; anthers dehiscing by a single slit, that may appear curved or linear | |
| 6 Stamens irregularly scattered over lower surface and sides of receptacle; male inflorescences highly branched | 7. ENDRESSIA |
| 6: Stamens regularly arranged in pairs, or rarely in rows; male inflorescences only rarely highly branched | |
| 7 Female flowers with hyperstigma, stigma short, conical; male flowers with deltoid anthers dehiscing by a single curved slit over stamen apex | 5. WILKIEA |
| 7: Female flowers without hyperstigma, stigma conical to elongate and subulate; male flowers with ellipsoid anthers, dehiscing by a single horizontal slit | 6. STEGANTHERA |

MONIMIACEAE

1. HEDYCARYA

Hedycarya J.R.Forst. & G.Forst., *Char. Gen. Pl.* 127 (1776); from the Greek *hedys* (sweet) and *karyon* (a nut), alluding to the succulent fruits packed in a mulberry-like head.

Type: *H. arborea* J.R.Forst. & G.Forst.

Shrubs or small to medium trees, dioecious. Leaves entire or regularly and coarsely dentate, chartaceous to slightly coriaceous. Inflorescences terminal or axillary panicles, with 3–20 flowers, or sometimes single-flowered. Male flowers depressed-cupuliform; tepals usually 8, triangular; stamens generally numerous, on floor and lower walls of receptacle; anthers dehiscing outwardly; connective sometimes prolonged and expanded into an appendage; filaments very short to absent. Female flowers depressed-cupuliform; tepals 6–12, distinct or not; carpels usually numerous; ovary glabrous or pubescent; stigma short and thick; staminodes present or absent. Fruiting receptacle cupuliform to convex, scarcely enlarged. Fruit formed of a loose to tight cluster of small or large drupes.

A genus of about 11 species, with 2 endemic in eastern Australia and the remainder in the SW Pacific, particularly in New Caledonia.

J.Jérémie, *Etude des Monimiaceae: Revision du genre Hedycarya, Adansonia* ser. 2, 18: 25–53 (1978); J.Jérémie, *Description d'une nouvelle espece d'Hedycarya (Monimiaceae) de Nouvelle-Calédonie et confirmation de l'existence d'une 2e espece de ce genre en Australie*, *Bull. Mus. Natl Hist. Nat., Ser. 4. Misc. 5, section B, Adansonia*: 247–258 (1983).

Shrub or small tree, 2–10 (–20) m tall; leaf margins coarsely toothed; drupes small, globose (c. 3.5 mm diam.) and clustered, maturing yellow or orange [SE Qld to Tas.]

1. *H. angustifolia*

Small to medium tree, 6–25 m tall; leaf margins mostly entire, drupes large, ovoid (c. 10 mm long) and loosely arranged, maturing bright red [NE Qld]

2. *H. loxocarya*

1. *Hedycarya angustifolia* A.Cunn., *Ann. Nat. Hist.* 1: 215 (1838)

Hedycarya australasica (Sond.) A.DC. var. *angustifolia* (A.Cunn.) A.DC., *Prodr.* 16: 673 (1868); *H. cunninghamii* Tul., *Arch. Mus. Hist. Nat.* 8: 408 (1855–1856), as *Cunninghami*, *nom. illeg.* T: Blue Mountains, N.S.W., 1834, *R.Cunningham*; *holo*: K.

Hedycarya dentata var. *australasica* Sond., *Linnaea* 28: 228 (1856); *H. pseudomorus* F.Muell., *Trans. Philos. Inst. Victoria* 2: 63 (1858); *H. australasica* (Sond.) A.DC., *Prodr.* 16: 673 (1868), *nom. illeg.*; *H. australasica* (Sond.) A.DC. var. *australasica*, *Prodr.* 16: 673 (1868). T: Mount Disappointment, Vic., *F.Mueller*; *holo*: MEL.

Illustrations: J.Jérémie, *Adansonia*, ser. 2, 18: 31, fig. 2 (1978); T.D.Stanley & E.M.Ross (eds), *Flora SE Queensland*, 1: 153, fig. 20, A1–3 (1983); N.G.Walsh & T.J.Entwistle, *Fl. Victoria*, 3: 29, fig. 2a–c (1996).

Shrub or small tree 2–10 (–20) m tall. Leaves: petiole 15–40 mm long; lamina elliptic, ovate to lanceolate, 4–16 cm long, 1.5–6 cm wide, cuneate to rounded at base, coarsely toothed, each tooth ending in a short hard point, acuminate to acute at apex; midrib prominent on both surfaces, flattened to slightly sunken above, raised beneath. Male inflorescence 1.5–2 cm long, branched, 5–16-flowered; pedicels 4–8 mm long, pubescent. Male flowers ±flattened-cupuliform, c. 6 mm diam.; tepals 8; stamens c. 50, with connective shortly elongated into a small appendage; filaments very short. Female inflorescence 1.5–2 cm long, (1) 2–4-flowered; pedicels 8–10 mm long, pubescent. Female flowers ±flattened-cupuliform, c. 6 mm diam.; tepals c. 12, small; carpels 40–50; ovary ±columnar, glabrous or shortly pubescent; stigma short, ±conical. Drupes ±globose, c. 3.5 mm diam., tightly clustered, maturing yellow or orange. *n* = 19, *fide* F.Ehrendorfer *et al.*, *Taxon* 17: 343 (1968). *Australian Mulberry*, *Native Mulberry*. Fig. 14A–D.

Widespread from SE Qld along the E coast and nearby ranges to Tas. Grows particularly near the margins of cool temperate rainforests, often as an understorey tree in wet sclerophyll forest, from 20–1300 m alt. Flowers May–Nov.; fruits Nov.–Apr. Map 76.

Qld: Mt Cordeaux, Cunninghams Gap, NE of Warwick, *E.J.Carroll* 765 & *I.R.Telford* (CANB). N.S.W.: Monga State Forest, 5 km S of Monga, *I.Crawford* 984 (CANB). A.C.T.: Brindabella Ra., c. 3 km along Blue Range Camp Rd, *P.Carmen* 21 & *T.Conway* (CANB). Vic.: 1.2 km along track to summit of Mt Ellery from Big River Rd, *D.B.Foreman* 1950 (CANB, HO, MEL, NSW). Tas.: King Is., Yarra Ck gorge, 6 Mar. 1966, *J.H.Willis* (CANB, MEL).

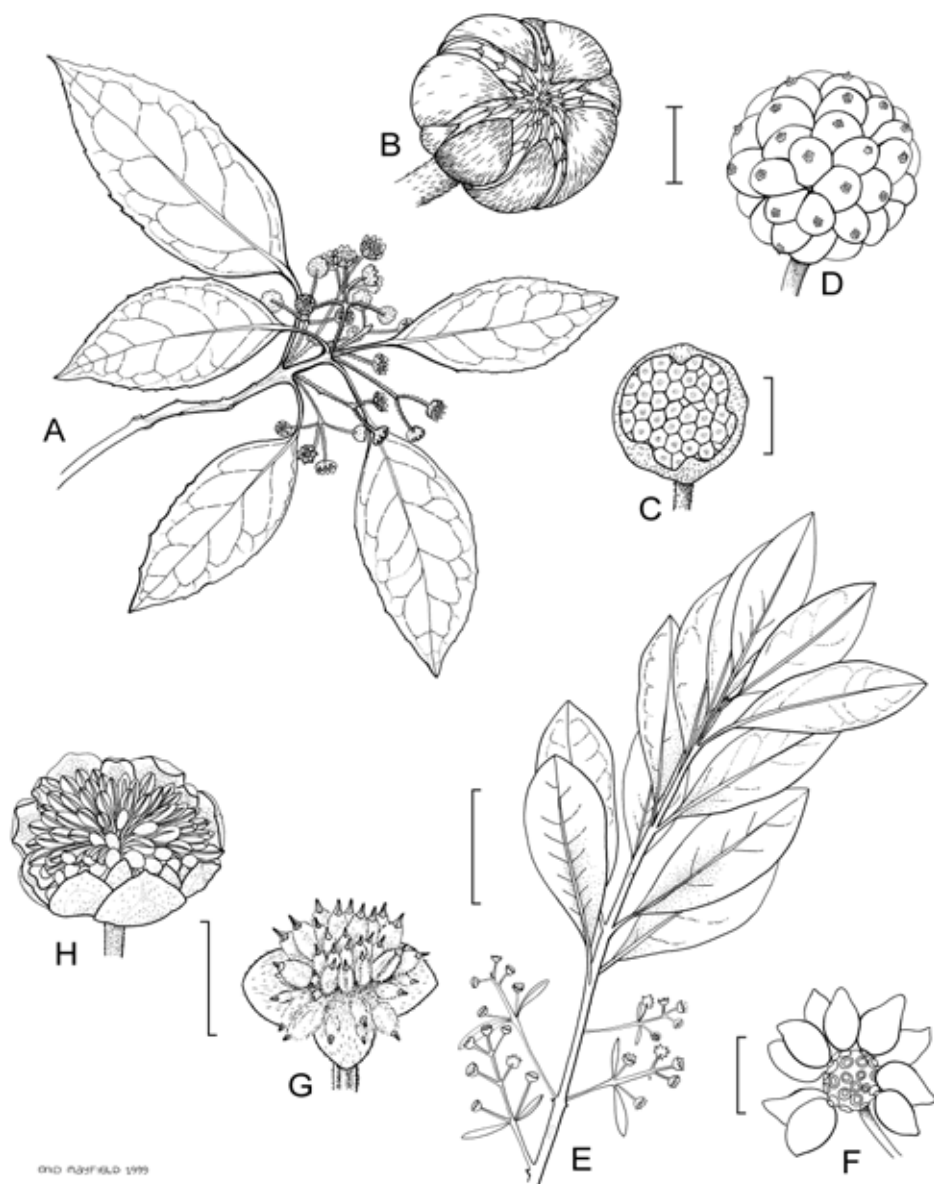


Figure 14. *Hedycarya*. **A–D**, *H. angustifolia*. **A**, branchlet with male flowers; **B**, male flower (A–B, L.G.Adams 2473, MEL); **C**, female flower (P.R.H.St.John s.n., MEL599679); **D**, aggregate fruit (A.C.Beauglehole 42996, MEL). **E–H**, *H. loxocarya*. **E**, branchlet with female flowers; **F**, aggregate fruit; **G**, female flower; **H**, male flower (**E**, **G**, B.Gray 991, QRS; **F**, B.Gray 1653, QRS; **H**, B.Gray 1483, QRS). Scale bars: **A** = 20 mm; **B**, **C** = 2 mm; **D** = 4 mm; **E** = 60 mm; **F** = 10 mm; **G**, **H** = 5 mm. Drawn by E.Mayfield.

2. *Hedycarya loxocarya* (Benth.) W.D.Francis, *Bull. Misc. Inform.* 1931: 458 (1931)

Mollinedia loxocarya Benth., *Fl. Austral.* 5: 287 (1870); *Wilkiea loxocarya* (Benth.) Perkins in H.G.A.Engler (ed.), *Pflanzenr.* 49: 26 (1911). T: Rockingham Bay, Qld, *J.Dallachy*; lecto: K; possible isolecto: MEL, *fide* T.Whiffin & D.Foreman, *Fl. Australia* 2: 451 (2007); remaining syn: MEL 2050652

Illustration: J.Jérémie, *Adansonia* ser. 4, 5: 253, fig. 3 (1983).

Small to medium trees 6–25 m tall. Leaves: petiole 12–20 mm long; lamina obovate to elliptic, 5.5–14.5 cm long, 2.3–6.5 cm wide, attenuate at base, entire, acute at apex, sometimes bluntly so; midrib prominent on both surfaces. Male inflorescence 2–5 cm long, 5–9 (–13)-flowered; pedicels 3–8 (–10) mm long, densely short pubescent. Male flowers ±flattened-cupuliform, 8–11 mm diam., c. 4–5 mm high; tepals 8 in ±2 whorls of 4; stamens more than 60, with connective prolonged into a short, triangular to spatulate appendage, curving over towards centre of flower; filaments very short. Female inflorescence 2–5 cm long, 5–9 (–13)-flowered; pedicels 5–8 mm long, densely short pubescent. Female flowers ±flattened-cupuliform, c. 5 mm diam., c. 3 mm high; tepals 6, broadly triangular; carpels c. 30, with outer ones possibly sterile (staminodes); ovary short columnar, pubescent; stigma short, semi-hemispherical to conical. Fruiting receptacle folding back and enlarging in fruit with tepals persistent. Drupes ovoid., c. 10 mm long, 6 mm wide, loosely arranged, bright red. $2n = 38$, *fide* F.Ehrendorfer *et al.*, *Taxon* 17: 343 (1968). Fig. 14E–H.

Endemic to NE Qld, occurring extensively from the Finnigan Uplands to the Paluma Ra. Grows in rainforest, sometimes at rainforest/tall open forest margins, from 80–1040 m alt. Flowers May–Sept.; fruits Feb.–Mar. Map 77.

Qld: S.F.R. 310, Gillies Logging Area, *B.Gray* 1742 (LTB, QRS); S.F.R. 557, Davies Logging Area, *B.Gray* 1653 (LTB, QRS); S.F.R. 194, *A.K.Irvine* 2087 (QRS); S.F.R. 185, c. 5 km N of Tinaroo Falls Dam, *V.K.Moriarty* 1986 (QRS); 6 km NW of Paluma, *A.R.Bean* 5039 (BRI).

2. LEVIERIA

Levieria Becc., *Malesia* 1: 192 (1877); after Emile Levier (1838–1912) a French botanist and physician in Florence, Italy.

Type: *L. montana* Becc.

Trees or shrubs, rarely lianes (not in Australia), dioecious. Leaves entire or dentate, chartaceous to somewhat membranous. Inflorescences axillary or terminal cymes, with 1–15 flowers. Male flowers ±globose; tepals usually 8 in 2 whorls, ±rounded; stamens numerous (c. 20–40) on floor of receptacle; stamen connective prolonged and expanded into an appendage; filaments very short. Female flowers ±globose; tepals usually 4, somewhat irregular in shape, around a small ostiole; carpels 15–40 or more, the ovary pubescent; stigma short, conical; staminodes absent. Fruiting receptacle folding back in fruit. Fruit a cluster of sessile drupes on a flattened receptacle.

A genus of 7 species, all in New Guinea with one species extending to Ceram and another species extending to N Qld.

W.R.Philipson, A revision of *Levieria* (Monimiaceae), *Blumea* 26: 373–385 (1980).

***Levieria acuminata* (F.Muell.) Perkins, *Bot. Jahrb. Syst.* 25: 570 (1898)**

Mollinedia acuminata F.Muell., *Fragm.* 5: 155 (1866). T: Sea View Range, Qld, 9 Nov. 1864, *J.Dallachy*; lecto: MEL 2052268, *fide* T.Whiffin & D.Foreman, *Fl. Australia* 2: 451 (2007).

Tree, 5–20 m tall. Leaves usually glabrous, sometimes very sparsely pubescent below; petiole 10–16 mm long; lamina ovate to elliptic, 6–12 cm long, 2.4–5 cm wide, rounded to attenuate, often slightly oblique at base, sometimes irregularly toothed, acuminate; midrib prominent on both surfaces. Male inflorescence 3–5 (–8) cm long, up to 15-flowered; pedicels 3–5 (–8) mm long, densely short pubescent. Male flowers irregularly globose, c. 3 mm high and 5 mm diam.; tepals 8 in 2 whorls, the outer tepals rounded and slightly thickened, the

inner thinner; anther connective prolonged above in a triangular spatulate appendage, curved inwards at top; filaments short. Female inflorescence (1–) 2–3 cm long, 1–5-flowered; pedicels 5–8 mm long, short appressed-pubescent. Female flowers ±globose, c. 3–4 mm high and 5 mm diam.; tepals 4, small; carpels c. 16; ovary 1–1.5 mm high, squat; stigma conical. Fruiting receptacle yellowish. Drupes ovoid, c. 6–8 mm long, 5–6 mm wide, black. $2n = 38$, *vide* F.Ehrendorfer *et al.*, *Taxon* 17: 343 (1968). Fig. 15D–E.

Occurs in NE Qld, from the Windsor Tablelands to the Paluma Ra.; also occurs in New Guinea. Grows in rainforest, from 400 to 1000 m alt. Flowers Nov.–Dec.; fruits Mar.–Aug. Map 78.

Qld: S.F.R. 144, Dasyurid Logging Area, *B.Hyland* 10165 (LTB, QRS); S.F.R. 310, Upper Goldsborough Logging Area, *B.Gray* 3974 (QRS); S.F.R. 756, North McNamee Logging Area, *B.Hyland* 5623 (CANB, QRS); S.F.R. 185, Robson Logging Area, *B.Gray* 2068 (CANB, QRS).

3. AUSTROMATTHAEA

Austromatthaea L.S.Sm., *Contr. Queensland Herb.* 6: 6 (1969); from the Latin *australis* (southern) and the genus *Matthaea* from which this taxon was distinguished.

Type: *A. elegans* L.S.Sm.

Shrub or small tree, dioecious. Leaves regularly serrate, thickly chartaceous to somewhat coriaceous. Inflorescences (sub-) terminal or axillary cymes, 1–3-flowered. Male flowers turbinate to ovoid; tepals 4, triangular; stamens numerous, on lower wall and floor of receptacle; anthers dehiscing by two slits or these confluent above; connective not prolonged into an appendage; filaments very short. Female flowers larger than male, depressed globose-turbinate; tepals 4; upper part of receptacle falling as a calyptra; carpels numerous, scattered on floor of receptacle, the ovary densely pubescent with long hairs; stigma long and subulate; staminodes absent. Fruiting receptacle convex and enlarged. Fruit forming as a tight cluster of sessile drupes.

A monotypic genus endemic to NE Queensland.

L.S.Smith, New species of and notes on Queensland plants V, Monimiaceae, *Contr. Queensland Herb.* 6: 6–8, 25 (1969).

Austromatthaea elegans L.S.Sm., *Contrib. Queensland Herb.* 6: 6 (1969)

T: Several miles NW of Kuranda, S.F.R. 1073, c. 1800 ft [c. 550 m], Qld, 10 Sept. 1959, *L.S.Smith* 10847; holo: BRI; iso: CANB, K, MEL, NSW.

Illustration: L.S.Smith, *Contr. Queensland Herb.* 6: 25, fig. 3 a–g (1969).

Shrub or small tree 2–7 m tall; branchlets drooping, densely tomentose. Leaves glabrous above, pubescent below; petiole 6–10 mm long; lamina lanceolate, sometimes broadly so, 9.5–19 cm long, 2.5–5 cm wide, ±rounded at base, regularly serrate, acuminate; midrib prominent on both surfaces, flattened above, raised beneath. Male inflorescence axillary, c. 2.5–3 cm long, 1–3-flowered; pedicels 10–15 mm long, densely short pubescent becoming glabrous and glaucous. Male flowers depressed turbinate, to c. 7 mm high, 10 mm diam., thick-walled, hard, becoming glabrous and glaucous; tepals 4, as two pairs; stamens c. 25–40, c. 2–2.5 mm long; filaments very short, the anthers ±sessile. Female inflorescence axillary or commonly subterminal, 1 (–3)-flowered; pedicels 15–25 mm long, densely short pubescent, becoming glabrous and glaucous. Female flowers depressed globose-turbinate, c. 6–10 mm high, 11–15 mm diam., thick-walled, hard, becoming glabrous and glaucous; tepals 4, as 2 pairs; carpels numerous (over 100), c. 2 mm long, ovary c. 1 mm long, clothed in long straight hairs; stigma elongate, c. 1 mm long. Drupes ovoid, c. 16–20 mm long, 12 mm wide, reddish purple to bluish or black with a glaucous bloom. Fig. 15A–C.

Endemic to NE Qld, from N of the Daintree R. and throughout the Atherton Tablelands. Grows in rainforest, from 80–1200 m alt. Flowers Aug.–Nov.; fruits Apr.–Sept. Map 79.



Figure 15. A–C, *Austromatthaea elegans*. A, branchlet with female flowers (D.Foreman 1703, MEL); B, partial infructescence (S.Johnson 1891, MEL); C, branchlet with male flowers (D.Foreman s.n., 4 Sept. 1978, MEL). D–E, *Levieria acuminata*. D, branchlet with young fruits (B.P.M.Hyland 5623, QRS); E, branchlet with male flowers (B.Hyland 10165, QRS). Scale bars: A, C–E = 20 mm; B = 10 mm. Drawn by E.Mayfield.

3. *Austromatthaea*

MONIMIACEAE

Qld: S.F.R. 933, Little Pine Logging Area, *B.Gray 4058* (LTB, QRS); S.F.R. 755, *A.K.Irvine 909* (QRS); S.F.R. 605, Bridle Logging Area, *B.Hyland 7740* (QRS); Thornton Ra., N of Daintree R. crossing on Mossman to Cape Tribulation road, *J.Wrigley & I.R.Telford 997* (CANB).

Endress (1980) reports that the outer (peripheral) stamens have anthers with two lateral longitudinal slits that remain distinct, while the inner (central) stamens have anthers in which the two slits become confluent.

4. HEMMANTIA

Hemmantia Whiffin, *Fl. Australia* 2: 452 (2007); named after the type locality, Mt Hemmant, in NE Queensland.

Type: *H. webbii* Whiffin

Shrub or small tree, apparently dioecious. Leaves distinctly and regularly toothed, thin and papery. Inflorescences (at least the male) predominantly terminal, occasionally axillary, with (1–) 3 flowers. Male flowers urceolate to campanulate; tepals 4, distinct, long-triangular; stamens 2, on inner wall of receptacle; anthers with two lateral slits that may become confluent above; connective not prolonged into an appendage; filaments very short. Female flowers and fruit not known.

A monotypic genus, known from a single locality in NE Qld.

In the absence of female flowers, the precise relationships of this genus cannot be determined. The general form and pubescence of the plant is somewhat reminiscent of *Austromatthaea*, especially of seedlings of that plant in that the leaves are thin and papery. The stamens are also somewhat similar to *Austromatthaea*. However, the thin and papery nature of the male flowers, and the single pair of stamens, show this taxon as distinct. The leaf volatile oils (Whiffin, unpubl. data) also indicate that this taxon is distinct from all other Australian species in the family.

Hemmantia webbii Whiffin, *Fl. Australia* 2: 453 (2007)

T: Mt Hemmant, July 1973, 16°06' S, 145°26' E, *L.J.Webb & J.G.Tracey 10908* (BRI AQ20546); holo: BRI; iso: BRI.

Wilkia sp. (Mt Hemmant BH8485), B.P.M.Hyland *et al.*, *Austral. Trop. Rain Forest Pl.* (2003)

Gen. (AQ20546) sp. (Mt Hemmant L.J.Webb+ 10908), Staff of the Queensland Herbarium, *Queensland Vasc. Pl. Names Distrib.* 193 (1993); R.J.F.Henderson, *Queensland Pl.* 120 (1997)

Shrub or small tree to 2 m tall; indumentum of long, spreading, simple hairs. Leaves moderately pilose on both surfaces with long spreading hairs, especially on veins; petiole 3–8 (–12) mm long; lamina elliptic to ovate-elliptic, sometimes tending to ovate or obovate, 8–15 cm long, 3–4.5 cm wide, acute to obtuse to slightly cordate at base, distinctly and evenly serrate, acute; veins prominent, especially below. Male inflorescence densely pubescent with long spreading hairs. Male flowers c. 6 mm long including tepals; tepals in 2 pairs, c. 3 mm long, the outer pair slightly longer than the inner; stamens 2 in a single pair. Female flowers and fruit not known.

Endemic to NE Qld, known only from 3 collections from the type locality, Mt Hemmant. Grows in upland rainforest, from 600–800 m alt. Flowers recorded July and Oct. Map 80.

Qld: Vacant Crown Land, Noah, *B.Hyland 8293* (LTB, QRS); Vacant Crown Land, Mt Hemmant, *B.Hyland 8485* (LTB, QRS).

MONIMIACEAE

5. WILKIEA

Wilkiea F.Muell., *Trans. Philos. Inst. Victoria* 2: 64 (1858); after Dr. David E. Wilkie, Vice President of the Philosophical Institute of Victoria (later the Royal Society of Victoria).

Type: *W. calyptrocalyx* F.Muell.

Trees or shrubs, monoecious (or perhaps rarely dioecious). Leaves entire or mostly toothed, chartaceous to often distinctly coriaceous. Inflorescences axillary or terminal, cymes or panicles, with usually 3–9 flowers, but sometimes solitary or rarely up to 30. Male flowers \pm globose; tepals 4–8, around a small ostiole; stamens 4–8 (–30), usually \pm regularly arranged in pairs on floor and lower walls of receptacle, but sometimes in vertical rows; anthers deltoid, dehiscing by a single apical slit curving over the stamen apex; connective not prolonged into an appendage; filaments short to long, thick and slightly flattened, glabrous or (in one species) densely pubescent. Female flowers flattened-globose, with a large ostiole, calyprate at maturity; tepals minute, decussate, the outer whorls of usually 2 pairs (occasionally more) somewhat distinct, the inner whorls thickened and glandular forming a hyperstigma; carpels numerous, the ovary glabrous or densely pubescent; stigma short, hemispherical to conical; staminodes absent. Upper part of fruiting receptacle falling off forming a circular scar. Fruit a cluster of variably sessile to shortly stipitate drupes.

A genus of about 12 or more species, most occurring in Eastern Australia with one supposed and endemic species in SE New Guinea. In addition to the species in the key here, there are at least two additional undescribed species that are clearly distinct but which are not sufficiently well known to determine their relationships. These are treated as *Wilkiea* species A and B at the end of the genus.

It is likely that many (perhaps all) species described as dioecious have male and female flowers on the same plant but usually not at the same time. For example, many plants with mature fruit have young flowers that are male.

The seedling leaves of all species are generally more obviously and distinctly toothed than the adult leaves, and species with entire adult leaves may have sparsely toothed juvenile leaves.

Within Australia at least, the species previously referred to the genus *Kibara* cannot be separated generically from those traditionally referred to the genus *Wilkiea*. Philipson (1987, 1993) separated the genera on the basis that *Wilkiea* had stamens that were scattered over the floor and lower walls of the receptacle, while *Kibara* had stamens in pairs. In fact all Australian species of *Wilkiea*, with the exception of *W. austroqueenslandica*, have stamens in distinct pairs in a regular arrangement. *Wilkiea austroqueenslandica* has numerous stamens, up to 30, although these are regularly arranged rather than scattered. This species, although differing from all other *Wilkiea* species in the number of stamens, appears to be closely related to *W. hylandii* and *W. smithii*, and therefore part of this genus. The only Australian species that has been referred to *Wilkiea* and which has the stamens scattered over the inner walls of the receptacle is *W. wardellii*. This taxon differs from all other species of *Wilkiea*, and is now recognised as a distinct genus, *Endressia*. The sole species of *Wilkiea* described from Papua New Guinea, *W. foremanii* Philipson, has stamens scattered over the floor and lower walls of the receptacle, although otherwise differing from *Endressia*. This Papua New Guinea species would not fall into the (expanded) concept of *Wilkiea* as adopted here.

Only the Australian species referred to the genus *Kibara* have been studied. If other species of *Kibara*, including the type species, also fall within the concept of *Wilkiea* as adopted here, then the name *Kibara*, as the older name, would have to be adopted for the Australian species.

The genus *Tetrasynandra* was recognised by Perkins (1898) on the basis of having the stamen filaments fused into a tube. Three species, all from Australia, were transferred from *Kibara* into *Tetrasynandra*. However, the character of fused stamen filaments is variable, even within a species, and these species are not otherwise closely related. It has previously been noted (Johnson, 1962; Endress, *in litt.*) that *Tetrasynandra* is not a natural genus, and that one species (*T. laxiflora*) should be placed in *Steghanthera*, while the other two (*T. longipes* and *T. pubescens*) should be placed in *Wilkiea* or *Kibara*.

- 1 Inflorescences and flowers densely pubescent; female flowers with carpels densely pubescent
- 2 Mature leaves distinctly pubescent, especially on lower surface and veins; stamen filaments densely pubescent 4. *W. pubescens*
- 2: Mature leaves \pm glabrous, rarely pubescent on veins; stamen filaments \pm glabrous
- 3 Male flowers with up to 30 stamens; leaf margins prominently toothed [SE Qld & NE NSW] 1. *W. austroqueenslandica*
- 3: Male flowers with 4–10 stamens; leaf margins entire or toothed in upper half only [NE Qld & Cape York Penin.]
- 4 Male flowers with (6) 8 (10) stamens; leaf margin entire or irregularly prominently toothed in upper half 3. *W. hylandii*
- 4: Male flowers with 4 stamens; leaf margin entire 2. *W. smithii*
- 1: Inflorescences and flowers glabrous or at most sparsely pubescent with short hairs; female flowers with carpels glabrous or occasionally sparsely to densely pubescent
- 5 Male and female inflorescences 3–5 cm or more in length
- 6 Male inflorescences (9–) 20–30-flowered, much branched, pedicels 7–9 mm long, stamens 4 (rarely 6); female inflorescences 3–9-flowered, pedicels 2–4 mm long, carpels 40–50, glabrous to sparsely pubescent 9. *W. rigidifolia*
- 6: Male inflorescences 5–11-flowered, pedicels 15–20 mm long, stamens 6 or 8; female inflorescences 3-flowered (rarely 9-flowered), pedicels 15–18 mm long, carpels 9–13, densely shortly pubescent 10. *W. longipes*
- 5: Male and female inflorescences 1–3 (–4) cm long
- 7 Female inflorescence generally 5–9-flowered; male inflorescence 3–9-flowered
- 8 Male and female inflorescences 1.0–1.5 cm long, pedicels 3–6 mm long; male flowers with 4 stamens (rarely 8); female flowers with 13–20 glabrous carpels 8. *W. macrophylla*
- 8: Male and female inflorescences 2.0–3.0 cm long, pedicels 4–10 mm long; male flowers with 6 or 8 stamens; female flowers with 20–40 pubescent carpels 7. *W. huegeliana*
- 7: Female inflorescence usually single-flowered (occasionally 2 or 3 pedicels arising from the one point); male inflorescence 1–5-flowered
- 9 Petiole 3–10 mm long; leaf base \pm acute 5. *W. angustifolia*
- 9: Petiole 2–5 mm long; leaf base cordate to almost stem-clasping 6. *W. cordata*

1. *Wilkiea austroqueenslandica* Domin, *Biblioth. Bot.* 22(89): 672 (1926)

T: Süd-Queensland: Regenwälder der Tambourine Mts, Mar. 1910, *K. Domin*; holo: PR; photo: BRI.

Spreading shrub or small tree 1–5 (–9) m tall. Leaves glabrous; petiole 5–15 mm long; lamina obovate, elliptic to oblong-elliptic, 6–21 cm long, 2–7 cm wide, cuneate to attenuate at base, prominently but somewhat irregularly toothed, acute at apex; midrib prominent on both surfaces, flattened above, raised beneath. Male inflorescence axillary, 2–3.5 (–5) cm long, 7–9-flowered; pedicels c. 8 mm long, densely pubescent. Male flowers globose, 4–5 mm diam.; tepals as 4 pairs; stamens c. 30, arranged in vertical rows over lower and side walls of receptacle; filaments short. Female inflorescence axillary, 3–5 cm long, 1–9-flowered; pedicels 10–15 mm long, densely silky-pubescent. Female flowers globose, 5–7 mm diam.; outer tepals as 2 pairs; carpels c. 35; ovary densely silky-pubescent; stigma \pm hemispherical. Fruiting receptacle swollen, orange. Drupes ovoid, c. 15–22 mm long, 10–15 mm wide, glossy, olive black. *Smooth Wilkiea*, *Furry-flowered Wilkiea*. Plate 14; Fig. 16B–C.

Extending from the McPherson Ra. in SE Qld to the Tweed and Richmond Rivers in NE N.S.W. Grows in coastal to subtropical rainforests, from sea-level to 850 m alt. Flowers July–Dec.; fruits June–Aug. Map 81.

Qld: O'Reilleys Guest House, Lamington Natl Park, Dec. 1978, *C.Harman* (BRI); Mt Roberts, Lamington Natl Park, *S.T.Blake 20490* (BRI). N.S.W.: Red Scrub, Whian Whian State Forest, 13 miles [21 km] NE of Lismore, *R.Schodde 5630* (CANB).

The three species *W. austroqueenslandica*, *W. hylandii* and *W. smithii* form a distinct group within the genus which may be worthy of taxonomic recognition. While *W. austroqueenslandica* differs from all other species of *Wilkiea* in the male flowers having a larger number of stamens, these are arranged in a more or less regular fashion and appear typical of the genus.

2. *Wilkiea smithii* Whiffin, *Fl. Australia* 2: 453 (2007)

T: State Forest 607, Shoteel Logging Area, Qld, 16°55'S, 145°36'E, 23 Feb. 1995, *B.Gray 6001*; holotype: QRS.

Wilkiea sp. (Mt Molloy L.S.Smith 3955), R.J.F.Henderson, *Queensland Pl.* 120 (1997), p.p.

Wilkiea sp. (=RFK/1944), B.Hyland and T.Whiffin, *Australian Tropical Rain Forest Trees* (1993).

Shrub or small slender tree 1.8–8 m tall. Leaves densely pubescent when young, especially on midrib, glabrescent; petiole 8–12 mm long; lamina elliptic or oblong-elliptic, 8.5–14 cm long, 3–6 cm wide, cuneate or sometimes slightly rounded at base, entire, acute, occasionally slightly acuminate or obtuse at apex; midrib prominent on both surfaces, flattened above, raised beneath. Male inflorescence axillary, 1.5–3 cm long, (3–) 5-flowered; pedicels 6–8 mm long, densely pubescent. Male flowers ±globose to clavate, c. 3 mm diam.; tepals 8 in 2 whorls; stamens usually 4, in 2 pairs, rarely 1 stamen missing, 1 pair long and 1 short; filaments short or long. Female inflorescence axillary or terminal, c. 1.5 cm long, (1–) 3 (–5)-flowered; pedicels c. 5–8 mm long, densely pubescent. Female flowers rare, ±globose; carpels 20–40; ovary densely pubescent; stigma ±hemispherical. Fruiting receptacle swollen, mid orange or orange-yellow. Drupes ovoid, 12–16 mm long, 9–13 mm wide, glaucous, purple-black to black. Fig. 16D–E.

Endemic to NE Qld, occurring from the Finnigan Uplands to the northern part of the Atherton Tablelands. Grows in drier, more seasonal, rainforest, from 200–800 m alt. Flowers Aug.–Dec.; fruits Apr.–Oct. Map 82.

Qld: Timber Reserve 176, Lorna Doone Logging Area, *B.Hyland 12239* (QRS); S.F.R. 607, Shoteel Logging Area, *B.Gray 2791* (QRS); Upper Parrot Ck, Annan R., *L.J.Brass 20181* (BRI); Shiptons Flat, *L.W.Jessup GJD2859*, *G.P.Guymer & H.A.Dillewaard* (BRI).

3. *Wilkiea hylandii* Whiffin, *Fl. Australia* 2: 453 (2007)

T: Timber Reserve 14, Massy, Qld, 13°52'S, 143°23'E, 9 Nov. 1980; *B.Hyland 10898*; holotype: QRS; isotype: LTB.

Monimiaceae sp. (McIlwraith Range BH 10894), B.P.M.Hyland *et al.*, *Austral. Trop. Rain Forest Pl.* (2003)

Wilkiea sp. (Mt Molloy L.S.Smith 3955), R.J.F.Henderson, *Queensland Pl.* 120 (1997), p.p.

Shrub or small tree, 1.5–5 m tall. Leaves pubescent when young, glabrescent or hairs persisting on midrib; petiole 10–15 mm long; lamina elliptic, 8–15 cm long, 3–5.5 cm wide, attenuate to cuneate at base, entire or irregularly but prominently toothed in upper half, acuminate at apex; midrib prominent on both surfaces, flattened above, raised and prominent beneath. Male inflorescence axillary, c. 1.5 cm long, 5–7-flowered; pedicels 4–5 mm long, densely pubescent. Male flowers angular-globose, 3–4 mm diam.; tepals 6, with 2 pairs around ostiole, and one lower on receptacle; stamens (6) 8 (10), in pairs; filaments of different lengths so as to present a symmetrical formation at ostiole. Female inflorescence axillary, 3–5 cm long, 3–5-flowered; pedicels 7–15 mm long, densely pubescent. Female flowers depressed-globose, c. 8 mm high, 11 mm diam.; outer tepals as 2 pairs; carpels c. 40; ovary long villous especially on lines representing 4 angles; stigma ±hemispherical. Fruiting receptacle enlarged, orange. Drupes ovoid, 15–18 mm long, 10–13 mm wide; glossy black.

Endemic to Cape York Penin., Qld, occurring in the area around McIlwraith Ra. Grows in rainforest from 400–600 m alt. Flowers Sept.–Dec.; fruits May–Oct. Map 83.

Qld: McIlwraith Ra., *B.Hyland 7646* (LTB, QRS); Timber Reserve 14, Massy, *B.Hyland 10894* (QRS); Timber Reserve 14, Leo Creek Rd, *A.Irvine 371* (QRS); McIlwraith Ra., Leo Creek Rd, *B.Hyland 8384* (QRS).

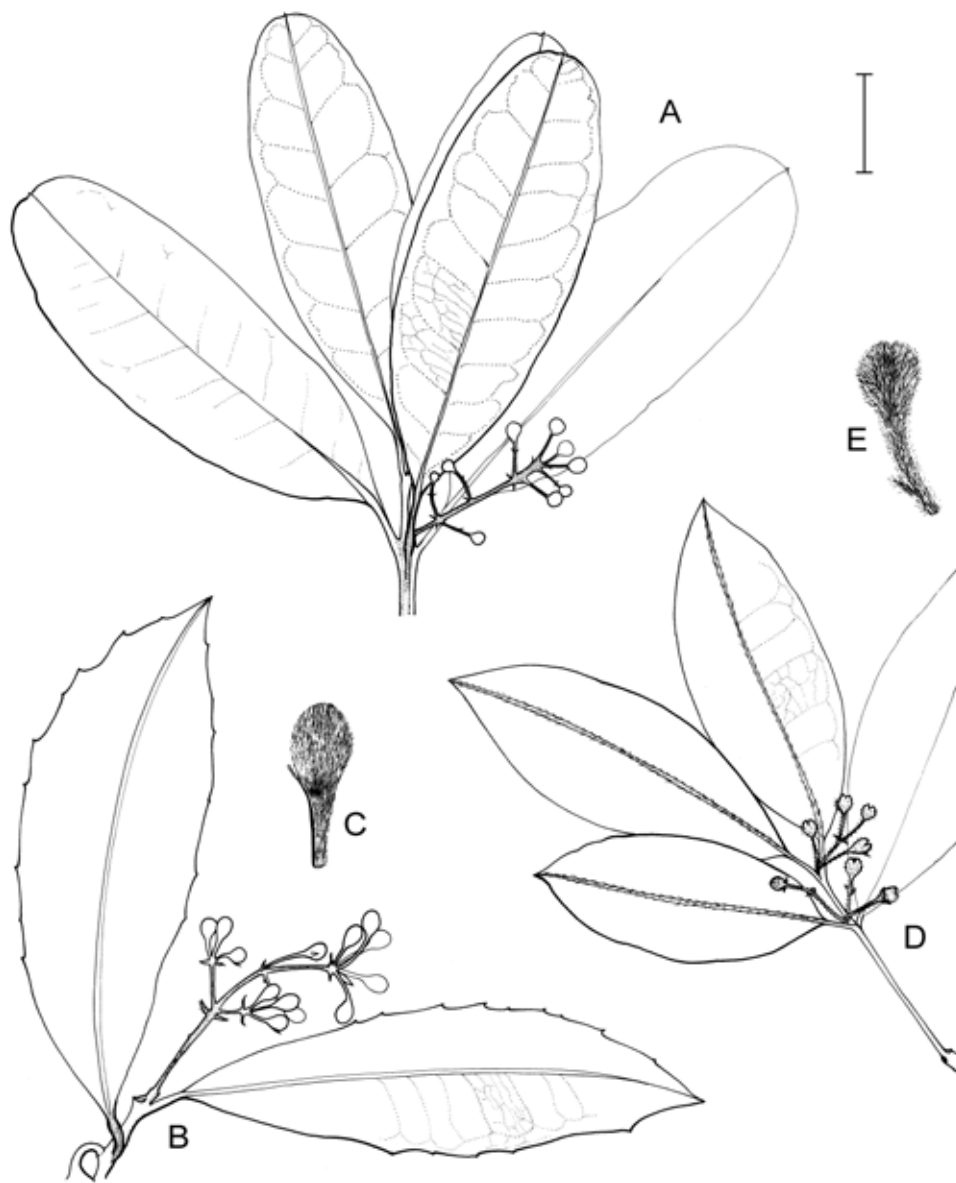


Figure 16. *Wilkiea*. **A**, *W. rigidifolia*, branchlet with male flowers (J.R.Clarkson 9327 & V.J.Nelder, QRS). **B–C**, *W. austroqueenslandica*; **B**, branchlet with male flowers; **C**, close up of male flower (**B–C**, S.Clark, J.Pickard & R.Coveny 1584, NSW). **D–E**, *Wilkiea smithii*, **D**, branchlet with female flowers; **E**, close up of male flower (**D–E**, L.W.Jessup *et al.* GJD2859, BRI). Scale bar: **A**, **B**, **D** = 25 mm; **C**, **E** = 5 mm. Drawn by E.Mayfield.

4. *Wilkiea pubescens* (Benth.) Whiffin & Foreman, *Fl. Australia* 2: 451 (2007)

Kibara pubescens Benth., *Fl. Austral.* 5: 290 (1870); *Tetrasyandra pubescens* (Benth.) Perkins, *Bot. Jahrb. Syst.* 25: 569 (1898); *Mollinedia pubescens* (Benth.) F.Muell., *Syst. Census Austral. Pl.* 3 (1883). T: Rockingham Bay, Qld, *J.Dallachy*; lecto: K, *fide* T.Whiffin & D.Foreman, *Fl. Australia* 2: 451 (2007).

Shrub or small tree 5–7 m tall. Leaves pubescent; petiole 5–10 mm long; lamina elliptic, 4.5–12 cm long, 2–5 cm wide, shortly attenuate or cuneate to rounded at base, entire to shallowly serrate mainly in upper two-thirds, mostly acute, sometimes bluntly so at apex, occasionally obtuse; midrib flattened above, raised and prominent beneath. Male inflorescence axillary, sometimes in more branched terminal clusters, 1.5–3 cm long, 3–5-flowered; pedicels 5–10 mm long, densely pubescent. Male flowers globose, 3–4 mm diam.; tepals 6, with 2 pairs over ostiole and 1 pair lower on receptacle; stamens as 2 (3) pairs; filaments densely pubescent. Female inflorescence 1.5–3 cm long, (3–) 5 (–7)-flowered; pedicels 5–10 mm long, densely pubescent. Female flowers globose, 3–4 mm diam.; outer tepals as 2 pairs; carpels 15–30; ovary cuneate, densely pubescent with ± appressed golden hairs; stigma conical or elongate hemispherical. Fruiting receptacle slightly swollen, pale orange. Drupes ovoid, 10–14 mm long, 9–11 mm wide, purplish black.

Occurs in NE Qld, where extensively distributed from Cooktown to Mt Elliott, and possibly extending into Central Qld. Grows in rainforest, or at margins of rainforest, or in rainforest of wet sclerophyll forest, from 5–1100 m alt. Flowers Feb.–June; fruits Feb.–Sept. Map 84.

Qld: Bloomfield Beach, c. 1.6 km N of Bloomfield R. mouth, *L.S.Smith 11064* (BRI); S.F.R. 144, *B.Hyland 8722* (CANB, QRS); Hills Ck, Cairns, *C.Lyons 81* (BRI); S.F.R. 194, Barron, *B.Gray 1710* (CANB, LTB, QRS); Dunk Is., behind Brammo Bay, *L.J.Webb & J.G.Tracey 10651* (CANB).

5. *Wilkiea angustifolia* (F.M.Bailey) Perkins in H.G.A.Engler (ed.), *Pflanzenr.* 49: 27 (1911)

Mollinedia angustifolia F.M.Bailey, *Queensland Dept Agric. Stock. Bot. Bull.* 5: 23 (1892). T: Bellenden Ker, at about 3,000 or 4,000 ft elevation, Qld, 1889, [*F.M.Bailey?*]; holotype: BRI.

Wilkiea sp. (Barong, L.W.Jessup 719), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 116 (2002)

Shrub or small tree 1–6 m tall. Leaves glabrous; petiole 3–10 mm long; lamina narrowly elliptic to broadly elliptic, 7–21 cm long, 2–9 cm wide, acute or sometimes rounded at base, crenate to serrate at margin, acute to acuminate, sometimes blunt at apex; midrib flattened to slightly raised above, raised and prominent beneath. Male inflorescence axillary, often several clustered together, c. 10–15 mm long, 3–5-flowered; pedicels c. 10 mm long, glabrous. Male flowers globose to depressed-globose, 2.5–3 mm diam.; tepals 6, with 2 pairs around ostiole and 1 pair lower on receptacle; stamens 4 in 2 pairs; filaments of inner pair longer than outer pair. Female inflorescence axillary or terminal, usually of a single flower (sometimes 2 or 3), 10–25 mm long; pedicels 10–20 mm long, glabrous. Female flowers globose to depressed-globose, c. 3–5 mm high and 4–5 mm diam.; outer tepals as 3 pairs; carpels 8–20; ovary angled, c. 1.5 mm high, glabrous; stigma flat to slightly hemispherical. Fruiting receptacle enlarged, yellow to orange. Drupes ovoid, 10–18 mm long, 8–10 mm wide, purple-black or black. Fig. 17E–G.

Endemic to NE Qld, occurring from the Finnigan Uplands to the Cardwell Ra. Grows in rainforest, from 100–1585 m alt. Flowers Nov.–May; fruits Mar.–Oct. Map 85.

Qld: S.F.R. 143, Windmill Logging Area, *B.Hyland 11695* (LTB, QRS); summit area, Mt Lewis, *R.Schodde 3345* (CANB); S.F.R. 143, South Mary Logging Area (Mt Lewis), *A.K.Irvine 511* (QRS); Centre Peak, Mt Bellenden Ker, *J.Wrigley & I.R.Telford 851* (CANB); Mt Bouragama, between Gold Hill and Alexandra Ck, *L.J.Webb & J.Tracey 13734* (QRS).

While the recognition of *W. cordata* (previously placed within *W. angustifolia sens. lat.*) removes some variation, this is still a variable species. Distinct populations may occur in the Herberton Ra. area, including Mt Baldy, and others around the Ravenshoe area. While these may be worthy of some taxonomic recognition, no clearly distinguishing characters are currently known.

6. *Wilkiea cordata* Whiffin, *Fl. Australia* 2: 453 (2007)

T: State Forest Reserve 607, Emerald Logging Area, Mt Haig, Qld, 17°06'S 145°36'E, alt. 1240 m, 19 Feb. 1981, *B.Gray* 1913; holo: QRS; iso: LTB.

Wilkiea sp. (Boonjee BG5413), B.P.M.Hyland *et al.*, *Austral. Trop. Rain Forest Pl.* (2003)

Wilkiea sp. (Russell Gorge, S.J.Dansie 1909), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 116 (2002)

Shrub or small tree 1–4 m tall. Leaves glabrous; petiole 2–5 mm long; lamina oblong-elliptic to oblong-obovate, 11–26 cm long, 3–9 cm wide, cordate to almost stem clasping at base, serrate to almost entire, acuminate to acute or bluntly acute at apex; midrib prominent on both surfaces, flattened to slightly raised above, raised beneath. Male inflorescence axillary, clustered, 1- or 3-flowered, 1.0–1.5 cm long; pedicels 4–8 mm long, glabrous. Male flowers angular-globose; tepals 6, with 2 pairs around ostiole, and 1 pair lower on receptacle; stamens in 2 pairs; filaments long, 1 pair slightly longer than other. Female inflorescence axillary or terminal, usually 1-flowered, occasionally 2 or 3, 1–2.5 (–4) cm long; pedicels c. 5–15 mm long, glabrous. Female flowers globose to depressed-globose, 3–4 mm high, 4–5 mm diam.; carpels c. 25; ovary glabrous; stigma ±hemispherical. Fruiting receptacle yellow with orange tinge. Drupes ovoid, c. 12–15 (–20) mm long, 10–12 mm wide, purplish black or black.

Endemic to NE Qld, occurring on the ranges to the N and E of the Atherton Tablelands, predominantly at mid to higher altitudes. Grows in rainforest understorey, from 100–1250 m alt. Flowers Jan.–Mar.; fruits Mar. (young), June–Aug. Map 86.

Qld: Timber Reserve 1230, Boonjee Logging Area, *A.K.Irvine* 1732 (QRS); S.F.R. 185, Haig Logging Area, *B.Gray* 2657 (QRS); S.F.R. 607, Bridle Logging Area, *B.Gray* 977 (LTB, QRS); c. 20 km SE of Yungaburra, *W.Morawetz et al.* 19-30185 (QRS); SFR 185, Danbulla, *B.Hyland* 2804 (QRS).

7. *Wilkiea huegeliana* (Tul.) A.DC., *Prodr.* 16(2): 669 (1868)

Mollinedia hugeliana Tul., *Ann. Sci. Nat. Bot.* ser. 4, 3: 45 (1855). T: 'Nova Hollandia orientalis (Hügel; All.Cunningham)'; syn: W.

Wilkiea calyptrocalyx F.Muell., *Trans. Philos. Inst. Victoria* 2: 64 (1857). T: On sub-saline banks of the Brisbane River, [Qld], *Hill & F.Mueller*; holo: MEL.

Tall shrub or small tree, 1–8 m tall. Leaves glabrous or with a few scattered short simple hairs on lower surface; petiole 5–12 mm long; lamina ovate, obovate, narrowly oblong to narrowly elliptic, 6–15 cm long, 1–8 cm wide, attenuate to rounded at base, mostly distantly toothed, acute, sometimes bluntly so, coriaceous; midrib prominent on both surfaces. Male inflorescence axillary, 2–2.5 cm long, 7–9-flowered; pedicels 4–10 mm long, sparsely minutely pubescent. Male flowers globose, 2–4 mm diam.; tepals 6, with 2 pairs around ostiole, and a third lower on receptacle, glabrous; stamens as 3 or 4 pairs; filaments short, 0.5 mm long. Female inflorescence terminal or axillary, 2.5–3 cm long, 5–9-flowered; pedicels 5–10 mm long, sparsely minutely pubescent. Female flowers globose or depressed-globose, 4–6 mm diam.; outer tepals as 2 pairs; carpels 20–40; ovary pubescent; stigma hemispherical to conical. Fruiting receptacle pale yellow to mid orange. Drupes ovoid, 12–15 mm long, 8–10 mm wide, glossy bluish black or glossy black. *Veiny Wilkiea*, *Common Wilkiea*, *Tetra Beech*. Fig. 17A–B.

Extending from SE Qld to the S coast of N.S.W. Grows in rainforest from the coast to nearby ranges, sometimes in disturbed areas, from sea-level to 900 m. Flowers Aug.–Dec.; fruits Apr.–Jan. Map 87.

Qld: Mt Roberts, Lamington Natl Park, McPherson Ra., *S.T.Blake* 20491 (NSW); Yandina Ck, 2.5 km E of Valdora and 6 km NE of Yandina, *P.R.Sharpe* 4532 (BRI, NSW). N.S.W.: Along Sweetmans Rd, c. 5 miles [8 km] S of Tyalgum, *R.D.Hoogland* 11659 (BRI, CANB); S slopes of Mt Lindesay, *R.Schodde* 5611 (CANB, NSW); c. 1 mile [c. 1.6 km] W of Kiama, *R.Schodde* 3513 (CANB, NSW).

8. *Wilkiea macrophylla* (A.Cunn.) A.DC., *Prodr.* 16(2): 669 (1868)

Hedycarya macrophylla A.Cunn., *Ann. Nat. Hist.* 1: 215 (1838); *Mollinedia macrophylla* (A.Cunn.) Tul., *Ann. Sci. Nat. Bot.* ser. 4, 3: 45 (1855); *Kibara macrophylla* (A.Cunn.) Benth., *Fl. Austral.* 5: 288 (1870). T: '... frequent in shaded woods on the coast, especially on the banks of the larger rivers of the colonies. - 1804, R.Brown, - 1818, Allan Cunningham'; syn: *n.v.*

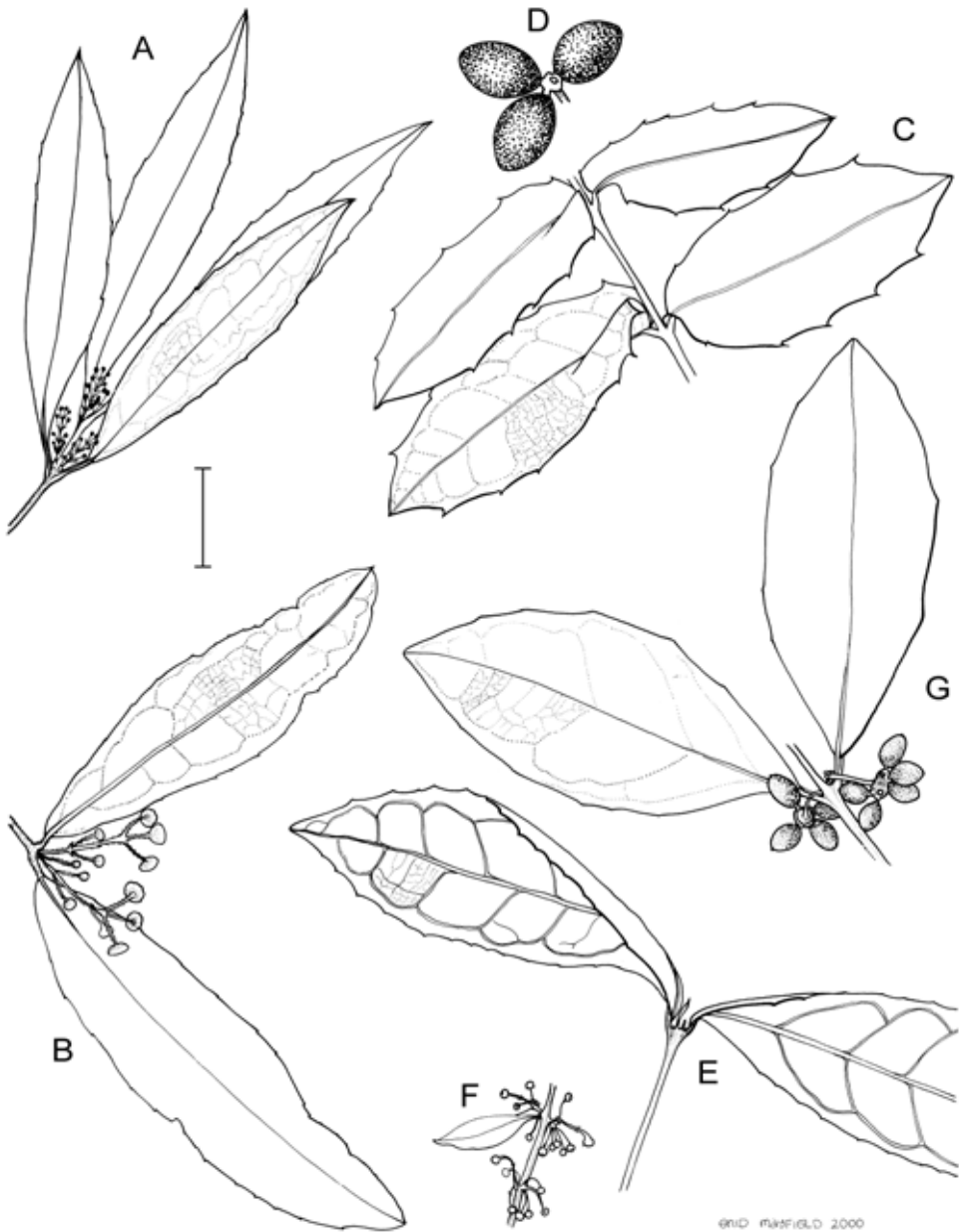


Figure 17. *Wilkiea*. **A–B**, *W. huegeliana*. **A**, branchlet with male flowers (I.R.Telford 1203, CANB); **B**, branchlet with female flowers (H.Streimann 8130, CANB). **C–D**, *W. macrophylla*; **C**, leafy branchlet; **D**, fruit (C–D, I.R.Telford 5435, CANB). **E–G**, *Wilkiea angustifolia*. **E**, leafy branchlet; **F**, male flowers (G.Sankowsky 1040, BRI); **G**, fruiting branchlet (J.G.Tracey 14942, QRS). Scale bar: **A–C**, **E–F** = 25 mm; **D** = 20 mm. Drawn by E.Mayfield.

Illustrations: T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 1: 153, fig. 20, C1–C2 (1983); B.D.Morley & H.R.Toelken (eds), *Fl. Pl. Australia* 40, fig. 13d (1983)

Shrub or small tree, 1–6 m tall. Leaves glabrous; petiole 2–10 mm long; lamina narrowly elliptic to broadly elliptic, obovate, to broadly oblong, 6.5–24 cm long, 2–9 cm wide, cuneate to subcordate at base, entire or with hard prominent teeth, acute to obtuse, thick and coriaceous; midrib prominent on both surfaces, flattened above, raised beneath. Male inflorescence axillary, 1–1.5 cm long, 3–9-flowered; pedicels c. 3 mm long, glabrous. Male flowers ovoid, 2–3 mm diam.; tepals 6, with 2 pairs around ostiole and a third lower on receptacle; stamens as 2 pairs, rarely to 4 pairs; filaments very short. Female inflorescence axillary, c. 1.5 cm long, 7–9-flowered; pedicels 4–6 mm long, glabrous. Female flowers flattened-globose, 3–4 mm diam.; the outer tepals as 6 or 7 pairs; carpels 13–20; ovary glabrous. Fruiting receptacle swollen, pale orange-yellow. Drupes ovoid, 15–20 mm long, 10–12 mm wide, glossy, purple-black to olive black. *Large-leaved Wilkiea*. Fig. 17C–D.

Extending from Central Qld to N of the Richmond R. in NE N.S.W. Grows in rainforest, from 500–610 m alt. Flowers Dec.–Feb.; fruits Feb.–Sept. Map 88.

Qld: Mt Blackwood, c. 25 km NW of Mackay, *P.R.Sharpe 4552*, *G.Batianoff* (BRI); Mt Perry, *P.I.Forster 4282* (BRI); Cania Gorge Natl Park, c. 24 km NW of Monto, *R.J.Henderson 2973 et al.* (BRI, NSW). N.S.W.: Bilambil, 27 July 1978, *A.G.Floyd* (CANB).

This species is similar in vegetative appearance to *W. rigidifolia*, although very different in floral characters. The 2 species are basically allopatric, but their ranges may overlap in central eastern Qld, where sterile specimens are difficult to separate.

9. *Wilkiea rigidifolia* (A.C.Sm.) Whiffin & Foreman, *Fl. Australia* 2: 451 (2007)

Kibara rigidifolia A.C.Sm., *J. Arnold Arbor.* 22: 243 (1941). T: Lower Fly River, East bank opposite Sturt Island, Papua New Guinea, Oct. 1936, *L.J.Brass 8216*; holotype: *n.v.*; iso: BRI.

Wilkiea sp. (Somerset *L.J.Webb* 11845), Staff of the Queensland Herbarium, *Queensland Vasc. Pl. Names Distrib.* 193 (1993); *R.J.F.Henderson, Queensland Pl.* 120 (1997)

Shrub or small tree, 1.5–10 m tall. Leaves glabrous; petiole 10–25 mm long; lamina elliptic, broadly elliptic to oblong-elliptic, 8–28 cm long, 6–8 cm wide, attenuate, cuneate to rounded at base, mostly entire (juvenile leaves prominently toothed), acute to mostly obtuse at apex; midrib prominent on both surfaces, flattened above, raised beneath. Male inflorescence axillary, sometimes ramiflorous (borne on twigs just behind leaves), 3.5–4 cm long, highly branched, (9–) 20–30-flowered; pedicels 7–9 mm long, glabrous. Male flowers ±campanulate, 3–5 mm diam.; tepals as 4 pairs around a distinct ostiole, glabrous; stamens as 2 (3) pairs, all the same size but reaching different heights because of placement; filaments long. Female inflorescence axillary, not as highly branched, c. 3.5 (–6) cm long, 3–9-flowered; pedicels 2–4 mm long, glabrous. Female flowers flattened-globose, 4–5 mm diam.; outer tepals as 2 pairs; carpels 40–50; ovary c. 1 mm high, glabrous to sparsely pubescent; stigma squat, flat. Fruiting receptacle enlarged, orange-yellow. Drupes globose to ovoid, 10–15 mm long, 8–12 mm wide, glossy black. Fig. 16A.

Occurs in Cape York Penin. and the northern part of NE Qld, and possibly extending further S to Central Qld.; also occurs in the Western Province of Papua New Guinea. Grows in a variety of habitats ranging from rainforest to dry sclerophyll woodland, often by streamsides, from sea-level to 550 m alt. Flowers Feb.–Aug.; fruits May–Dec. Map 89.

Qld: Bamaga Rd, 8 km S of Cape York, *B.Gray 4296* (QRS); between Lockerbie and Somerset, *B.Gray 2026* (LTB, QRS); Narau Beach, Newcastle Bay, *B.Gray 2030* (LTB, QRS); Palm Ck, 46.2 km N of Wenlock R. crossing on the Coen-Bamaga road, *J.T.Waterhouse & P.G.Wilson 2674* (BRI); Chester R., *B.Hyland 9445* (QRS).

10. *Wilkiea longipes* (Benth.) Whiffin & Foreman, *Fl. Australia* 2: 451 (2007)

Kibara longipes Benth., *Fl. Austral.* 5: 289 (1870); *Mollinedia longipes* (Benth.) F.Muell., *Syst. Census Austral. Pl.* 3 (1883); *Tetrasynandra longipes* (Benth.) Perkins, *Bot. Jahrb. Syst.* 25: 569 (1898). T: Rockingham Bay, Qld, *J.Dallachy*; syn: MEL 2050660, 2050662, 2050663, 2050666 (male flowers); 2050654, 2050657 (fruit).

Shrub or small tree, 0.75–15 m tall. Leaves glabrous; petiole 8–20 mm long; lamina elliptic, broadly elliptic, oblong elliptic or ovate, 8.5–26 cm long, 4–12 cm wide, shortly attenuate to cuneate or sometimes rounded at base, crenate (often irregularly so and mostly in upper half), bluntly acute to obtuse; midrib flattened above, raised and prominent beneath. Male inflorescence axillary, sometimes ramiflorous, to 8.5 cm long, 5–11-flowered; pedicels 15–20 mm long, glabrous or sparsely pubescent. Male flowers clavate to globose, 2–3 mm high, 1.5–3 mm wide; tepals as 4 pairs around ostiole; stamens as 3 or 4 pairs, sometimes partially fused at base; filaments short to long. Female inflorescence axillary, 3–4.5 (–9) cm long, flowers in single unit of 3, occasionally branched as 3 units each of 3; pedicels 15–18 mm long, glabrous or sparsely pubescent. Female flowers \pm globose, c. 4 mm diam.; outer tepals as 2 pairs around ostiole, with a third pair lower on receptacle; carpels 9–13; ovary \pm cuneate, c. 1.5 mm high, covered with short dense, appressed hairs; stigma hemispherical. Fruiting receptacle swollen, orange to bright red. Drupes globose to ovoid, 12–16 mm long, 10–13 mm wide, black or dark blue.

Occurs in Cape York Penin. and NE Qld. Grows in rainforest to semi-deciduous mesophyll vine forest, from 10–850 m alt. Flowers Nov.–May; fruits Sept.–June. Map 90.

Qld: Mission Beach, Fenbys Gap, *L.S.Smith* 4903 (BRI, CANB); Portion 62, Alexandra (Noah Ck), *B.Hyland* 2787 (CANB, QRS); Clohesy R., *G.Sankowsky* 429 (QRS); Cape Tribulation, *W.Morawetz et al.* 15-8185 (QRS); Claudie R., S of airport, *A.K.Irvine* 686 (QRS).

11. *Wilkiea* sp. A

Wilkiea sp. (Palmerston B.P.Hyland 80), Staff of the Queensland Herbarium, *Queensland Vasc. Pl. Names Distrib.* 193 (1993); R.J.F.Henderson, *Queensland Pl.* 120 (1997)

Wilkiea sp. (Palmerston BH 80RfK), B.P.M.Hyland *et al.*, *Austral. Trop. Rain Forest Pl.* (2003)

Tree, to c. 5 m tall, with distinct corky bark. Leaves glabrous; petiole 5–10 (–12) mm long; lamina broadly elliptic, (6–) 8–13 (–15) cm long, (2.5–) 3.5–5 (–6) cm wide, acute at base, entire, somewhat acuminate at apex; midrib slightly raised and channelled above, distinctly raised below. Male inflorescence axillary, often clustered, 1–2 cm long, 3–9-flowered, pedicels 2–3 mm long, glabrous. Male flowers \pm globose, c. 1–2 mm diam.; tepals as 2 pairs around ostiole; stamens in unequal pairs, filaments very short. Female flowers not known. Fruiting pedicel c. 10 (–15) mm long. Fruiting receptacle c. 6–10 (–15) mm wide with 10–12 drupes.

Endemic to NE Qld, with a somewhat scattered occurrence from near Cooktown S to Palmerston Natl Park. Grows in rainforest, from 150–700 m alt. Flowers (buds) Oct. Map 91.

Qld: Natl Park Reserve 904 (Palmerston Hwy), *B.Hyland* 80 (QRS); Gap Ck, c. 22 miles [c. 35 km] S by E of Cooktown, *L.S.Smith s.n.* (AQ339984) (BRI); Daintree Natl Park, Daintree R. headwaters, *P.I.Forster* 22947 (BRI).

This species has the male flowers typical of *Wilkiea*, and almost certainly belongs here. It can be readily separated from all other species of *Wilkiea* by the distinct corky bark, and the plant being entirely glabrous.

12. *Wilkiea* sp. B

Gen. (AQ385424) sp. (McDowall Range J.G.Tracey 14552), R.J.F.Henderson, *Queensland Pl.* 120 (1997)

Small sometimes scrambling shrub, to c. 2 m tall. Leaves glabrous, or sparsely pubescent below; petiole c. 2–3 mm long; lamina ovate to ovate-elliptic, (4–) 5–8 (–9) cm long, 2–3 cm wide, rounded to somewhat cordate at base, distinctly and regularly serrate at margin, acute to acuminate at apex; midrib obscure above, prominent below. Male inflorescences axillary, often clustered, c. 5 mm long, 1–5 (–9)-flowered; pedicels c. 3–4 mm long, glabrous or short pubescent. Male flowers \pm globose, c. 3 mm high, 3–4 mm diam.; tepals 6, with 2 pairs around ostiole and a third lower on receptacle; stamens as 4 pairs, in upper half of flower; filaments very short. Female inflorescences axillary, or perhaps occasionally terminal, 1–3 (–5)-flowered. Female flowers not known. Fruiting receptacle green. Drupes ovoid, c. 15 mm long, 10 mm wide, black.

Endemic to NE Qld, known only from the McDowall Ra., Mt Pieter Botte, Mt Hemmant and Thornton Peak. Grows in upland rainforest, often along ridges, from 400-600 m alt. Flowers (buds) Nov.; fruits Oct. Map 92.

Qld: McDowall Ra., *R.Jensen* 974 (BRI); McDowall Ra., *J.G.Tracey* 14552 (BRI, QRS); Vacant Crown Land Noah, Mt Hemmant, *B.Hyland* 8484 (QRS); Thornton Peak, mid-eastern along Little Cooper Ck, *M.D.Godwin* C4299 (BRI).

This species is currently placed in *Wilkiea*, despite the lack of female flowers which are important in generic placement. It has the male flowers more or less typical of *Wilkiea* (including *Kibara*), including the eight stamens with deltoid anthers. The habit, leaves, and stamen placement (in pairs, but in the upper half of the flower) are a little unusual for *Wilkiea*, and this species may well prove to be a distinct genus when further details, including female flowers, are known.

6. STEGANTHERA

Steganthera Perkins, *Bot. Jahrb. Syst.* 25: 564 (1898); from the Greek *stegos* (a covering or roof) and *anthera* (anther).

T: not designated.

Trees or shrubs, monoecious (or perhaps dioecious outside Australia). Leaves entire or somewhat irregularly toothed, chartaceous to coriaceous. Inflorescences axillary, cymes or panicles, sometimes fasciculate, usually 3- or more flowered, and up to 15 (female) or 60 (male). Male flowers globose to depressed globose or distinctly turbinate; tepals 4, surrounding an ostiole; stamens 4, in pairs, rarely 2, 3 or 5, on floor and side walls of receptacle; anthers ellipsoid, opening by a single horizontal slit; connective not prolonged into an appendage; filaments distinct, short to moderately long, thick and \pm flattened, occasionally but variably fused. Female flowers globose to depressed-globose or distinctly turbinate, calyptrate at maturity; tepals 4, not forming a hyperstigma; carpels numerous, the ovary pubescent; stigma conical to elongate and subulate, glabrous or pubescent; staminodes absent. Upper part of fruiting receptacle falling off forming a circular scar. Fruit a cluster of often stipitate drupes.

A genus of about 18 species, mainly in New Guinea extending to the Celebes, Moluccas, Bismarck Archipelago and the Solomon Is., with 5 species in NE Qld, of which 3 are endemic.

Within Australia, the genera *Steganthera* and *Wilkiea* are superficially similar. They differ mainly in floral details. For the female flowers, there is a hyperstigma in *Wilkiea* but not in *Steganthera*; the stigma is short and \pm conical in *Wilkiea*, but generally elongate to subulate in *Steganthera*. For the male flowers, the anthers are distinctly triangular (deltoid) in *Wilkiea*, but ellipsoid in *Steganthera*.

For information on the genus *Tetrasynandra*, one species of which has been transferred to *Steganthera* as *S. laxiflora*, see the comments under *Wilkiea*.

W.R.Philipson, A synopsis of the Malesian species of *Steganthera* (Monimiaceae), *Blumea* 29: 481-497 (1984); P.K.Endress, A second species of *Steganthera* (Monimiaceae) from Australia, *Blumea* 25: 315-318 (1979).

1 Flowers glabrous

2 Petiole 1-6 mm long; flowers, both male and female, depressed-globose

1. ***S. macooraiia***

2: Petiole 8-15 mm long; flowers, both male and female, distinctly rimmed

2. ***S. cooperorum***

1: Flowers pubescent

3 Leaf lamina pubescent on both surfaces, more so beneath

3. ***S. laxiflora***

3: Leaf lamina glabrous, or at most sparsely pubescent beneath

4 Petiole 4-6 mm long, leaf lamina glabrous

4. ***S. australiana***

4: Petiole 8-12 mm long, leaf lamina glabrous or sparsely pubescent beneath

5. ***S. hirsuta***

1. *Steganthera macooria* (F.M.Bailey) P.K.Endress, *Blumea* 25: 315 (1979)

Mollinedia macooria F.M.Bailey, *Dept Agric. Stock. Bot. Bull.* 5: 23 (1892); *Wilkiea macooria* (F.M.Bailey) Perkins in H.G.A.Engler (ed.), *Pflanzenr.* 49: 26 (1911). T: Bellenden Ker Range up to the summit of the South Peak, 5,000 feet, Qld, coll. unknown; holo: BRI.

Illustration: P.K.Endress, *Blumea* 25, 315–318, figs 1–7 (1979).

Shrub or tree, 2–12 m tall. Leaves glabrous; petiole 1–6 mm long; lamina narrowly to broadly elliptic, 4.5–14 cm long, 2–5.8 cm wide, cuneate at base, entire, acute to acuminate; midrib flattened above, raised and prominent beneath. Male inflorescences 1–1.5 cm long, 1–3-flowered, glabrous. Male flowers depressed-globose, c. 3 mm high, 4 mm diam.; tepals 4, paired; stamens in 2 pairs; filaments flattened, pubescent. Female inflorescences often clustered, 1–1.5 (–2) cm long, 1–3-flowered, glabrous. Female flowers depressed-globose, c. 3 mm high, 4–5 mm diam.; tepals as 2 pairs; carpels 10–24, the ovary c. 2 mm tall; stigma semi-elongate, glabrous. Fruiting receptacle enlarged, dull orange-yellow. Drupes ovoid, c. 15–18 mm long, 8–9 mm wide, red to black. $2n = \pm 76$, *fide* F.Ehrendorfer *et al.*, *Taxon* 17: 343 (1968). Plate 16; Fig. 18B.

Endemic to NE Qld, on the tops of the higher mountains such as Bellenden Ker, Thornton Peak and Mt Baldy. Grows in rainforest, often by streams, montane rainforest or in open thickets, from 640–1600 m alt. Flowers June–Jan.; fruits May–Oct. Map 93.

Qld: S.F.R. 194, *T.Whiffin* 931 (LTB); S.F.R. 144, Bower Bird Logging Area, *B.Gray* 3531 (QRS); summit of Centre Peak Mt Bellenden Ker, *J.G.Tracey* 14927 (QRS); S.F.R. 143, North Mary Logging Area, *B.Gray* 2257 (LTB, QRS).

2. *Steganthera cooperorum* Whiffin, *Fl. Australia* 2: 453 (2007)

T: Timber Reserve 1230, Boonjie Logging Area, Qld, 17°22' S, 145°45' E, 720 m alt., 4 Dec. 1972; *B. Hyland* 2766 (*R.F.K.*); holo: QRS; iso: LTB.

[*Kibara papuana* auct. non A.C.Sm.: B.Hyland and T.Whiffin, *Australian Tropical Rain Forest Trees* (1993)]

Gen. (AQ63687) sp. (Davies Creek L.J.Webb+ 6430), Staff of the Queensland Herbarium, *Queensland Vasc. Pl. Names Distrib.* 192 (1993); R.J.F.Henderson, *Queensland Pl.* 120 (1997)

Tree, 3–10 m tall. Leaves glabrous; petiole 8–15 mm long; lamina elliptic to mostly oblong-elliptic, 8–17 cm long, 2–7 cm wide, cuneate at base, entire or sometimes with a few shallow irregularly spaced teeth, acuminate, sometimes bluntly so; midrib prominent on both surfaces, flattened to slightly raised above, raised beneath. Male inflorescences c. 2 cm long, usually 3-flowered, glabrous. Male flowers turbinate with a marked rim; stamens as 2 pairs; filaments longish, \pm glabrous. Female inflorescences 2–3 (–4) cm long, usually 3-flowered, glabrous. Female flowers turbinate with a marked rim, c. 6 mm diam., with small ostiole; tepals as 2 pairs; carpels c. 50, 2–3 mm high, spirally arranged or in irregular whorls; stigma elongate, subulate, short-appressed-pubescent. Fruiting receptacle yellow to yellow-brown. Drupes ovoid, 15–20 mm long, 10–15 mm wide, maroon to black. Fig. 18C.

Endemic to NE Qld, common in the ranges to the N and E of the Atherton Tableland. Grows in rainforest, from 400–1200 m alt. Flowers Dec.; fruits May–Oct. Map 94.

Qld: S.F.R. 185 Parish of Danbulla Haig Logging Area, *B.Gray* 3265 (QRS); Tinaroo Ra., *L.J.Webb & J.G.Tracey* 11056 (BRI); S.F.R. 755, Boonjie Logging Area, *T.Whiffin* 771 (LTB, QRS); Timber Reserve 1230, Bartle Frere, Boonjee Logging Area, *B.Hyland* 14096 (LTB, QRS); Mt Finnegan, S of Cooktown, *L.J.Webb & J.G.Tracey* 12120 (BRI).

The distinct turbinate flowers (both male and female) place this species in section *Anthobembix* of the genus *Steganthera*, and distinguish it from all other Australian species of the genus. Other species in section *Anthobembix* are found in New Guinea, but none match this species.



Figure 18. *Steganthera*. **A**, *S. laxiflora* subsp. *laxiflora*, branchlet with male flowers (B.Hyland 12556, QRS). **B**, *S. macooraia*, fruiting branchlet (B.Hyland 5025, QRS). **C**, *S. cooperorum*, branchlet with female flowers (B.Hyland 14096, BRI). Scale bar = 30 mm. Drawn by E.Mayfield.

3. *Steganthera laxiflora* (Benth.) Whiffin & Foreman, *Fl. Australia* 2: 452 (2007)

Kibara laxiflora Benth., *Fl. Austral.* 5: 289 (1870); *Tetrasynandra laxiflora* (Benth.) Perkins, *Bot. Jahrb. Syst.* 25: 569 (1898); *Mollinedia laxiflora* (Benth.) F.Muell., *Syst. Census Austral. Pl.* 3 (1883). T: Rockingham Bay, 1870, Qld, *J.Dallachy*; lecto: K, *fide* T. Whiffin & D. Foreman, *Fl. Australia* 2: 452 (2007).

Mollinedia subternata F.M.Bailey, *Queensland Dept Agric. Stock. Bot. Bull.* 5: 22 (1892). T: Freshwater Creek, near Cairns, Qld, *E.Cowley*; *holo*: BRI.

Tree, 2–20 m tall. Leaves pubescent on both surfaces, more so beneath; petiole 4–14 mm long; lamina narrowly to broadly elliptic to oblong-elliptic, 5–20 cm long, 1.5–8 cm wide, cuneate to slightly rounded at base, entire or toothed, acuminate or acute; midrib prominent on both surfaces, flattened above, raised and prominent beneath. Male inflorescences 3–9 (–12) cm long, 5–60-flowered, densely pubescent. Male flowers ±globose, c. 3 mm diam.; tepals as 2 pairs; stamens in 2 pairs; filaments longish, pubescent, partially to completely fused. Female inflorescences 2.5–9 (–12) cm long, (1–) 3–15-flowered, densely pubescent. Female flowers depressed-globose, c. 2–3 mm diam.; tepals as 2 pairs around ostiole; carpels c. 20, c. 2.5–3 mm tall; ovary ovoid, pubescent; stigma shortly conical to conical. Fruiting receptacle yellow to orange-brown. Drupes ovoid or ellipsoid, 15–18 mm long, 9–13 mm wide, black.

Occurs in NE and Central Qld, but possibly extending N into Cape York Penin.; two subspecies are recognised.

Petiole 7–14 mm long; female inflorescences 5–9 (–12) cm long, with (1–) 5–15 flowers; male inflorescences highly branched, with up to 50 flowers

3a. subsp. *laxiflora*

Petiole 4–8 mm long; female inflorescences 2.5–5 cm long, with (1–) 3–5 flowers; male inflorescences few-branched, with 5–9 flowers

3b. subsp. *lewisensis*

3a. *Steganthera laxiflora* (Benth.) Whiffin & Foreman subsp. *laxiflora*

Tree, 2–20 m tall. Leaves: petiole 7–14 mm long; lamina elliptic, broadly elliptic or oblong elliptic, 6–20 cm long, 1.5–8 cm wide. Male inflorescences highly branched, 5–9 (–12) cm long, with up to 50 flowers. Female inflorescences 5–9 (–12) cm long, (1–) 5–15-flowered. Female flowers usually with 18–22 carpels. Fig. 18A.

Occurs extensively in NE Qld, from the Finnigan Uplands to Mt Elliott, and into Central Qld; possibly also on Cape York Penin. Grows in rainforest, from 40–1050 m alt. Flowers Aug.–Mar.; fruits May–Dec. Map 95.

Qld: S.F.R. 144, *B.Hyland 5669* (QRS); S.F.R. 755, *B.Hyland 7323* (QRS); S.F.R. 191, Elinjaa Logging Area, *T.Whiffin 769* (QRS); S.F.R. 755, North Johnstone Logging Area, *T.S.Risley 202* (QRS); Mission Beach, S of Clump Point, *F.H.J.Crome 132* (CANB).

3b. *Steganthera laxiflora* subsp. *lewisensis* Whiffin, *Fl. Australia* 2: 454 (2007)

T: S.F.R. 143, Kanawarra, Carbine Logging Area, Qld, 16°29'S, 145°26'E, 6 Jun 1988, *B.Hyland 13748*; *holo*: QRS; *iso* LTB.

Tetrasynandra sp. (Mt Lewis B.P.Hyland 1053), Staff of the Queensland Herbarium, *Queensland Vasc. Pl. Names Distrib.* 193 (1993); R.J.F.Henderson, *Queensland Pl.* 120 (1997)

Small slender tree, 2–10 m tall. Leaves: petiole 4–8 mm long; lamina elliptic to narrowly elliptic, 5.5–15.5 cm long, 1.8–4.5 cm wide. Male inflorescences 3–5 cm long, 5–9-flowered. Female inflorescences 2.5–5 cm long, (1–) 3–5-flowered. Female flowers usually with 14–18 carpels.

Endemic to NE Qld, known only from the area around Mt Lewis and Mt Spurgeon on the Carbine Tableland. Grows in rainforest, from 1000–1200 m alt. Flowers (buds appear in June) Nov.–Dec.; fruits June–Nov. Map 96.

Qld: S.F.R., 143, North Mary Logging Area, *B.Hyland 7907* (LTB, QRS); S.F.R. 143, Carbine Logging Area, *B.Hyland 13748* (LTB, QRS); S.F.R. 143, Leichhardt Logging Area, *B.Hyland 11430* (LTB, QRS).

This subspecies differs from subsp. *laxiflora* in the smaller stature, smaller leaves, and smaller inflorescences.

4. *Steganthera australiana* C.T.White, *Proc. Roy. Soc. Queensland* 55: 78 (1944)

T: Garradunga, Cook District, Qld, 5 Dec. 1941, *C.T.White 11738*; holo: BRI; iso: BRI.

Shrub or small tree, 1–7 m tall. Leaves glabrous; petiole 4–6 mm long; lamina narrowly elliptic to elliptic, 4.5–14 cm long, 1.2–5.4 cm wide, cuneate to attenuate at base, entire or irregularly and sparsely toothed, acute to mostly acuminate; midrib prominent on both surfaces, flattened above, raised beneath. Male inflorescences 2–3 cm long, 3 (–5)-flowered, appressed-pubescent. Male flowers ±globose, c. 3 mm diam.; tepals as 2 pairs; stamens as 2 pairs, rarely only 1 pair; filaments 2 slightly longer, 2 slightly shorter, slightly pubescent, dark. Female inflorescences 2–3 cm long, 3-flowered, shortly pubescent. Female flowers globose to depressed-globose, c. 3 mm tall, c. 4 mm diam.; tepals as 2 pairs over ostiole; carpels 8–12, c. 2.5 mm tall; the ovary pubescent; stigma elongate, with 4 lines of pubescence. Fruiting receptacle yellow-green to orange. Drupes ovoid, c. 13 mm long, 10 mm wide, black.

Occurs in NE Qld, on the Caribbe Tableland and the central part of the Atherton Tablelands and adjacent lowlands; also occurs in Papua New Guinea. Grows in rainforest, sometimes in disturbed areas, from 10–1550 m alt. Flowers Sept.–Dec.; fruits Sept.–Mar. Map 97.

Qld: S.F.R. 194, *B.Hyland 25183* (LTB, QRS); Kaban, c. 15.4 km N. of Ravenshoe, *L.S.Smith 4676* (BRI); S.F.R. 194, *B.Gray 2283* (LTB, QRS); headwaters of Beatrice R., adjoining S.F.R. 650, *S.J.Dansie 20164* (QRS).

5. *Steganthera hirsuta* (Warb.) Perkins, *Bot. Jahrb. Syst.* 25: 567 (1898)

Kibara hirsuta Warb., *Bot. Jahrb. Syst.* 13: 316 (1891). T: Diemi, Central District, Papua New Guinea, 20 Apr. 1933, *L.J.Brass 3798*; iso: BRI.

Tetrasynandra sp. (Iron Range *L.J.Brass 19070*), Staff of the Queensland Herbarium, *Queensland Vasc. Pl. Names Distrib.* 193 (1993); *R.J.F.Henderson, Queensland Pl.* 120 (1997)

Small tree, 12 m tall. Leaves glabrous or sparsely pubescent on lower surface; petiole 8–12 mm long; lamina elliptic, oblong-elliptic to ovate or obovate, 11.5–19 cm long, 4.5–8 cm wide, cuneate, entire (juvenile leaves coarsely toothed), acute or bluntly acuminate to obtuse; midrib prominent on both surfaces, flattened above, raised beneath. Male flowers ±globose, c. 3 mm diam.; tepals as 2 pairs; stamens as 2 pairs, filaments pubescent. Female inflorescences 2–3 cm long, (1–) 2–5-flowered, densely pubescent. Female flowers ±globose, c. 4 mm diam.; tepals 4 around a small ostiole; carpels c. 50–60, c. 2 mm long; ovary densely pubescent; stigma elongate, with pubescence extending up sides. Fruiting receptacle yellow to orange. Drupes ovoid, c. 13 mm long, 10 mm wide, black.

Occurs on Cape York Penin., Qld, from near the tip and at Iron Ra.; otherwise widely distributed from Sulawesi through New Guinea to New Britain and New Ireland. Grows in rainforest, at around 150 m alt. Flowers (old female) June; young fruits July. Map 98.

Qld: Chester R., *B.Hyland 9418* (LTB, QRS); Iron Ra., *L.J.Brass 19070* (BRI).

The known Australian specimens are female or juvenile. The descriptions of the male flowers and fruit are taken from Philipson (1984).

7. ENDRESSIA

Endressia Whiffin, *Fl. Australia* 2: 454 (2007); named after Peter Endress, well-known student of the primitive angiosperm families including the Monimiaceae.

T: *E. wardellii* (F.Muell.) Whiffin

Tree, probably monoecious. Leaves crenate, slightly fleshy. Inflorescences terminal or axillary, cymes or panicles, of few (female) or many (male) flowers. Male flowers globose to clavate; tepals 4 around a small ostiole; stamens numerous, scattered on lower and side walls of receptacle; anthers deltoid, dehiscing by a single apical slit curving over the stamen apex; connective not prolonged into an appendage; filaments very short, glabrous, the anthers

±sessile. Female flowers poorly known, calyptrate at maturity, apparently without a hyperstigma; carpels relatively few, the ovary glabrous. Upper part of fruiting receptacle falling off forming a circular scar. Fruit a cluster of stipitate drupes.

A monotypic genus from NE Qld.

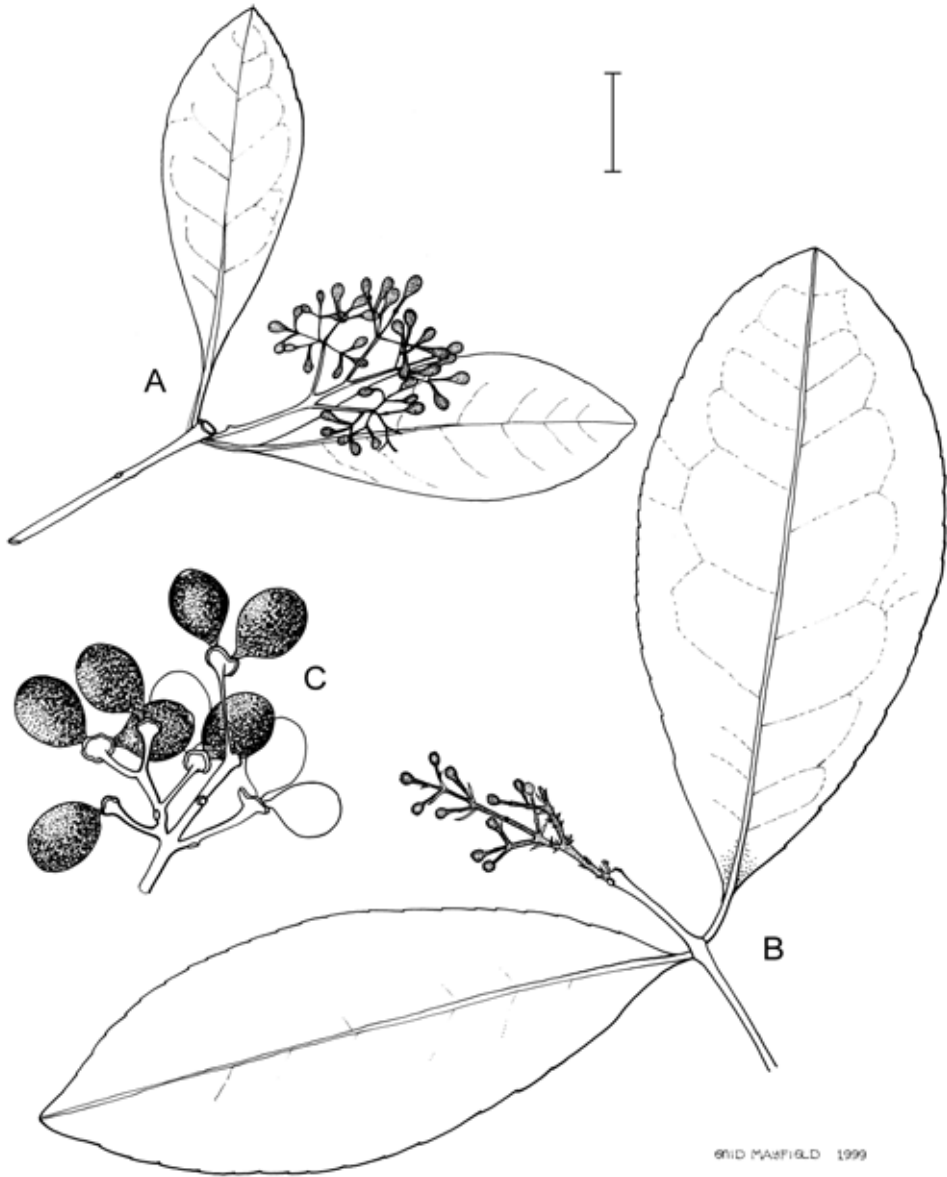


Figure 19. *Endressia wardelli*. **A**, branchlet with male flowers; **B**, branchlet with female flowers (**A–B**, B.Hyland 5684, QRS); **C**, fruits (G.Sankowsky 678 & N.Sankowsky, BRI). Scale bar: **A–B** = 20 mm; **C** = 10 mm. Drawn by E.Mayfield.

***Endressia wardellii* (F.Muell.) Whiffin, *Fl. Australia* 2: 454 (2007)**

Mollinedia wardellii F.Muell., *Fragm.* 5: 155 (1866); *Wilkiea wardellii* (F.Muell.) Perkins, *Bot. Jahrb. Syst.* 25: 570 t. VI e, 1–4 (1898). T: Coast Range, Qld, 17 Nov. 1865, *J.Dallachy*; lecto: MEL 2050659, *vide* T.Whiffin, *Fl. Australia* 2: 454 (2007).

Wilkiea paniculata F.Muell., *Fragm.* 5: 155 (1866), *nom. inval., pro syn.*

Wilkiea sp. (=RFK/3350), B.Hyland and T.Whiffin, *Australian Tropical Rain Forest Trees* (1993).

Tree 4–20 m tall. Leaves: petioles red when fresh, 8–13 mm long; lamina ovate, elliptic to obovate, 4–13 cm long, 2–6 cm wide, attenuate to cuneate at base, crenate, acute to obtuse; midrib prominent on both surfaces, flattened to slightly raised above, raised and prominent beneath. Male inflorescences 3–7 (–10) cm long, highly branched, with numerous flowers, glabrous. Male flowers globose to clavate, c. 3 mm diam.; tepals as 2 pairs; stamens 10–15, scattered over lower and side walls of receptacle;. Female inflorescences 1–4 cm long, few-flowered, glabrous. Female flowers globose; carpels 8–10. Flowering receptacle yellow to pale orange. Drupes globose to ellipsoid, 10–15 mm long, 10–12 mm wide, red. Fig. 19.

Endemic to NE Qld, on the Windsor, Carbine and N part of the Atherton Tablelands. Grows in rainforest, from (800–) 1000–1260 m alt. Flowers Sept.–Dec.; fruits May–Nov. Map 99.

Qld: S.F.R. 143, North Mary Logging Area, *B.Gray* 3667 (LTB, QRS); S.F.R. 144, Windsor Tableland, *B.Gray* 1200 (LTB, QRS); S.F.R. 607, Mt Haig, *V.K.Moriarty* 2460 (LTB, QRS); Mt Carbine Tableland, *G.Sankowsky* 678 (BRI); S.F.R. 144 on Piccaninny Ck at Paddys Camp, *B.Hyland* 5684 (QRS).

In addition to the characters noted in the key, this species differs from all other N Qld species examined (except for *Austromatthaea elegans*) in having hypogaeal rather than epigeal germination (B.P.M.Hyland *et al.*, *Austral. Trop. Rain Forest Pl.* (2003)).

8. PALMERIA

Palmeria F.Muell., *Fragm.* 4: 151 (1864); named after Sir James Fredrick Palmer (1803–1871), first president of the Legislative Council of Victoria.

Type: *P. scandens* F.Muell.

Woody climbers or scandent shrubs, climbing by recurved branches, dioecious. Leaves mostly entire or sometimes shallowly crenate, chartaceous to thinly coriaceous. Inflorescences axillary, racemes or panicles, with (5–) 7–15 (–40) flowers, pubescent with stellate hairs. Male flowers cupuliform to flattened-hemispherical; tepals 4–7, inflexed, ±triangular or somewhat irregular in shape; stamens numerous, scattered over inner surface of receptacle; anthers dehiscing by 2 longitudinal slits; connective not prolonged into an appendage; filaments very short or ±absent. Female flowers globose or urceolate; tepals c. 5, around a small ostiole, minute; carpels 5–10 (–20), the ovary glabrous; stigma linear, protruding through ostiole; staminodes absent. Fruiting receptacle enlarging, splitting irregularly. Fruit of sessile drupes scattered on split receptacle.

A genus of about 15 species mainly in New Guinea, with one extending to E Sulawesi. 3 endemic species are currently recognised in Eastern Australia. It is possible that some of the New Guinea species may also occur in Australia.

W.R.Philipson, A revision of the Malesian species of *Palmeria* (Monimiaceae–Monimieae), *Blumea* 28: 85–101 (1982).

- 1 Undersurface of leaves with a whitish, felt-like indumentum of stellate hairs; male inflorescences with (9–) 13–40 flowers

3. *P. hypotephra*

- 1: Undersurface of leaves lacking a whitish, felt-like indumentum of stellate hairs, a more or less dense indumentum of golden-brownish stellate hairs may be present; male inflorescences with 7–15 flowers

- 2 Lamina elliptic to oblong or sometimes obovate, 4.5–19 cm long, 2–9 cm wide, lower surface with scattered to occasionally dense, stellate and simple hairs; drupes large, to 20 mm diam.

1. *P. scandens*

- 2: Lamina elliptic to occasionally ovate, 3–11.5 cm long, 1.5–5 cm wide, lower surface often densely stellate-hairy; drupes smaller, to 9 mm diam.

2. *P. foremanii*

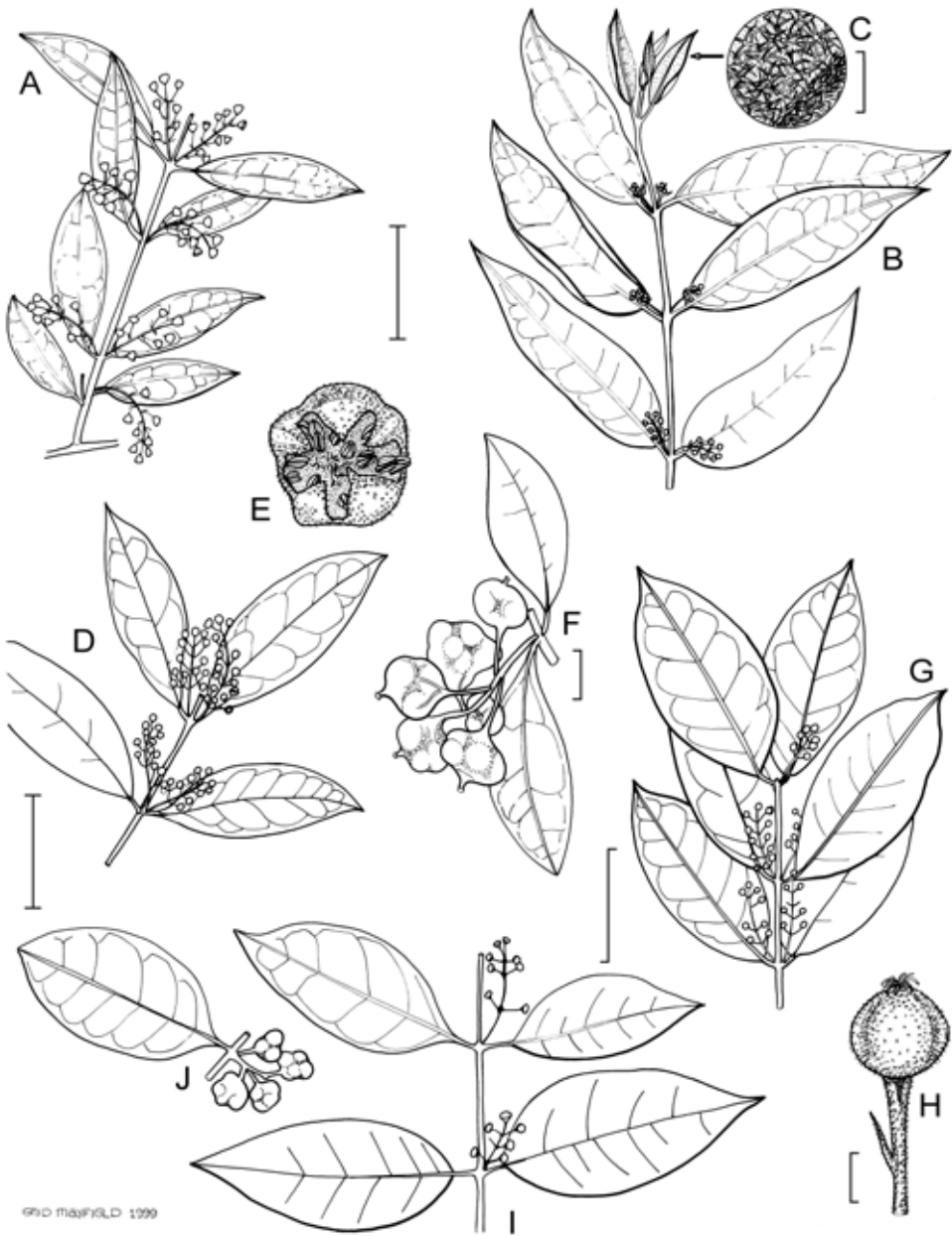


Figure 20. *Palmeria*. A–C, *P. foremanii*. A, branchlet with male flowers (R.Schodde 3573, CANB); B, branchlet with female flowers; C, undersurface of leaf showing dense covering of stellate hairs (B–C, R.Schodde 3573a, CANB). D–H, *P. hypotephra*. D, branchlet with male flowers (W.Cooper 00939, QRS); E, male flower; F, branchlet with mature fruit just before dehiscence (D.Fitzsimon 303, QRS); G, branchlet with female flowers; H, female flower (E, G–H, B.Jackes 1, BRI). I–J, *P. scandens*. I, branchlet with male flowers (B.Gray 4318, QRS); J, branchlet with mature fruits just before dehiscence (W.Cooper 019096, QRS). Scale bars: A, B, D, G, I, J = 50 mm; C = 2 mm; E = 5 mm; F = 10 mm; H = 1 mm. Drawn by E.Mayfield.

1. *Palmeria scandens* F.Muell., *Fragm.* 4: 152 (1864)

Palmeria scandens var. *typica* Domin, *Biblioth. Bot.* 22(89): 674 (1926), *nom. inval.* type variety. T: Rockingham Bay, Qld, *J.Dallachy*; lecto: MEL 2050674, *fide* T.Whiffin & D.Foreman, *Fl. Australia* 2: 452 (2007).

Palmeria scandens var. *hirsuta* Domin, *Biblioth. Bot.* 22(89): 674 (1926). T: Süd-Queensland: Regenwälder der Tambourine Mts, 1910, *K.Domin*; holotype: PR, *n.v.*

Palmeria coriacea C.T.White, *Proc. Roy. Soc. Queensland* 47: 75 (1936). T: Thornton Peak, 4000 ft, Qld, 14 Mar. 1932, *L.J.Brass* 2282; holotype: BRI.

Hedycarya racemosa Tul., *Ann. Sci. Nat. Bot.* ser 4, 3: 45 (1855); *Palmeria racemosa* (Tul.) A.DC., *Prodr.* 16(2): 657 (1868). T: Nova Hollandia (Hügel; Baume); synonym: P, W *n.v.*

Illustrations: N.C.W.Beadle, *Students Fl. NE New South Wales* 2: 108, fig. 41 C1–C5 (1982); B.D.Morley & H.R.Toelken (eds), *Fl. Pl. Australia*, fig. 13 a–b (1983); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 1: 153, fig. 20 B1–B2 (1983).

Branchlets sparsely to somewhat densely pubescent with simple or stellate hairs. Leaves: petiole 5–12 mm long; lamina elliptic to oblong or sometimes obovate, 4.5–19 cm long, 2–9 cm wide, rounded to very slightly cordate at base, entire or very shallowly crenate, acuminate, sparsely pubescent above, sparsely to occasionally densely pubescent with mixed simple and stellate hairs on lower surface; midrib sunken above, raised and prominent beneath. Male inflorescences 3–5.5 cm long, 7–15-flowered; pedicels 4–8 mm long. Male flowers 3–8 mm diam.; tepals (4 or) usually 5, slightly irregular, inflexed over stamens, ±reaching cavity floor; stamens usually 30–40, sometimes less, c. 1.5 mm long, pubescent up the abaxial side of the filament. Female inflorescences c. 2 cm long, 5–9-flowered; pedicels 4–5 mm long. Female flowers globose, c. 2–3 mm diam.; tepals usually 5; carpels c. 10. Fruiting hypanthium green on outside, red inside, up to 2 cm diam. before splitting. Drupes ±globose, to 20 mm diam., shiny black. $2n = 38$, *fide* F.Ehrendorfer *et al.*, *Taxon* 17: 343 (1968). Plate 15; Fig. 20I–J.

Widespread from Cape York Penin. (McIlwraith Ra., where rarely collected) through NE Qld to SE N.S.W. Grows in rainforest from the coast to nearby ranges, sometimes in open or disturbed areas, from 60–1550 m alt. Flowers May–Sept.; fruits Dec.–Mar. Map 100.

Qld: Timber Reserve 14, McIlwraith Ra., *T.Whiffin* 913 (LTB, QRS); S.F.R. 194, *B.Gray* 20153 (LTB, QRS); S.F.R. 251, *B.Hyland* 14535 (QRS); Forest Glen, 10 km S of Nambour, *I.R.Telford* 4281 (CANB). N.S.W.: Bellangry State Forest, NW of Wauchope, 19 Mar. 1969, *J.Wrigley s.n.* (CANB); Mt Cambewarra, c. 6 miles [c. 10 km] N of Nowra, *R.Schodde* 3166 (CANB).

A variable species, with several forms, especially in NE Qld; these forms are not worthy of taxonomic recognition. Specimens previously referred to as *Palmeria coriacea* C.T.White occur at higher altitudes and have leaves which are ovate, ±glabrous, shorter and thicker than typical specimens. A form from Mt Lewis has ±glabrous leaves with an elongated drip tip.

2. *Palmeria foremanii* Whiffin, *Fl. Australia*, 2: 454 (2007)

T: The Head, near source of Teviot Creek, Qld, 4 May 1978, *K.A.W.Williams* 78049; holotype: BRI; isotype: CANB, K, NSW.

Branchlets densely stellate-hairy. Leaves: petiole 5–12 mm long; lamina elliptic, occasionally ovate, 3–11.5 cm long, 1.5–5 cm wide, rounded to cuneate at base, entire, acute to acuminate, glabrous on upper surface except for dense stellate hairs on lower part of midrib (extending up from petiole), golden-brown stellate-hairy on lower surface; midrib sunken above, raised and prominent beneath. Male inflorescences 2–6 cm long, 7–13-flowered; pedicels 4–6 mm long. Male flowers 4–7 mm diam.; tepals usually 5; stamens 40–43. Female inflorescences 2–7.5 cm long, 7–15-flowered; pedicels 2–7 mm long. Female flowers c. 2–3 mm diam.; tepals usually 5; carpels 7–12. Fruiting hypanthium at least 1.5 cm diam. before splitting, pink inside. Drupes ±globose, 8–9 mm diam., shiny black. Fig. 20A–C.

Extending from the Lamington Plateau in SE Qld to Alstonville in NE NSW. Grows in subtropical rainforest or in remnant rainforest, on basaltic soils, from 180–1100 m alt. Flowers Mar.–Aug.; fruits Apr.–May. Map 101.

Qld: near O'Reilleys Lodge, c. 20 miles [32 km] S of Canungra, *R.Schodde 3372* (CANB). N.S.W.: Tweed Ra., Wiangarie State Forest, 4 miles [6.5 km] N of Forest Top, *J.Pickard & D.Blaxell 322* (NSW); c. 2 miles [3 km] SW of Goonengerry, E foothills of Nightcap Ra., *R.Schodde 3573 & H.C.Hayes* (CANB).

3. *Palmeria hypotephra* (F.Muell.) Domin, *Repert. Spec. Nov. Regni Veg.* 12: 390 (1913)

Morinda hypotephra F.Muell., *Victorian Naturalist* 6: 55 (1889). T: Mt Bellenden Ker, c. 5,200 feet, Qld, 1887, *W.A.Sayer*; lecto: MEL 274868, *fide* T.Whiffin & D.Foreman, *Fl. Australia* 2: 452 (2007).

Branchlets usually moderately to densely pubescent with stellate hairs. Leaves: petiole 5–10 mm long; lamina elliptic to ovate, 6–11 cm long, 2.5–5.5 cm wide, attenuate, cuneate to rounded at base, entire, mostly acuminate, glabrous on upper surface, densely grey to off-white stellate-hairy (felt-like in texture) on lower surface; midrib flattened to sunken above, raised and prominent beneath. Male inflorescences 4–7.5 cm long, (9–) 13–36-flowered; pedicels 7–10 mm long. Male flowers 4–7 mm diam.; tepals 4 or 5 (6); stamens c. 30–35. Female inflorescences 2–2.5 cm long, (5–) 9–15-flowered; pedicels c. 3–7 mm long. Female flowers ovoid to globose, 2–3 mm diam.; tepals 4 or sometimes 5; carpels c. 10–12, c. 2.5 mm high, \pm glabrous. Fruiting receptacle enlarging to at least 1.5 cm diam. before splitting, green outside, pink to red inside. Drupes \pm globose, 5–6 mm diam., dark brown to black. Fig. 20D–H.

Occurs mostly in NE Qld, with a single locality in central eastern Qld. Grows in rainforests often near the margins, from 80–1550 m alt., and commoner at higher altitudes. Flowers May–Oct.; fruits Sept.–Apr. Map 102.

Qld: Mt Bellenden Ker, summit of S peak, *L.J.Brass 18298* (CANB); near The Boulders, Babinda, *R.L.Jago 539* (QRS); Mt Bartle Frere, *B.Gray 181* (QRS); Mt Macartney, S.F.R. 652, *P.I.Forster 9900 and M.C.Tucker* (BRI); S.F.R. 310, Swipers Logging Area, *B.Hyland 9761* (QRS); S.F.R. 62, Gamma, *B.Hyland 8213* (QRS).

This species shows some similarities to *P. hypargyrea* Perkins from New Guinea in the fine dense indumentum of the lower leaf surface and inflorescence, but the two are probably distinct.

ATHEROSPERMATACEAE

*D.B.Foreman*¹ & *T.Whiffin*²

Evergreen shrubs or trees, bisexual, monoecious or (not in Australia) dioecious, usually aromatic. Plants glabrous or hairy. Stem nodes sometimes conspicuously swollen or flattened. Leaves exstipulate, opposite-decussate, petiolate; lamina simple, pinnately veined; midrib conspicuous, often with small translucent gland-dots. Flowers terminal or axillary, solitary or in inflorescences of simple dichasia or thyriform, pedicellate, odourless or fragrant. Bracts and bracteoles present or absent. Perianth regular, with 1 or more whorls, of 4–20 segments; segments usually tepaloid, free. Stamens 4–10 or more; staminal filaments present or (not in Australia) absent; anthers basifixed, 2-celled, dehiscent by valves, appendages absent or apical; staminodes present or absent. Carpels 4–30, superior, free. Style single, unbranched, terminal or arising from near base of carpel. Ovule 1 per loculus; placentation \pm basal. Fruit a cluster of achenes (sometimes incorrectly referred to as nutlets) borne on or within the enlarged hypanthium, with surface \pm smooth or with fine, plumose hairs; hypanthium usually dehiscent into 1–4 valves.

The Atherospermataceae consist of 7 genera and about 16 species occurring in the cooler rainforests of Australia, New Guinea, New Caledonia, New Zealand, southern Chile and western Patagonia. In Australia the family consists of 4 genera (3 of which are endemic),

¹ Deceased, formerly of 50 Benjamin Drive, Lara, Victoria 3212.

² Department of Botany, La Trobe University, Bundoora, Victoria 3086.

ATHEROSPERMATACEAE

with 10 endemic species, and extends from Cape York, along the E coast and into the nearby ranges of the mainland, to Tas.

Atherospermataceae were only recognised at subfamily level in the broadly circumscribed Monimiaceae by Cronquist (1981), but in recent years there has been an increasing body of morphological, biochemical and biogeographical evidence to warrant recognition at family level.

R.Brown, *Voy. Terra Austral.* 2: 553–554 (1814); J.Lindley, Monimiaceae, in A.L.P.P. de Candolle, *Prodr.* 16(2): 640–676 (1868); G.Bentham, Monimiaceae *p.p.*, *Fl. Austral.* 5: 282 (1870); F.Pax, Monimiaceae, in H.G.A.Engler & K.Prantl (eds), *Nat. Pflanzenfam.* III (2): 94–105 (1891); J.R.Perkins, Beiträge zur Kenntnis der Monimiaceae I., *Bot. Jahrb. Syst.* 25: 547–577 (1898); J.R.Perkins & E.Gilg, Monimiaceae, in H.G.A.Engler (ed.), *Pflanzenr.* 4: 1–122 (1901); J.R.Perkins, Monimiaceae Suppl., in H.G.A.Engler (ed.), *Pflanzenr.* 49: 1–67 (1911); L.L.Money, I.W.Bailey & B.G.Swamy, The morphology and relationships of the Monimiaceae, *J. Arnold Arbor.* 31: 372–404 (1950); R.Schodde, A monograph of the family Atherospermataceae R.Br., unpubl. PhD thesis, Univ. Adelaide (1969); R.Schodde, Two new suprageneric taxa in the Monimiaceae alliance (Laurales), *Taxon* 19: 324–328 (1970); R.N.Patel, Wood anatomy of dicotyledons indigenous to New Zealand. 3. Monimiaceae and Atherospermataceae, *New Zealand J. Bot.* 11: 587–598 (1973); T.D.Stanley & E.M.Ross (eds), Atherospermataceae, *Fl. SE Queensland* 1: 152–154 (1983); I.R.Telford, Atherospermataceae, in B.D.Morley & H.R.Toelken (eds), *Fl. Pl. Australia* 39–41 (1983); D.B.Foreman, The morphology and phylogeny of some Monimiaceae (*sensu lato*) in Australia, unpubl. PhD thesis, Univ. New England (1985); B.Martinez-Laborde, Some comments on a recent classification of the Monimiaceae, *Taxon* 37: 834–837 (1988); S.S.Renner, Phylogenetic affinities of Monimiaceae based on cpDNA gene and spacer sequences, *Perspect. Pl. Ecol. Evol. Syst.* 1: 61–67 (1998); S.S.Renner, Circumscription and phylogeny of Laurales: evidence from molecular and morphological data, *Amer. J. Bot.* 86: 1301–1315 (1999); S.S.Renner, D.Murray & D.Foreman, Timing transantarctic disjunctions in the Atherospermataceae (Laurales): evidence from coding and noncoding chloroplast sequences, *Syst. Biol.* 49: 579–591 (2000).

KEY TO GENERA

- | | |
|---|------------------------|
| 1 Flowers enclosed by 2 large ±persistent bracts; stamens with an elongated connective or if connective lacking then flowers solitary | |
| 2 Flowers bisexual, in threes; stamens with an elongated aristate connective; leaves glabrous | 1. DORYPHORA |
| 2: Flowers unisexual, solitary; stamens lacking an elongated connective; leaves densely grey to white pubescent beneath, rarely glabrescent | 4. ATHEROSPERMA |
| 1: Flowers with small non-persistent bracts; stamens without an elongated aristate connective; flowers never solitary | |
| 3 Perianth and androecium persistent in fruiting hypanthium; achenes completely silky-hirsute | 2. DAPHNANDRA |
| 3: Perianth and (usually) androecium not persistent in fruiting hypanthium; achenes silky-hirsute down one side | 3. DRYADODAPHNE |

1. DORYPHORA

Doryphora Endl., *Gen. Pl.* 1: 315 (1837), from the Greek *dory* (spear) and *phoreo* (I carry) alluding to the bristle-like points of the anthers.

Type: *D. sassafras* Endl.

Medium sized to tall trees; indumentum of simple hairs. Leaves deeply serrate to almost entire, coriaceous, glabrous. Inflorescence axillary, a 3-flowered simple dichasium, with

2 large dimorphic bracts enclosing mature flower buds, caducous at anthesis. Flowers bisexual. Hypanthium shortly campanulate. Perianth usually of 4 or 6 tepals, in 2 or 3 slightly unequal whorls. Androecium of 3 or 4 whorls; the outer whorl of usually 6 stamens, each with 2 narrow appendages (glands) near base of filament; connective extensively prolonged above anthers; the inner (2 or 3) whorls each of usually 6 unequal staminodes. Carpels usually 6–12; style arising near base, silky-hirsute, persistent in fruit. Fruiting hypanthium enlarged, ovoid to cylindrical or urceolate, sparsely but uniformly pubescent, dehiscent irregularly into 2 to 4 equal or \pm equal valves; perianth and androecium early caducous. Achenes ovoid to ellipsoid, glabrous, borne on inner surface of hypanthium.

A genus of 2 species, endemic to eastern Australia.

Tepals 4; carpels 6–8; fruiting hypanthium shortly 4-ribbed or ribs sometimes absent

1. *D. aromatica*

Tepals 6; carpels 8–12; fruiting hypanthium prominently 6-ribbed, with ribs extending onto or over hypanthium base

2. *D. sassafras*

1. *Doryphora aromatica* (F.M.Bailey) L.S.Sm., *Proc. Roy. Soc. Queensland* 69: 48 (1958)

Daphnandra aromatica F.M.Bailey, *Syn. Queensland Fl.*, Suppl. 1: 46 (1886). T: Johnstone River, Qld, 1885, *T.L.Bancroft*; holo: BRI; iso: K (fragment), MEL, ?NSW.

Tree 12–40 m tall. Leaves: petiole 5–8 mm long; lamina elliptic to obovate, 5–13.5 cm long, 2–4.3 cm wide, attenuate to cuneate at base, shallowly serrate to almost entire, acute to acuminate at apex; midrib prominent on both surfaces; veins visible on both surfaces, slightly raised beneath. Flowers white; tepals 4, 5–7 mm long, 2.5–3.5 mm wide. Androecium of 3 whorls; outer whorl of 5 stamens; middle whorl of 3–5 stamen-like staminodes; inner whorl of 3–6 style-like staminodes. Carpels 6–8. Fruiting hypanthium shortly 4-ribbed or ribs sometimes absent. Achenes 3–4.5 mm long, c. 2–3 mm diam.; style plumose, c. 18 mm long. Fig. 21F–I.

In NE Qld. Grows in rainforest, from 700 to 1100 m alt. Flowers Feb.–June; fruits Apr.–Jan. Map 103.

Qld: S.F.R. 143, Windmill Logging Area, *B.Gray 1301* (CANB, QRS); S.F.R. 755, North Johnstone Logging Area, *B.Gray 1362* (CANB, QRS); Churchill Ck, Mt Lewis Ra., c. 12 miles [c. 19 km] N of Mt Molloy, *R.Schodde 3332* (A, AD, B, BO, BRI, CANB, E, G, L, QRS, SING, WELT); S.F.R. 191, Wongabel, *G.Stocker 632* (CANB, QRS); S.F.R. 310, SE of Yungaburra, *J.Wrigley 651* & *I.R.Telford* (CANB).

2. *Doryphora sassafras* Endl., *Iconogr. Gen. Pl.* t. 10 (1837)

T: Illawarra district, N.S.W., Aug. 1824, *A.Cunningham* [6]; lecto: K, *fide* R.Schodde, *Fl. Australia* 2: 455 (2007); isolecto: A, K, SING.

Illustrations: N.C.W.Beadle, *Stud. Fl. NE New South Wales* 2: 110, fig. 42 B1–B6 (1972, 1982); T.D.Stanley & E.M.Ross (eds), *Fl. SE Queensland* 1: 153, fig. 20 E1–E3 (1983).

Shrub to tree, 2.5–36 m tall. Leaves: petiole 3–6 mm long; lamina elliptic to ovate-lanceolate, broadly ovate or rarely obovate, 3–11 cm long, 1.5–4 cm wide, cuneate to attenuate at base, shallowly to deeply serrate, acute to obtuse at apex; midrib prominent on both surfaces; veins visible but not prominent on either surface, slightly raised beneath. Flowers white; tepals 6 in 2 whorls, (6–) 7–13 (–18) mm long, (1.5–) 2.5–4 (–7) mm wide. Androecium of (3 or) usually 4 whorls; outer whorl of 6 stamens; middle whorl of 6 stamen-like staminodes; inner (1 or 2) whorls of 8–12 style-like staminodes. Carpels 8–12. Fruiting hypanthium prominently 6-ribbed, with ribs extending onto or over hypanthium base. Achenes 3.5–5 mm long, 2–3 mm diameter; style plumose, c. 13 mm long. $2n = \pm 82$, *fide* F.Ehrendorfer *et al.*, *Taxon* 17: 342 (1968). *Sassafras*. Plate 18; Fig. 21A–E.

Extending from the S coast of N.S.W. to SE Qld. Grows in rainforest or understorey of wet sclerophyll forest, from near the coast to the nearby ranges, at 50–1500 m alt. Flowers (buds Mar.) May–Oct.; fruits Sept.–June. Map 104.

Qld: Wilsons Peak, *W.A.W.Beuzeville 958* (CANB); Beechmont Ra., 2 km S of Binna Burra, *I.R.Telford 8196* (CANB). N.S.W.: Doyles River State Forest, 73.5 km SE of Walcha on Oxley Hwy, *D.B.Foreman 992*

ATHEROSPERMATACEAE

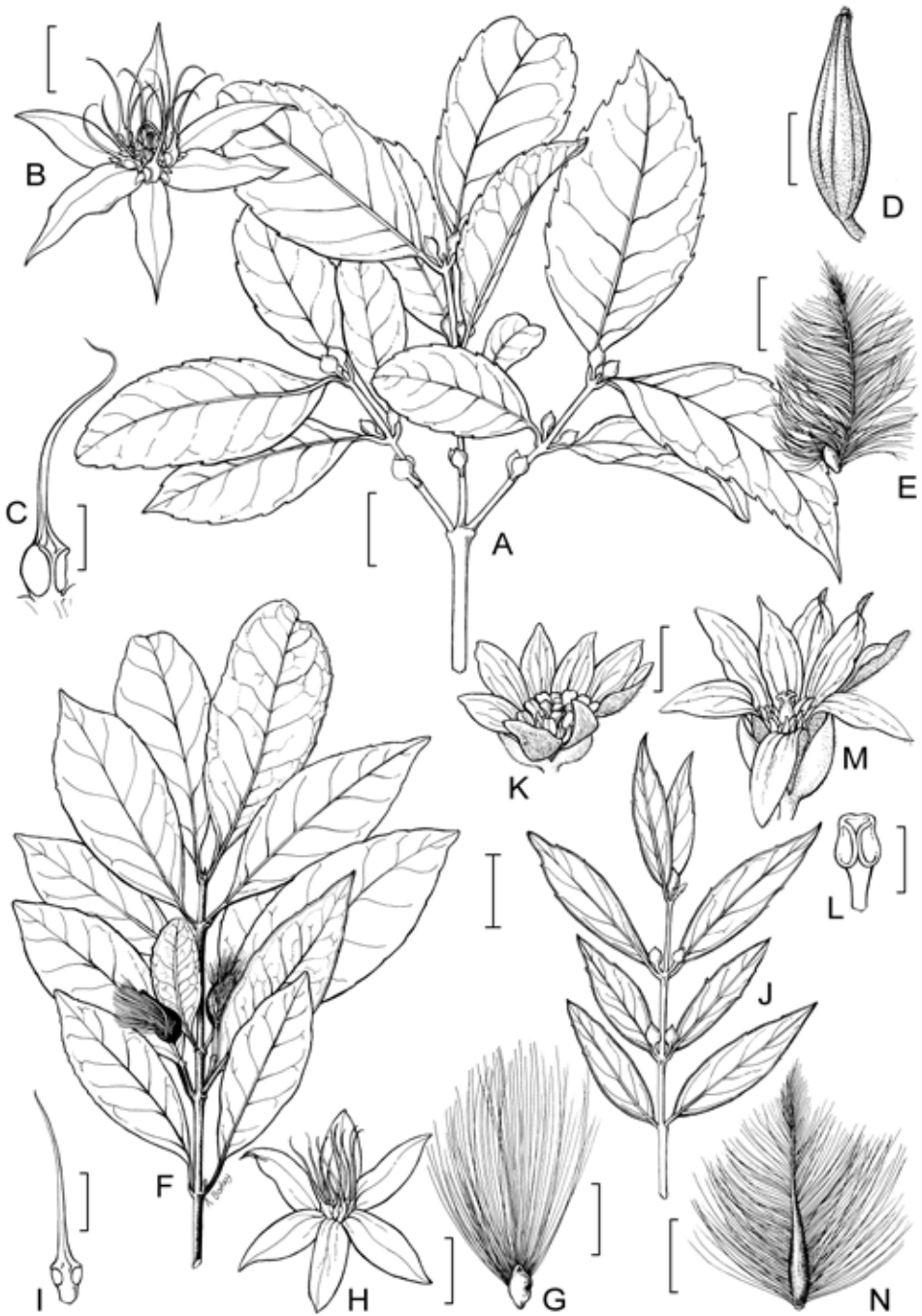


Figure 21. A–E, *Doryphora sassafras*. A, branchlet (D.Foreman s.n., MEL 157894); B, flower; C, anther (B–C, D.Foreman s.n., MEL 157895); D, fruit; E, achene (D–E, D.Foreman, 2 Dec. 1980, MEL). F–I, *Doryphora aromatica*. F, fruiting branchlet; G, achene (F–G, D.Foreman 56, MEL); H, flower; I, anther (H–I, B.Gray 4496, MEL). J–N, *Atherosperma moschatum* subsp. *moschatum*. J, branchlet (I.Telford 3922, MEL); K, male flower; L, anther; M, female flower (K–M, D.Foreman 1039, MEL); N, achene (H.Aston s.n., MEL 1579893). Scale bars: A, F, J = 20 mm; B, H, K, M = 6 mm; C, I, L = 2 mm; D = 8 mm; E, G, N = 4 mm. Drawn by A.Barley.

(CANB, NE, WELTU); near Major's Point, SE of Ebor, *I.R. Telford 1166* (CANB); Lyons Rd, Currowan State Forest, c. 8 miles [13 km] W of Batemans Bay, *R. Schodde 4195* (CANB, K, NSW).

Schodde (1969) recognised a small-leaved variety which seems to grade continuously into forms with normal sized leaves. No varieties are recognised here.

2. DAPHNANDRA

Daphnandra Benth., *Fl. Austral.* 5: 285 (1870); named from the Greek *daphne* (laurel) and *andros* (man or male), alluding to the anthers being like those of *Daphne*.

Type: *D. micrantha* (Tul.) Benth.

Tall shrubs or trees; indumentum of simple hairs. Leaves entire or variously toothed. Inflorescences axillary, cymes or thyrsoid panicles, usually many-flowered; bracts small, caducous before anthesis. Flowers bisexual. Hypanthium campanulate. Perianth ±differentiated into sepals and petals, usually 2 outer whorls each of 5 sepals and 1 or 2 inner whorls each of 5 petals. Androecium of 3 or 4 whorls; outer whorl of usually 4–7 stamens, each with 2 appendages (glands) at base of filament; connective not prolonged beyond apex; inner (2 or 3) whorls each of about 5 staminodes. Carpels usually 4–12; styles terminal. Fruiting hypanthium enlarged, cylindrical to globose, glabrous or glabrescent, dehiscent by a single slit; perianth and androecium persistent until after hypanthium dehiscence. Achenes ±ellipsoid, uniformly silky hirsute, on inner surface of hypanthium.

A genus of 6 species, endemic to eastern Australia.

- | | | |
|----|--|------------------------|
| 1 | Midrib slightly raised or flat on upper surface of leaves (sometimes impressed near base only) | |
| 2 | Fruiting hypanthium ±globose, 4–8 mm long; leaf margin deeply, coarsely crenulate-toothed at least in apical half | 6. <i>D. johnsonii</i> |
| 2: | Fruiting hypanthium cylindrical to urceolate, 5–20 mm long; leaf margin shallowly, finely crenulate-toothed for most of length | |
| 3 | Floral hypanthium hairy; leaf margins crenate-serrate | 2. <i>D. apatela</i> |
| 3: | Floral hypanthium glabrous; leaf margins finely crenulate | 5. <i>D. melasmena</i> |
| 1: | Midrib impressed on upper surface of leaves | |
| 4 | Fruiting hypanthium slenderly urceolate-fusiform, 10–30 mm long, with papery walls; leaf lamina 7–17 (–22) cm long | |
| 5 | Leaf lamina ±chartaceous; stems usually pubescent; stamens usually 6 or 7; floral hypanthium usually strigulose | 1. <i>D. repandula</i> |
| 5: | Leaf lamina ±coriaceous; stems ±glabrous; stamens usually 5; floral hypanthium glabrous | 3. <i>D. micrantha</i> |
| 4: | Fruiting hypanthium (cylindrical-) urceolate to obpyriform, 5–20 mm long, with woody walls; leaf lamina 4–9 (–12) cm long | |
| 6 | Tepals green-white; leaf margin crenulate to near base; fruiting hypanthium (cylindrical-) urceolate | 5. <i>D. melasmena</i> |
| 6: | Tepals reddish; leaf margin crenate in upper ² / ₃ ; fruiting hypanthium usually ±obpyriform | 4. <i>D. tenuipes</i> |

1. *Daphnandra repandula* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 3 (1882)

Atherosperma repandum F.Muell., *Fragm.* 10: 105 (1877). T: Dalrymple Gap, Rockingham Bay, 10 May, 1868, *J. Dallachy*; lecto: MEL3181, *fide* R.Schodde, *Fl. Australia* 2: 455 (2007); Trinity-Bay, 1877, *F.M. Bailey*; remaining syntype: MEL3182.

Daphnandra dielsii J.R.Perkins in H.G.A.Engler (ed.), *Pflanzenr.* 49: 46 (1911). T: 'Ober-Barron', Qld, May 1902, *L. Diels 8401*; holo: B (destroyed); Wongabel Forest Reserve, c. 7 miles south of Atherton, Atherton Tableland, Qld, 7 Aug 1963, *R. Schodde 3258*; neo: CANB; isoneo: A, AD, B, BRI, CANB, G, L, P, QRS, SING, WELT, *fide* R.Schodde, *Fl. Australia* 2: 455 (2007).

Tree 5–25 (–30) m tall. Leaves: petiole 8–15 mm long; lamina ovate to narrowly ovate, 9.5–26 cm long, 2–7 cm wide, shortly attenuate and sometimes slightly oblique at base, serrate, acuminate at apex, sparsely to densely hispid-strigose beneath, particularly on nerves and midrib, rarely almost glabrous; midrib sunken above, raised and prominent beneath; veins visible on both surfaces, raised and prominent beneath. Inflorescence paniculate, with each branchlet terminating in 3 flowers. Tepals pale green to yellowish green. Stamens pale green. Fruiting hypanthium 15–35 mm long. Achenes 6–7 mm long, long-plumose; style 10–13 mm long. $2n = 44$, *fide* F.Ehrendorfer *et al.*, *Taxon* 17: 342 (1968).

In NE Qld on the Atherton and Evelyn Tablelands. Grows in rainforest, at 450–1300 m alt. Flowers Jan.–Sept.; fruits May (very immature)–Jan. Map 105.

Qld: S.F.R. 775 North Johnson River Logging Area, *B.Gray* 986 (QRS, LTB); S.F.R. 185, Robson Logging Area, *B.Gray* 1887 (QRS, LTB); S.F.R. 452, East Barron, *B.P.M.Hyland* 13670 (QRS); Lamonds Hill, *A.K.Irvine* 607 (QRS); Palmerston Natl Park, *R.F.Thorne* 20713 and *W.T.Jones* (BRI).

2. *Daphnandra apatela* Schodde, *Fl. Australia* 2: 455 (2007)

T: Doyles River State Forest, c. 50 miles [80.5 km] W of Wauchope, N.S.W., 20 Oct. 1966, *R.Schodde* 5123; holo: CANB; iso: A, AD, B, BH, BO, BRI, CANB, CHR, CONC, E, FI, G, K, L, LAE, MEL, NSW, P, PNH, PRE, SGO, SING, UC, US, W, WELT.

Daphnandra sp. A, G.J.Harden, *Fl. New South Wales* 1: 133 (1990)

?*Daphnandra* sp. McPherson Range (W.D.Francis AQ217480), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 116 (2002)

[*Atherosperma micranthum* auct. non Tul.: F.J.H. von Mueller, *Pl. Victoria* 1: 24 (1860), *p.p.*]

[*Daphnandra micrantha* auct. non (Tul.) Benth.: G.Bentham, *Fl. Austral.* 5: 285 (1870), *p.p.*]

Small to medium-sized tree, (10–) 15–25 (–30) m tall. Leaves: petiole 3–10 mm long; lamina narrowly elliptic to ovate, 5.5–14 cm long, 1.5–4.5 cm wide, shortly attenuate at base, shallowly and finely crenate-serrate except towards base, acuminate at apex, glossy mid-green above, paler below, glabrous; midrib flattened above, raised and prominent beneath; veins flattened and obscure above, raised and well-defined beneath. Inflorescence ± congestedly thyriform. Tepals pale green, cream, whitish or creamy-green. Stamens pale green or green-cream. Fruiting hypanthium (7–) 8–15 (–20) mm long. Achenes (4–) 5 (–6) mm long, long-plumose; style (4–) 5–10 (–12) mm long. *Socket Wood, Satin Wood, Yellow Wood.*

A wide-spread species in SE Qld and NE N.S.W. Grows in disturbed sub-tropical rainforest and rainforest margins, montane subtropical rainforest, often at the head of damp gullies, at 200–950 m alt. Flowers (buds appear c. May) Aug.–Oct.; fruits Oct.–Feb. Map 106.

Qld: Sarabah Ra., c. 12 miles [19 km] S of Canungara, Lamington Plateau, *R.Schodde* 3363 (A, AD, BRI, CANB, L); Beechmont Ridge, Mcpherson Ra., *R.Schodde* 5595 (CANB). N.S.W.: below Rowley's Trig, Dingo State Forest, c. 15 miles [24 km] W of Wingham, *R.Schodde* 5120 (A, AD, BRI, CANB, CHR, CONC, E, G, K, L, LAE, MEL, NSW, P, SING, US, WELT); S slopes of Mt Lindesay, *R.Schodde* 5609 (CANB); Wiangaree State Forest, c. 13 miles [21 km] NE of Kyogle, *R.Schodde* 5622 (BRI, CANB).

Fruits sometimes galled. Previously confused with *Daphnandra micrantha* (Tul.) Benth.

3. *Daphnandra micrantha* (Tul.) Benth., *Fl. Austral.* 5: 285 (1870)

Atherosperma micranthum Tul., *Ann. Sci. Nat., Bot.* ser. 4, 3: 46 (1855). T: Port Jackson, [N.S.W.], *Fraser*; holo: W destroyed; iso: OXF, P (photo at CANB).

[*Daphnandra tenuipes* auct. non J.R.Perkins: J.H.Maiden, *Forest Fl. New South Wales* 7, f. 259 (1921)]

Small tree, c. 6–15 m tall. Leaves: petiole 3–8 mm long; lamina elliptic to obovate, occasionally ovate, 4.5–16 cm long, 1–5 cm wide, cuneate to shortly attenuate at base, finely toothed, acute to acuminate at apex, glossy dark green above, paler and duller beneath, drying olive-grey to dark brown or blackish, glabrous; midrib slightly indented above, prominent beneath; veins flattened above, prominent beneath. Inflorescence laxly thyriform. Tepals pale greenish yellow to pale green. Stamens pale green. Fruiting hypanthium (3–) 5–13 (–16) mm long. Achenes 4–5 mm long, long-plumose; style (12–) 14–18 mm long.

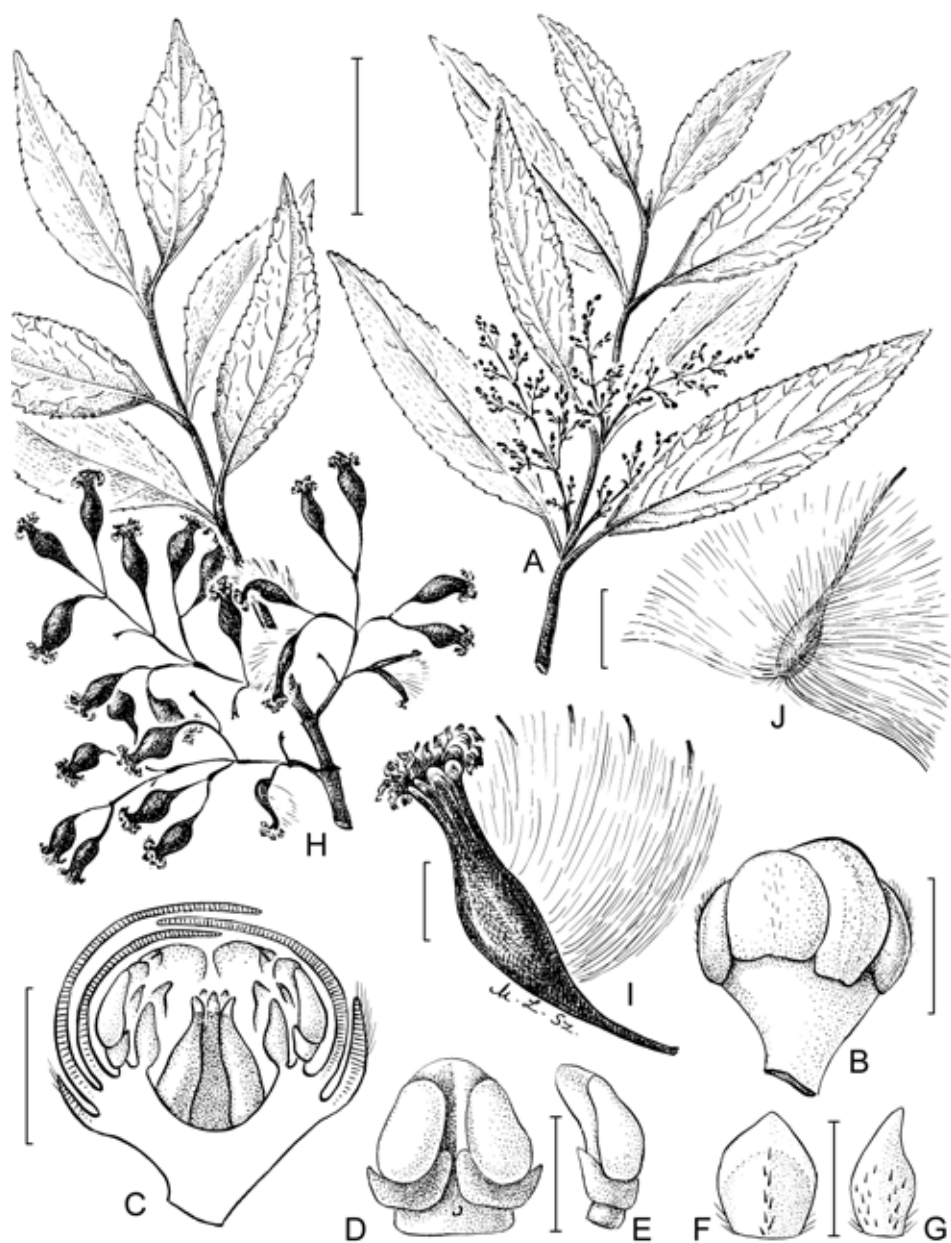


Figure 22. *Daphnandra melasmena*. **A**, flowering branchlet; **B**, flower bud; **C**, L.S. flower bud; **D**, undehiscent stamen (abaxial view); **E**, undehiscent stamen (lateral view); **F**, **G**, staminodes (**A–G**, H.Hayes & Turner 2, CANB); **H**, fruiting branchlet; **I**, fruiting hypanthium; **J**, achene (**H–J**, R.Schodde 3574, CANB). Scale bars: **A**, **H** = 3 cm; **B**, **C** = 1 mm; **D–G** = 0.5 mm; **I**, **J** = 5 mm. Drawn by M.L.Szent-Ivany; reproduced with permission of R.Schodde.



Figure 23. *Daphnandra johnsonii*. **A**, flowering branchlet; **B**, flower bud; **C**, L.S. flower bud; **D**, inner tepal, **E**, undeveloped stamen (abaxial view); **F**, undeveloped stamen (lateral view); **G**, staminode (adaxial view); **H**, staminode (adaxial view) (**A–H**, L.A.S.Johnson & E.F.Constable, NSW 52310); **I**, infructescences; **J**, fruiting hypanthium; **K**, achene (**I–J**, McBarron 12959, CANB). Scale bars: **A** = 3 cm; **B** = 2 mm; **C**, **D** = 1 mm; **E–H** = 0.5 mm; **I** = 2 cm; **J**, **K** = 3 mm. Drawn by M.L.Szent-Ivany; reproduced with permission of R.Schodde.

Confined to coastal and near coastal areas around the Hastings and Manning R. systems in NE N.S.W. from near Port Macquarie to Taree and Wauchope. Grows in disturbed rainforest, in moist gullies, or at rainforest margins, at 150–370 m alt. Flowers Sept.–Oct.; fruits Nov.–Feb. Map 107.

N.S.W.: Bottlebush Ck near Top Seven Rd, Bellangry State Forest near Wauchope, Oct. 1958, *J.C.Cousins* (CANB); Hastings Forestry Hwy, 10 miles [c. 16 km] NW of Wauchope, *R.Schodde 5146* (A, AD, B, BRI, CANB, CHR, CONC, E, G, K, L, MEL, NSW, OXF, P, US, W); Kendall–Comboyne road, c. 6 miles [10 km] E of Comboyne, *R.Schodde 5154* (A, AD, BRI, CANB, CHR, CONC, K, L, NSW).

4. *Daphnandra tenuipes* J.R.Perkins in H.G.A.Engler (ed.), *Pflanzenr.* 4: 75 (1901)

T: N.S.W., Tweed River District, Mar. 1896, *E.Betche*; iso: NSW, MEL.

[*Daphnandra micrantha* auct. non (Tul.) Benth.: R.H.Anderson, *Trees New South Wales* 3rd edn, 223 (1956), p.p.]

Tall shrub to small tree 2–13 m tall. Leaves: petiole 2–5 mm long; lamina ovate to elliptic, 5–12.5 cm long, 1.8–5 cm wide, shortly attenuate to cuneate at base, finely crenate in upper two-thirds, acuminate at apex, mostly glabrous, sometimes with a few hairs on or near nerves and midrib on lower surface when young; midrib sunken above, raised and prominent beneath; veins flattened and rather obscure above, raised and prominent beneath. Inflorescence ±divaricately thyriform. Tepals pink to red, or pale maroon. Stamens pale maroon. Fruiting hypanthium (5–) 7–12 (–17) mm long. Achenes (3–) 4–5 (–6) mm long, moderately long-plumose; styles (5–) 6–8 (–10) mm long. *Red-flowered Socketwood*.

Restricted to the McPherson Ra. in SE Qld, the Nightcap Ra. and the Tweed R. district in NE N.S.W. Grows in rainforest, on rainforest margins in exposed positions, in open forest with a closed understorey, or in *Nothofagus* forest, at 100–960 m alt. Flowers Mar.–Oct.; fruits Sept.–Jan. Map 108.

Qld: Gorge Falls area, Upper Tallebudgera, McPherson Ra., *P.I.Forster 7875* and *D.Halford* (BRI); Repeater Station road, Springbrook, c. 14 miles [c. 22.5 km] SW of Southport, *R.Schodde 5605* (BRI, CANB, NSW). N.S.W.: Whian Whian State Forest, Lismore District, *R.Schodde 3572* and *H.C.Hayes* (A, AD, B, BISH, BRI, CANB, CHR, COFFS, E, G, K, L, NSW, PNH, UC, US, W, WELT); Blue Nob TV station road, c. 3 miles [c. 5 km] N of Nimbin, *R.Schodde 5624* (CANB).

Some specimens were distributed by Schodde with manuscript names that were not subsequently used. Specimens labelled *Daphnandra phoenicea* or *Daphnandra* sp. B that are red-flowered belong here under *D. tenuipes*. Specimens similarly labelled but which are green-flowered are probably *D. melasmene*.

5. *Daphnandra melasmene* Schodde, *Fl. Australia* 2: 456 (2007)

T: Red Scrub, Whian Whian, c. 12 miles [19 km] NNE of Lismore, N.S.W., 27 Oct. 1969, *R.Schodde 5629*; holo: CANB; iso A, AD, BAB, CANB, K, L, LIL, MA, NSW, P, TO.

Daphnandra sp. D, G.J.Harden, *Fl. New South Wales* 1: 132 (1990)

Shrub to small tree, 3–20 m tall. Leaves: petiole 1–5 mm long; lamina ovate to narrowly elliptic, (3–) 4–8 (–10) cm long, 1.5–3 (–4) cm wide, shortly attenuate at base, finely crenate, acuminate at apex, glabrous above, sparsely strigose to almost glabrous beneath, often drying blackish, olive-black or dark olive brown; midrib flattened to sunken above, raised and prominent beneath; veins flattened and faintly visible or obscure above, raised and clearly visible beneath. Inflorescence ±congestedly thyriform. Tepals pale green, greenish white to white. Stamens with red tints. Fruiting hypanthium (5–) 9–20 mm long. Achenes (4–) 5–6 mm long, long-plumose; style (5–) 6–10 (–13) mm long. Fig. 22.

Confined to NE N.S.W. from the Nightcap Ra. to the Bellingen district S of Coffs Harbour. Grows in rainforest often in remnant areas and on the margins, at 10–700 m alt. Flowers Oct.; fruits June–Nov. Map 109.

N.S.W.: c. 15 miles [24 km] W of Bowraville, *R.Schodde 3525* & *H.C.Hayes* (A, AD, B, CANB, CHR, COFFS, G, L, NSW, WELT); Nimbin–Dunoon road, c. 11 miles [18 km] N of Lismore, Nightcap Ra.,

2. *Daphnandra*

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R.Schodde 5627 (BRI, CANB, NSW); c. 5 miles [c. 8 km] W of Bellingen, *R.Schodde 5632* (BRI, CANB); Whian-Whian State Forest, *L.J.Webb and J.G.Tracey 11245* (CANB, NSW).

See note under *D. tenuipes* on distribution of R.Schodde herbarium material.

6. *Daphnandra johnsonii* Schodde, *Fl. Australia* 2: 456 (2007)

T: Spring Creek, 1 mile [1.6 km] W of Kiama, N.S.W., 7 Sept. 1960, *H.C.Hayes, L.A.S.Johnson & E.F.Constable s.n.*; holotype: CANB; isotype: COFFS, L, NSW.

Daphnandra sp. C, G.J.Harden, *Fl. New South Wales* 1: 132 (1990)

[*Daphnandra micrantha* auct. non (Tul.) Benth.: R.H.Anderson, *Trees New South Wales* 3rd edn, 223 (1956), p.p.; O.D.Evans, in N.C.W.Beadle et al., *Handb. Vasc. Pl. Sydney Blue Mtns* 130 (1963)]

Small tree 5–20 m tall. Leaves: petiole 3–10 mm long; lamina ±elliptic to ovate, (4–) 5–8 (–12) cm long, 2–4 (–6) cm wide, shortly attenuate at base, deeply and coarsely toothed in upper two-thirds, acuminate at apex, glabrous; midrib flattened above, raised and prominent beneath; veins flattened and barely visible above, raised and clearly visible beneath. Inflorescence congestedly thyriform. Tepals pale greenish white to white. Hypanthium (4–) 5–7 (–8) long. Achenes c. 2 mm long, shortly-plumose; style 2.5–3 mm long. Fig. 23.

Rare and confined to the Illawarra region of N.S.W. Grows mostly at the margins of disturbed rainforest, at 30–125 m alt. Flowers Sept.; fruits Aug. Map 110.

N.S.W.: Minna Murra Falls Reserve, *R.Schodde 3475* (CANB, L, NSW); Yellow Rock Ck, c. 4 miles [6.5 km] SW of Albion Park, *R.Schodde 5167* (CANB, CHR, K, L, NSW).

Fruits are often galled. Previously confused with *Daphnandra micrantha* (Tul.) Benth.

3. DRYADODAPHNE

Dryadodaphne S.Moore, *J. Bot.* 61: 109 (1923); from the Greek *dryados* (a wood nymph) and *Daphne* (the bay tree or laurel) perhaps alluding to the blaze odour.

Type: *D. celastroides* S.Moore

Tall trees, usually ±glabrous. Leaves dentate to almost entire. Inflorescences axillary, narrow thyriform panicles, usually 3–5-flowered; bracts small, caducous before anthesis. Flowers bisexual. Hypanthium ovoid to shortly campanulate. Perianth of 8 tepals in 2 whorls. Androecium of 4 whorls; outer (1 or 2) whorls each of 4 stamens, each with 2 short appendages (glands) at base of filament; connective shortly prolonged above anthers; inner (2 or 3) whorls each of 4 staminodes. Carpels usually 8–16; styles terminal. Fruiting hypanthium enlarged, ellipsoid to cylindrical, glabrous, dehiscent regularly into 4, sometimes 2, equal valves; perianth not persistent; staminodes sometimes persistent. Achenes narrowly ellipsoid, silky hirsute on one side, in deep pits on inner wall of hypanthium.

A genus of 3 species; 1 is endemic to NE Qld and the others to New Guinea.

Dryadodaphne trachyphloia Schodde, *Fl. Australia* 2: 456 (2007)

T: Mt Spurgeon, Qld, 1080 m, 16 Apr. 1968, *B.Hyland & R.F.Grimes RFK 1496*; holotype: BRI; isotype: BRI, CANB, MEL, QRS.

[*Dryadodaphne novoguineensis* auct. non (J.R.Perkins) A.C.Sm.: L.S.Smith, *Proc. Roy. Soc. Queensland* 69: 49 (1958)]

Trees 8–45 m tall, buttresses present. Leaves: petiole 10–15 mm long; lamina linear to broadly lanceolate (narrowly ovate) to elliptic, 4–11.5 (–17) cm long, 1–3.5 (–4) cm wide, attenuate at base, shallowly crenate to almost entire, obtuse to mostly acuminate at apex, glabrous; midrib prominent on both surfaces, raised beneath; veins barely visible above, obscure beneath. Flowers without an obvious perfume. Tepals unequal, cream to greenish cream with pink or red markings on inner surface. Androecium red; outer whorl of stamens 2–2.5 mm long, 1.25–1.5 mm wide, inner whorl of stamens (if present) 1.5–2 mm long, 1 mm

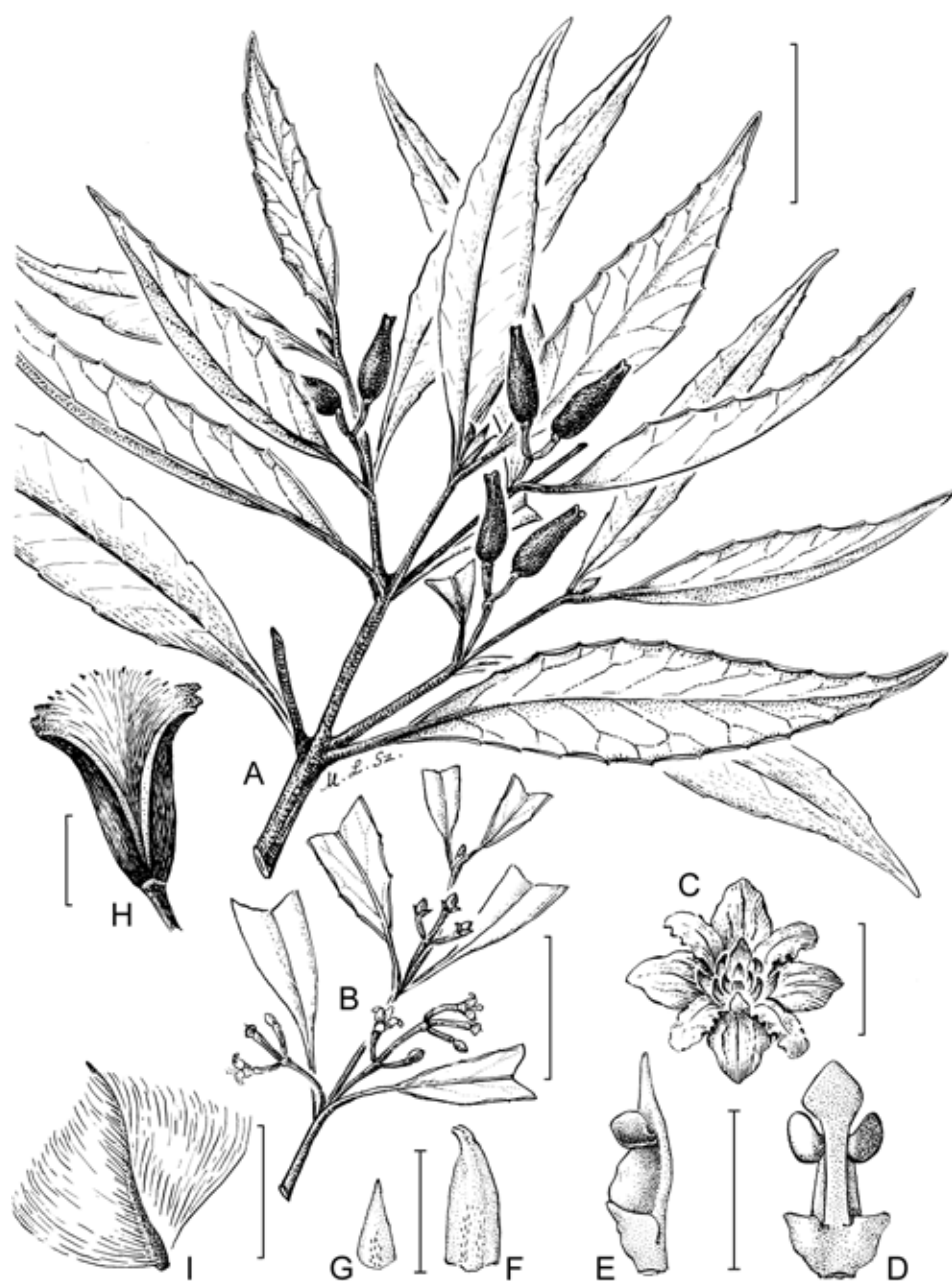


Figure 24. *Dryadodaphne trachyphloia*. **A**, fruiting branchlets (R.Schodde 3352, CANB); **B**, inflorescences; **C**, flower; **D**, stamen (abaxial view); **E**, stamen (lateral view); **F**, outer staminode (abaxial view); **G**, inner staminode (abaxial view) (**B–G**, Hanson, May 1951, CANB); **H**, fruiting hypanthium; **I**, achene (**H–I**, R.Schodde 3340, CANB). Scale bars: **A** = 3 cm; **B** = 2 cm; **C** = 2 mm; **D–G** = 1 mm; **H**, **I** = 1 cm. Drawn by M.L.Szent-Ivany; reproduced with permission of R.Schodde.

wide; inner whorls of staminodes 0.5–2 mm long. Fruiting hypanthium 11–22 mm long, 4–7 mm diam. Achenes 3–5 mm long; styles 5–10 mm long. Plate 17; Fig. 24.

In NE Qld in the Mt Lewis and Mt Spurgeon area. Grows in rainforest, at 450–1400 m alt. Flowers Dec.–May; fruits Apr.–Sept. Map 111.

Qld: Mt Spurgeon, *B.Hyland & R.F.Grimes 1496* (BRI, CANB, MEL, QRS); Timber Reserve 165, Kobi Logging Area, *B.Hyland 10660* (LTB, QRS); S.F.R. 144, Whypalla, Bower Bird Logging Area, *B.Hyland 13456* (LTB, QRS); S.F.R. 143, North Mary Logging Area, *A.K.Irvine 1409* (QRS).

4. ATHEROSPERMA

Atherosperma Labill., *Nov. Holl. Pl.* 2: 74 t. 224 (1806); named from the Greek *athero* (barb or awn) and *sperma* (seed), referring to the awned achenes.

Type: *A. moschatum* Labill.

Antherosperma Poir. in J.B.A.P.M. de Lamarck & J.L.M.Poiret, *Encycl.* 8: 817 (1808), orth. var.

Monoeocious shrubs to tall trees; indumentum of centrifixed hairs. Leaves dentate to entire with a strong spicy smell. Flowers unisexual, axillary, solitary; 2 large bracts enclosing mature flower bud, persistent through anthesis. Hypanthium campanulate. Perianth of 8 tepals, in 2 ± distinct, slightly unequal whorls. Male flowers: stamens usually 12–20, spirally arranged, each with 2 narrow appendages (glands) at base of filament; connective not prolonged above anthers; staminodes absent. Female flowers: staminodes usually 24–40, in 3 subspiral whorls; carpels up to 30; style terminal. Fruiting hypanthium enlarged, subglobose, densely pubescent, ± indehiscent, with enlarging inner staminodes surrounding the exerted styles. Achenes ellipsoid or slightly conical, uniformly plumose, on inner surface of hypanthium.

A monotypic genus, endemic to SE Australia including Tas.

A.Shapcott, Genetic and ecological variation in *Atherosperma moschatum* and the implications for conservation of its biodiversity, *Austral. J. Bot.* 42: 663–686 (1994).

***Atherosperma moschatum* Labill., *Nov. Holl. Pl.* 2: 74 t. 224 (1806)**

Atherosperma integrifolium A.Cunn. ex A.DC. in A.L.P.P. de Candolle, *Prodr.* 16(2): 676 (1868), *nom. illeg. pro syn.* under *A. moschatum*. T: in capite Van-Diemen, [Tas.], *J.J.H. de Labillardière 142*; iso: MEL.

Atherosperma dilatatum Gand., *Bull. Soc. Bot. France* 66: 233 (1919). T: Victoria, Launching Place, *Coghill*; holotype: LY, *fide* D.J.McGillivray, *Contr. New South Wales Natl Herb.* 4: 333 (1973); iso: BO.

Atherosperma muticum Gand., *Bull. Soc. Bot. France* 66: 233 (1919). T: Victoria, 1902, *C.Walter*; holotype: LY n.v., *fide* D.J.McGillivray, *Contr. New South Wales Natl Herb.* 4: 333 (1973).

Atherosperma tasmanicum Gand., *Bull. Soc. Bot. France* 66: 233 (1919). T: 'Oceania', Tas., 1850, *R.Gunn*; holotype: LY n.v., *fide* D.J.McGillivray, *Contr. New South Wales Natl Herb.* 4: 333 (1973).

Illustrations: N.C.W.Beadle, *Stud. Fl. NE New South Wales* 2: 110, fig. 42 A1–A5 (1972, 1982); B.D.Morley & H.R.Toelken (eds), *Fl. Pl. Australia* 40, fig. 13 c, e–f (1983).

Shrubs to conical trees, 2–30 m tall; nodes sometimes flattened. Young branchlets, inflorescences and leaf undersurface usually densely hairy. Leaves aromatic when crushed: petiole 2–6 mm long; lamina lanceolate, oblanceolate to elliptic, 3–9.5 cm long, 0.8–2.3 cm wide, cuneate to obtuse at base, regularly to irregularly toothed or entire, acute at apex, glossy green on upper surface, with dense grey to white indumentum below or rarely glabrescent. Flowers pleasantly perfumed; tepals 6–10 mm long, cream to white often streaked with purple. Fruiting hypanthium c. 10–12 mm long, with 10–30 achenes. Achenes c. 10–20 mm long including a slender plumose style 8–17 mm long.

Occurs from Barrington Tops in N.S.W. through eastern Vic. to Tas. Two subspecies are recognised here.

Adult leaf margin regularly toothed; small to medium-sized trees, 4–30 m tall

a. subsp. *moschatum*

Adult leaf margin entire; shrubs or small trees, 2–10 m tall

b. subsp. *integrifolium*

a. *Atherosperma moschatum* Labill. subsp. *moschatum*

Small to medium-sized trees 4–30 m tall. Leaf lamina lanceolate, oblanceolate or sometimes elliptic; margins usually regularly to irregularly toothed. *Black Sassafras*, *Southern Sassafras*. Fig. 21J–N.

Extending from SE N.S.W. to Tas. Grows in cool-temperate rainforest, or in the rainforest understorey of wet sclerophyll forest, often with *Nothofagus*, from 40 to 1100 m alt. Flowers (buds develop Feb.–Aug.) Sept.–Nov.; fruits Sept.–Feb. Map 112.

N.S.W.: Brown Mtn, c. 15 miles [c. 24 km] E of Nimmitabel, *R.Schodde 3402* (A, AD, B, BO, CANB, E, G, L, NSW, SING, UC, WELT); Headwaters of Clifford Ck, 3 miles [c. 5 km] E of Blowering Dam, *R.Schodde 5634* (CANB). Vic.: Acheron Way, 2–3 km E of turnoff to Mt Donna Buang, *D.B.Foreman 1039* (CANB, HO, MEL, NE, NSW, WELT); Gap Rd, head of Bonang R., 4 km E of Bonang Hwy, *A.N.Rodd 5340*, *S.Corbett & D.Wilson* (CANB). Tas.: lower E slopes of Mt Wellington, c. 6 miles [c. 10 km] SW of Hobart, *R.Schodde 3420* (A, AD, CANB, HO, L).

b. *Atherosperma moschatum* subsp. *integrifolium* (A.Cunn. ex Tul.) Schodde, *Fl. Australia* 2: 456 (2007)

Atherosperma integrifolium A.Cunn. ex Tul., *Arch. Mus. Hist. Nat.* 8: 421 (1855). T: Blue Mountains, N.S.W., Apr. 1826, *A.Cunningham*; iso: K, P?, SING, all n.v., *fide* R.Schodde, PhD thesis (1969).

Atherosperma elongatum Gand., *Bull. Soc. Bot. France* 66: 232 (1919). T: Jamieson Valley and Blue Mountains, N.S.W., Sept. 1899, *J.Maiden* [=Forsyth]; holo: LY n.v., *fide* D.J.McGillivray, *Contr. New South Wales Natl Herb.* 4: 333 (1973); iso: NSW, US.

Slender shrub or small tree, 2–10 m tall. Leaf lamina mostly lanceolate; margins entire, young leaves sometimes sparsely and irregularly toothed.

In N.S.W. from Barrington Tops to the Blue Mtns. Grows in cool-temperate rainforest, often with *Nothofagus*, from 890 to 1370 m. Flowers (buds appear in Jan.) Aug.–Sept.; fruits Oct. Map 113.

N.S.W.: Minne-haha, Katoomba, May 1927, *O.D.Evans* (CANB); Lyrebird Dell, Leura, *A.N.Rodd 4607* (NSW); East Barrington Tops, c. 40 miles [c. 65 km] N of Singleton, *R.Schodde 3213* (A, AD, CANB, L, NSW, WELT); Andrew Murray Lookout track, Gloucester Tops, 21 Nov. 1986, *J.B.Williams s.n.* (NE, NSW).

IDIOSPERMACEAE

*L.W.Jessup*¹

Trees, andromonoecious. Leaves opposite, simple, exstipulate; lamina entire, pinnately veined. Inflorescence of 1–4 flowers, axillary or terminal; peduncle with 2 or 3 nodes bearing decussate, caducous bracts. Flowers male or bisexual, sessile and articulate above top pair of bracts. Hypanthium bearing 30–40 spirally arranged, imbricate tepals; lowermost ones broad, sepaloid, enclosing flower in bud, caducous; succeeding ones smaller, narrower; c. 15–18 uppermost tepals persistent, spreading. Stamens at rim of hypanthium, inflexed, tepal-like, thick with almost no filament; anthers extrorse, suprabasal. Staminodes similar to stamens, inner ones smaller, hood-shaped. Carpels 0 or 1–3 (–5), free; stigma subsessile, broad, fleshy, obliquely terminal; ovules 1, rarely 2, basal, anatropous. Fruit large, globose or depressed-globose, indehiscent; hypanthium forming on a thin, brittle outer layer crowned by persistent inner tepals and stamens and a spongy inner layer; pericarp thin, appressed to hypanthium wall. Seed usually solitary; testa thin, adhering to pericarp; endosperm absent; cotyledons 3 or 4, massive, fleshy, peltately attached.

¹ Queensland Herbarium, Brisbane Botanic Gardens Mt Coot-tha, Mt Coot-tha Road, Toowong, Queensland 4066.

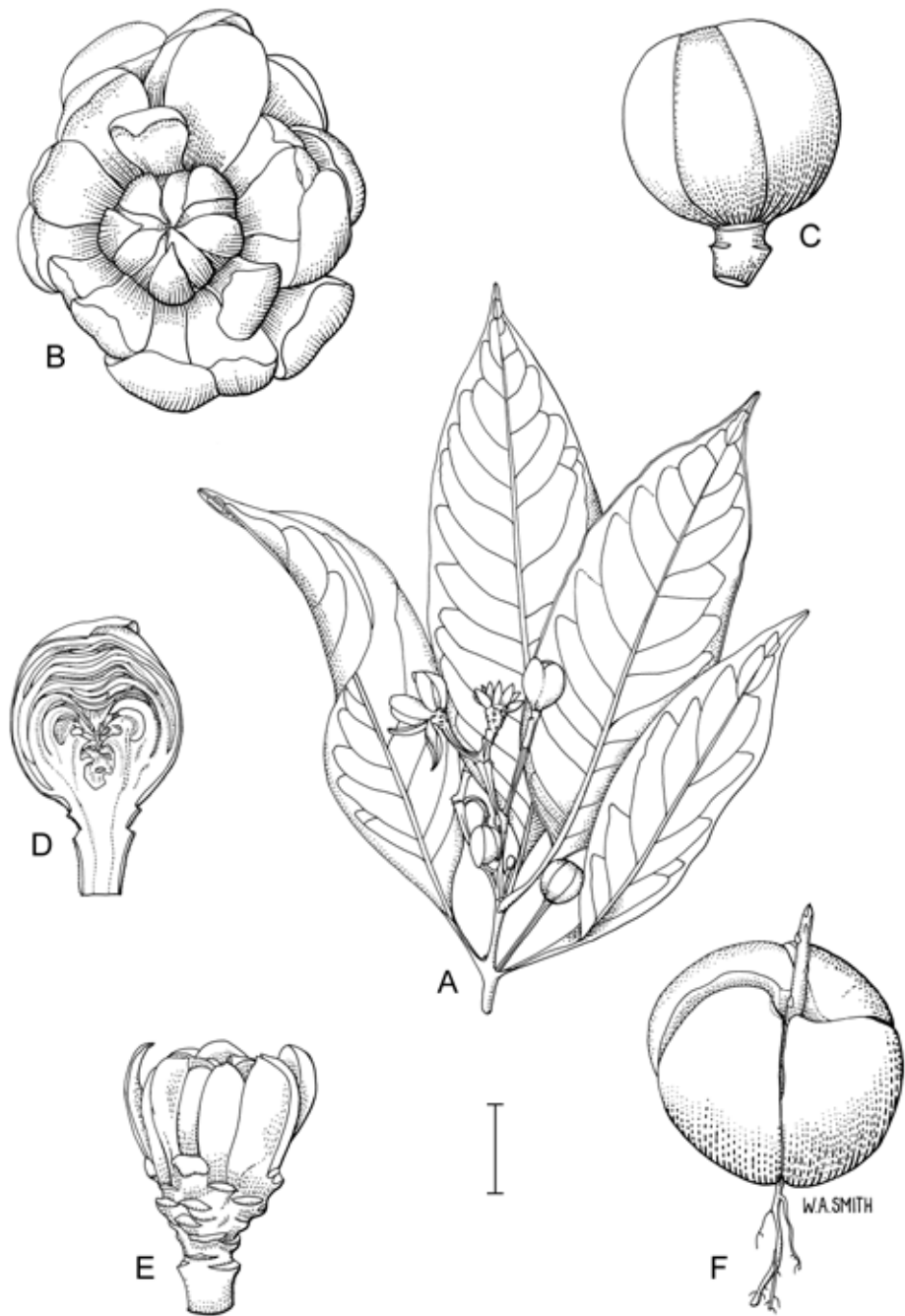


Figure 25. *Idiospermum australiense*. **A**, flowering branchlet (B.Gray 4081, BRI); **B**, flower, apical view (L.Webb & J.Tracey 10745, BRI); **C**, flower bud; **D**, L.S. flower bud; **E**, side view of flower (**C–E**, B.Hyland 6242, BRI); **F**, germinating seed (L.Webb & J.Tracey 850, BRI). Scale bar: **A**, **F** = 24 mm; **B–E** = 6 mm. Drawn by W.A.Smith.

IDIOSPERMACEAE

A monotypic family found only in lowland tropical rainforest in NE Qld.

Although previously accepted as a separate family by Cronquist and others, the contrasting view of Carlquist (1983) and other authors since, and most recently the molecular evidence of Renner (1999) and morphological evidence of Worboys (2003), support the inclusion of *Idiospermum* in Calycanthaceae.

S.T.Blake, *Idiospermum* (Idiospermaceae), a new genus and family for *Calycanthus australiensis*, *Contr. Queensland Herb.* 12: 1–37 (1972); S.Carlquist, Wood anatomy of the Calycanthaceae: ecological and systematic implications, *Alisio* 10: 427–441 (1983); S.S.Renner, Circumscription and phylogeny of the Laurales: evidence from molecular and morphological data, *Amer. J. Bot.* 86(9): 1301–1315 (1999); S.J.Worboys, Polycarpelly in *Idiospermum australiense* (Calycanthaceae), *Austrobaileya* 6(3): 553–556 (2003).

IDIOSPERMUM

Idiospermum S.T.Blake, *Contr. Queensland Herb.* 12: 4 (1972); from the Greek *idios* (peculiar, distinct) and *sperma* (a seed), in reference to the seed.

Type: *I. australiense* (Diels) S.T.Blake

Idiospermum australiense (Diels) S.T.Blake, *Contr. Queensland Herb.* 12: 5, figs 1–13 (1972)

Calycanthus australiensis Diels, *Bot. Jahrb. Syst.* 48(107): 10 (1912). T: Russell R. region near Harvey Ck, Qld, 6 June 1902, *L.Diels* 8548; holo: B (destroyed); Harvey Creek, E side of Mt Bellenden Ker, Qld, 19 Jul 1998, *S.Worboys* SJW346; neo: BRI (2 sheets).

Illustrations: S.T.Blake, *op. cit.*, figs 1–13.

Tree to 25 m tall. Shoots glabrescent. Leaves: petiole 1.2–2.5 cm long; lamina elliptic, oblong or narrowly ovate, usually 8–20 cm long, 3–10 cm wide, decurrent or attenuate at base, acuminate, glabrous, usually with 7–15 pairs of secondary veins. Peduncle 2–3.5 cm long, pubescent. Lower bracts oblong, 2–2.5 mm long; upper bracts broadly elliptic, concave, 9–10 mm long, appressed-pubescent. Lower tepals elliptic, concave, 12–10 mm long, 7–8 mm wide, appressed-pubescent outside; intermediate tepals elliptic to obovate, 8–10 mm long, 3–5 mm wide, appressed-pubescent outside; upper tepals oblong to narrowly obovate, 7–8 mm long, 2.5–3 mm wide, acute to acuminate, appressed-pubescent only in middle near base on outside. Stamens 13–15, 2.7–3 mm long. Staminodes 8–10. Ovary obovate, compressed, 1.5–2 mm long. Fruit 5–6 cm long, 6–7 cm wide, olive brown. Plate 20; Fig. 25.

Occurs in north-eastern Qld from Oliver Ck to Mackenzie Ck, N of Daintree and also Russell R. and Harvey Ck; in complex mesophyll vine forest. Map 114.

Qld: Mackenzie Ck, NE of Daintree, WNW of Bailey Point, *S.T.Blake* 23621 (BRI); base of Mt Hutchinson, Parish of Alexandra, *B.Gray* 4081 (BRI); Oliver Ck, Cape Tribulation area, *L.J.Webb & J.G.Tracey* 13333 (BRI).

LAURACEAE

*J. Le Cussan*¹ & *B.P.M. Hyland*²

Cassytha by *J.Z. Weber*³

Evergreen trees, shrubs or parasitic twiners (*Cassytha*), usually bisexual, sometimes dioecious (*Lindera*, *Litsea* and *Neolitsea*). Leaves reduced to scales (*Cassytha*), or fully developed, simple, exstipulate, petiolate, minutely oil-dotted; margins usually entire. Inflorescence often paniculate and pseudoterminal, but umbellate and axillary in *Lindera*, *Litsea* and *Neolitsea*, racemose, capitate or spicate in *Cassytha*. Bracts usually small and inconspicuous, but large and completely enclosing inflorescence in umbellate genera. Flowers actinomorphic, usually 3-merous (occasionally 2 or 4), partly united, usually with 6 segments in 2 whorls, but perianth segments quite distinct in *Cassytha*. Stamens usually 3–12 per flower, rarely 2 (to 12–20 in *Lindera* and *Litsea*), with innermost whorl often reduced to staminodes; anthers basifixed, 2–4-locular, outer whorls introrse, the innermost whorl extrorse (all introrse in *Lindera*, *Litsea* and *Neolitsea*); glands usually attached to filaments of some anthers. Ovary superior, 1-locular; ovule solitary, pendulous; style terminal; stigma usually small. Fruits baccate, sessile (*Cassytha*), or often on a bare pedicel, but sometimes the perianth persists as a swollen receptacle at base or encloses part or whole of the fruit; mesocarp usually succulent; endocarp usually developed, sometimes thick and hard but often thin and closely associated with testa. Seed solitary; testa thin; cotyledons frequently uniform in texture, sometimes ruminant.

A family of about 43 genera and 3,000 or more species, widely distributed throughout the tropics and sub-tropics, primarily in lowland to montane rainforests, the main centres being in SE Asia and tropical South America; in Australia there are 8 genera and 136 species, of which 112–115 species are endemic.

The family contains many important timber trees, (39 commonly utilised species) including Queensland (or Black) Walnut (*Endiandra palmerstonii*) and Bolly Silkwood (*Cryptocarya oblata*). Other important commercial products derived from members of the family (but not native to Australia) include avocado, cinnamon, camphor, bay leaves and sassafras oil. Rare and new organic compounds are being discovered in some species, for example endiandric acid in *Endiandra jonesii* and *Endiandra introrsa* (W.M. Bandaranayake *et al.*, *J. Soc. Chem. Comm.* 1980: 162–163 (1980)).

Laurus nobilis L. (Bay Tree) is reported as sparingly naturalised in Vic. but no specimens have been seen.

Persea americana Mill. (Avocado Pear) sometimes persists in old gardens and around plantations, but is not considered to be naturalised, and is not treated further in the text.

The perianth of most genera consists of 6 segments in 2 whorls, 3 outer and 3 inner tepals which are more or less similar, except in *Cassytha*. The flowers of *Cassytha* exhibit 2 quite distinct whorls, and although in general the shape, size and texture of the segments varies quite markedly between the two whorls, the term ‘tepals’ for all six perianth segments has been maintained. In *Cassytha*, several of the flowers and fruit are subtended by a short stalk; however, these are not always termed ‘pedicellate’ as there is often a pair of floral bracteoles located distally to the stalk, clasping the base of the flower or fruit. In this treatment, such flowers or fruits are termed ‘sessile’. *Cassytha* has had a relatively ‘turbulent’ taxonomic history, being placed at various times in a separate family, Cassythaceae, as well as in

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³ Deceased, formerly of 14 Cluny Drive, North Buderim, Qld 4556.

LAURACEAE

several orders, sub-orders, tribes and sub-tribes. However, most recent authors place *Cassytha* as a genus of Lauraceae, and this interpretation has been maintained in this treatment. J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 187–262 (1981) gives further information on the taxonomic history of *Cassytha*.

R.Brown, Laurinae, *Prodr.* 401–405 (1810); C.G.Nees von Esenbeck, *Syst. Laur.* (1836); C.F.Meissner, in A.L.P.P. de Candolle, *Prodr.* 15: 1–260 (1864); G.Bentham, Laurinae, *Fl. Austral.* 5: 293–313 (1870); F.M.Bailey, Laurineae, *Queensland Fl.* 4: 1297–1316 (1901); C.K.Allen, Studies in Lauraceae. IV. Preliminary study of the Papuan species collected by the Arnold Expeditions, *J. Arnold Arbor.* 23: 112–155 (1942); A.J.G.H.Kostermans, Lauraceae, *Reinwardtia* 4: 193–256 (1957); R.L.N.Sasti, Studies in the Lauraceae. IV. Comparative Embryology and Phylogeny, *Ann. Bot. n. ser.* 27 (107): 425–433 (1963); A.J.G.H.Kostermans, *Bibliographia Lauracearum* (1964); W.D.Francis, *Austral. Rain-forest Trees* 3rd edn, 113–143 (1970); A.G.Floyd, *New South Wales Rainforest Trees* part 1, 2nd edn (1979); T.D.Stanley & E.M.Ross, *Fl. SE Queensland* 1: 154–168 (1983); B.P.M.Hyland, A Revision of Lauraceae in Australia (excluding *Cassytha*), *Austral. Syst. Bot.* 2: 135–367 (1989); A.G.Floyd, *Rainforest Trees Mainland SE Australia* 168–195 (1989); G.J.Harden in G.J.Harden (ed.), Lauraceae, *Fl. New South Wales* 1: 133–147 (1991); J.R.Wheeler (ed.) *et al.*, Lauraceae, *Fl. Kimberley Region* 59–63 (1992); D.C.Christophel & B.P.M.Hyland, *Leaf Atlas Austral. Trop. Rain Forest Trees* 121–137 (1993); B.P.M.Hyland & T.Whiffin, *Austral. Trop. Rain Forest Trees, An Interactive Identification System* 2: 179–226 (1993); J.G.Rohmer, Lauraceae, in K.Kubitzki, J.G.Rohrer & V.Bittich (eds), *Fam. Gen. Vasc. Pl.* 2: 366–391 (1993); D.C.Christophel & A.I.Rowett, Leaf and Cuticle Atlas of Australian Leafy Lauraceae, *Fl. Australia Suppl. Ser. No.* 6 (1996); K.Heo, H. van der Werff & H.Tobe, Embryology and relationships of Lauraceae (Laurales), *Bot. J. Linn. Soc.* 126: 295–322 (1998).

KEYS TO GENERA

Flowering Material

- | | |
|--|-------------------------|
| <p>1 Parasitic twiners; leaves absent, or reduced to scales</p> | 2. CASSYTHA |
| 1: Trees or shrubs; leaves well-developed | |
| 2 Flowers male or bisexual | |
| 3 Anthers 2-locular (rarely 1) | |
| <p>4 Inflorescence umbellate; umbels completely enclosed in hemispherical decussate bracts before anthesis</p> | 6. LINDERA |
| <p>4: Inflorescence paniculate or racemose; flower buds not enclosed in hemispherical decussate bracts</p> | |
| <p>5 Fertile stamens 3 (rarely 2)</p> | 5. ENDIANDRA |
| 5: Fertile stamens 6–9 | |
| 6 Fertile stamens 9 | |
| <p>7 Flowers hypogynous; ovary not surrounded by perianth tube, with a significant part of ovary projecting beyond the top of the tube</p> | 1. BEILSCHMIEDIA |
| <p>7: Flowers epigynous or perigynous; ovary closely surrounded by perianth tube with only the stigma, style and perhaps the top of the ovary projecting beyond the top of the tube</p> | 4. CRYPTOCARYA |
| 6: Fertile stamens fewer than 9 | |
| <p>8 Anther valves opening inwards and sideways</p> | 1. BEILSCHMIEDIA |
| <p>8: Anther valves opening outwards and sideways</p> | 5. ENDIANDRA |
| 3: Anthers 4-locular | |

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- | | |
|---|----------------------|
| <p>9 Inflorescence paniculate; flower buds not enclosed in hemispherical bracts</p> | 3. CINNAMOMUM |
| <p>9: Inflorescence umbellate; umbels completely enclosed in hemispherical decussate bracts before anthesis</p> | |
| <p>10 Tepals absent or vestigial; flowers 6–14 per umbel; staminal glands not attached to anther filaments</p> | 7. LITSEA |
| <p>10: Tepals 4–6, perfectly developed; flowers 2–7 per umbel; staminal glands attached to anther filaments</p> | |
| <p>11 Leaves often triplinerved, often in pseudo-whorls or tight spirals on sections of the twigs, while other sections of the twigs are devoid of fully-developed leaves; flowers usually 2-merous with tepals 2 + 2; stamens usually 4 + 2; umbels sessile or very shortly pedunculate</p> | 8. NEOLITSEA |
| <p>11: Leaves penninerved, spirally arranged and uniformly distributed on twigs; flowers usually 3-merous; tepals 3 + 3 (or 6); stamens 6–16 (–20); umbels distinctly pedunculate</p> | 7. LITSEA |
| <p>2: Flowers female</p> | |
| <p>12 Tepals absent or poorly developed; flowers 6–15 per umbel</p> | |
| <p>13 Glands attached to staminode; staminodes in one series; pedicel 2.6–4 mm long</p> | 6. LINDERA |
| <p>13: Glands not attached to staminodes; staminodes in 2 series; pedicel 1.3–2.6 mm long</p> | 7. LITSEA |
| <p>12: Tepals 4–6, perfectly developed; flowers 1–6 per umbel</p> | |
| <p>14 Leaves often triplinerved, often in pseudo-whorls or tight spirals on sections of the twigs, while other sections of the twigs are devoid of fully developed leaves; flowers predominantly 2-merous</p> | 8. NEOLITSEA |
| <p>14: Leaves penninerved, spirally arranged and uniformly distributed on twigs; flowers predominantly 3-merous</p> | 7. LITSEA |

Fruiting material

- | | |
|---|----------------------|
| <p>1 Parasitic twiners; leaves absent or reduced to scales</p> | 2. CASSYTHA |
| <p>1: Trees or shrubs; leaves well-developed</p> | |
| <p>2 Fruit seated in a cup surrounding lower part of fruit or on a fleshy swollen receptacle</p> | |
| <p>3 Leaves opposite or subopposite</p> | 3. CINNAMOMUM |
| <p>3: Leaves spirally arranged or in pseudo-whorls or alternate</p> | |
| <p>4 Leaves smelling of camphor when crushed, triplinerved, usually alternate</p> | 3. CINNAMOMUM |
| <p>4: Leaves not smelling of camphor when crushed, triplinerved or penninerved, spirally arranged or in pseudo-whorls</p> | |
| <p>5 Leaves often triplinerved, often in pseudo-whorls or tight spirals on sections of the twigs, while other sections of the twigs are devoid of fully developed leaves</p> | 8. NEOLITSEA |
| <p>5: Leaves penninerved, spirally arranged and uniformly distributed on twigs</p> | |
| <p>6 Fruiting carpel seated in a cup-shaped receptacle</p> | 7. LITSEA |
| <p>6: Fruiting carpel seated on a swollen receptacle (but base of carpel not enclosed by receptacle)</p> | |

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- 7 Ripe fruits red; mature twigs ±glabrous, (sometimes puberulous) **6. LINDERA**
- 7: Ripe fruits black; mature twigs clothed in tortuous, erect and appressed hairs **7. LITSEA**
- 2: Fruit not seated in a cup surrounding lower part of fruit or on a fleshy swollen receptacle
- 8 Fruit appearing inferior (enclosed by perianth tube) with remnants of perianth lobes persisting at apex of fruit or apex marked by a conspicuous scar **4. CRYPTOCARYA**
- 8: Fruit superior with remnants of perianth lobes usually persisting at base of fruit **†1. BEILSCHMIEDIA**
‡5. ENDIANDRA
- † *Beilschmiedia* and *Endiandra* cannot be distinguished by fruit alone, flowers are also required.

1. BEILSCHMIEDIA

Beilschmiedia Nees in N.Wallich, *Pl. Asiat. Rar.* 2: 61, 69 (1831); after K.T.Beilschmied, a chemist and botanist in Germany.

Type: *B. roxburghiana* Nees; lecto, *vide* A.J.G.H.Kostermans, *Recueil Trav. Bot. Neerl.* 35: 839 (1938).

Nesodaphne Hook.f., *Fl. Nov.-Zel.* 1: 217 (1853). T: not designated.

Trees, often large. Twigs usually ±sericeous (at least when young), rarely completely glabrescent. Leaves spirally arranged, petiolate; lamina mainly penninerved, midrib raised or flush with upper surface (sometimes slightly depressed in *B. volckii*). Inflorescence paniculate, axillary and often pseudoterminal (racemose and axillary in *B. oligandra*); bracts small. Flowers bisexual, 3-merous. Tepals 3 + 3. Stamens: anthers 6 introrse, or 6 introrse + 3 extrorse, 2-locular; glands 6, stalked, with stalks usually villous and heads mainly glabrous, or glands absent. Staminodes 0–6. Ovary usually sessile; stigma inconspicuous. Fruit to 70 mm diam.; pedicel not swollen; mesocarp usually fleshy; endocarp thin to thick. Seed to 60 mm diam.; radicle apical or close to apex; cotyledons distinct from one another, uniform in texture.

A pantropical genus of more than 200 species occurring in Africa, Asia, Malasia, Australia, Pacific Islands, New Zealand, South and Central America; 11 species (10 endemic) in Australia. Distributed from Cape York Penin., Qld, to northern N.S.W.

This genus is of important commercial value with 5 species producing millable logs of generally fine grade timber (referred to as ‘walnut’). A further 4 species also produce millable logs although these are not commonly utilised.

Flowering material

- 1 Stamens 6 or fewer in each flower
- 2 Staminodes 6 in each flower
- 3 Leaf lamina 12–27 cm long, underside green; larger staminodes 1–1.2 mm long **11. B. volckii**
- 3: Leaf lamina 7–13 cm long, underside glaucous; larger staminodes 0.5–0.9 mm long **3. B. castrisinensis**
- 2: Staminodes 0–3 in each flower
- 4 Staminodes c. 1.8–2.5 mm long; outer tepals 2–2.5 mm long **7. B. oligandra**
- 4: Staminodes c. 0.5–0.8 mm long; outer tepals 0.6–1 mm long **10. B. tooram**
- 1: Stamens 9 in each flower

- 5 Staminoles not differentiated, cylindrical or clavate; ovary conspicuously stalked **1. *B. bancroftii***
- 5: Staminoles differentiated, i.e. consisting of a head, which is \pm cordate or sagittate and a filament; ovary sessile or very shortly stalked
- 6 Primary veins up to 5 pairs; outer tepals > 2 mm long **2. *B. brunnea***
- 6: Primary veins 6 or more pairs; outer tepals seldom exceeding 2 mm in length
- 7 Flowers pleasantly perfumed; leaf margin mainly flat, but recurved near base just prior to its junction with petiole **9. *B. recurva***
- 7: Flowers unpleasantly perfumed; leaf margin \pm flat throughout (occasionally slightly recurved about middle)
- 8 Lamina glaucous on underside **4. *B. collina***
- 8: Lamina green on underside
- 9 Primary vein angle usually 45–70°; primary veins forking towards margin of lamina and branches forming rather conspicuous loops
- 10 Outer tepals > 1.5 mm long **5. *B. elliptica***
- 10: Outer tepals < 1.5 mm long **8. *B. peninsularis***
- 9: Primary vein angle usually 30–55°; primary veins curving inside lamina margin usually without conspicuous forks and not forming conspicuous loops
- 11 Apex of inner anthers obtuse, very shortly tomentose; tepals 1.1–1.5 mm long **6. *B. obtusifolia***
- 11: Apex of inner anthers acute, aristate; tepals 1.5–1.8 mm long **†34. *Cryptocarya oblata***

†*Cryptocarya oblata* has been included in the above key because the flowers sometimes appear similar in structure to those of *Beilschmiedia* (see note in the *C. oblata* description).

Fruiting material

- 1 Fruits > 30 mm diam.
- 2 Cotyledons burgundy in colour when freshly cut **11. *B. volckii***
- 2: Cotyledons cream, orange or apricot when freshly cut
- 3 Fruits wider than long; fruits slightly bilobed and laterally compressed **3. *B. castrisinensis***
- 3: Fruits longer than wide (occasionally about as long as wide); fruits not bilobed although sometimes laterally compressed
- 4 Fruits brownish or orange-brown when ripe; endocarp usually 2–2.5 mm thick (rarely thinner) **1. *B. bancroftii***
- 4: Fruits black, blue-black or purplish black when ripe; endocarp 0.6–2 mm thick
- 5 Young twigs clothed in straight, appressed, brown or pale brown hairs **7. *B. oligandra***
- 5: Young twigs clothed in tortuous, erect, brown hairs **10. *B. tooram***
- 1: Fruits < 30 mm diam.
- 6 Primary veins up to 5 pairs **2. *B. brunnea***
- 6: Primary veins 6 or more pairs
- 7 Seeds 12 mm or more diam.

- 8 Young twigs clothed in straight, pale brown, appressed hairs; leaf margin mainly flat, but recurved near base just prior to junction with petiole **9. *B. recurva***
- 8: Young twigs clothed in tortuous, erect, brown hairs; leaf margin flat throughout **10. *B. tooram***
- 7: Seeds to 12 mm diam.
- 9 Lamina glaucous on underside **4. *B. collina***
- 9: Lamina green on underside
- 10 Primary vein angle usually 30–55°; primary veins curving inside lamina margin without conspicuous forks and not forming loops **6. *B. obtusifolia***
- 10: Primary vein angle usually 45–70°; primary veins forking towards lamina margin, branches forming conspicuous loops
- 11 Fruits 12 mm diam. **5. *B. elliptica***
- 11: Fruits 13–15 mm diam. **8. *B. peninsularis***

1. *Beilschmiedia bancroftii* (F.M.Bailey) C.T.White, *Bot. Bull. Dept. Agric., Queensland* 20: 17 (1918)

Cryptocarya bancroftii F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 2: 16 (1891). T: Johnstone River, Qld, *T.L.Bancroft* (BRI 10069); lecto: BRI; *F.M.Bailey (Bellenden Ker Expedition)*; remaining syn: BRI, K, MEL, *vide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 148 (1989).

Beilschmiedia lachnostemonea F.Muell., *Victorian Naturalist* 9: 11 (1892). T: Russell River, Qld, *W.Sayer*; syn: BRI, K, MEL, NSW.

Illustration: B.P.M.Hyland, *op. cit.* 2: 276, fig. 1 (1989).

Tree to 30 m. Stem usually buttressed. Twigs terete or angular, pubescent when young, glabrous when older. Leaves: petiole 5–16 mm long; lamina lanceolate, 7–15.5 cm long, 2–3 cm wide, green or ±glaucous below, eventually ±glabrescent. Inflorescence ±exceeding leaves. Flowers opening widely with tepals reflexed, green to greenish brown, perfumed. Tepals pubescent: outer 2.1–2.8 mm long, 1.2–1.7 mm wide; inner 2.3–3.5 mm long, 1.2–1.7 mm wide. Outer anthers 0.6–0.8 mm long, 0.6–0.9 mm wide, glabrous; filaments 1–1.7 mm long. Inner anthers 0.6–0.8 mm long, 0.5–0.8 mm wide, glabrous; filaments 1.2–2.1 mm long; glands present. Staminodes 3, undifferentiated. Ovary stalked, 0.9–1.1 mm long, 0.7–1 mm wide, glabrous; style glabrous. Fruit globular, 65–75 mm long, 50–60 mm wide, green to brownish orange. Cotyledons cream. *Yellow Walnut*.

Occurs from Mt Lewis to South Mission Beach, N Qld; from sea level to 1200 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Dec.–Aug.; fruits Dec.–Mar., also Aug. Map 115.

Qld: S.F.R. 143, Little Mossman L.A., (Mt Lewis), *V.K.Moriarty 2150* (QRS); T.R. 155, Alexandra Ra., *B.Hyland 12820* (QRS); South Mission Beach, *G.Stocker 810* (BRI, K, KEP, L, NSW, QRS).

Blaze odour resembles sugarcane.

2. *Beilschmiedia brunnea* B.Hyland, *Austral. Syst. Bot.* 2: 149 (1989)

T: State Forest Reserve 310, Windin Logging Area, Qld, 24 Jan. 1983, *B.Hyland 12473*; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 277, fig. 2; 343, fig. 68A–B (1989).

Tree to 35 m. Stem usually buttressed. Twigs terete or angular, eventually glabrescent. Leaves: petiole 13–26 mm long; lamina ovate to elliptic, 7–12.5 cm long, 2.5–7 cm wide, slightly glaucous below, eventually ±glabrescent. Inflorescence c. same length as leaves. Flowers opening quite widely with tepals becoming almost horizontal, green–pale brown, perfumed. Tepals densely pubescent; outer 2.4–3 mm long, 1.5–1.7 mm wide; inner 2.6–3.2 mm long, 1.4–1.7 mm wide. Outer anthers 0.8–1.3 mm long, 0.7–0.9 mm wide, pubescent abaxially; filaments 1–1.4 mm long. Inner anthers 0.8–1.1 mm long, 0.6–0.7 mm wide, pubescent adaxially; filaments 1–1.7 mm long; glands present. Staminodes 3, differentiated. Ovary sessile or shortly stalked, 0.5–1 mm long, 0.7–0.8 mm wide, usually hairy; style

usually hairy. Fruits ellipsoidal, globular, 20–22 mm long, 17 mm wide, black. Cotyledons yellowish cream. *Brown Walnut*.

Occurs from the Clohesy R. to Ravenshoe/Koombooloomba, N Qld; at 500–1100 m alt. Grows in rainforests in soils derived from granite and basalt. Flowers Dec.–Feb.; fruits Oct.–Dec. Map 116.

Qld: S.F.R. 251, Tableland L.A. (Koombooloomba), *G.Stocker* 923 (QRS); S.F.R. 194 (Herberton Ra.), *B.Gray* 1837 (QRS); T.R. 310, Boonjee, *B.Hyland* 4901 (QRS); Clohesy R., *B.Hyland* 1283RFK (QRS).

Differs from other species of *Beilschmiedia* in the small number of lateral veins and the tepals more than 2 mm long.

3. *Beilschmiedia castrisinensis* B.Hyland, *Austral. Syst. Bot.* 2: 150 (1989)

T: Natl Park Res. 164, Noah, Qld, 10 Nov. 1983, *B.Hyland* 12861; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 278, fig. 3; 343, fig. 68C–D (1989).

Tree to 30 m. Stem usually buttressed. Twigs slightly fluted, pubescent. Leaves: petiole 8–19 mm long; lamina lanceolate, 7.3–12.6 cm long, 2.3–3.7 cm wide, glaucous below, soon almost glabrescent. Inflorescence not exceeding leaves. Flowers not opening widely, with tepals geniculate, enclosing everything except anther tips and style, cream or creamy green, ±perfumed. Tepals 0.5–1 mm long, 0.8–1.5 mm wide, pubescent. Stamens 6, uniform; anthers 0.4–0.6 mm long, 0.6–0.9 mm wide, glabrous; filaments 0.1–0.3 mm long; glands absent. Staminodes 6, undifferentiated (3 outer, 0.5–0.9 mm long; 3 inner, 0.3–0.7 mm long). Ovary 0.4–0.8 mm long, 0.4–0.7 mm wide, glabrous; style glabrous. Fruit 45–65 mm long, 48–71 mm wide (longer axis), 36–55 mm wide (shorter axis), black. Cotyledons cream to light yellow.

Occurs from the Daintree R. to the Bloomfield R., N Qld; from sea level to 660 m alt. Grows in rainforests, generally in soils derived from metamorphic rocks. Flowers Sept.–Dec.; fruits June–Dec. Map 117.

Qld: Timbercamp Rd, China Camp (S of Bloomfield), *L.J.Webb* & *J.G.Tracey* (BRI); Natl Park Res. 164, Oliver Ck, *B.Gray* 3210 (QRS); Alexandra Ra., *B.Gray* 4133 (QRS); vacant crown land, Noahs Ck, *B.Hyland* 3188RFK (QRS).

This species is similar to *B. volckii*, differing in its smaller leaf laminas and shorter staminodes.

4. *Beilschmiedia collina* B.Hyland, *Austral. Syst. Bot.* 2: 151 (1989)

T: State Forest Reserve 144, 18 Nov. 1976, *B.Hyland* 9186; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 279, fig. 4; 343, fig. 68E–F (1989).

Tree to 30 m. Stem usually not buttressed. Twigs angular, eventually ±glabrescent. Leaves: petiole 6–23 mm long; lamina elliptic to lanceolate to narrowly obovate, 5–15 cm long, 1.5–4.5 cm wide, glaucous and pubescent below. Inflorescence approximating or exceeding leaves. Flowers opening quite widely with tepals remaining ±erect, creamy green, perfumed. Tepals 1.1–1.5 mm long, 0.7–1 mm wide, pubescent. Outer anthers 0.5–0.8 mm long, 0.5–0.7 mm wide, pubescent; filaments 0.2–0.5 mm long. Inner anthers 0.5–0.6 mm long, 0.4–0.5 mm wide, pubescent; filaments 0.3–0.8 mm long; glands present. Staminodes 3, differentiated. Ovary 0.4–0.8 mm long, 0.5–0.6 mm wide, usually sessile, glabrous; style glabrous. Fruit ellipsoidal, 20–23 mm long, 12–13 mm wide, black to purplish black. Cotyledons cream. *Blush Walnut*.

Occurs in N and central Qld, from Big Tableland (S of Cooktown) to Eungella; at 350–1200 m alt. Grows in rainforests, particularly mountain rainforests, in soils derived from granite. Flowers Nov.–Dec.; fruits Aug.–Jan. Map 118.

Qld: T.R. 146, Tableland L.A. (Big Tableland), *B.Hyland* 10565 (QRS); Mt Spec, *B.Hyland* 1557 RFK (QRS); S.F.R. 194 (Herberton Ra.), *B.Gray* 3204 (QRS); Bluewater Ra. (N of Townsville), *B.Hyland* 10080 (QRS); S.F.R. 62, Eungella, *P.Qualischedfski* 283 (QRS).

Similar to *B. obtusifolia*, differing in the leaves being white or glaucous on the underside.

5. *Beilschmiedia elliptica* C.T.White & W.D.Francis, *Bot. Bull. Dept. Agric., Queensland* 22: 28 (1920)

T: Kin Kin, Qld, *W.D.Francis s.n.*; lecto: BRI; isolecoto: A, BRI, K, MEL, QRS; Fraser Island, Qld, *W.R.Petri s.n.*; remaining syn: BRI; Kin Kin, Qld, *C.T.White s.n.*; remaining syn: BRI, *fide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 152 (1989).

Tree to 35 m. Stem sometimes buttressed. Twigs terete or fluted, eventually almost glabrescent. Leaves: petiole 5–11 mm long; lamina elliptic to lanceolate to ovate, 8–13 cm long, 2–4 cm wide, green and glabrous below. Inflorescence not exceeding leaves. Flowers opening fairly widely with tepals remaining \pm erect, ?cream; perfume unknown. Tepals pubescent: outer 1.8–2 mm long, 1.2–1.3 mm wide; inner 2.3–2.4 mm long, 1.2–1.4 mm wide. Outer anthers 0.7–0.9 mm long, c. 0.7 mm wide, glabrous; filaments 0.8–0.9 mm long. Inner anthers 0.5–0.7 mm long, 0.4–0.5 mm wide, glabrous; filaments 0.8–0.9 mm long; glands present. Staminodes 3, differentiated. Ovary sessile, c. 0.9 mm long, 0.7–0.8 mm wide, glabrous; style glabrous. Fruit globular, c. 12 mm diam., glaucous, black. Cotyledon colour unknown. *Grey Walnut*.

Occurs from Gympie, southern Qld, to Coffs Harbour, northern N.S.W.; from sea level to 300 m alt. Grows in rainforests. Flowers Aug.–Oct.; fruits Feb.–Apr. Map 119.

Qld: S.F.R. 451, Cameron L.A. (E of Gympie), *B.Hyland 11002* (QRS); Kin Kin, *W.D.Francis BRI 010068* (A, BRI, K, MEL, QRS). N.S.W.: Eden Ck, near Kyogle, *L.J.Webb 5215* (BRI); Bruxner Park (near Coffs Harbour), *B.Hyland 4573RFK* (QRS).

6. *Beilschmiedia obtusifolia* (F.Muell. ex Meisn.) F.Muell., *Syst. Census Austral. Pl.* 3 (1882)

Cryptocarya obtusifolia F.Muell. ex Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 508 (1864); *Nesodaphne obtusifolia* (F.Muell. ex Meisn.) Benth., *Fl. Austral.* 5: 299 (1870). T: Clarence River, N.S.W., *F.Mueller* (probably *H.Beckler*); holo: G-DC; ?iso: K, MEL.

Cryptocarya glaucescens var. *reticulata* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 73 (1864). T: New South Wales, *C.Moore 5*; holo: K.

Tree to 35 m. Stem sometimes buttressed. Twigs terete, soon glabrescent. Leaves: petiole 5–22 mm long; lamina elliptic to narrowly obovate, 7–17 cm long, 2–6 cm wide, green and glabrous below. Inflorescence exceeding leaves. Flowers opening widely with tepals remaining \pm erect, creamy, perfumed. Tepals pubescent; outer 1.1–1.5 mm long, 1–1.4 mm wide; inner 1.1–1.7 mm long, 1.1–1.5 mm wide. Outer anthers 0.6–0.9 mm long, 0.7–1 mm wide, pubescent; filaments 0.3–0.6 mm long. Inner anthers 0.4–0.8 mm long, 0.5–0.7 mm wide, obtuse, very shortly tomentose; filaments 0.5–0.8 mm long; glands present. Staminodes 3, differentiated. Ovary 0.5–0.9 mm long, 0.5–0.8 mm wide, sessile, glabrous; style glabrous. Fruit ellipsoidal, 18–24 mm long, 11–15 mm wide, black, sometimes glaucous. Cotyledons cream. *Blush Walnut*. Plate 19.

Occurs in eastern Australia from Cape York Penin. and Torres Strait Is., Qld, to Macksville, N.S.W.; from sea level to 800 m alt. Grows in rainforests in soils derived from a variety of rock types, but reaching best development in gallery forests in alluvium. Also found in New Guinea. Flowers Oct.–June; fruits July–Nov. (some all year). Map 120.

Qld: Daintree R., *L.J.Brass 2350* (A, B, BISH, BRI, K, MEL); Hunter Ck, Julatten, *G.Sankowsky 416* (QRS); Wasp Ck, Bamaga area, *S.J.Dansie 20114* (QRS). N.S.W.: Warrell Ck, 8 km S of Nambucca Heads, *A.G.Floyd 720* (BRI); Mt Warning Natl Park, *A.G.Floyd 298* (CANB).

7. *Beilschmiedia oligandra* L.S.Sm., *Proc. Roy. Soc. Queensland* 70: 28 (1959)

T: State Forest Reserve 310, Gadgarra, Swipers Logging Area, Qld, *K.J.White 1288*; holo: BRI; iso: A, AFO, K. Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 344, fig. 69A–B (1989).

Tree to 30 m. Stem buttressed. Twigs terete, glabrous. Leaves: petiole 8–24 mm long; lamina elliptic to lanceolate, 7.5–12.2 cm long, 2.7–4.8 cm wide, green or \pm glaucous below, glabrous or pubescent. Inflorescence scarcely exceeding petiole. Flowers opening widely,

with outer tepals becoming almost horizontal, creamy green, not perfumed. Tepals usually sparsely pubescent; outer 2–2.5 mm long, 2.1–2.8 mm wide; inner 1.8–2.2 mm long, 1.5–1.8 mm wide. Stamens 6, \pm uniform; anthers 0.7–1 mm long, 1.1–1.6 mm wide, glabrous; filaments 0.8–1.4 mm long; glands absent. Staminodes usually 3, undifferentiated, gland-like swellings present basally (sometimes additional staminodes present). Ovary sessile 1–1.3 mm long, 0.9–1.2 mm wide, glabrous; style glabrous. Fruit usually globular, sometimes ellipsoidal, laterally compressed, 37–54 mm long, 34–50 mm wide, black to blue-black. Cotyledons apricot, orange. *Ivory Walnut*.

Occurs from Alexandra Ra. to Palmerston region (W of Innisfail), Qld; at 60–720 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Oct.–Nov.; fruits June–Oct. Map 121.

Qld: T.R. 165, Alexandra L.A., *B.Hyland 10643* (QRS); S.F.R. 310, Windin L.A., *A.Dockrill 75* (BRI, K, L, QRS); T.R. 1230, Boonjee L.A., *V.Moriarty 2100* (QRS); T.R. 755, Badgery L.A. (Palmerston), *B.Gray 2822* (QRS).

8. *Beilschmiedia peninsularis* B.Hyland, *Austral. Syst. Bot.* 2: 154 (1989)

T: Tozers Gap, Qld, 23 Jan. 1982, *B.Hyland 11572*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 280, fig. 5 (1989).

Tree to 20 m. Stem not buttressed. Twigs terete, glabrous, with pale, flaky bark. Leaves: petiole 3–11 mm long; lamina lanceolate to elliptic to obovate, 6–13 cm long, 2–4 cm wide, green below, eventually glabrescent. Inflorescence c. same length as leaves. Flowers opening quite widely with tepals remaining \pm erect, cream, perfumed. Tepals pubescent; outer 1.1–1.4 mm long, 0.9 mm wide; inner 1.2–1.4 mm long, 1.1 mm wide. Outer anthers 0.6–0.7 mm long, 0.6–0.7 mm wide, pubescent; filaments 0.5 mm long. Inner anthers 0.5–0.6 mm long, 0.4 mm wide, pubescent; filaments 0.6–1 mm long; glands present. Staminodes 3, differentiated. Ovary sessile, 0.6–0.8 mm long, 0.6–0.7 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 20–28 mm long, 13–15 mm wide, blue-black. Cotyledons cream. Plate 21.

This species has only been found in a few localities on Cape York Penin., Qld; from sea level to 600 m alt. Grows in rainforests and favours soils derived from granite. Flowers Jan.–Mar.; fruits Oct.–Nov. Map 122.

Qld: Natl Park Res. 8 (northern end of Iron Ra.), *B.Hyland 11207* (QRS); Garraway Ra., *B.Hyland 3611RFK* (QRS); T.R. 14, McIlwraith Ra., *B.Hyland 3093RFK* (QRS); Silver Plains, Rocky R., McIlwraith Ra., *B.Hyland 10142* (QRS).

This species is similar to *B. elliptica*, differing in the tepals being less than 1.5 mm long.

9. *Beilschmiedia recurva* B.Hyland, *Austral. Syst. Bot.* 2: 155 (1989)

T: Massey Creek, Ravenshoe–Millaa Millaa Road, 1 Feb. 1977, *B.Gray 276*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 281, fig. 6 (1989).

Tree to 35 m. Stem sometimes buttressed. Twigs angular, eventually glabrescent. Leaves: petiole 8–22 mm long; lamina oblong to elliptic, 6–12.7 cm long, 2.7–5.3 cm wide, green or slightly glaucous below, eventually almost glabrescent. Inflorescence exceeding leaves. Flowers opening quite widely with tepals remaining \pm erect, yellowish, pale green, perfumed. Tepals pubescent; outer 1.1–1.8 mm long, 0.9–1.4 mm wide; inner 1.2–1.8 mm long, 1–1.6 mm wide. Outer anthers 0.7–0.9 mm long, 0.5–0.8 mm wide, pubescent; filaments 0.4–0.7 mm long. Inner anthers 0.6–0.8 mm long, 0.4–0.6 mm wide, pubescent; filaments 0.5–1 mm long; glands present. Staminodes 3, differentiated. Ovary sessile, 0.6–0.8 mm long, 0.7–1 mm wide, glabrous; style glabrous. Fruit usually ellipsoidal, 23–32 mm long, 15–21 mm wide, black. Cotyledons cream. *Ivory Walnut*. Fig. 26.

Occurs from Mt Windsor Tableland (N of Cairns) S to near Townsville, N Qld; at 150–1200 m alt.; possibly also in New Guinea. Grows in rainforests in soils derived from a variety of rock types. Flowers Jan.–Mar.; fruits Aug.–Dec. Map 123.



Figure 26. *Beilschmiedia recurva*. A, habit; B, seedling; C, L.S. fruit; D, fruit; E, leaf base; F, flower; G, flower with 2 tepals and 2 stamens removed; H, stamen and tepal (outer whorl, adaxial view); I, stamen and glands (inner whorl, abaxial view); J, staminode (abaxial view) (A, E–J, B.Gray 276, QRS; B–D, B.Gray 643, QRS). Scale bars: A, B = 40 mm; C = 10 mm; D, E = 20 mm; F, G = 2 mm; H–J = 1 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 281 (1989).

Qld: Windsor Tableland, *K.Sanderson 1749* (QRS); T.R. 165, Kobi L.A. (western side of Thorntons Peak), *B.Hyland 10662* (QRS); Mission Beach, *B.Hyland 1146 RFK* (QRS); Dotswood Holding, Bluewater Ra., N of Townsville, *B.Hyland 10095* (QRS).

Differs from other species in the leaf margin being recurved at the base.

10. *Beilschmiedia tooram* (F.M.Bailey) B.Hyland, *Austral. Syst. Bot.* 2: 156 (1989)

Endiandra tooram F.M.Bailey, *Queensland Fl.* 4: 1308 (1901). T: middle Tully River, Qld, *J.F.Bailey s.n.*; holo: BRI.

Illustration: B.P.M.Hyland, *op. cit.* 2: 344, fig. 69C–D (1989).

Tree to 30 m. Stem sometimes buttressed. Twigs terete, tomentose. Leaves: petiole 6–18 mm long; lamina elliptic to narrowly obovate, 6.5–21 cm long, 2.5–7 cm wide, green or slightly glaucous below, eventually \pm glabrescent. Inflorescence not exceeding leaves. Flowers not opening widely, with tepals \pm clasping anthers, cream to greenish yellow, without perfume. Tepals 0.5–1 mm long, 0.7–1.3 mm wide, mainly glabrous. Stamens 6 (sometimes 4 or 5), 0.5–0.9 mm long, 0.7–1.2 mm wide, sessile, glabrous; glands absent. Staminodes usually 3, undifferentiated. Ovary sessile, 0.5–1 mm long, 0.4–0.9 mm wide, glabrous; style glabrous. Fruit globular, laterally compressed, 36–55 mm long, 35–55 mm wide (longer axis), 22–35 mm wide (shorter axis). Cotyledons cream or orange. *Brown Walnut*.

Occurs in N Qld, from S of the Bloomfield R., to the Palmerston region (W of Innisfail); at 60–1080 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Nov.–Feb.; fruits Aug.–Dec. Map 124.

Qld: T.R. 165, Pieter Botte L.A., *B.Hyland 3507 RFK* (QRS); Coopers Ck (Cape Tribulation), *B.Gray 3738* (QRS); S.F.R. 755, North Johnstone, *G.Stocker 1750* (QRS); S.F.R. 756, Egan L.A., (Palmerston), *V.Moriarty 2146* (QRS).

11. *Beilschmiedia volckii* B.Hyland, *Austral. Syst. Bot.* 2: 156 (1989)

T: Boonjee, Timber Reserve 1230, Qld, 15 Feb. 1973, *A.K.Irvine 464*; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 282, fig. 7; 344, fig. 69E–F (1989).

Tree to 35 m. Stem usually buttressed. Twigs \pm terete, eventually \pm glabrescent at maturity. Leaves: petiole 11–38 mm long; lamina obovate to elliptic to lanceolate, 12–27 cm long, 6.5–11 cm wide, green below, eventually almost glabrescent. Inflorescence not exceeding leaves. Flowers opening fairly widely with tepals \pm erect at anthesis, cream, pale or brownish cream, without perfume. Tepals 0.7–1.3 mm long, 1.5–1.9 mm wide, densely hairy. Stamens 6; anthers 0.6–0.9 mm long, 0.5–0.8 mm wide, glabrous, sometimes pubescent abaxially; filaments 0.1–0.3 mm long, hairy; glands absent. Staminodes 6, undifferentiated (3 outer, 1–1.2 mm long; 3 inner, 0.5–0.7 mm long). Ovary sessile, 0.7–1 mm long, 0.7–1 mm wide, glabrous; style glabrous. Fruit globular, 45–67 mm long, 43–65 mm wide, black to purplish black. Cotyledons purplish burgundy.

Occurs from upper Goldsborough (W of Babinda) to the Palmerston region (W of Innisfail), northern Qld; from 300–700 m alt. Grows in rainforests in soils derived from basalt. Flowers Dec.–Feb.; fruits Oct.–Dec. Map 125.

Qld: S.F.R. 310, *T.Risley 10* (QRS); Natl Park Res. 904, Nandroya Falls, Palmerston, *B.Gray 3699* (QRS); S.F.R. 755 (Palmerston), *B.Hyland 5921* (QRS).

Similar to *B. castrisinesis*, differing in the larger leaf laminas and longer staminodes.

LAURACEAE

2. CASSYTHA

J.Z. Weber

Cassytha L., *Sp. Pl.* 1: 35 (1753); from Greek *kasytas* or *kadytas* for cuscuta, dodder.

Type: *C. filiformis* L.

Herbaceous, perennial, parasitic, partly autotrophic twiners, attached to host by small elliptic haustoria. Stems filiform or terete. Leaves spirally arranged, clasping, minute, scaly. Inflorescence a panicle, spike, raceme, or reduced to sessile or stalked head; peduncle erect; bracts 3. Flowers bisexual, sessile or shortly pedicellate, with 1 bract and 2 bracteoles. Perianth segments 6, free, persistent; sepals 3, scale-like, similar to floral bracts; petals 3, larger, fleshy. Receptacular tube: in flower turbinate, shallow-concave, tapering into pedicel and continuing into petals; after fertilisation becoming fleshy and enlarged to enclose ovary. Stamens and staminodes 12, in 4 whorls of 3; outer fertile whorls 3 (or 2); inner sterile whorls (staminodes) 1 (or 2); anthers 2-locular, dehiscent by an operculum; glands ovoid, at each side of base of filaments in third whorl. Carpel erect, white; ovary globular; style short, capitate. After fertilisation ovary forming crustaceous pericarp (bony putamen) which is enclosed by the tube of the fleshy receptacle. Fruit globular, bearing on top the lignified perianth and androecium sometimes encircled by a glandular rim. Seeds lacking endosperm; cotyledons thick, hemispherical, fleshy.

A genus of 23 species, 1 species (*C. filiformis*) is cosmopolitan but mainly in the tropics; 3 species are endemic to Africa; 19 species occur in Australia, of which 16 are endemic, 1 extending to Malaysia, 2 to New Guinea, 1 (?2) to New Zealand.

J.Lindley, in *Nix. Pl.* 112 (1833), treated this genus in his arrangement of Order Laurales in Cassytheae, and in *Nat. Syst. Bot.* 2nd edn, 202 (1836) allocated it to the Cassythaceae, 'a peculiar order with general structure of Lauraceae'. C.D.F.Meisner, *Pl. Vasc. Gen.* 324 [Tab. Diagn.] & 237 [Commentarius] (1841) included Cassytheae with 12 other tribes and 31 genera in Lauraceae. This view was shared by C.G.Nees von Esenbeck, *Syst. Laur.* (1836); D.F.L.Schlechtendal, *Linnaea* 20: 577 (1847); G.Bentham & J.D.Hooker, *Gen. Pl.* (1880); A.J.G.H.Kostermans, *Lauraceae, Forest Research Institute, Indonesia* 57: 1–59 (1957); and Weber (1981).

H.H.Allan, *Lauraceae, Fl. New Zealand* 137–138 (1961); W.M.Curtis, *Lauraceae, Stud. Fl. Tasmania* 3: 596 (1967); J.H.Willis, *Handb. Pl. Victoria* 2: 159–160 (1972); J.Z.Weber, A Taxonomic Revision of *Cassytha* (Lauraceae) in Australia, *J. Adelaide Bot. Gard.* 3: 187–262 (1981); J.R.Wheeler, *Lauraceae*, in N.G.Marchant *et al.*, *Fl. Perth Region* 1: 60–62 (1987); N.G.Walsh & T.J.Entwistle (eds), *Lauraceae, Fl. Victoria* 3: 26–30 (1997).

- | | |
|--|--------------------------|
| 1 Plant glabrous | |
| 2 Flowers and fruits on pedicels at least 1 mm long | 3. <i>C. pedicellosa</i> |
| 2: Flowers and fruits on pedicels < 0.3 mm long or sessile | |
| 3 Flowers < 0.8 mm long; spirally arranged on spike | 2. <i>C. micrantha</i> |
| 3: Flowers 1.3–3.2 mm long in distally congested spikes | 1. <i>C. glabella</i> |
| 1: Plant pubescent and/or bracts and sepals ciliate or fimbriate | |
| 4 Pedicel none or minute and concealed by the whorled bracts | |
| 5 Flowers and fruits in sessile glomerules or heads on short peduncles 2–7 mm long | |
| 6 Petals and fruits glabrous [W.A.] | 9. <i>C. nodiflora</i> |
| 6: Petals and fruits pubescent | 6. <i>C. pubescens</i> |
| 5: Flowers and fruits in pedunculate heads or panicles; peduncles 5–30 mm or more long | |

- 7 Petals glabrous
- 8 Fruits globular, greenish (drying black); peduncles c. 0.5 mm thick 8. *C. filiformis*
- 8: Fruits ovoid, reddish (never drying black); peduncles 0.3–0.4 mm thick (dried) 4. *C. capillaris*
- 7: Petals pubescent
- 9 Flowers in heads
- 10 Peduncles 0.2–0.5 mm thick; flowers globular; bracts equalling flowers, conspicuous in flower-head 5. *C. flava*
- 10: Peduncles > 1 mm thick (dried); flowers ovoid; floral bracts shorter than flowers, not protruding from flower-head
- 11 Staminodes and basal glands with white gland-like appendage [W.A.] 11. *C. aurea*
- 11: Staminodes and basal glands without appendages
- 12 Fruit glabrous; stamens of outer whorl at least twice as long as wide 12. *C. candida*
- 12: Fruit pubescent (sometimes sparsely so); stamens of outer whorl c. 1.5 times as long as wide
- 13 Bracteoles on pedicel inserted at different levels from bract; staminodes and glands dark tipped 11. *C. aurea*
- 13: Bract and bracteoles whorled; staminodes and glands uniformly coloured 6. *C. pubescens*
- 9: Flowers in panicles or spikes
- 14 Pubescence on petals short, black, retrorse; fruit glabrous, smooth, green (drying black) 10. *C. melantha*
- 14: Pubescence on petals white and red, not retrorse; fruit pubescent, smooth or papillose, often ribbed, variously coloured, drying variously
- 15 Fruit papillose, ribs and glandular ring absent, drying brown 13. *C. rufa*
- 15: Fruit smooth, sometimes with ribs and/or with glandular ring, drying grey-black
- 16 Pubescence on fruit sparse to dense, white or with bands of white and red hairs; peduncle 5–25 mm rarely more 6. *C. pubescens*
- 16: Pubescence on fruit dense, red or mixed red and white but never banded; peduncle 10–50 mm long or more 7. *C. phaeolasia*
- 4: Pedicels at least 0.3 mm long, conspicuous; bract and bracteoles inserted at different levels on pedicel (except occasionally in *C. pomiformis*)
- 17 Fertile stamens 6 (whorl opposite petals lacking cells)
- 18 Leaves and bracts ovate, peltate [W.A.] 18. *C. racemosa*
- 18: Leaves and bracts triangular, basifixed [Qld, N.S.W.] 19. *C. muelleri*
- 17: Fertile stamens 9
- 19 Flowers in pedunculate umbels; peduncle at fruiting clavate [W.A.] 14. *C. pomiformis*
- 19: Flowers in loose or congested racemes (not umbels) variously elevated
- 20 Flowers distant in loose racemes 30–100 mm long, petals and fruit glabrescent, fruit never banded with red and green hairs 15. *C. paniculata*
- 20: Flowers in clustered racemes 5–30 mm long, in glomerules or spaced when fruit banded with red and green hairs; petals and fruits variously pubescent

- 21 Glandular rim on flower and fruit absent or indistinct and overgrown by hairs; flowers on peduncles to 15 mm long and clustered in glomerules or on peduncles to 30 mm long and spaced; fruit variously pubescent, sometimes banded red and green-white **6. *C. pubescens***
- 21: Glandular rim distinct; flowers on peduncles to 7 mm long; fruit glabrescent or densely white-pubescent and banded with dull-green and red-brown hairs
- 22 Fruit glabrescent, drying black; staminodes and glands without glandular appendage; ovary glabrous **17. *C. flindersii***
- 22: Fruit streaked with alternate bands of dull-green and red-brown hairs, drying brown; staminodes and glands with white appendage; ovary with ring of hairs medially **16. *C. peninsularis***

1. *Cassytha glabella* R.Br., *Prodr.* 404 (1810), *p.p.*, as to the lectotype only

T: King George's Sound, [W.A.], *R. Brown iter Austral.* 3018; lecto: BM, *fide* J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 205 (1981).

Cassytha micrantha Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 256 (1864), *p.p.*, excl. lectotype, *quoad spec.* T: Swan River, W.A., *J. Drummond* 152; syn: K, NY; Swan River, W.A., *J. Drummond* suppl. 61, a. 1845; syn: K, MEL.

Cassytha microcephala Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 253 (1864), *p.p. quoad spec.* T: Swan River, W.A., *J. Drummond* 68; syn: K, MEL; Phillip Island, Vic., *R.C. Gunn* 19; syn: K.

Stem (0.2–) 0.5–1 mm thick, glabrous, green or yellow to red-green, smooth, drying yellow-brown. Inflorescence a cluster or head, (2–) 5–10-flowered, single or rarely paired; peduncles (4–) 8–15 × c. 0.5 mm, usually narrower basally, glabrous. Floral bracts whorled, rarely inserted at 2 levels, glabrous; bract ovate, 1–1.5 × 0.5–1 mm, basifixed, light green to yellow-green tinted red with narrow scarious margin, bracteoles similar, smaller, c. 1 mm long. Flowers ovoid to obovoid, 1.3–2 (–3.2) × 1 (–2) mm, mostly white, rarely yellowish, sessile or rarely pedicellate. Sepals ovate, 0.5–1 × 0.4–0.8 mm, acute, glabrous, yellow-green, with white or yellow scarious margin. Petals ovate to oblong-ovate, 1–2 (–3) × 0.8–1 (–1.5) mm, subacute, glabrous or very rarely pubescent inside (f. *bicallosa*), white, drying yellow-brown. Fertile stamens 9. Staminodes pyramidal to wedge-shaped, 0.7 (–1) × 0.2–0.3 mm, shortly stalked, white; gland ovoid to obovoid, $\frac{3}{4}$ size of staminodes, white. Ovary fusiform, c. 0.8 (–1.5) × 0.3–0.5 mm, white, glabrous. Receptacular tube glabrous inside. Fruit ovoid to fusiform or globular, 4.4–11 × 2.3–3.5 mm, green to yellow-green, drying green or yellow and translucent, to reddish, often having 6 prominent, longitudinal veins or a glandular rim on top. *Smooth Cassytha*, *Tangled Dodder-laurel*, *Slender Dodder-laurel*, *Slender Devil's Twine*.

Endemic to Australia, occurring in all States but not N.T. Flowers throughout the year in Australia, but flowering season varies from north to south.

Except for f. *bicallosa*, the forms can only be distinguished in fruit. Collections from Qld with flowers only are assumed to be f. *glabella* and from S.A. f. *dispar* as these are the only forms known to occur in these States.

- 1 Petals pubescent inside; two callosities distally on petals, scarious margin of sepals and floral bracts usually yellow (dried) [W.A.] **1d. f. *bicallosa***
- 1: Petals glabrous inside; scarious margin of sepals and floral bracts white (dried)
- 2 Fruit with conspicuous glandular rim (yellow) on top [W.A.] **1c. f. *casuarinae***
- 2: Fruit without glandular rim
- 3 Fruit ovoid; floral bracts spreading **1a. f. *glabella***
- 3: Fruit pyriform to fusiform; fruit base clasped by ascending floral bracts **1b. f. *dispar***

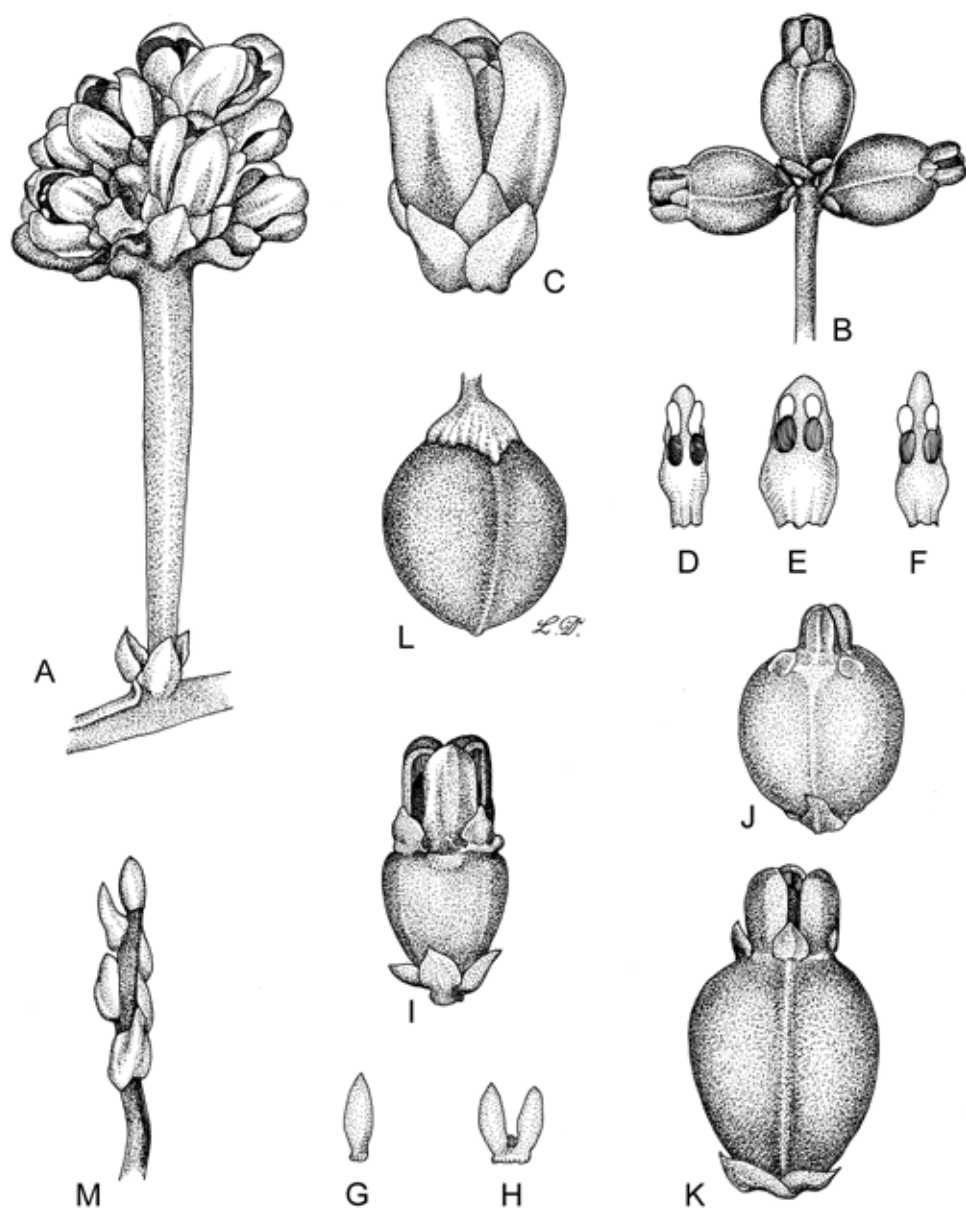


Figure 27. *Cassytha glabella* f. *glabella*. **A–B**, inflorescence; **A**, with flowers; **B**, with fruits; **C**, flower and bracts; **D–F**, stamens, front view showing open loculi and upright flaps; **D**, second whorl; **E**, first whorl showing filament widened laterally; **F**, third whorl; **G**, staminode; **H**, glands with base attached to receptacle; **I–K**, fruits; **I**, young fruit with almost horizontal verticillate bracts; **J**, globose, showing bract and leathery perianth closing orifice; **K**, obovate, showing almost horizontal verticillate bracts and perianth incompletely closing orifice; **L**, stone; **M**, young shoot with scale leaves. Scales and voucher specimens not given. Drawn by L. Dutkiewitz. Reproduced with permission from *J. Adelaide Bot. Gard.* 3: 187–262 (1981).

1a. *Cassytha glabella* R.Br. f. *glabella*

Illustration: J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 208, fig. 4 (1981).

Flowers ovoid, 1.3–2.5 mm long; sepals and floral bracts with scarious always white margins. Fruit sessile on spreading floral bracts, ovoid to globular, 4–5 × c. 3 mm (dried), green or yellowish to orange-red, drying green, smooth. Longitudinal veins hardly visible. Fig. 27.

Known from widely scattered localities in south western W.A. Occurs in SE Qld, N.S.W. and Vic., mostly near the coast, and rarely in Tas. The only form found in Qld. Flowers from Feb.–July in Qld, from June–Oct. in Vic. and throughout the year in Tas. Fruits maturation takes 2–3 months. Map 126.

W.A.: 39 km S of Geraldton Hwy on the Eneabba road, *R.J.Chinnock* 3206 (AD, CANB). Qld: 2 km N of Yandoran, *P.Sharpe* 2251 (BRI). N.S.W.: Gibraltar Range Natl Park, *R.Coveny* 5682 (BRI, NSW). Vic.: c. 6 km N of Cape Conran, *A.C.Beaglehole* 31279 (AD, MEL). Tas.: Pt Arthur, *Rev. J.Buflon* 24 (MEL).

1b. *Cassytha glabella* f. *dispar* (Schltdl.) J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 209 (1981)

Cassytha dispar Schltdl, *Linnaea* 20: 578 (1847). T: an sandigen Orten, Süd-Australien, a. 1847, *H.Behr* 45; holotype: HAL.

Cassytha micrantha Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 256 (1864), *p.p.*, excl. lectotype, *quoad spec.* *J.Drummond* 149; Swan River, W.A.; syn: K.

Illustration: J.Z.Weber, *op. cit.* 3: 209, fig. 5 (1981).

Flowers ovoid or obovoid, 1.3–2.5 mm long; sepals and floral bracts with scarious always white margins. Fruit basal portion narrowed to a stalk clasped by the almost vertical floral bracts, fusiform to narrowly ovoid, (5–) 7–11 × 1.5–2.5 (–3.7) mm, pale green or yellow to orange-red, dried young fruit very dark, mature golden to yellow and translucent with lighter coloured, quite prominent longitudinal veins continuing into perianth segments.

Common in southern W.A., frequent in S.A. (the only form found), Vic. and Tas., extending into the SE corner of N.S.W. only (Twofold Bay). Flowers mainly Nov.–Feb. Map 127.

W.A.: 31.8 km W of Hyden, *R.J.Chinnock* 3265 (A, AD, PERTH). S.A.: Mt Crawford, *D.J.E.Whibley* 7211 (AD, CANB, CAS). N.S.W.: between Wallagaraugh and Vic.–N.S.W. border, *A.C.Beaglehole* 33677, (AD, MEL, NSW). Vic.: Oakleigh, 1884, *A.Morrison s.n.* (BM, CANB, G, M, MEL, NSW, PERTH). Tas.: Friendly Beaches, *S.J.Jarman* 1 (AD, HO).

Differs from f. *glabella* in the narrower and longer fruit, and in the floral bracts which clasp the stalk-like extension of the fruit and which are almost vertical and not almost horizontal as in f. *glabella*.

1c. *Cassytha glabella* f. *casuarinae* (Nees) J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 211 (1981)

Cassytha casuarinae Nees in J.G.C.Lehmann, *Pl. Preiss.* 1: 619 (1845). T: W.A., *J.Drummond* 64; neo: MEL; isoneo: K, NY, *fide* J.Z.Weber, *loc. cit.*

Cassytha digitata Nees in J.G.C.Lehmann, *Pl. Preiss.* 1: 620 (1845). T: Princess Royal Harbour, W.A., Dec. 1840, *L.Preiss* 1626; syn: MEL.

Cassytha microcephala Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 253 (1864), *p.p. quoad spec.* T: King George's Sound, W.A., Jan., Feb. 1854, *W.H.Harvey* 4; syn: NY, TCD; King George's Sound, W.A., Jan., Feb. 1854, *W.H.Harvey* 8; syn: NY, TCD.

[*Cassytha racemosa* auct. non Nees; G.Bentham, *Fl. Austral.* 5: 312 (1870), *p.p.* as to synonym *C. digitata* Nees.]

Illustration: J.Z.Weber, *op. cit.* 3: 212, fig. 6 (1981).

Flowers ovoid, 1.3–2.5 mm long; sepals with white scarious margins turning yellow and gland-like in fruit later. Fruit sessile or stalked on floral rosette which clasps the base, turbinate to campanulate, 4.5–7.7 × c. 3 mm, (?green), drying golden-brown finely dotted with glands; conspicuous yellow glandular ring in form of plate surmounting the fruit under perianth segments, drying yellow to brown; longitudinal veins hardly visible.

Endemic to SW and S coastal W.A. Flowers mainly Nov.–Mar. Map 128.

W.A.: Bow R., Nov. 1912, *E.N.S. Jackson s.n.* (CANB, NSW, PERTH); NE of Perth, *A. Morrison 7405* (K); 25 km S of Ravensthorpe, *D.J.E. Whibley 5413* (AD, PERTH).

Differs from f. *glabella* and f. *dispar* in having a yellow glandular ring apparent from early stages of fruit development and in the sepals turning yellow.

1d. *Cassytha glabella* f. *bicallosa* J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 221 (1981)

T: Oolingurru [Oolingurrah, Murchison River] W.A., (?Anon. per) *A. Oldfield s.n.*, holotype: MEL; iso: K.

Illustration: J.Z. Weber, *op. cit.* 3: 212, fig. 7 (1981).

Floral bracts almost erect; scarious margins usually yellow. Flower sessile or on pedicel 0.1–0.2 mm long, obovoid, 1.9–3.2 × c. 1.4 mm. Sepals triangular c. 1 mm long, usually with narrow scarious margin (dried). Petals obovate, 1.5–3 × 0.6–1 mm, glabrous outside, white pubescent inside, distally bearing 2 internal callosities 0.4–0.6 mm long, which may bulge on outside, white, powdery-waxy inside. Receptacular tube papillose pubescent inside. Fully developed fruit not seen. Young fruit spherical, with apical glandular rim.

Endemic to south-western W.A., occurring near the mouth of the Murchison R., around Watheroo and S to the Darling Ra. near Perth. Flowers mainly Nov.–Mar. Map 129.

W.A.: Claremont, W.A., 28 March 1900, *A. Morrison s.n.* (K).

Similar to f. *glabella* in having a hemispherical sessile fruit, and to f. *casuarinae* in having a yellow fleshy glandular ring, but differing from them in the petals being pubescent inside and with a pair of glands.

2. *Cassytha micrantha* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 256 (1864)

T: King George's Sound, W.A., *W.H. Harvey 1*; lectotype: TCD, *vide* J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 212 (1981).

Illustration: J.Z. Weber, *op. cit.* 3: 213, fig. 8 (1981).

Stem glabrous, golden-greenish (dried), 0.2–0.6 mm thick. Inflorescence usually a single loose spike, 10–15 or more-flowered, conspicuously spirally arranged, developing acropetally; peduncle 8–23 mm long, thickest (c. 0.5 mm) near centre. Floral bracts whorled; bract triangular c. 0.7 × 0.3 mm, acute, glabrous, yellow, translucent; bracteoles similar, narrower than sepals, c. 0.5 mm long. Flowers globular, c. 0.7 mm diam., sessile. Sepals triangular-ovate, 0.3–0.4 × 0.2–0.3 mm, yellow, translucent. Petals ovate, mucronulate, incurved to hooded, to c. 0.6 mm long and wide, golden-brown (dried), darker than sepals. Fertile stamens 9, c. 0.5 mm long, white, turning brown. Staminodes triangular-pyramidal, c. 0.2 × 0.1 mm, brown (dried); gland ovoid, c. 0.1 mm long, brown (dried). Ovary fusiform, c. 0.5 × 0.2 mm, yellow, translucent (dried). Receptacular tube glabrous outside and inside. Fruit not seen.

Endemic to southern W.A. from Scott R. to near Esperance, mostly near the coast, and inland to the Stirling Ra. Flowers Dec.–Feb. Map 130.

W.A.: Thistle Cove, *A.S. George s.n.* (PERTH); Mt Magog, *G.J. Keighery 5942* (PERTH); Scott Natl Park, *G.J. Keighery 12065* (PERTH).

Similar to *C. glabella*, differing in the loosely spirally arranged spike and smaller globular flowers to 0.7 mm long, ripening acropetally. This is the most slender-stemmed representative of the genus.

3. *Cassytha pedicellosa* J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 214 (1981)

T: Derwent [?River], Tas., [*L. Rodway s.n.*]; holotype: MEL.

Illustration: J.Z. Weber, *op. cit.* 3: 215, fig. 9 (1981).

Plant glabrous; stem 0.3–0.7 mm thick, (drying golden-reddish to brown). Inflorescence a single 3–5 (–more?)-flowered loose cluster; peduncle 8–20 mm long, c. 0.4 mm thick. Floral bracts inserted at 2 levels (drying brownish); bract basal, ovate to triangular, subacute,

c. 0.8×0.5 mm; bracteoles triangular, subacute, c. 0.4×0.3 mm, clasping pedicel in upper $\frac{2}{3}$, persistent in fruit. Pedicel 1 mm or slightly longer, c. 0.3 mm thick, to 0.5 mm thick in fruit. Flowers globular, c. 1 mm diam.; receptacular tube fusiform, gradually narrowing into pedicel. Sepals triangular, c. 0.7×0.6 mm, subacute. Petals ovate, c. 0.9×0.8 mm, subacute, slightly hooded, golden-brown (dried). Fertile stamens 9 (drying light brown). Staminodes ovoid, c. 0.1 mm long; glands $\frac{3}{4}$ of size of staminode. Ovary c. 0.9×0.3 mm (drying light-brown). Fruit ovoid, $4.2\text{--}4.5 \times 2.5\text{--}3$ mm, dark red-brown, longitudinally striate with darker lines, surmounted by conspicuous verrucae in the form of a thick plate (black dried); spheroid portion carried on extended receptacular tube, which gradually attenuates into pedicel.

Endemic to Tas., known from the type collection and from Little Musselroe Bay. Flowers in spring. Map 131.

Tas.: Little Musselroe Bay, A. Moscal 3005 (HO).

Differs from *C. glabella* in the conspicuous pedicel, floral bract inserted at different levels and dark brown fruit. Differs from *C. micrantha* in the flowers clustered in a loose head.

4. *Cassytha capillaris* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 252 (1864)

T: Bungarmassing, Borneo, 1857–1858, *J. Motley* 539; holo: K.

Cassytha strigosa W. Fitzg., *J. Roy. Soc. W. Australia* 3: 143 (1918). T: base of Mt Broome, W.A., May 1905, W. V. Fitzgerald 817; holo: NSW.

Cassytha tenuis C.K. Allen, *J. Arnold Arbor.* 23: 155 (1942). T: Mabaduan, Western Division, Papua [New Guinea], Apr. 1936, L.J. Brass 6514; holo: A; iso: BRI.

Illustration: J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 217, fig. 10 (1981).

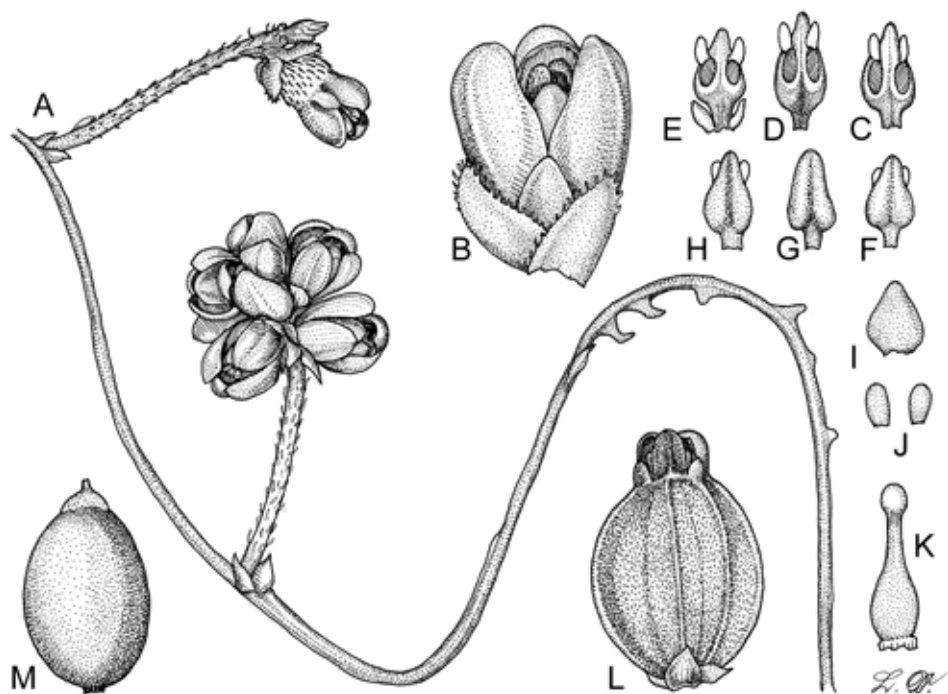


Figure 28. *Cassytha capillaris*. A, habit; B, flower with bracts; C–E, stamens in front view, showing open loculi and upright flaps; C, first whorl; D, second whorl; E, third whorl with two basal glands; F–H, stamens in rear view; I, staminode; J, glands; K, ovary; L, mature fruit; M, stone. Scales and voucher specimens not given. Drawn by L. Dutkiewitz. Reproduced with permission from *J. Adelaide Bot. Gard.* 3: 187–262 (1981).

Stem (0.2–) 0.5–1.4 mm thick, drying green to reddish brown, young shoots glabrous or red pubescent, becoming glabrescent. Inflorescence a spike, with 3–10 distally crowded or loose flowers, single or rarely paired; peduncle 2–18 mm long, cylindrical or slightly clavate or attenuate when long, sometimes zig-zag, glabrous or with thick short strigose hairs or having long and dense retrorse or antrorse indumentum. Floral bracts whorled; bract triangular, c. 1 × 1 mm, puberulent to glabrous, red-ciliate; bracteoles similar, smaller. Flowers sessile, globose, c. 1.2 mm diam. Sepals triangular, c. 0.5 mm long, mostly glabrous, red-ciliate. Petals ovate, c. 1.1 × 1 mm, glabrous, greenish outside, whitish inside, sometimes slightly red-tinted. Fertile stamens 9, white. Staminodes pyramidal, tip wedge-shaped, c. 0.3 × 0.2 mm, white, occasionally with a white apical gland; glands ovoid or obovoid, c. 0.2 × 0.15 mm, occasionally with a white apical gland. Ovary fusiform, c. 0.9 × 0.4 mm (dried), glabrous. Receptacular tube glabrous inside. Fruit ovoid, 4–6 × 3–4 mm (dried), glabrous or pubescent; hairs adherent, wine-red, drying darker. Fig. 28.

Widely scattered across northern Australia, N of latitude 24°S, extending around the coast and adjacent interior from Carnarvon, W.A., to Cape Yorke Penin., Qld, and S to the arid regions of N.T. and the Barkly Tableland, Qld. Also in Borneo, Buru (Boero), Sri Lanka, New Guinea and ?Timor. Flowers apparently all year depending on rainfall. Map 132.

W.A.: Well 30, Canning Stock Route, *A.S.Mitchell 1078* (AD, DNA, PERTH). N.T.: Woolanang, *C.R.Dunlop 5886* (CANB, DNA); 40 km SSE of Nathan River HS, *P.K.Latz 11174* (DNA, MEL). Qld: off Gregory Developmental Rd, *G.N.Batianoff*, 8 Apr. 1991 (BRI); Mareeba, *G.P.D.Smith*, Apr. 1929 (NSW).

Distribution of *C. capillaris* overlaps with *C. filiformis* and resemblance is quite marked. In *C. filiformis* the receptacular tube is mostly glabrous, as are the fruits which are regularly globular, green and drying black, while the fruits in *C. capillaris* are smaller, ovate and red even when dry. The description of *C. capillaris* covers the great variations seen in Australian and New Guinea specimens.

5. *Cassytha flava* Nees in J.G.C.Lehmann, *Pl. Preiss.* 1: 620 (1845)

T: Fremantle, W.A., Jan. 1839, *L.Preiss 1622*; lecto: MEL; isolecto: MEL (2-sheets), *vide* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 219 (1981).

Illustration: J.Z.Weber, *op. cit.* 3: 220, fig. 11 (1981).

Stem filiform, (0.2–) 0.6–1.1 mm thick, grey-golden, diffuse-tomentose at first, becoming glabrescent; some hairs to 1 mm long, irregularly twisted and tinted red. Inflorescence a 5–15-flowered head, single or rarely paired; peduncle (3–) 12–18 (–32) × 0.2–0.5 mm, narrower basally; long peduncles on some plants may be many-flowered, with long diffuse hairs; on others short peduncles few-flowered, with short retrorse hairs. Floral bracts whorled; bract ovate, acute, 1–1.5 × 0.5–0.8 mm, brown, leathery (dried), white-pubescent, ciliate; bracteoles similar, smaller. Flowers globular, c. 1 mm across, yellow. Sepals ovate, 0.5–1 mm × c. 0.5 mm, yellow, pubescent outside, glabrous inside, drying triangular, c. 0.5 × 0.5 mm, thick-leathery, brown. Petals ovate, 0.8–1.5 × 0.7–1 mm, pubescent outside, glabrous or slightly pubescent inside, yellow, remaining yellow when dried even on fruit. Stamens fertile, 9, brown, triangular. Staminodes pyramidal, c. 0.3 × 0.3 mm, pubescent, with oblique fleshy glabrous white gland-like tips which dry dark; glands ovoid, c. 0.2 × 0.15 mm, glabrous, not gland-tipped. Ovary fusiform 1–1.5 × 0.5 mm, pubescent in upper half, protruding from pubescent receptacular tube. Fruit globular, c. 4 mm across, grey, densely white-pubescent.

Occurs in south-western W.A., from Geraldton to near Esperance. Flowers probably all year round, but fruits have only been collected Oct.–Dec. Map 133.

W.A.: 26 km SE of Coomalo Ck on Brand Hwy, *R.Hnatiuk 761381* (PERTH); Wongan Hills Experimental Farm, *C.M.Parker 277* (PERTH); Jarrah Rd, S Perth, *R.J.Cranfield R273* (PERTH); c. 32 km NNE of Stokes Inlet, *A.E.Orchard 1612* (AD, PERTH); 15 km NE of Albany, *K.H.Rechinger 60305* (PERTH).

Glabrescent forms may show similarities with *C. glabella* but are distinguished by the rotate opened flowers, yellow petals, brown stamens and protruding bracteoles in flower head.

6. *Cassytha pubescens* R.Br., *Prodr.* 404 (1810)

T: Australia [most likely N.S.W. or Vic.], 1802–1805, *R.Brown iter Austral.* 3021; lecto: BM; isolecto: K, *fide* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 221 (1981); remaining syn: Australia, eastern seaboard, *J.Banks & D.Solander*, 1770; syn: BM (2 sheets), NSW.

Cassytha pubescens Schldtl., *Linnaea* 20: 577 (1847), *nom. illeg.*; *Cassytha piligera* Schldtl., *Linnaea* 21: 446 (1848); *Cassytha pubescens* var. *fasciculata* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 255 (1864). T: Bethany, S.A., *H.Behr* 44; holotype: HAL.

Cassytha pubescens var. *macrostachya* F.Muell., *Fragm.* 5: 167 (1866), *nom. nud.*

Cassytha rugulosa Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 255 (1864). T: N. Holland, *Fraser* 77; lecto: K; isolecto: NY, *fide* J.Z.Weber, *loc. cit.*

Cassytha tasmanica Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 252 (1864). T: George Town, Tas., 23 Oct. 1843, *R.C.Gunn* 532; lecto: K; isolecto: NY, *fide* J.Z.Weber, *loc. cit.*; remaining syn: Kangaroo Bottom, Tas., 23 Sept. 1840, *R.C.Gunn* 532; syn: K; V.D.Land-Tas.; ?syn: K.

Cassytha tepperiana C.F.Ludw. ex Tepper, *Bot. Centralbl.* 49(51): 5 (1888), as *tepperana*. T: Karatta, S.A., 11 Nov. 1886, *J.G.O.Tepper*; lecto: MEL, *fide* J.Z.Weber, *loc. cit.*; remaining syn: Karatta, 14 Nov. 1885; syn: AD; Karatta, 14 Nov. 1886; syn: AD; Grassy Ck, S.A., *J.G.O.Tepper*; syn: AD.

Illustration: J.Z.Weber, *op. cit.* 3: 223, fig. 12 (1981).

Stem (0.3–) 0.5–1.5 (–3) mm thick, smooth to rugulose, pubescent, yellow-green or grey-green to reddish. Inflorescence an almost sessile or elevated spike or raceme, or loose or somewhat congested head, 2–15-flowered, rarely more, usually single or paired, sometimes fasciculate or paniculate; peduncle 3–30 (–100) mm long, pubescent, hairs yellow or white and ±tinted red. Floral bracts whorled or inserted at different levels, ovate, 0.7–1.5 × 0.8–1.5 mm, acute, ±peltate, ciliate, pubescent often on both sides, with hairs grey, yellow or red, persistent in fruit. Flowers sessile or on pedicel to 1 mm long, ovate to obovate, 1–2.9 × 1–2 mm. Sepals triangular to triangular-ovate, 0.7–1 × 0.5–0.8 mm, acute, pubescent, honey-yellow to brown, black in fruit, often sunken in glandular rim. Petals obovate to ovate, 1–2 × 0.9–1.5 mm, pubescent. Fertile stamens 9, white, turning brown; outer stamens dorsiventrally flattened, sometimes pubescent dorsally. Staminodes pyramidal, cordate or ovoid, 0.3–0.7 × 0.2–0.3 mm, with or without a ±conspicuous white apical gland. Glands ovoid, 0.3–0.6 × 0.2–0.3 mm, often crested with a white gland. Ovary fusiform, 0.7–1.6 × 0.3–0.5 mm, variously pubescent. Receptacular tube pubescent inside. Fruit globose to obovoid, 6–10 × 5.5–9 mm, grey, green-grey to green-red, glabrescent to heavily pubescent, indumentum white mixed with red, often broadly banded dull-green and dull-red-brown with 6 ±raised longitudinal ribs; sometimes topped by a flat glandular rim. *Dodder-laurel*, *Spilled Devil's Twine*, *Devil's Twine*, *Downy Dodder-laurel*.

Widespread over SE Australia and probably New Zealand, but not entering arid areas. Extending E from the Eyre Penin. S.A., through Vic., Tas. and N.S.W., and in Qld S of the Tropic of Capricorn. Flowers through summer from Dec.–Apr.; fruits develop slowly from Mar.–Apr. Map 134.

S.A.: Black Hill, *D.J.E.Whibley* 2065 (AD, CANB, NSW). Qld: Cooloola Natl Park, *P.R.Sharpe* 3593 (BRI). N.S.W.: Devlins Ck, *R.Coveny* 11353 (AD, K, L, MO, NSW, RSA). Vic.: Pine Mtn, *A.C.Beaglehole* 88675 (MEL). Tas.: SE of Knocklofty, *A.E.Orchard* 5117 (DNA, HO).

Variation in the inflorescence, flowers, fruits and indumentum is great, probably partly due to the isolation of widely dispersed populations. Suites of morphological characters are not confined exclusively to particular areas but occur to different degrees in both remote and nearby populations. Specimens from Qld and the NE corner of N.S.W. have rather long peduncles to 10 cm, remote flowers, and floral bracts usually whorled in flower, but in fruit inserted at 2 levels. The fruits are rather large, c. 9 × 7 mm, pyriform and topped with a glandular rim, or globose and without the rim, glabrescent or pubescent with quite dense white and red striae, red indumentum over more or less bulging ribs. In the Dividing Ra. in N.S.W. and eastern Vic. (Gippsland) the peduncles are mostly single, generally 20–30 mm long, with flowers in loose heads, and floral bracts mostly inserted at 2 levels in flower and fruit. The fruits are c. 6 × 4 mm, more globose, grey and grey-red pubescent, ribs ±prominent, glandular rim if present smaller. Coastal specimens in south-eastern N.S.W. mainly have longer peduncles (to c. 50 mm), tend to be more pubescent with generally

longer hairs and grey and red flowers mostly loose along peduncle, inflorescences often paired or fasciculate to paniculate, and floral bracts whorled in flower, inserted at 2 levels in fruit. The fruits are c. 7×6 mm, obovate with conspicuous glandular rim, ribs more or less prominent. In Vic. W of Gippsland and eastern S.A. the inflorescence is usually single, rarely paired, 5–15 mm long, flowers always sessile in a loose to congested head, fruit globose, c. 7×5 mm, grey-pubescent, including heavily pubescent specimens in Tas., but specimens with distinctly pedicellate flowers and paniculate inflorescence have been collected on Mt Lofty (S.A.). Rugulose stems are common to a greater or lesser degree in N.S.W., Vic. and S.A., particularly on Kangaroo Is. The indumentum on similar plants from adjacent localities varies in length and colour, or even on different parts of the same plant.

Similarities with *C. filiformis* show in the stem, inflorescence, flowers and indumentum, and in distribution they overlap in Qld and N.S.W. north of 32°S latitude. However, *C. filiformis* differs in having glabrous petals and fruits which are always globose and dry black.

Similarities with *C. paniculata*, *C. phaeolasia* and *C. rufa* are discussed under those species.

7. *Cassytha phaeolasia* (F.Muell.) Benth., *Fl. Austral.* 5: 310 (1870)

Cassytha paniculata var. *phaeolasia* F.Muell., *Fragm.* 5: 167 (1866). T: east boundary of Gipp's Land, [Vic.], F.Mueller; lecto: MEL, fide J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 221 (1981).

Stem 0.5–1.5 mm thick, smooth to rugulose, pubescent to glabrescent on same plant, yellow-green to reddish. Inflorescence single or often paired, of 5–15 loosely spaced flowers; peduncle 20–70 mm long (rarely longer), brown-green, pubescent. Floral bracts almost always whorled, pubescent. Flowers sessile, ovoid, 1–2 mm long. Sepals triangular, c. 0.7 mm, variously pubescent, in fruit sometimes sunken in glandular rim. Petals ovate,

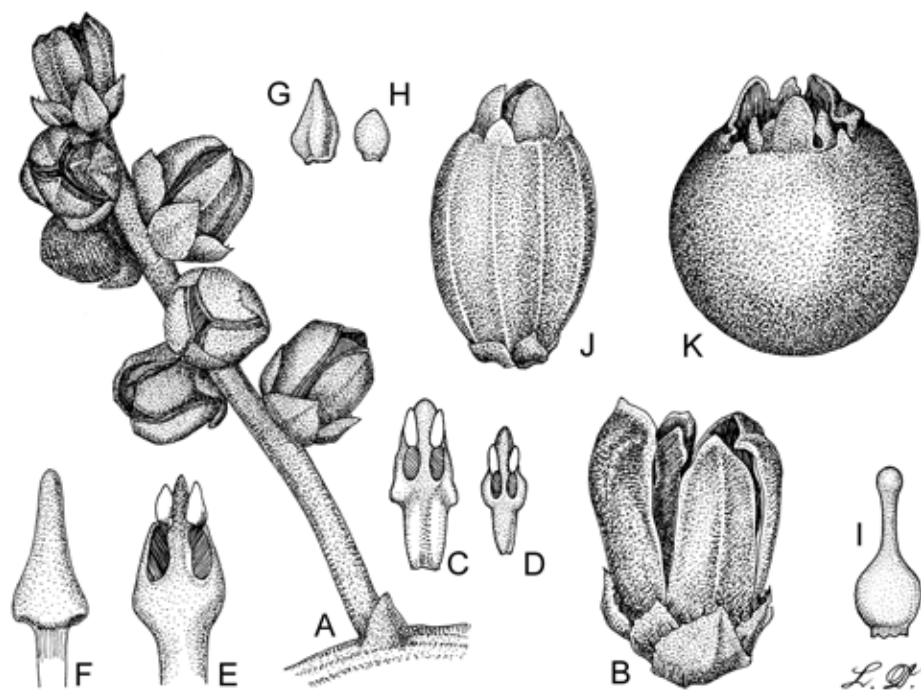


Figure 29. *Cassytha filiformis*. A, inflorescence; B, flower with bracts; C–F, stamens, front view showing open loculi and upright flaps; C, first whorl; D, second whorl; E, third whorl; F, sterile stamen of third whorl; G, staminode; H, gland; I, ovary; J–K, fruits. Scales and voucher specimens not given. Drawn by L.Dutkiewitz. Reproduced with permission from *J. Adelaide Bot. Gard.* 3: 187–262 (1981).

1–1.5 mm long, glabrescent to antrorsely white- and red-pubescent. Fertile stamens 9, those of the first whorl ovate-lanceolate, flattened and pubescent on back, others oblanceolate-oblong. Staminodes and glands sometimes with a terminal white or dark gland. Ovary glabrous or with a ring of hairs medially. Receptacular tube pubescent inside. Fruit globose to obovoid, 5–10 mm across, heavily pubescent with mostly red indumentum, sometimes hexagonal with reddish ribs. *Rusty Dodder-laurel*.

Widespread in coastal regions in SE Australia, from around Sydney, N.S.W., S to eastern Gippsland, Vic. Flowers Sept.–Mar. Map 135.

N.S.W.: 1 km SE of Douglas Park, *L.Haegi* 1421 (AD, NSW); Wyong State Forest, *W.Bishop* 819 (NSW); S of Eden, *D.E.Albrecht* 394 (MEL). Vic.: W of Tree Creek Falls, *R.Melville* 3050 (K, MEL, NSW); Howe Ra., 24 Oct. 1948, *J.H.Willis* s.n. (MEL).

Shows similarities with *C. paniculata*, which has pedicellate flowers and less pubescent petals and fruits. Differs from some forms of *C. pubescens* in indumentum, which in the latter is mostly white and sometimes streaked red in alternate bands. Differs from *C. rufa* in having pubescent, not papillose, fruit.

8. *Cassytha filiformis* L., *Sp. Pl.* 1: 35 (1753)

T: illustration in H.A.Rheede, *Hort. Ind. Malab.* [India] 7: t. 44, (1688), lecto, *fide* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 229 (1981).

Cassytha filiformis var. *pseudopubescens* Domin, *Biblioth. Bot.* 89(4): 680 (1930). T: Emu Park near Rockhampton, Qld, Dec. 1909, *K.Domin* 4200; lecto: PR 526768; isolecto: BRI, *fide* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 228 (1981).

Cassytha filiformis f. *pycnantha* Domin, *Biblioth. Bot.* 89(4): 680 (1930), *in obs.* T: not given.

Cassytha cuscutiformis F.Muell. ex Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 255 (1864), *nom. inval.*, in synonymy under *C. filiformis*.

Illustration: J.Z.Weber, *op. cit.* 3: 230, fig. 13 (1981).

Stem filiform, 0.2–1.5 mm thick, pubescent to glabrescent, bright yellow-green or orange to dark red (drying irregularly striate and more or less verrucose). Inflorescence a spike, 2–16-flowered, usually single, rarely paired or paniculate; peduncle (3–) 13–50 (–100) mm long, thinner than stem, heavily pubescent to glabrescent. Floral bracts whorled; bract ovate to triangular, c. 1 × 0.6 mm, acute, pubescent to glabrescent, ciliate; bracteoles similar, smaller. Flowers sessile, globular-ovoid, 1–2 × 0.8–1.5 mm. Sepals triangular, 0.6–1 × 0.5–0.9 mm, pubescent to glabrescent, ciliate. Petals ovate, 1–1.8 × 1–1.5 mm, bluntly acute, glabrous on both sides, rarely appressed papillose inside, white to green. Fertile stamens 9, or 6 when inner whorl sterile, white, drying brown; stamens of inner whorl oblanceolate, 0.7–1 mm long and c. 0.4 mm across if fertile, if sterile then subulate, c. 0.3 mm across. Staminodes pyramidal, conspicuously stalked, c. 0.5 × 0.3 mm; glands conical or ovoid, c. 0.35 × 0.25 mm. Ovary fusiform, less than 2 mm long and c. 0.3 mm across, glabrous or with ring of hairs in central portion. Receptacular tube glabrous or pubescent. Fruit ovoid to nearly globular, 4–8 × 3–5 mm, glabrous, green or orange to red on maturing, sometimes white, commonly drying black, rarely deep-green with brown vertical stripes. *Love Vine, False Dodder.* Plate 24; Fig. 29.

A pantropical species also occurring in the subtropics. In Australia it is distributed around the N coast from near Exmouth Gulf, W.A., to Kempsey on the mid N coast of N.S.W., extending well into the adjacent dry tropics. Flowers all year. Map 136.

W.A.: Wolf Ck, *A.S.George* 15326 (PERTH). N.T.: Melville Is., *G.Wightman* 1044 (DNA); 43 km N of Renner Springs, *A.C.Beauglehole* 46403 (DNA, MEL). Qld: 17.6 km W of The Dry Swamp, *V.J.Neldner* 3295 (BRI). N.S.W.: Park Beach, Coffs Harbour, *R.G.Coveny* 12774 (BRI, NSW, PRC).

9. *Cassytha nodiflora* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 252 (1864)

T: Swan River Colony, 1848, *J.Drummond coll. no.* 226; lecto: K; isolecto: BM, G, MEL, NSW, NY, TCD, *fide* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 237 (1981); Swan River Colony, 1848, *J.Drummond coll. no.* 228; remaining syn: BM (2 sheets), G, K, MEL, TCD.

Illustration: J.Z.Weber, *op. cit.* 3: 238, fig. 16 (1981).

Stem 0.5–1.5 mm thick, glabrescent, yellow-green, green-brown (dried), young shoots white-pubescent with retrorse hairs. Inflorescence a crowded glomerule, 2–20 (rarely more)-flowered, single or fasciculate; peduncle 1–3 × c. 1 mm, grey-pubescent turning brown. Floral bracts whorled; bract ovate, subacute, c. 1.5 × 1 mm, ±basifixed, glabrescent, ciliate or with a ±hyaline margin, yellow-green turning brown, occasionally with central gland; bracteoles similar, c. 1 × 1 mm, basifixed, glandless. Flowers sessile, first ovoid, later obovoid, 1.3–2.7 × 1.4–2 mm, first greenish, later yellow. Sepals ovate, c. 1.2 mm, glabrous (rarely sprinkled with a few hairs), green-yellow maturing yellow, becoming brown and leathery on fruit. Petals ovate, obtuse, 1.2–2.5 × 1–2 mm, glabrous outside, pubescent inside, yellow when mature, in fruit brown and leathery. Fertile stamens 9, at first white, with staminodes and glands turning brown. Staminodes pyramidal, c. 0.6 × 0.4 mm, with distinct white glandular tip; glands ovoid, c. 0.5 × 0.3 mm, with distinct white glandular tip. Ovary filiform, c. 1.3 × 0.4 mm, glabrous. Fruit globular, 5–7 × 4–6 mm, glabrous, green to yellowish green, sometimes with yellow-reddish stripes, drying black.

Endemic to south-western W.A., extending from Shark Bay SE to Norseman, especially on sandy flats. Flowers Aug.–Jan.; fruits Sept.–Oct. Map 137.

W.A.: Denham, *P.G. Wilson 12228* (PERTH); c. 30 km of Morawa, *J.Z. Weber 5150* (AD, HBG, NY, P, TCD); c. 35 km N of Merredin, *D.J.E. Whibley 4722* (AD, CANB, PERTH); c. 5 km E of Norseman, *A.A. Munir 5270* (AD, K, NY).

10. *Cassytha melantha* R.Br., *Prodr.* 404 (1810)

T: Port Jackson, N.S.W., 3 Sept. 1803, *R. Brown iter Austral.* 3020; lecto: BM; islecto: K, *fide* J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 246 (1981).

Illustration: J.Z. Weber, *op. cit.* 3: 247 fig. 21 (1981).

Stem (0.9–) 1.3–2 (–4) mm thick, glabrescent, green to reddish green. Young shoots pubescent. Inflorescence a spike, (1–) 6–9 (–13)-flowered, single or rarely clustered; peduncles (8–) 20–30 (–95) × 0.8–1.5 mm, usually darker than stem, covered with white and red, short retrorse hairs. Floral bracts whorled; bract triangular, c. 1 × 1–1.4 mm, with hairs short, reddish, appressed, spreading; bracteoles deltoid-ovate, 0.5–0.6 × 0.7–0.9 mm, with similar indumentum. Flowers ovate, 2–3 × 1.3–2 mm, subsessile to sessile. Sepals deltoid, 1–1.3 × c. 1 mm, pubescent. Petals ovate, acute, 1.9–2.7 × 1.3–1.9 mm, pubescent on both sides with short, thick, retrorse, appressed black hairs, pubescence outside basally often reddish. Fertile stamens 9. Staminodes obcordate, c. 0.7 × c. 0.4 mm, shortly stalked, white, turning brown; gland ovoid, somewhat angular to hexagonal, c. 0.5 × 0.2–0.3 mm. Ovary fusiform, c. 2 × 0.5 mm, glabrous. Fruit globular, 10–15 mm across, glabrescent, light green to cream-white, usually drying black, 7–10 mm across.

Endemic to Australia, occurring in all States except the N.T. and Qld. Occurs S of latitude 30°S, extending from the coast far inland. Flowers from June–Oct., rare in Nov. and Dec.; fruits usually Sept.–Dec. The flowering period throughout Australia is very uniform in this species and is confined to the coolest months of the year. Map 138.

W.A.: 11.4 km N of South Ironcap, *R.J. Chinnock 3268* (AD, PERTH). S.A.: Stewart Ra., *J.Z. Weber 7272* (AD, AK, BRI). N.S.W.: 15.2 km WNW of Ardlethan, *R.G. Coveny 12873* (AD, MEL, PERTH, PRE). Vic.: 4.2 km S of Mt Crozier, *M.D. Crisp 3388* (CBG, MEL). Tas.: Railton–Latrobe road, *D.I. Morris 8166* (HO, MEL).

Similar to *C. candida*, differing in the retrorse, short black hairs on the petals.

11. *Cassytha aurea* J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 239 (1981)

T: c. 25 km W of Giralalia Homestead, W.A., 2 Oct. 1975, *J.Z. Weber 4896*; holotype: AD; isotype: AD, CANB, K, MEL, NSW, NY, PERTH.

Stem 0.5–1 (–2.2) mm thick, pubescent to glabrescent, grey-green, yellow-green, reddish green or brown. Inflorescence a loose or congested head or spike, 2–10-flowered, single, paired or fasciculate; peduncle 3–30 (–80) mm, usually woolly-pubescent, hairs curly, yellow or grey. Floral bracts whorled; bract triangular, 1–2.5 mm, white-pubescent, light brown; bracteoles similar, smaller. Flowers sessile, ovoid, 1–3 mm long, yellow-green,

densely pubescent. Sepals triangular-ovate, 1–1.5 mm, pubescent outside, glabrous inside. Petals ovate or obovate, 0.8–2.5 mm, white, yellow-green to grey-green, pubescent on both sides with antrorse hairs. Fertile stamens 9, white or light brown, turning brown; stamens of the first whorl angular-ovate or obovate, widest below cells, $1-2 \times 0.7-1$ mm, with filaments laterally expanded, mostly pubescent or ciliate. Staminodes ovoid or narrowly pyramidal, $0.7-1 \times 0.4-0.5$ mm, shortly stalked; basal glands angular-ovate, $0.4-1 \times 0.4-0.5$ mm, white or brown. Ovary fusiform, $2-2.5 \times c. 0.7$ mm, pubescent. Fruit globular, 8–10 mm across, grey-green or yellow-green, densely pubescent.

Endemic to south-western W.A. There are 2 varieties.

On some specimens the glandular rim on the top of the fruit is well-developed, but in the mature fruit it is overgrown by hairs and less conspicuous.

Flowers in loose head; staminodes and glands with white tip

11a. var. aurea

Flowers in congested head; staminodes and glands with dark tip

11b. var. hirta

11a. *Cassytha aurea* J.Z.Weber var. *aurea*

Illustration: J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 240, fig. 17 (1981).

Stem reddish green to brown, with white-woolly indumentum. Peduncles 3–30 (rarely –80) mm long. Flowers 2.5–3 mm long in loose head, one or two remote below on peduncle. Sepals $c. 1 \times c. 1$ mm, grey-pubescent. Petals ovate, $c. 2.5 \times 1.6$ mm; hairs mostly straight, grey and tinted red. Staminodes obcordate, $c. 0.8 \times 0.5$ mm, light-brown with gland-like white appendage; glands angular-ovate, $c. 0.7 \times 0.5$ mm, light-brown, with white apex. Ovary with ring of hairs medially. Fruit grey-green, pubescent, with glandular rim on top. *Tangle foot*.

Occurs in coastal W.A., from North West Cape S to Geraldton. Flowers Aug.–Nov.; fruits June–Dec. Map 139.

W.A.: Gales Bay, *J.Z.Weber 4898* (AD, PERTH); 5 km SE of Gnarlou HS, *A.S.George 10186* (PERTH); Shark Bay, $c. 5$ km W of Hamelin Pool, *J.Z.Weber 5035* (AD, PERTH); Coodoamia Nat. Res. *S.D.Hopper 1454* (PERTH); mouth of Greenough R., *R.D.Royce 8009* (PERTH).

Shows similarities with *C. melantha* in the robust stem and loose inflorescence, differing mainly in having yellow flowers with white indumentum which is antrorse on the petals, pubescent ovary and densely pubescent fruit.

Differs from *C. candida* in having staminodes and glands white-tipped.

11b. *Cassytha aurea* var. *hirta* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 243 (1981)

T: $c. 31$ km east of Geraldton, W.A., 15 Oct. 1975, *J.Z.Weber 5106*; holo: AD; iso: CANB, NSW, PERTH.

Illustration: J.Z.Weber, *loc. cit.* (1981).

Stem yellow-green to grey-green, woolly-pubescent to glabrescent; hairs white dotted black. Peduncles commonly paired, 5–10 mm long. Flowers 2–2.5 mm, yellowish, condensed in a hairy head. Sepals $c. 1.5 \times 1$ mm; apical hairs dotted black. Petals obovate, yellowish, 2–2.5 mm, white-pubescent. Staminodes triangular-pyramidal, pointed, $c. 1 \times 0.4$ mm with slightly darkened tip which turns darker; glands ovate, $c. 0.7 \times 0.4$ mm, slightly pointed, with darker tip. Ovary slightly angular, pubescent in upper half. Ripe fruit yellow-green, pubescent, with glandular rim on top.

Occurs from Geraldton S to Perth and SE to Dundas Nature Reserve, W.A. Flowers Aug.–Nov.; fruits all year round. Map 140.

W.A.: Kalbarri Natl Park, *A.Strid 20737* (PERTH); E edge of Wongan Hills, *K.F.Kenneally 7502* (PERTH); Hill River Valley, 9 Oct. 1977, *J.Dodd* (PERTH); SW Dundas Nat. Res., *G.J.Keighery 12612* (PERTH).

Around Geraldton both varieties occur but intergradation has not been observed.

12. *Cassytha candida* (J.Z.Weber) J.Z.Weber, *Fl. Australia* 2: 457 (2007)

Cassytha aurea var. *candida* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 241 (1981). T: Meda-Oobagooma Rd, c. 65 km N of Gibb River Rd, W.A., 12 July 1976, *A.C.Beaglehole 52710*; holo: AD; iso: MEL, PERTH.

Stem (0.5–) 0.7–1.8 mm thick, white-pubescent, rarely glabrescent, yellow-green, rarely grey-green or brown-green. Inflorescence a single crowded, elongated head, 10–15-flowered or more; peduncle 10–30 (–100) mm, densely white-pubescent. Floral bracts whorled; bract triangular, acute, 0.5–1.5 mm long, pubescent, brown; bracteoles similar, smaller. Flowers globular, ovoid to obovoid, 1–2 mm long, dull white-pubescent (dried). Sepals triangular, c. 1 mm, yellow-brown. Petals ovate, 1–2 × 0.8–2 mm, densely pubescent with rigid dull-white antrorse hairs, less pubescent inside. Stamens 9, glabrous, white; outer stamens angular-lanceolate, 1–1.8 × c. 0.8 mm, usually $\frac{1}{2}$ as wide as long. Staminodes narrowly pyramidal, c. 0.4 mm long, white, turning brown; glands ovoid, white turning brown. Ovary fusiform, c. 2 × 0.7 mm, glabrous. Fruit globular, c. 8 mm, glabrescent, sprinkled with few hairs, green with vertical blotches, drying brown, corky, or black-brown crowned with whitish petals.

Occurs in the tropics of northern Australia. Occurs near Oobagooma HS, and in the Drysdale River Natl Park, W.A., and from near Oenpelli S to Katherine, N.T. Flowers and fruits all year. Map 141.

W.A.: base of Anjo Penin., *J.H.Willis*, 22 May 1984 (AD, MEL, PERTH); Governor Is., *E.A.Chesterfield 253* (L, PERTH). N.T.: 10 km SW of Oenpelli, *J.Z.Weber 9858* (AD, BRI, DNA, NSW, NY); Kakadu Natl Park, *G.J.Leach 2807* (BRI, DNA).

Differs from *C. aurea* in the glabrous fruit and ovary, and in the narrow outer stamens which are heavily pubescent and $\frac{2}{3}$ as wide as long in *C. aurea*. Differs from *C. melantha* in the dull-white hairs on the petals.

Similar to *C. rufa*, differing in having flowers in a condensed, elongate head and brown-corky fruits not papillose-puberulent.

13. *Cassytha rufa* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 244 (1981)

T: Kennedy Rd, c. 3 km N of Pascoe R., Qld, Aug. 1965, *C.H.Gittins 1015*; holo: BRI; iso: NSW.

Illustration: J.Z.Weber, *op. cit.* 3: 245 fig. 20 (1981).

Stem (0.4–) 0.8–1.5 mm thick, pubescent to glabrescent; indumentum white or red or green-grey to brown (dried). Inflorescence single or rarely paired or fasciculate, (2–) 7–16 or many-flowered, at first in a loose head, later remote along lengthening peduncle, maturing acropetally, often with fruits basally and few congested flowers in buds terminally; peduncle (12–) 25–220 × 0.7 (–1) mm, usually rusty coloured, red- and white-pubescent to puberulent. Floral bracts whorled; bract triangular, c. 1 × 0.7 mm, red-pubescent, ciliate; bracteoles similar, smaller. Flowers ovoid, 1.7–2.3 × 1.2–1.7 mm, yellowish pubescent. Sepals triangular, c. 0.8 × 0.7 mm, pubescent. Petals ovate, 1.5–2.1 × 1.3–1.5 mm, pubescent on both sides; hairs short, appressed, antrorse, red and white. Fertile stamens 9. Staminodes obcordate, c. 0.6 × 0.5 mm, glands ovoid, c. 0.4 × 0.3 mm. Ovary glabrous. Fruit globular, c. 7 × 5.5 mm (dried), puberulent, papillose, drying brown, rarely black.

Endemic in Qld, occurring from northern Cape York Penin. to Cunnamulla near the N.S.W. border. Flowers probably all year. Map 142.

Qld: 14.7 km S of Mutee Heads turnoff, *J.R.Clarkson 6138* (AD, BRI, MBA); 32 km W of Yarrowmere HS, *V.J.Neldner 3338* (BRI); c. 32 km SE of Blackwater, *R.J.Henderson 858* (AD, PERTH); 15 km S of Charleville, *R.W.Purdie 240* (BRI).

Similar to *C. melantha* and *C. pubescens*, differing in the sessile flowers and papillose brownish fruits.

14. *Cassytha pomiformis* Nees in J.G.C.Lehmann, *Pl. Preiss.* 1: 620 (1845)

T: prope oppidulum Fremantle, W.A., Dec. 1838, *L.Preiss 1625*; lecto: MEL; isolecto: MEL, NY, *vide J.Z.Weber, Fl. Australia* 2: 457 (2007).

Cassytha ceratopoda Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 257 (1864). T: Swan River, W.A., *J.Drummond* 150 & 151; syn: K, MEL, NY.

Cassytha multiflora Nees in J.G.C.Lehmann, *Pl. Preiss.* 1: 621 (1845). T: 'King Georges Sound, [W.A.], All. Cunningham in Herb. Schauer. Herb. Preiss. No. 2629'; holo: *n.v.*

Cassytha subcapitata Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 253 (1864). T: Swan River, W.A., (1845), *J.Drummond* suppl. no 63; lecto: MEL; isolecto: K, NY, *fide* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 250 (1981).

Cassytha pomiformis var. *pubiflora* Benth., *Fl. Austral.* 5: 313 (1870). T: W.A., *J.Drummond* suppl. n. 63; syn: K, MEL, NY; King George Sound, W.A., *J.Preiss* 2629; syn: *n.v.*

Illustration: J.Z.Weber, *loc. cit.*

Stem (0.2–) 0.6–1.3 mm thick, yellow-green or grey-green to dark green (dried), bristly white-hairy or glabrescent. Inflorescence a congested umbel, few–10-flowered, single, sometimes paired or fasciculate; peduncle $2.5\text{--}30 \times 0.6\text{--}0.8$ (–1.5) mm, pubescent, thickening (to 1.8 mm) with age. Pedicels $0.4\text{--}1.5 \times 0.2\text{--}0.8$ mm, distinctly white-pubescent. Bracts whorled at base or inserted at 2 levels; bract ovate, peltate, c. 1.4×0.7 mm, or triangular, basifixed, c. 0.7×0.5 mm, pubescent, brown; bracteoles triangular, c. 0.5×0.3 mm, pubescent, brown, sometimes persistent in fruit. Flowers ovoid, $2\text{--}2.5 \times 1.3\text{--}1.6$ mm, yellow outside, white inside. Sepals triangular-ovate, c. 0.6 mm, yellow-brown, pubescent outside, turning brown. Petals ovate, $1.5\text{--}1.9 \times 0.8\text{--}1$ mm, yellowish, antrorse-pubescent on both sides, turning dark brown. Fertile stamens 9, obovoid, white, turning brown. Staminodes narrowly pyramidal, c. 0.6×0.3 mm, white, turning brown, with white apex; glands ovoid, dorsiventrally flattened, c. 0.5×0.3 mm, white, turning brown, crested white. Ovary fusiform, c. 1.5×0.5 mm, glabrous or sprinkled with hairs. Receptacular tube short, white-pubescent, abruptly contracted into pedicel. Fruit fusiform-globose, c. 10×6 mm, grey-pubescent, yellow-green, turning green-black, globose portion carried on distinct darker pedicel. Fig. 30.

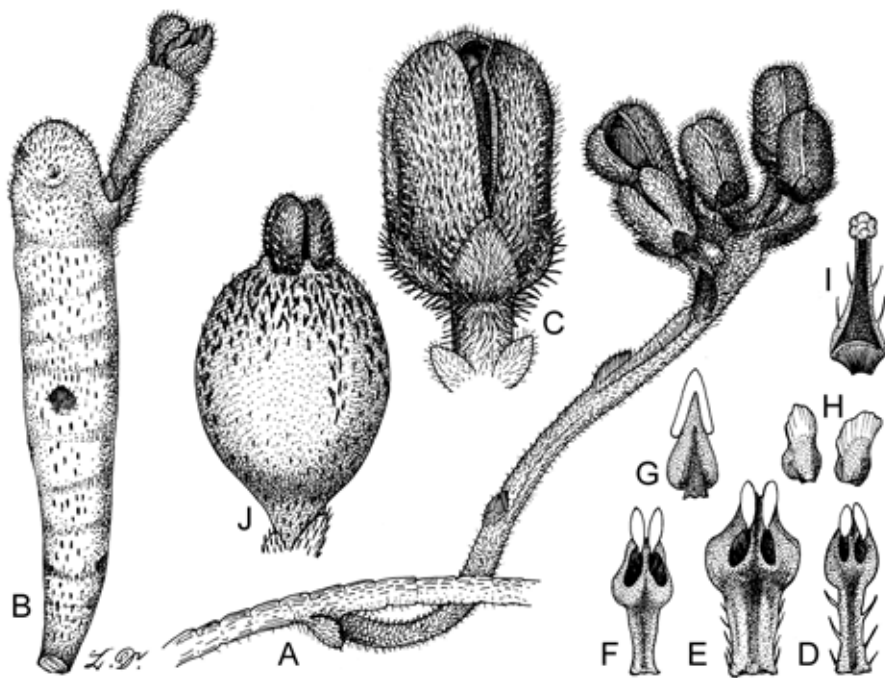


Figure 30. *Cassytha pomiformis*. A, stem and inflorescence with flowers; B, clavate peduncle with young fruit; C, flower, showing pedicel with basal bracteoles; D–F, stamens, front view, showing open loculi and upright flaps; D, second whorl; E, first whorl; F, third whorl; G, staminode, centripetal view; H, glands, centripetal view; I, ovary and lower style; J, fruit. Scales and voucher specimens not given. Drawn by L.Dutkiewitz. Reproduced with permission from *J. Adelaide Bot. Gard.* 3: 187–262 (1981).

Endemic to south-western W.A., extends from Geraldton to King George Sound and Esperance. Flowers July–Jan.; fruits Aug.–Dec., commonly flowering and fruiting at same time. Map 143.

W.A.: c. 22 km S of Carbla Stn, *J.Z. Weber 5034* (AD, BRI, HO, KI, MEL, NSW, NY, W, Z); Howathara Hill Res., *N. McFarland 1259* (AD, BRI, NY, PERTH); Wongan Hills Experimental Farm Reserve, *C.M. Parker 257* (AD, CANB, PERTH); 6.9 km E of rabbit proof fence on the Hyden–Lake Cronin road, *R.J. Chinnock 3278* (AD, M, MEL); Nat. Res. 16479, 25 km W of Kulin, *J.M. Brown 019* (PERTH).

Specimens with paired inflorescences often show diversity in the age of peduncles, where the shorter and thicker carries fruits or is barren, the longer and less clavate carries flowers.

15. *Cassytha paniculata* R.Br., *Prodr.* 404 (1810)

T: Port Jackson, N.S.W., Aug. 1803, *R. Brown*; lecto: BM, *fide J.Z. Weber, J. Adelaide Bot. Gard.* 3: 221 (1981).

Cassytha remotiflora F. Muell. ex Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 256 (1864); *C. paniculata* var. *remotiflora* (F. Muell. ex Meisn.) Benth., *Fl. Austral.* 5: 311 (1870). T: Moreton Island, [Qld], Aug. 1855, *F. Mueller s.n.*; lecto: MEL, *fide J.Z. Weber, loc. cit.*

Stem 0.5–1.5 mm thick, smooth, rarely rugose, glabrescent, yellow-green to green. Inflorescence a loose raceme, 5–15 (sometimes more)-flowered, single or paniculate; peduncle 30–100 mm long. Bracts inserted at 2 levels: bract subtending pedicel; bracteoles supporting base of calyx, later often immersed in base of fruit. Flowers mostly ovoid, 1–2 mm long. Pedicel conspicuous in flower, to 0.5 mm long, often pubescent, sometimes inconspicuous in fruit. Sepals triangular, c. 0.6 mm, glabrescent, ciliate. Petals ovate, 1–2 × 0.9–1.8 mm, fleshy, mostly glabrescent, yellow to yellow-green. Fertile stamens 9. Staminodes long-pyramidal with conspicuous white gland-like appendage; glands ovoid and crested with white appendage. Ovary glabrous; receptacular tube pubescent. Fruit globose to obovoid, 6–8 × 4–7 mm (dried), green, yellow-green to red-green, glabrescent, sometimes 6-ribbed.

Occurs from south eastern Qld to Eden, N.S.W., and probably in New Zealand. Found in dry forests, woodlands and on shrubby dunes. Flowers Sept.–Apr. Map 144.

Qld: Proston, *S.T. Blake 14257* (BRI). N.S.W.: 23 km N of Coonabarabran, *G.M. Cunningham 5286* (NSW); Tanilba White Sands, *H. van Rees 427* (MEL); Breakfast Ck & Nepean Rd, *W. Bishop 758* (NSW); Palorang Ra. at Rossi, *R. Schodde 3465* (AD, NSW).

More hairy plants show similarities with forms of *C. pubescens* but in the latter the flowers are loosely placed along the peduncle and the petals and fruits are distinctly heavily pubescent. Differs from *C. phaeolasia* which has sessile flowers and fruits heavily pubescent.

16. *Cassytha peninsularis* J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 232 (1981)

T: S of Pt Rickaby, S.A., 11 Dec. 1974, *J.Z. Weber 4462*; holo: AD; iso: CANB, MEL, NSW, PERTH.

Illustration: *J.Z. Weber, op. cit.* 3: 234, fig. 14 (1981), as *C. peninsularis* var. *peninsularis*.

Stem 0.5–2.5 mm thick, glabrescent, rarely rugulose, yellow-green, green to green-red. Inflorescence a raceme or panicle, 1–5-flowered, single or fasciculate; peduncles 1–7 mm long. Floral bracts inserted at 2 levels; bract angular-ovate, 1–1.5 × c. 1 mm, fleshy or leathery, puberulent, ciliate; bracteoles similar, smaller. Pedicel 0.2–1 × c. 0.4 mm. Flowers ovate, 1.7–2.5 mm long, yellow. Sepals triangular, c. 1.2 mm, mostly glabrous, yellow, in fruit light-brown, immersed in glandular rim. Petals ovate, c. 2 × 1.5 mm, glabrous or rarely sprinkled with few hairs outside, yellow, in fruit dark brown. Fertile stamens 9, narrow obovoid, white, outer flattened. Staminodes cordate to pyramidal, laterally compressed, c. 1 × 0.7 mm, conspicuously white-glandular crested; glands ovate, c. 0.8 × 0.5 mm, also white-glandular tipped. Ovary fusiform, c. 2 × 0.7 mm, with ring of hairs medially. Fruit globular, c. 7 × 6.5 mm (dried obovoid, grey-brown), pubescent, broadly banded with dull-green and dull red-brown hairs; glandular rim much more conspicuous on dried specimens. (*Streaked*) *Dodder-laurel*.

Endemic in southern S.A. Occurs on the Eyre Penin., Yorke Penin., and Kangaroo Is. Flowers from Oct.–Feb.; fruits start from Mar. Map 145.

S.A.: 4 km S of Coorabie, *H.R.Toelken* 7696 (AD, CBG, HO); 18 km N of Elliston, *P.C.Heyligers* 79135 (AD, CANB); Coffin Bay, *C.R.Alcock* 11206 (AD, BR, LSU); Hundred of Ramsay, sec. 176, *B.J.Blaylock* 1657 (AD, CANB, HO, NSW); between American R. and Kingscote, *Hj.Eichler* 15482 (AD, HAL, PERTH).

Shows similarities with *C. nodiflora*, which has whorled floral bracts and the fruit lacking a glandular rim. Similarities with *C. flindersii* are discussed under that species. From *C. pubescens* it is geographically isolated and forms of the latter in Mt Lofty Ra. in S.A. have greyish pubescence and usually sessile flowers and fruits.

17. *Cassytha flindersii* (J.Z.Weber) J.Z.Weber, *Fl. Australia* 2: 457 (2007)

Cassytha peninsularis var. *flindersii* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 235 (1981). T: slopes of Mt Remarkable, S.A., 6 Dec. 1973, *J.Z.Weber* 3682; holo: AD; iso: BRI, CANB, G, HO, K, MEL, NSW, NY, OXF, PERTH.

Illustration: J.Z.Weber, *op. cit.* 3: 236, fig. 15 (1981), as *C. peninsularis* var. *flindersii*.

Stem 0.5–1.6 m thick, glabrescent, green to green-red. Inflorescence single or fasciculate, raceme or panicle, 1–5-flowered; peduncles to 7 mm long. Floral bracts in 2 planes; bract triangular, obtuse, c. 1.5×1 mm, fleshy, peltate, green, turning brown and leathery; bracteoles ovate, c. 1.1×1 mm, slightly pubescent, ciliate, turning leathery when supporting fruit. Pedicel 0.5–1 \times 0.3–0.5 mm. Flowers globose to ovoid, c. 2×1.5 mm, green, later yellow. Sepals triangular-ovate, c. 1 mm long, green, fleshy, sometimes with few white hairs. Petals triangular-ovate, c. 1.5×1.5 mm, subacute-obtuse, fleshy, first greenish, later yellowish on margins, slightly pubescent outside, densely so inside. Fertile stamens 9, first greenish, with staminodes and glands turning white. Staminodes obcordate, acute, c. 0.5 mm, without appendages; glands ovate, c. 0.4 mm, without appendages. Ovary fusiform, c. 1×0.5 mm, glabrous. Fruit obovoid, 7–9 \times 5–6, glabrescent with few scattered hairs,

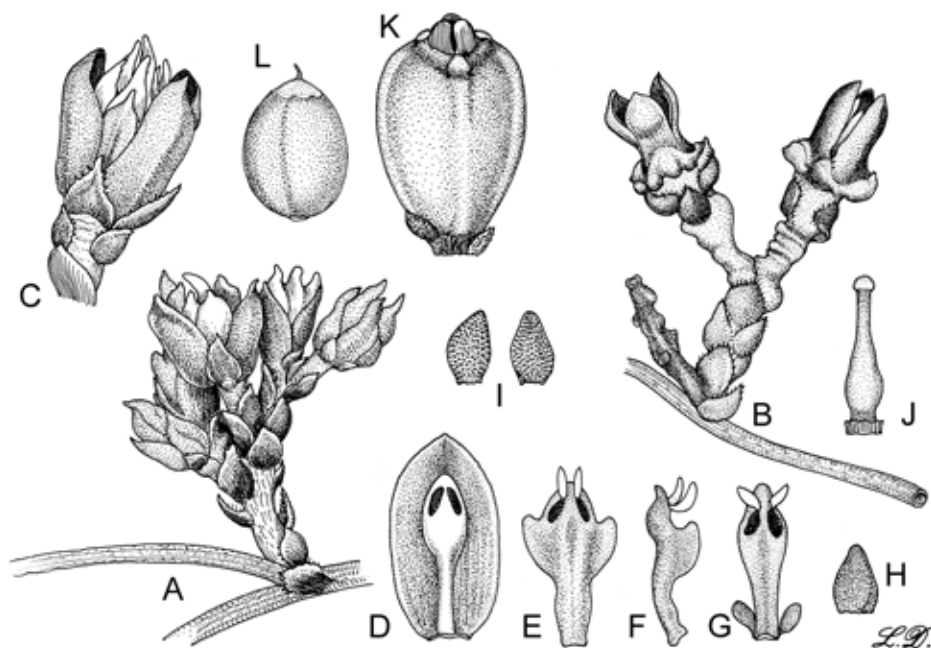


Figure 31. *Cassytha flindersii*. A, stem and inflorescence with flowers; B, young fruits; C, flower; D, petal from inside; E, stamens of first whorl, E1 front view; E2 side view; F, stamen of third whorl; G, staminode; H, glands, centripetal view; I, ovary; J, fruit; K, stone. Scales and voucher specimens not given. Drawn by L. Dutkiewitz. Reproduced with permission from *J. Adelaide Bot. Gard.* 3: 187–262 (1981).

slightly 6-ribbed, pale green to yellow and red spots, drying black. Glandular rim well-developed, especially on young fruits. Fig. 31.

Endemic to S.A. Extends from Mt Playford and Freeling Heights in the Flinders Ra. S to near Mt Remarkable and Mambray Ck. Flowers Apr.–Dec.; fruits developing in 6–8 weeks. Map 146.

S.A.: Freeling Heights, May 1976, *R.J.Bates* (AD, CANB, MEL); W of Partacoona Stn, 31 May 1978, *P.Hornsby* (AD, BRI, CANB, M); ESE of Old Cudnia HS, *T.Hall* 265 (AD).

Shows similarities with *C. peninsularis*, which has fruits distinctly pubescent with banded dull-green and dull red-brown hairs and staminodes and glands tipped white. Differs from *C. pubescens* in having pedicellate flowers and glabrescent fruits. In inflorescence shows similarities with *C. nodiflora* from which it differs in having sessile flowers.

18. *Cassytha racemosa* Nees in J.G.C.Lehmann, *Pl. Preiss.* 1: 621 (1845)

Cassytha racemosa var. *genuina* Hochr., *Candollea* 2: 365 (1925), *nom. illeg., type variety*. T: prope oppidulum Fremantle, W.A., *L.Preiss* 1623; lecto: MEL; isolecto: K, MEL, *fide* J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 251 (1981).

Stem (0.3–) 0.7–2 mm thick, glabrescent to pubescent, light yellow-green or brownish to dark green. Leaves ovate-peltate, 1.5–2.5 × 0.5–0.8 mm. Inflorescence a loose raceme or head (1–) 4–8 (–10)-flowered, single, paired or fasciculate, sometimes paniculate; peduncles 3–30 × 0.5–1 mm, glabrescent to pubescent. Pedicel 1–2 × 0.3–0.8 mm, pubescent or glabrescent. Floral bracts inserted at 2 levels; bract ovate and peltate, 0.5–1.2 × 0.3–0.5 mm, pubescent to glabrescent, ciliate; bracteoles smaller, persistent in fruit. Flowers ovoid, 1–2 × 0.9–1.5 mm, white to greenish yellow, pubescent. Sepals triangular-ovate to round, 0.5–0.7 mm, pubescent to glabrescent, ciliate. Petals ovate, 1–1.8 × 0.8–1.5 mm, pubescent to glabrescent outside, appressed white-hairy inside. Fertile stamens 6, first and third whorl light-yellow or white; stamens of second whorl (opposite petals) reduced to staminodes, filiform and c. 1 × 0.3 mm, often adhering to petals throughout length. Staminodes conical, c. 0.5 × c. 0.35 mm, commonly white, occasionally white-tipped; glands ovoid, c. 0.5 mm, occasionally white-tipped. Ovary fusiform, 1–1.5 × c. 0.5 mm, pubescent all over or only in a transverse median ring.

Endemic to south-western Australia. There are 2 forms.

Fruits lobed

18a. f. *racemosa*

Fruits smooth

18b. f. *pilosa*

18a. *Cassytha racemosa* Nees f. *racemosa*

Illustration: J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 253, fig. 23 (1981).

Bracteoles in flower attached to pedicel, in fruit clasping and embedded in basal portion. Fruit globose to pyriform, 6–8 × 6–7 mm, glabrescent; base of fruit obconical, short and wide, including expanded pedicel between bract and bracteoles; globose portion divided into 6 vertical, thick lobes, each topped by a perianth segment, usually no glandular rim on top.

Endemic to south-western W.A., extending from Shark Bay S to Pemberton, and E approaching the Stirling Ra., mostly confined to flats near the sea. Map 147.

W.A.: c. 5 km N of Geraldton, *J.Z.Weber* 5105 (AD, CANB, G, PERTH); S end of Drummond Cove, *W.R.Barker* 2238 (AD, MEL, PERTH); Cape Naturaliste, 30 Oct. 1979, *D.King* (PERTH); just W of Augusta, *D.J.E.Whibley* 5082 (AD, PERTH); Denmark, *A.Strid* 20410 (PERTH).

The pedicel of f. *racemosa* is integrated as a widened (ob)conical part of the fruit: in the other form it is quite distinct, cylindrical and narrow.

18b. *Cassytha racemosa* f. *pilosa* (Benth.) J.Z.Weber, *J. Adelaide Bot. Gard.* 3: 254 (1981)

Cassytha racemosa var. *pilosa* Benth., *Fl. Austral.* 5: 312 (1870). T: King George Sound, W.A., *A.Oldfield*; lecto: MEL; isolecto: MEL, *fide* J.Z.Weber, *loc. cit.*

Cassytha umbellata Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 257 (1864). T: near Cape Riche, W.A., Mar. 1854, W.H. Harvey 5; lecto: K., *fide* J.Z. Weber, *loc. cit.*

Illustration: J.Z. Weber, *op. cit.* 3: 255, fig. 24 (1981).

Bracteoles in flower and fruit clasping. Fruit pyriform to globose, 9–11 × 3.5–7 mm, smooth, pubescent to glabrescent, greenish to yellow and translucent, turning dark green to black.

Endemic to W.A., extending from North West Cape to Israelite Bay. Map 148.

W.A.: c. 15 km WSW of Indarra, *L. Haegi* 1159 (AD, DNA, NSW, PERTH); Tuttaning Nat. Res., *Hj. Eichler* 20969 (AD, PERTH); c. 13 km E of Oldfield R. estuary, *N.N. Donner* 2989 (AD, PERTH); Howick Hill, *E.N.S. Jackson* 1313 (AD, HO, PERTH); near Point Dover, *P.G. Wilson* 5957 (AD, PERTH).

Fruits of plants in the northern part of the range are more globose. Shows similarities with *C. muelleri* in its pyriform fruits but differs in its ovate and peltate leaves (triangular and basifixed in *C. muellerii*). The two taxa are also geographically isolated.

19. *Cassytha muelleri* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 257 (1864)

Cassytha racemosa f. *muelleri* (Meisn.) J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 256 (1981). T: Moreton Is., [Qld], Aug. 1855, *F. Mueller*; lecto: MEL; isolecto: K, NY, *fide* J.Z. Weber, *loc. cit.*

Illustration: J.Z. Weber, *op. cit.* 3: 255, fig. 25 (1981).

Stem 0.3–1 mm thick, glabrescent to pubescent, light yellow-green or brownish to dark green. Leaves triangular, basifixed, 0.5–1.5 × 0.8 mm. Inflorescence a loose raceme or head, 4–8-flowered, single, paired or fasciculate, sometimes paniculate; peduncle 3–30 mm long, glabrescent to pubescent. Pedicel 1–10 mm long. Floral bracts triangular, inserted in 2 planes; bract c. 1.5 × c. 0.8 mm, glabrescent, ciliate, dark brown (dried); bracteoles smaller, persistent in fruit. Flowers ovoid, 1–2 mm long, white to greenish yellow, pubescent. Sepals triangular-ovate, c. 0.6 mm, pubescent to glabrescent, ciliate. Petals ovate to bluntly acute, 1–1.8 mm long, pubescent to glabrescent outside, with appressed white hairs inside. Fertile stamens 6; stamens of outer whorl spatulate, 1–1.5 × c. 0.7 mm; stamens of second whorl opposite petals sterile, filiform, c. 1 mm long, often adhering to petal; stamens of inner whorl narrowly obovate. Staminodes conical, c. 0.5 mm, white, turning brown, occasionally with white apex; glands ovoid. Ovary fusiform, 1–1.5 × c. 0.5 mm, pubescent. Fruit pyriform, 8–9 × 4–5 mm, smooth, glabrescent, drying dark green to brown, glandular rim well-developed on top, basal obconical portion gradually narrowing into the distinct pedicel.

Occurs in SE Qld from Gympie to around Brisbane and W towards Crows Nest, and in NE N.S.W. near Grafton. Flowers all year. Map 149.

Qld: c. 5 km ESE of Crows Nest, *L.S. Smith* 14820 (BRI); Mt Tibrogargan, Oct. 1921, *S.L. Everist* (BRI); Maroochie (River), Oct. 1874 (BRI). N.S.W.: Rocky Ck, *R. Coveny* 4981 (AD, NSW).

Stems on the Qld specimens are thinner than those on N.S.W. specimens, showing similarities in the fruit with *C. racemosa* f. *pilosa* which has ovate, peltate leaves.

Doubtful and Excluded Names

Cassytha coronata Nees in J.G.C. Lehmann, *Pl. Preiss.* 1: 620 (1845), as *Cassytta coronata*

T: Western Australia, *L. Preiss* 1627; not found.

I have not seen any specimen which would comply with Nees' description in being a dioecious *Cassytha*, nor has the specimen cited by the author, *L. Preiss* 1627, from Western Australia, been found.

Cassytha pubescens var. *macrocarpa*

This name was attributed to T.S. Hart (*Victorian Naturalist* 42: 79 (1925)) by A.J.G.H. Kostermans (1964), and listed in the *Australian Plant Name Index* (1991) as an invalid name, not accepted by the author. In fact it is a typographical error by Kostermans.

Hart was discussing specimens of *Cassytha pubescens* labelled as *C. pubescens* var. *macrostachya* by F. von Mueller. Mueller never published this name, and Hart does not accept it. The lectotype recorded in the *Australian Plant Name Index* is the result of a typesetting error, and is the lectotype of *C. racemosa*.

Cassytha robusta Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 255 (1864)

T: Swan River, W.A., *J.Drummond* 148, 227; syn: *n.v.*

This name was omitted from J.Weber's revision (Weber, 1981), probably due to an oversight. Bentham (*Fl. Austral.* 5: 312 (1870)) considered it to be a synonym of *C. melantha* R.Br. but, since the type material has not been examined, it is listed in this treatment as doubtful.

3. CINNAMOMUM

Cinnamomum Schaeff., *Bot. Exped.* 74 (1760); from the classical Greek name for cinnamon.

Type: *C. zeylanicum* Garcin. ex Blume

Trees. Twigs usually ±pubescent (at least when young). Leaves opposite, or alternate or pseudowhorled, petiolate; lamina often triplinerved (at least near base). Inflorescence paniculate, axillary and pseudoterminal (*C. baileyianum* axillary and terminal), not enclosed in hemispherical decussate bracts before anthesis. Flowers bisexual, 3-merous. Tepals 3 + 3. Stamens: anthers 6 introrse + 3 extrorse, 4-locular; glands 6, stalked, with stalks sericeous, heads glabrescent. Staminodes 3, differentiated; stalks sericeous; head ±sagittate. Ovary ±sessile; stigma cumuloid or funnel-shaped. Fruit seated in a cup surrounding lower part of fruit; mesocarp fleshy; endocarp thin. Seed: testa thin; radicle apical; cotyledons distinct, uniform in texture.

A genus of about 250 species occurring in Asia, Malesia, Australia, the Pacific and South and Central America; 6 species in Australia (5 endemic, 1 introduced). Distributed from northern Qld to southern N.S.W., in rainforest.

Cinnamomum laubatii (Pepperwood), *C. oliveri* and *C. virens* (Camphorwood) produce millable logs providing useful all purpose timbers. The blaze odour is very distinctive, usually peppery (*C. baileyianum* also sarsaparilla and menthol).

A.J.G.H.Kostermans, A monograph of the Genus *Cinnamomum* Schaeff. (Lauraceae) Part 1, *Ginkgoana: Contr. Fl. Asia Pacific Region* 6: 150–161 (1986).

Flowering Material

- | | | |
|----|---|--------------------------|
| 1 | Leaves mostly triplinerved | |
| 2 | Leaves green on underside | 1. <i>C. baileyianum</i> |
| 2: | Leaves glaucous or slightly glaucous on underside | |
| 3 | Leaf lamina > 3 times as long as wide | 3. <i>C. laubatii</i> |
| 3: | Leaf lamina < 3 times as long as wide | |
| 4 | Leaves smelling strongly of camphor | 2. <i>C. camphora</i> |
| 4: | Leaves not smelling strongly of camphor | 5. <i>C. propinquum</i> |
| 1: | Leaves mostly penninerved | |
| 5 | Tepals > 4 mm long | 6. <i>C. virens</i> |
| 5: | Tepals < 4 mm long | 4. <i>C. oliveri</i> |

Fruiting Material

- | | | |
|----|---|--------------------------|
| 1 | Cup obviously lobed at apex | |
| 2 | Bark and twigs emitting a strong peppery odour when cut; leaves obviously triplinerved | 5. <i>C. propinquum</i> |
| 2: | Bark and twigs emitting an odour like a mixture of sarsaparilla and menthol or a spicy odour but seldom peppery; some leaves not obviously triplinerved | 1. <i>C. baileyianum</i> |
| 1: | Cup entire at apex | |
| 3 | Cup longitudinally ribbed near apex; carpels < 12 mm diam. when ripe | 6. <i>C. virens</i> |
| 3: | Cup without longitudinal ribs near apex; carpels > 12 mm diam. when ripe | |
| 4 | Leaves penninerved and green on underside; bark and twigs emitting a fragrant odour when cut | 4. <i>C. oliveri</i> |
| 4: | Leaves triplinerved and usually slightly glaucous on underside | |
| 5 | Leaves lanceolate, > 3 times as long as wide; bark and twigs emitting a peppery odour when cut | 3. <i>C. laubatii</i> |
| 5: | Leaves usually broadly ovate to elliptic, < 3 times as long as wide; bark and twigs emitting an odour of camphor when cut | 2. <i>C. camphora</i> |

1. *Cinnamomum baileyianum* (F.Muell. ex F.M.Bailey) W.D.Francis, *Austral. Rain-forest Trees* 2nd edn, 118 (1951)

Persea baileyana F.Muell. ex F.M.Bailey, *Syn. Queensland Fl. Suppl.* 2: 51 (1888). T: Frazer's Island [Fraser Is.], Qld, *H.St.John Wood*, s.n.; holo: MEL; iso: ?BRI, MEL.

Tree to 20 m. Stem sometimes buttressed. Twigs 4-angled and pubescent when young, eventually terete and ±glabrescent. Leaves opposite; petiole 6–15 mm long; lamina elliptic to narrowly elliptic, 5–13 cm long, 2–5.2 cm wide, triplinerved, green below, eventually ±glabrescent. Inflorescence c. same length as flowers. Flowers opening quite widely with tepals becoming ±horizontal, cream, perfumed. Tepals 4.5–5.3 mm long, 2.3–2.8 mm wide, sericeous. Outer anthers c. 1.5 mm long, 1–1.3 mm wide, mainly glabrous; filaments 1.5–2.1 mm long. Inner anthers 1.3–1.4 mm long, 0.8–1 mm wide, glabrous only towards apex; filaments 1.5–2.7 mm long. Ovary 1.3–1.9 mm long, c. 1.1 mm wide, glabrous; style glabrous; stigma funnel-shaped. Fruit carpel ellipsoidal, 18–20 mm long, 10–13 mm wide, black, glaucous; cup apex lobed. Cotyledons cream. *Brown Bollywood*. Plate 22.

Occurs in southern and northern Qld (but not known from central Qld), from McIlwraith Ra. to near Brisbane; from sea level to 550 m alt. Grows in rainforests in soils derived from a variety of rock types, but generally in poorer soils. Flowers Mar.–May; fruits ?Nov.–?Dec. Map 150.

Qld: T.R. 14, McIlwraith Ra., Leo Creek Rd, *K.D.Sanderson* 777 (RS); T.R. 176 Monkhouse, Home Rule L.A., Cooktown, *B.Hyland* 25045 RFK (QRS); Fraser Is., *L.J.Webb* & *J.G.Tracey* 6363 (BRI).

2. **Cinnamomum camphora* (L.) J.Presl, *Přir. Rostlin* 2: 36, 47–56, t. 8 (1825)

Laurus camphora L., *Sp. Pl.* 1: 369 (1753). T: Japan; lecto: Herb. Linn. No. 518.7; LINN, *fide* A.J.G.H.Kostermans in J.Bosser *et al.* (ed.), *Fl. Mascareignes* 153: 13 (1982).

Tree to 20 m high. Stem sometimes buttressed. Twigs ±terete, glabrous. Leaves alternate or pseudowhorled; petiole 2–4 cm long; lamina ovate to very broadly ovate or elliptic, 4–11 cm long, 2.5–6 cm wide, usually triplinerved at base, glaucous below. Inflorescence usually slightly shorter than leaves. Flowers opening widely with tepals becoming ±horizontal, white or cream, smelling of camphor. Tepals 1–2 mm long, c. 1 mm wide, pubescent on inner surface at least in lower half. Anthers c. 0.5 mm long; filaments c. 0.7 mm long; filaments and staminodes pubescent. Ovary to 1 mm long, to 1 mm wide, glabrous; style glabrous; stigma funnel-shaped. Fruit globose, to 10 mm diam., black; cup apex entire. *Camphor Laurel*.

Naturalised in W.A., near Perth, and in eastern Qld and N.S.W., and sparingly in Vic., particularly along watercourses; native to Japan, Taiwan and China. Flowers Aug.–Oct.; fruits Jan.–July. Map 151.

W.A.: Mundaring Weir Settlement, *G.J.Keighery 9968* (PERTH). Qld: New England Hwy just N of Allora, *G.N.Batianoff 2010146* (BRI, CANB, DNA, MEL, NSW); Forrester Rd, Malanda, *P.I.Forster 26253* (A, AD, BRI, K, L, MO). N.S.W.: Hastings Point, *G.N.Batianoff 980222* (BRI, MEL, NSW, QRS); Stokers Siding Rd, 2.6 km ESE of Uki, *R.G.Coveny 12787 et al.* (BRI, DAO, K, MEL, NSW, PRC).

An aggressive invader of rainforest and pastureland in SE Qld and NE N.S.W.

3. *Cinnamomum laubatii* F.Muell., *Fragm.* 5: 165 (1866)

T: Rockingham Bay, Qld, *J.Dallachy s.n.*; holotype: MEL; isotype: A, BO, K, MEL.

[*Cinnamomum tamala* auct. non (Buch.-Ham.) T.Nees & C.H.Eberm.: G.Bentham, *Fl. Austral.* 5: 303 (1870); F.M.Bailey, *Queensland Fl.* 4: 1309 (1901).]

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 283, fig. 8; 345, fig. 70A–B (1989).

Tree to 35 m. Stem usually buttressed. Twigs angular and pubescent when young, eventually terete and glabrescent. Leaves opposite; petiole 5–15 mm long; lamina lanceolate, 8–14.5 cm long, 2–4 cm wide, triplinerved, slightly glaucous and pubescent below. Inflorescence approximating or exceeding leaves. Flowers opening widely with tepals ±horizontal, cream, pale green, perfumed. Tepals 3.5–4.8 mm long, 2.4–2.9 mm wide, sericeous. Outer anthers 1.5–1.8 mm long, 1–1.3 mm wide, sericeous; filaments 1–1.8 mm long, sometimes with 1 or 2 glands basally. Inner anthers 1.3–1.5 mm long, 0.8–0.9 mm wide, sericeous; filaments 1.1–1.8 mm long. Ovary 1.6–1.7 mm long, 1.3–1.5 mm wide, glabrous; style glabrous; stigma funnel-shaped. Fruit carpel ellipsoidal, 16–22 mm long, 13–14 mm wide, black; cup apex entire. Cotyledons white, cream. *Pepperwood*. Fig. 32.

Occurs from Cooktown to Mackay, northern Qld; from sea level to 1200 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Feb.–June; fruits Sept.–Nov. Map 152.

Qld: T.R. 146, Tableland L.A., Big Tableland, Cooktown, *B.Hyland 10561* (QRS); T.R. 1230, Boonjee L.A., *A.K.Irvine 1551* (A, BO, BRI, K, KEP, NSW, QRS, RSA); Lacey's Ck, Mission Beach, *F.Crome 9* (CANB, L); Natl Park Res. 573, Eungella, Finch Hatton Gorge, *B.Hyland 4265 RFK* (BRI, NSW, QRS).

4. *Cinnamomum oliveri* F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 5: 24 (1892)

T: Maroochie, Qld, *?F.M.Bailey s.n.*, *?J.D.Low s.n.*; holotype: BRI.

Cryptocarya glaucescens var. *camphorata* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 73 (1864); *Cryptocarya camphorata* (Meisn.) Domin, *Biblioth. Bot.* 89: 121 (1925). T: Illawarra, N.S.W., *W.Macarthur 201*; holotype: K.

Tree to 25 m. Stem usually buttressed. Twigs terete, glabrous. Leaves opposite; petiole 4–13 mm long; lamina lanceolate, 8.5–17 cm long, 2–5.2 cm wide, green or glaucous below, glabrous. Inflorescence usually exceeding leaves. Flowers opening widely, with tepals becoming ±horizontal, ?cream, perfumed. Tepals 3–4.1 mm long, 2.2–2.3 mm wide, tomentose abaxially, ±sericeous adaxially. Outer anthers 1.3–1.4 mm long, c. 0.9 mm wide, mainly glabrous; filaments 1.2–2.2 mm long. Inner anthers 1.1–1.4 mm long, 0.8–0.9 mm wide, mainly glabrous; filaments 1.2–2.9 mm long. Ovary 1.3–1.5 mm long, 0.9–1 mm wide, glabrous; style glabrous; stigma funnel-shaped. Fruit carpel ellipsoidal, c. 18 mm long, 14 mm wide, black, blue-black; cup apex entire. Cotyledons cream. *Camphorwood*. Plate 23.

Occurs from Iron Ra., Cape York Penin., Qld, to Berry, N.S.W.; from sea level to 1000 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Oct.; fruits Oct.–Dec. (Mar. in southern populations?). Map 153.

Qld: Iron Ra., *L.J.Webb & J.G.Tracey 8695* (BRI); Fraser Is., *L.J.Webb & J.G.Tracey 6362* (BRI); T.R. 61, Parish of Eungella, *P.Qualischiefski 3* (QRS). N.S.W.: Coramba, *B.Hyland 4405 RFK* (QRS); Broughton Mills Ck, Berry, *J.Badham NSW 137908* (NSW).

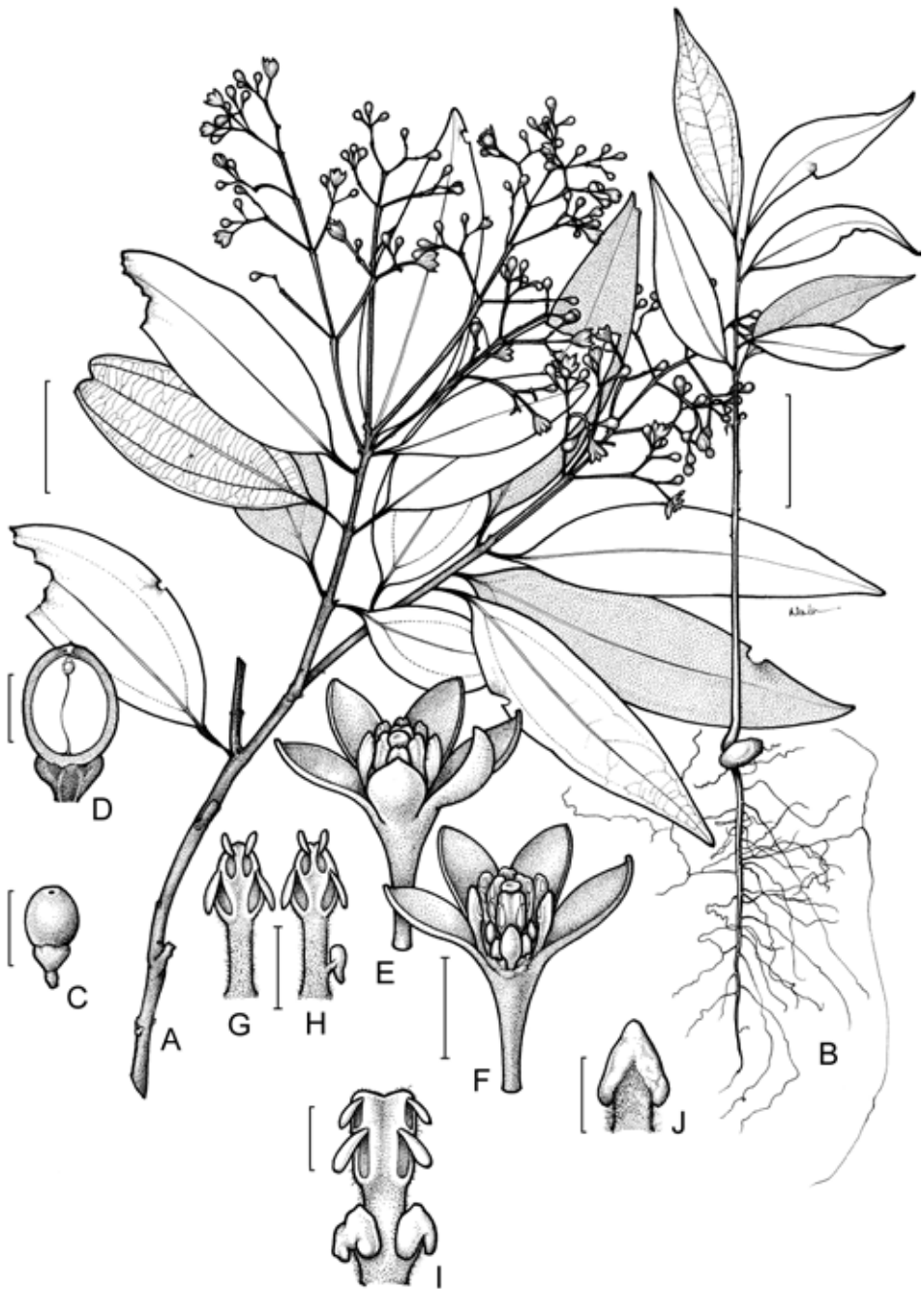


Figure 32. *Cinnamomum laubatii*. A, habit; B, seedling; C, fruit; D, L.S. fruit; E, flower; F, flower with 2 tepals removed; G, stamen (outer whorl, adaxial view); H, stamen (outer whorl, showing single gland); I, stamen (inner whorl, abaxial view); J, staminode (adaxial view) (A, E–J, B.Gray 315, QRS; B–D, G.Stocker 1596, QRS). Scale bars: A, B = 30 mm; C = 20 mm; D = 10 mm; E, F = 4 mm; G, H = 2 mm; I, J = 1 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 283 (1989).

5. *Cinnamomum propinquum* F.M.Bailey, *Queensland Fl* 4: 1309 (1901)

Cinnamomum propinquum F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 5: 25 (1892), *nom. prov.*
T: Mount Bartle Frere, Qld, *S.Johnson s.n.*; holo: BRI; iso: K, MEL.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 284, fig. 9 (1989).

Tree to 12 m. Stem usually not buttressed. Twigs 4-angled and pubescent when young, eventually terete and glabrescent. Leaves opposite; petiole 5–10 mm long; lamina lanceolate to ovate to elliptic, 5–9.5 mm long, 2–3.5 mm wide, triplinerved, \pm glaucous below, eventually \pm glabrescent. Inflorescence approximating or exceeding leaves. Flowers opening widely with tepals remaining \pm erect, creamy green, perfumed. Tepals 3.5–5 mm long, 2.1–3.5 mm wide, sericeous. Outer anthers 1.4–1.9 mm long, c. 1.2 mm wide, pubescent; filaments 1.6–1.7 mm long. Inner anthers 1.1–1.8 mm long, 0.9–1 mm wide, pubescent; filaments 1.6–2.3 mm long. Ovary 1.6–1.7 mm long, 1.2–1.4 mm wide, with upper half hairy; style sparsely pubescent; stigma cumuloid. Fruit carpel globular to ellipsoidal, c. 13.5 mm long, 11.5 mm wide, blue-black; cup apex lobed. Cotyledons white.

A rare species found only on summit regions of Mt Bartle Frere and Mt Bellenden Ker, Qld; from 1450–1550 m alt. Grows in stunted, montane rainforest in soils derived from granite. Flowers Oct.–Nov.; fruits Mar. Map 154.

Qld: Mt Bellenden Ker, *P.Endress 4287* (QRS); Mt Bellenden Ker, *J.G.Tracey 14932* (QRS); Mt Bartle Frere, *G.Sankowsky 425* (QRS); Mt Bartle Frere, *J.M.Powell 825* (BRI, K, NSW, QRS).

6. *Cinnamomum virens* R.T.Baker, *Proc. Linn. Soc. New South Wales* 22: 282 (1897)

T: Tintenbar, N.S.W., *W.Bäuerlen s.n.*; lecto: NSW; isolecto: BRI, K, L, MEL, *fide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 161 (1989).

Tree to 30 m. Stem usually not buttressed. Twigs terete, soon glabrescent. Leaves opposite; petiole 4–7 mm long; lamina lanceolate, narrowly elliptic, 4.5–9 cm long, 1.5–3 cm wide, predominantly penninerved (sometimes tending triplinerved), green and glabrescent below. Inflorescence approximating or exceeding leaves. Flowers opening quite widely with tepals remaining \pm erect, pale green, perfumed. Tepals 5–6 mm long, 1.5–2.6 mm wide, sericeous. Outer anthers 1.3–1.7 mm long, 0.9–1 mm wide; filaments 0.8–2 mm long. Inner anthers 1.3–1.5 mm long, 0.8–0.9 mm wide, \pm pubescent; filaments 1.3–2.4 mm long. Ovary 1.4–1.9 mm long, 1.2–1.4 mm wide, glabrous; style \pm pubescent; stigma cumuloid. Fruit carpel ellipsoidal, 12–15 mm long, 9.5–11 mm wide, black; cup entire at apex. Cotyledons white, cream. *Camphorwood*.

Occurs from Currumbin, southern Qld, to Williams R., N.S.W.; from sea level to 1400 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Feb.–July; fruits Aug.–Nov. Map 155.

Qld: Trees Rd, near Davidson's property, border Qld and N.S.W., *B.Hyland 12623* (QRS); Currumbin Ck, *D.L.Jones 11* (QRS); The Rock Pool, Currumbin Valley, *D.L.Jones 1278* (QRS). N.S.W.: Mt Lindesay, *C.T.White s.n.* (A); Moonpar State Forest, near Dorrigo, *B.Hyland 12340* (QRS).

4. CRYPTOCARYA

Cryptocarya R.Br., *Prodr.* 402 (1810); from the Greek *kryptos* (concealed), and *karyon* (a nut), referring to the fleshy perianth enclosing the seed.

Type: *C. glaucescens* R.Br.

Caryodaphne Blume ex Nees, *Syst. Laur.* 225 (1836). T: *C. laevigata* (Blume) Nees

Pseudocryptocarya Teschner, *Bot. Jahrb. Syst.* 58: 411 (1923). T: *P. pauciflora* (Lauterb. & K.Schum.) Teschner

Trees, occasionally shrubs. Twigs \pm sericeous to villous or glabrous. Leaves spirally arranged, petiolate; lamina penninerved or triplinerved. Inflorescence usually paniculate and pseudoterminal, (sometimes racemose or \pm cymose and axillary), not enclosed in hemispherical decussate bracts before anthesis. Flowers bisexual, 3-merous, usually opening widely, but

tepals usually remaining ±erect at anthesis. Tepals 3 + 3. Stamens: anthers 6 introrse + 3 extrorse, 2-locular; glands 6, stalked, with stalks usually pubescent, heads glabrous. Staminodes 3, differentiated; stalk usually pubescent; head ±sagittate or ±cordate. Ovary ±sessile; stigma usually inconspicuous. Fruit appearing inferior, enclosed in persistent swollen perianth, to 50 mm diam.; pedicel not swollen; mesocarp usually fleshy; endocarp usually thin, occasionally thick and woody. Seed: radicle usually apical, occasionally lateral; cotyledons either ruminant and ±fused, or uniform in texture and distinct.

A pantropical genus of 200–250 species occurring in Africa, Asia, Malesia, Australia, Pacific Islands and South America; 47 species in Australia (38 or 39 endemic). Distributed from Cape York Penin., Qld, to southern N.S.W. (*C. exfoliata* also occurs in N.T., and *C. cunninghamii* extends to N.T. and the Kimberley, W.A.). The species may be found in rainforest, monsoonal forests, gallery and littoral forests, and drier, ecotonal sclerophyll forests. This genus is of important commercial value with 11 species producing millable logs of generally fine grade timber, often referred to as 'laurel', although some species are referred to as silkwood, walnut, maple or sycamore. A further 15 species also produce millable logs although these are seldom utilised. Some species cause dermatitis and skin irritation.

Flowering Material (*C. glaucocarpa* not included)

- | | | |
|-----|--|------------------------------|
| 1 | Foveoles present, quite conspicuous on underside of lamina | 19. <i>C. foveolata</i> |
| 1: | Foveoles absent (rarely small and inconspicuous) | |
| 2 | Perianth tube 0.3–0.7 mm long; perianth not enclosing ovary | 34. <i>C. oblata</i> |
| 2: | Perianth tube 0.8–2.7 mm long; perianth tube enclosing ovary | |
| 3 | Lower half of perianth tube pubescent on inner surface | |
| 4 | Leaves triplinerved | |
| 5 | Flowers emitting an unpleasant odour | |
| 6 | Style pubescent; ovary pubescent | 43. <i>C. smaragdina</i> |
| 6: | Style glabrous; ovary glabrous | |
| 7 | Leaf lamina 3–5.5 cm long; young twigs clothed in straight and tortuous, erect and prostrate hairs | 3. <i>C. bellendenkerana</i> |
| 7: | Leaf lamina 6.5–15.5 cm long; young twigs clothed in straight, prostrate hairs | 22. <i>C. grandis</i> |
| 5: | Flowers odourless or emitting a pleasant odour | |
| 8 | Lamina glaucous on underside | |
| 9 | Midrib depressed or flush with upper surface | 12. <i>C. densiflora</i> |
| 9: | Midrib raised in upper surface | 16. <i>C. exfoliata</i> |
| 8: | Lamina green on underside | |
| 10 | Primary veins (not the basal pair) subtend an angle of > 45° with midrib | 37. <i>C. pleurosperma</i> |
| 10: | Primary veins (not the basal pair) subtend an angle of < 45° with midrib | |
| 11 | Mature twigs glabrous, or almost so | 7. <i>C. clarksoniana</i> |
| 11: | Mature twigs hairy | |
| 12 | Twig hairs all erect | 44. <i>C. triplinervis</i> |
| 12: | Twig hairs prostrate (occasionally some also erect) | |
| 13 | Perianth tube 1–1.4 mm long | 16. <i>C. exfoliata</i> |
| 13: | Perianth tube 1.4–2.7 mm long | 44. <i>C. triplinervis</i> |

- 4: Leaves penninerved
- 14 Midrib raised on upper surface
- 15 Flowers unpleasantly perfumed
- 16 Twig hairs straight and appressed; hairs on underside of leaf lamina straight and appressed **26. *C. lividula***
- 16: Twig hairs tortuous and erect; hairs on underside of leaf lamina tortuous and erect **35. *C. obovata***
- 15: Flowers pleasantly perfumed or without any obvious perfume
- 17 Primary vein angle greater than 45°; primary veins forking and forming definite loops well inside lamina margin
- 18 Petiole 5–13 mm long [Cape York Penin.] **8. *C. claudiana***
- 18: Petiole 4–6 mm long [southern Qld] **42. *C. sclerophylla***
- 17: Primary vein angle < 45°; primary veins curving inside lamina margin but not forming definite loops
- 19 Outer tepals 1.1–1.4 mm long **7. *C. clarksoniana***
- 19: Outer tepals 1.5–2.1 mm long
- 20 Ovary 0.7–0.9 mm long **16. *C. exfoliata***
- 20: Ovary 1–1.4 mm long **44. *C. triplinervis***
- 14: Midrib depressed or flush with upper surface
- 21 Lamina green on underside
- 22 Tepals glabrous on abaxial surface (sometimes sparsely hairy) **29. *C. meisneriana***
- 22: Tepals pubescent on abaxial surface
- 23 Twig hairs straight
- 24 Flowers unpleasantly perfumed **26. *C. lividula***
- 24: Flowers without any obvious odour
- 25 Outer tepals 1.5–2.1 mm long; mature twigs pubescent **44. *C. triplinervis***
- 25: Outer tepals 1.1–1.4 mm long; mature twigs almost glabrous **7. *C. clarksoniana***
- 23: Many twig hairs tortuous
- 26 Underside of lamina clothed in erect hairs **44. *C. triplinervis***
- 26: Underside of lamina clothed in appressed hairs
- 27 Twigs fluted; style glabrous or sparsely pubescent **23. *C. hypospodia***
- 27: Twigs angular; style pubescent **1. *C. angulata***
- 21: Lamina white or glaucous on underside
- 28 Tepals glabrous on abaxial surface **29. *C. meisneriana***
- 28: Tepals pubescent on abaxial surface
- 29 Inflorescence hairs > 0.4 mm long
- 30 Petiole 7–14 mm long; primary veins 5–10 pairs; inflorescence approximating or exceeding leaves **38. *C. putida***
- 30: Petiole 4–7 mm long; primary veins 3 or 4 pairs; inflorescence not exceeding leaves **3. *C. bellendenkerana***
- 29: Inflorescence hairs < 0.4 mm long
- 31 Abaxial surface of tepals clothed in erect, tortuous hairs
- 32 Reticulate veins not raised on underside of lamina; lateral veins 4–9 pairs

- 33 Leaf lamina oblong or obovate with apex obtuse or rounded; floral bracts 0.6–1.5 mm long, present or absent at anthesis; inner surface of perianth tube pubescent from base to apex **35. *C. obovata***
- 33: Leaf lamina elliptic or ovate with apex acute or obtuse; floral bracts 0.4–0.6 mm long, absent at anthesis; inner surface of perianth tube pubescent only near apex **23. *C. hypospodia***
- 32: Reticulate veins conspicuously raised on underside of lamina; lateral veins 6–14 pairs
- 34 Style 1.1–1.4 mm long; petiole 7–13 mm long **5. *C. brassii***
- 34: Style 0.7–1.2 mm long; petiole 11–21 mm long **28. *C. mackinnoniana***
- 31: Abaxial surface of tepals clothed in appressed, usually straight, occasionally tortuous hairs
- 35 Twig hairs erect
- 36 Leaves > 8 cm long; inflorescence paniculate, exceeding leaves **5. *C. brassii***
- 36: Leaves 3–6 cm long; inflorescence racemose (sometimes paniculate), not exceeding leaves
- 37 Flowers emitting an unpleasant odour; primary veins 3 or 4 pairs; primary vein angle < 45° **3. *C. bellendenkerana***
- 37: Flowers without an obvious odour; primary veins 5–8 pairs; primary vein angle > 45° **13. *C. dorrigensis***
- 35: Twig hairs appressed
- 38 Vestigial styles present; flowers emitting an unpleasant odour
- 39 Old leaves sericeous on underside **43. *C. smaragdina***
- 39: Old leaves almost glabrous on underside
- 40 Leaves almost white on underside; midrib depressed on upper surface **25. *C. leucophylla***
- 40: Leaves glaucous on underside (sometimes green); midrib raised or flush with upper surface **26. *C. lividula***
- 38: Vestigial styles absent; flowers without any obvious perfume
- 41 Midrib raised or flush with upper surface; inflorescence paniculate, many-flowered **26. *C. lividula***
- 41: Midrib depressed on upper surface; inflorescence usually cymose or racemose, occasionally paniculate
- 42 Leaf lamina widest towards base; older twigs pubescent; inflorescence paniculate or cymose **40. *C. rigida***
- 42: Leaf lamina widest about middle; older twigs glabrous; inflorescence usually racemose, sometimes paniculate **33. *C. nova-anglica***
- 3: Lower half of perianth tube glabrous on inner surface
- 43 Leaves triplinerved
- 44 Twigs clothed in persistent, mostly tortuous, erect hairs
- 45 Underside of lamina clothed in mainly erect, tortuous hairs **44. *C. triplinervis***
- 45: Underside of lamina clothed in mainly straight, appressed hairs
- 46 Leaves green on underside; lamina 10.5–16.5 cm long **6. *C. burckiana***
- 46: Leaves slightly glaucous on underside; lamina 7–11 cm long **46. *C. whiffiniana***

- 44:** Twigs clothed in straight, appressed hairs when young but soon becoming almost glabrous
- 47** Domatia (with tufts of hair) present in axils of basal pair of primary veins on younger leaves (sometimes more difficult to see on older leaves) **22. *C. grandis***
- 47:** Domatia not present in axils of basal pair of primary veins on any leaves
- 48** Tepals glabrous on outer surface; inflorescence racemose or paniculate **24. *C. laevigata***
- 48:** Tepals pubescent on outer surface; inflorescence paniculate
- 49** Mature twigs clothed in persistent hairs **44. *C. triplinervis***
- 49:** Mature twigs almost glabrous
- 50** Inflorescence exceeding leaves; inflorescence bracts c. 1 mm long, persistent or deciduous, present or absent at anthesis **4. *C. bidwillii***
- 50:** Inflorescence not exceeding leaves; inflorescence bracts c. 0.4–0.8 mm long, deciduous, absent at anthesis
- 51** Primary veins (not the basal pair) subtend an angle of $> 45^\circ$ with the middle **37. *C. pleurosperma***
- 51:** Primary veins (not the basal pair) subtend an angle of $< 45^\circ$ with the middle **7. *C. clarksoniana***
- 43:** Leaves penninerved
- 52** Leaves green on underside
- 53** Leaf lamina < 4.5 cm long **47. *C. williwilliana***
- 53:** Leaf lamina > 4.5 cm long
- 54** Freshly broken twigs or stem bark emitting a strong odour (possibly resembling coconut)
- 55** Primary veins 3 or 4 pairs; apex of leaf lamina acuminate; leaf lamina usually widest below middle; lateral veins usually depressed on upper surface of leaf lamina [mountain rainforests, northern Qld] **9. *C. cocosoides***
- 55:** Primary veins 4–8 pairs; apex of leaf lamina obtuse or rounded, rarely shortly acuminate; leaf lamina widest about middle; lateral veins flush with upper surface [lowland rainforests, Kimberleys to northern Qld] **11. *C. cunninghamii***
- 54:** Freshly broken twigs or stem bark not emitting a strong odour (any odour detected being either faint or not resembling coconut)
- 56** Tepals glabrous on abaxial surface; reticulate veins not visible on upper surface of leaf lamina **29. *C. meisneriana***
- 56:** Tepals pubescent on abaxial surface; reticulate veins visible on upper surface of leaf lamina
- 57** Leaf lamina widest below middle
- 58** Style 0.6–1.2 mm long **7. *C. clarksoniana***
- 58:** Style 1.1–1.8 mm long
- 59** Twigs clothed in erect hairs **44. *C. triplinervis***
- 59:** Twigs clothed in appressed hairs
- 60** Pedicel 0.3–0.6 mm long **44. *C. triplinervis***
- 60:** Pedicel 1.5–2 mm long **17. *C. floydii***
- 57:** Leaf lamina widest about middle (rarely below middle)

- 61 Style pubescent
- 62 Midrib raised on upper surface of leaf lamina 31. *C. microneura*
- 62: Midrib depressed or flush with upper surface of leaf lamina
- 63 Underside of lamina clothed in erect hairs 44. *C. triplinervis*
- 63: Underside of lamina clothed in appressed hairs
- 64 Twigs fluted; inflorescences > 70 mm long; older twigs pubescent 23. *C. hypospodia*
- 64: Twigs angular; inflorescences < 70 mm long; older twigs glabrous 1. *C. angulata*
- 61: Style glabrous
- 65 Twig hairs erect
- 66 Twig hairs pale brown; pedicel 0.3–1 mm long; primary veins forming loops inside lamina margin 18. *C. foetida*
- 66: Twig hairs dark brown; pedicel absent or to 0.6 mm long; primary veins not forming loops inside lamina margin
- 67 Underside of lamina clothed in persistent, straight and tortuous, erect hairs 44. *C. triplinervis*
- 67: Underside of lamina clothed in persistent, appressed hairs or if erect then not persistent
- 68 Midrib depressed or grooved on upper surface of leaf lamina; ovary 0.6–0.9 mm long; style 0.8–0.9 mm long 14. *C. endiandrifolia*
- 68: Midrib flush with upper surface of leaf lamina; ovary 0.9–1.2 mm long; style 1.1–1.6 mm long 23. *C. hypospodia*
- 65: Twig hairs appressed
- 69 Twigs clothed in brown or dark brown hairs which persist on mature twigs
- 70 Midrib depressed or grooved on upper surface of leaf lamina; ovary 0.6–0.9 mm long; style 0.8–0.9 mm long 14. *C. endiandrifolia*
- 70: Midrib flush with upper surface of leaf lamina; ovary 0.9–1.2 mm long; style 1.1–1.4 mm long 23. *C. hypospodia*
- 69: Twigs clothed in brown or pale brown hairs which do not (or scarcely) persist on mature twigs
- 71 Pedicel absent, i.e. flowers sessile 27. *C. macdonaldii*
- 71: Pedicel 0.3–1 mm long
- 72 Flowers emitting an unpleasant odour
- 73 Leaf lamina 6–9.5 cm long; primary veins forming definite loops, well inside lamina margin; primary vein angle > 40° 18. *C. foetida*
- 73: Leaf lamina 8–11.5 cm long; primary veins gradually decreasing in size and curving inside lamina margin or forming inconspicuous loops; primary vein angle < 40° 26. *C. lividula*
- 72: Flowers without an odour or faintly but pleasantly perfumed
- 74 Primary vein angle > 45° 8. *C. claudiana*
- 74: Primary vein angle < 45°
- 75 Ovary 1.3–1.4 mm long; style c. 1.6 mm long 31. *C. microneura*
- 75: Ovary 0.7–1.1 mm long; style 0.9–1.4 mm long 4. *C. bidwillii*

52: Leaves white or glaucous on underside

76 Twig hairs erect

77 Freshly broken twigs emit a strong coconut odour

9. *C. cocosoides*

77: Freshly broken twigs do not emit a strong coconut odour

78 Twig hairs mostly > 0.4 mm long; flowers sessile or shortly pedicellate

79 Inflorescence hairs dark brown; mature leaves almost glabrous on underside, scattered hairs on midrib and primary veins only

38. *C. putida*

79: Inflorescence hairs pale brown; mature leaves pubescent at least along midrib and primary veins on underside

80 Primary veins 8–19 pairs; flowers sessile

32. *C. murrayi*

80: Primary veins 4–7 pairs; flowers sessile or with a pedicel to 0.3 mm long

39. *C. rhodosperma*

78: Twig hairs mostly < 0.4 mm long; flowers usually pedicellate

81 All hairs straight and appressed on abaxial surface of tepals

82 Midrib raised on upper surface of leaf lamina; petiole flat on upper surface

46. *C. whiffiniana*

82: Midrib depressed on upper surface of leaf lamina; petiole channelled on upper surface

83 Leaf lamina 3–5.5 cm long; tepals 1.7–2.2 mm long

3. *C. bellendenkerana*

83: Leaf lamina 6–13.5 cm long; tepals 1.3–1.8 mm long

30. *C. melanocarpa*

81: Many hairs tortuous and erect on abaxial surface of tepals

84 Leaf lamina almost white on underside

36. *C. onoprienkoana*

84: Leaf lamina green or glaucous on underside

85 Inflorescence hairs > 0.4 mm long

39. *C. rhodosperma*

85: Inflorescence hairs < 0.4 mm long

86 Flowers emitting an unpleasant odour

23. *C. hypospodia*

86: Flowers pleasantly perfumed or without any obvious odour

87 Lamina arched between primary veins on upper surface; secondary veins (arising from midrib) \pm at right angles to midrib; leaves widest about middle

10. *C. corrugata*

87: Lamina \pm flat between primary veins on upper surface; secondary veins not obviously at right angles to midrib; leaves widest below middle

41. *C. saccharata*

76: Twig hairs appressed

88 Tepals glabrous on abaxial surface

29. *C. meisneriana*

88: Tepals pubescent on abaxial surface

89 Floral bracts spatulate; bracts present at anthesis

15. *C. erythroxylon*

89: Floral bracts linear, lanceolate, navicular or triangular; bracts present or absent at anthesis

90 Twig hairs tortuous or at least a significant proportion tortuous

91 Leaf lamina 3–5.5 cm long; midrib depressed on upper surface

3. *C. bellendenkerana*

91: Leaf lamina 5.5–25 cm long; midrib raised or flush with upper surface

LAURACEAE

4. *Cryptocarya*

- | | |
|--|---------------------------|
| 92 Domatia (tufts of hair) present in axils of basal primary veins of most mature leaves | 46. <i>C. whiffiniana</i> |
| 92: Domatia not present on any leaves | |
| 93 Leaf lamina widest below middle; outer tepals larger than inner tepals | 41. <i>C. saccharata</i> |
| 93: Leaf lamina widest about middle; outer tepals narrower than inner tepals but of similar length | 23. <i>C. hypospodia</i> |
| 90: Twig hairs straight or nearly straight | |
| 94 Flowers without any obvious odour | |
| 95 Midrib depressed on upper surface; inflorescence not or scarcely exceeding leaves | 20. <i>C. glaucescens</i> |
| 95: Midrib raised on upper surface; inflorescence exceeding leaves | 31. <i>C. microneura</i> |
| 94: Flowers emitting an unpleasant odour | |
| 96 Leaves almost white on underside | |
| 97 Floral bracts linear; midrib raised or flush with upper surface | 2. <i>C. bamagana</i> |
| 97: Floral bracts triangular, navicular or lanceolate; midrib depressed on upper surface | 25. <i>C. leucophylla</i> |
| 96: Leaves glaucous on underside | |
| 98 Inflorescences exceeding leaves; style 0.9–1.3 mm long; outer tepals 1–1.4 mm long | 45. <i>C. vulgaris</i> |
| 98: Inflorescences not exceeding leaves; style 1.3–1.9 mm long; outer tepals 1.5–2.1 mm long | 26. <i>C. lividula</i> |

Fruiting Material

- | | |
|--|----------------------------|
| 1 Cotyledons ruminant, i.e. with a number of intrusions of the testa into each cotyledon, not only between the faces of the cotyledons | |
| 2 Foveoles present and quite conspicuous on underside of lamina | 19. <i>C. foveolata</i> |
| 2: Foveoles absent (rarely small and inconspicuous) on underside of lamina | |
| 3 Leaf lamina not glaucous on underside, usually green or colour completely obscured by hairs | |
| 4 Freshly broken twigs and stem bark emitting an odour like that of coconut, coconut ice or coconut and apricots | |
| 5 Apex of leaf lamina acuminate; leaf lamina widest below middle; primary veins 3 or 4 pairs [mountain rainforests, northern Qld] | 9. <i>C. cocosoides</i> |
| 5: Apex of leaf lamina obtuse, rounded or shortly acuminate; leaf lamina widest near middle; primary veins 4–8 pairs [lowland rainforests, Kimberley region to northern Qld] | 11. <i>C. cunninghamii</i> |
| 4: Freshly broken twigs and stem bark not emitting an odour like that of coconut, coconut ice or coconut and apricots | |
| 6 Reticulate veins prominent and raised on underside of dried leaves; fruits 8–13 mm long | 18. <i>C. foetida</i> |
| 6: Reticulate veins not prominent, not or scarcely raised on underside of dried leaves; fruits 13–18 mm long | 23. <i>C. hypospodia</i> |
| 3: Leaf lamina glaucous on underside | |
| 7 Leaves triplinerved | |

- 8 Fruits 13–20 mm long; older leaves puberulous to almost glabrous on underside **22. *C. grandis***
- 8: Fruits 9–10 mm long; older leaves sericeous on underside **43. *C. smaragdina***
- 7: Leaves penninerved
- 9 Twig hairs straight
- 10 Older leaves sericeous on underside; primary veins conspicuously raised on underside of leaf lamina **43. *C. smaragdina***
- 10: Older leaves glabrous or sparsely pubescent on underside; primary veins scarcely raised on underside of leaf lamina
- 11 Fruits 11.5–14 mm long; seed 9–12 mm long; petiole 4–8 mm long; midrib raised or flush with upper surface **26. *C. lividula***
- 11: Fruits 9–10 mm long; seed 6–7 mm long; petiole 7–12 mm long; midrib flush with upper surface **2. *C. bamagana***
- 9: Twig hairs tortuous
- 12 Infructescence 1–5 cm long
- 13 Primary veins 3 or 4 pairs; leaf lamina 3.5–5.5 cm long **3. *C. bellendenkerana***
- 13: Primary veins 4–6 pairs; leaf lamina 6.5–13.5 cm long **30. *C. melanocarpa***
- 12: Infructescence 6–20 cm long
- 14 Leaf lamina oblong or obovate; apex obtuse or rounded; seed 8–8.5 mm long **35. *C. obovata***
- 14: Leaf lamina elliptic or ovate; apex acute or obtuse; seed 8.5–16 mm long **23. *C. hypospodia***
- 1: Cotyledons uniform, i.e. not ruminant (on rare occasions there may be a narrow intrusion of the testa between the faces of the cotyledons but the cotyledons proper are not penetrated)
- 15 Fruits > 30 mm long; pink, red or orange when ripe
- 16 Leaves triplinerved; endocarp longitudinally ribbed **37. *C. pleurosperma***
- 16: Leaves not triplinerved; endocarp without longitudinal ribs **34. *C. oblata***
- 15: Fruits < 30 mm long; usually black or glaucous black, rarely red or orange when ripe
- 17 Fruits < 15 mm long
- 18 Leaves glaucous on underside at least when young
- 19 Twig hairs erect and tortuous
- 20 Radicle lateral **46. *C. whiffiniana***
- 20: Radicle apical
- 21 Leaves almost white on underside, particularly when young; endocarp 0.3–0.5 mm thick **36. *C. onoprienkoana***
- 21: Leaves slightly glaucous on underside; endocarp 0.4–0.9 mm thick
- 22 Fruits ovoid, occasionally globular; reticulate veins not or scarcely raised on underside of leaf lamina **38. *C. putida***
- 22: Fruits ellipsoidal; reticulate veins conspicuously raised on underside of leaf lamina
- 23 Young twigs with hairs > 0.4 mm long **32. *C. murrayi***
- 23: Young twigs with hairs < 0.4 mm long **5. *C. brassii***
- 19: Twig hairs appressed and mainly straight
- 24 Leaves triplinerved

LAURACEAE

4. *Cryptocarya*

- 25 Fruits depressed globular; fruits longitudinally ribbed; midrib depressed or flush with upper surface **12. *C. densiflora***
- 25: Fruits globular or ellipsoidal; fruits without longitudinal ribs; midrib usually raised on upper surface **16. *C. exfoliata***
- 24: Leaves penninerved
- 26 Fruits laterally compressed; distinctly wider than long; midrib depressed on upper surface **20. *C. glaucescens***
- 26: Fruits not laterally compressed; usually longer than wide, rarely wider than long; midrib raised, flush with or depressed on upper surface
- 27 Fruits pyriform (occasionally depressed globular)
- 28 Fruits c. 20–25 mm long; leaf lamina 6.5–14.5 cm long; petiole 8–19 mm long **15. *C. erythroxylon***
- 28: Fruits c. 12–15 mm long; leaf lamina 5.5–7.5 cm long; petiole 5–8 mm long **33. *C. nova-anglica***
- 27: Fruits globular, ellipsoidal or ovoid
- 29 Leaf lamina distinctly glaucous or whitish on underside; midrib depressed or flush with upper surface
- 30 Fruits 13–17 mm long; hairs inconspicuous but persisting on underside of old leaves **25. *C. leucophylla***
- 30: Fruits 8–13 mm long; underside of leaves sparsely pubescent or almost glabrous **45. *C. vulgaris***
- 29: Leaf lamina only slightly glaucous on underside; midrib raised on upper surface
- 31 Fruits 12–14 mm diam. [northern N.S.W., southern Qld] **31. *C. microneura***
- 31: Fruits 9–11 mm diam. [northern Qld, N.T.] **16. *C. exfoliata***
- 18: Leaves green on underside
- 32 Radicle lateral
- 33 Leaves triplinerved
- 34 Older twigs pubescent; twig hairs tortuous **6. *C. burckiana***
- 34: Older twigs ±glabrous; young twigs clothed in appressed hairs **16. *C. exfoliata***
- 33: Leaves penninerved
- 35 Primary vein angle > 45° **42. *C. sclerophylla***
- 35: Primary vein angle < 45° **16. *C. exfoliata***
- 32: Radicle apical
- 36 Leaf lamina 2.5–3.5 cm long **47. *C. williwilliana***
- 36: Leaf lamina 5.5–16.5 cm long
- 37 Midrib depressed on upper surface
- 38 Older twigs pubescent
- 39 Underside of mature leaves almost glabrous **14. *C. endiandrifolia***
- 39: Underside of mature leaves clothed in persistent hairs
- 40 Twig hairs > 0.4 mm long; underside of mature leaves clothed in tortuous, erect hairs **32. *C. murrayi***
- 40: Twig hairs < 0.4 mm long; underside of mature leaves clothed in straight, appressed hairs **44. *C. triplinervis***
- 38: Older twigs ±glabrous

- 41 Fruits very glaucous when ripe; infructescence axillary or below leaves **21. *C. glaucocarpa***
- 41: Fruits black when ripe (occasionally slightly glaucous); infructescence pseudoterminal **27. *C. macdonaldii***
- 37: Midrib raised or flush with upper surface
- 42 At least some twig hairs tortuous
- 43 Underside of lamina clothed in erect hairs
- 44 Leaf lamina 4.5–13 cm long; primary veins 2–6 pairs **44. *C. triplinervis***
- 44: Leaf lamina 11.5–30 cm long; primary veins 8–19 pairs **32. *C. murrayi***
- 43: Underside of lamina mainly clothed in appressed hairs (sometimes with a few erect hairs)
- 45 Twig hairs erect; lamina 4.5–8 cm wide **6. *C. burckiana***
- 45: Twig hairs appressed and erect; lamina 1.5–5 cm wide **44. *C. triplinervis***
- 42: Twig hairs straight only
- 46 Oil dots variable in shape, some \pm circular in shape, but others elongated, \pm streaky when viewed from upper surface with transmitted light; leaf lamina widest towards base **17. *C. floydii***
- 46: Oil dots \pm circular when viewed from upper surface with transmitted light; leaf lamina widest about middle, sometimes widest towards base
- 47 Mature twigs pubescent **44. *C. triplinervis***
- 47: Mature twigs glabrous or almost glabrous
- 48 Leaf lamina widest towards base
- 49 Testa c. 0.3 mm thick **4. *C. bidwillii***
- 49: Testa c. 0.1 mm thick **7. *C. clarksoniana***
- 48: Leaf lamina widest about middle
- 50 Primary veins 6–12 pairs; seed 11–12 mm long **8. *C. claudiana***
- 50: Primary veins 4–8 pairs; seed 6–9 mm long **31. *C. microneura***
- 17: Fruits > 15 mm long
- 51 Leaves glaucous on underside
- 52 Twig hairs straight
- 53 Fruits laterally compressed; wider than long **20. *C. glaucescens***
- 53: Fruits circular in cross section; usually longer than wide
- 54 Cotyledons pink or purplish **39. *C. rhodosperma***
- 54: Cotyledons white, yellow or cream
- 55 Infructescence (excluding fruit) < 20 mm long
- 56 Endocarp longitudinally ribbed; fruits ellipsoidal or ovoid **29. *C. meisneriana***
- 56: Endocarp without longitudinal ribs; fruits \pm broadly pyriform **33. *C. nova-anglica***
- 55: Infructescence (excluding fruit) > 20 mm long
- 57 Outer surface of fruit marked by numerous pale lenticel-like spots, readily visible to the naked eye from a distance of 2 m; leaf lamina 13–35 cm long; reticulate veins conspicuously raised on underside of leaf lamina **28. *C. mackinnoniana***
- 57: Outer surface of fruit without spots; leaf lamina 6–14 cm long; reticulate veins not or scarcely raised on underside of leaf lamina

Lauraceae

4. *Cryptocarya*

- 58 Fruits pyriform 15. *C. erythroxylon*
- 58: Fruits globular or ellipsoidal
- 59 Fruits 13–17 mm long; seed 9–11 mm long 25. *C. leucophylla*
- 59: Fruits 17–24 mm long; seed 11–20 mm long 40. *C. rigida*
- 52: Twig hairs tortuous
- 60 Fruits wider than long, bilobed 10. *C. corrugata*
- 60: Fruits longer than wide or length equals diam., not bilobed
- 61 Cotyledons pink or purplish 39. *C. rhodosperma*
- 61: Cotyledons white, cream or yellow
- 62 Outer surface of fruit marked by numerous, pale, lenticel-like spots readily visible to the naked eye from a distance of 2 m 28. *C. mackinnoniana*
- 62: Outer surface of fruit without spots
- 63 Midrib of older leaves hairy on upper surface
- 64 Leaf lamina 3.5–6 cm long; infructescence (excluding fruit) < 5 cm long 13. *C. dorrigensis*
- 64: Leaf lamina 10–30 cm long; infructescence (excluding fruit) > 5 cm long
- 65 Young twigs with hairs > 0.4 mm long 32. *C. murrayi*
- 65: Young twigs with hairs < 0.4 mm long 5. *C. brassii*
- 63: Midrib of older leaves glabrous on upper surface
- 66 Fruits ovoid or globular; leaf lamina widest about middle; lamina obtuse or rounded, sometimes acute at apex 38. *C. putida*
- 66: Fruits ellipsoidal or pyriform; leaf lamina usually widest below middle; lamina acuminate or acute at apex
- 67 Endocarp 0.5–0.8 mm thick; hairs on underside of lamina (between lateral veins) mainly erect 41. *C. saccharata*
- 67: Endocarp 0.2–0.5 mm thick; hairs on underside of lamina (between lateral veins) mainly appressed
- 68 Twig hairs mainly appressed; twig hairs straight and tortuous 40. *C. rigida*
- 68: Twig hairs mainly erect; twig hairs tortuous 36. *C. onoprienkoana*
- 51: Leaves green on underside
- 69 Endocarp longitudinally ribbed, the ribs being conspicuously raised and forming part of the endocarp
- 70 Leaves triplinerved; fruits 17–38 mm diam. 24. *C. laevigata*
- 70: Leaves penninerved; fruits 10–15 mm diam. 29. *C. meisneriana*
- 69: Endocarp without longitudinal ribs or with inconspicuous ribs which are not raised and do not form part of the endocarp
- 71 Fruits red or orange when ripe; fruits 35–46 mm wide 34. *C. oblata*
- 71: Fruits black or glaucous black when ripe; fruits 8–20 mm wide
- 72 Leaves triplinerved
- 73 Older twigs pubescent; twig hairs tortuous 6. *C. burckiana*
- 73: Older twigs ±glabrous; young twigs clothed in appressed hairs
- 74 Testa c. 0.1 mm thick 7. *C. clarksoniana*
- 74: Testa c. 0.3 mm thick 4. *C. bidwillii*

- 72:** Leaves penninerved
- 75** Midrib raised on upper surface of leaf lamina
- 76** Radicle lateral **42. *C. sclerophylla***
- 76:** Radicle apical
- 77** Leaf lamina widest below middle **7. *C. clarksoniana***
- 77:** Leaf lamina widest near middle **8. *C. claudiana***
- 75:** Midrib depressed or flush with upper surface of leaf lamina
- 78** Fruits > 20 mm long; seed > 15 mm long **1. *C. angulata***
- 78:** Fruits < 20 mm long; seed < 15 mm long
- 79** Midrib depressed on upper surface of leaf lamina
- 80** Infructescence axillary or below leaves; fruits very glaucous when ripe **21. *C. glaucocarpa***
- 80:** Infructescence pseudoterminal; fruits not or only slightly glaucous when ripe
- 81** Mesocarp with exocarp 0.2–0.3 mm thick; leaf lamina usually widest below middle **4. *C. bidwillii***
- 81:** Mesocarp with exocarp c. 0.8 mm thick; leaf lamina widest about middle
- 82** Mature twigs almost completely glabrous **27. *C. macdonaldii***
- 82:** Mature twigs clothed in tortuous, erect hairs **32. *C. murrayi***
- 79:** Midrib flush with upper surface of leaf lamina
- 83** Leaf lamina widest towards base; oil dots variable in shape, some ±circular, others elongated, ±streaky when viewed from upper surface with transmitted light **17. *C. floydii***
- 83:** Leaf lamina widest about middle; oil dots ±circular when viewed from upper surface with transmitted light
- 84** Mature twigs clothed in tortuous, erect hairs **32. *C. murrayi***
- 84:** Mature twigs almost completely glabrous
- 85** Testa c. 0.1 mm thick **7. *C. clarksoniana***
- 85:** Testa c. 0.3 mm thick **4. *C. bidwillii***

1. *Cryptocarya angulata* C.T.White, *Contr. Arnold Arbor.* 4: 33 (1933)

T: Gadgarra, Qld, 30 May, *S.F.Kajewski 1069*; holo: A; iso: B, BO, BRI, K, NSW.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 285, fig. 10 (1989).

Tree to 30 m. Stem usually not buttressed. Twigs angular, eventually glabrescent. Leaves: petiole 4–13 mm long; lamina lanceolate to elliptic to ovate, 4.7–14.2 cm long, 2.5–6 cm wide, penninerved, green below, eventually ±glabrescent. Inflorescence not exceeding leaves. Flowers creamy green, perfumed. Perianth tube 0.9–1.8 mm long, 1.3–1.8 mm wide, inner surface pubescent, or lower half glabrous. Tepals 1.3–1.7 mm long, 0.7–1.1 mm wide, pubescent. Outer anthers 0.5–0.7 mm long, 0.5–0.7 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.5–0.7 mm long. Inner anthers 0.6–0.7 mm long, 0.4–0.5 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.5–0.9 mm long. Ovary 0.8–1.1 mm long, 0.4–0.6 mm wide, sometimes pubescent at apex, otherwise glabrous; style pubescent. Fruit ellipsoidal, 24–30 mm long, 14–20 mm wide, blue-black or black. Cotyledons cream. *Ivory Laurel*.

Occurs from Cooktown to Eungella, Qld; from sea level to 1250 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Nov.–Jan.; fruits July–Dec. Map 156.

Qld: T.R. 146, Tableland L.A., *B.Hyland 10562* (QRS); S.F.R. 78 Dagmar, *B.Hyland 9231* (A, BO, BRI, K, KEP, NSW, QRS, RSA); S.F.R. 607, Bridle Creek Rd, *G.Stocker 1610* (QRS); S.F.R. 62, Eungella, *B.Hyland 4531 RFK* (QRS).

Blaze odour usually resembles freshly cut sugarcane.

2. *Cryptocarya bamagana* B.Hyland, *Austral. Syst. Bot.* 2: 171 (1989)

T: Bamaga, Qld, 8 Dec. 1982, *B.Hyland 25037 RFK*; holotype: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 286, fig. 11 (1989).

Tree to 15 m. Stem sometimes buttressed. Twigs terete or fluted, pubescent. Leaves: petiole 7–12 mm long; lamina lanceolate to elliptic, 8–14 cm long, 3–5 cm wide, penninerved, glaucous (almost white) below, eventually almost glabrescent. Inflorescence not exceeding leaves. Flowers cream, unpleasantly perfumed. Perianth tube 1.3 mm long, 1 mm wide, inner surface pubescent only towards apex. Tepals 1.6–1.7 mm long, c. 1 mm wide, pubescent. Outer anthers c. 0.8 mm long, 0.6 mm wide, pubescent abaxially, glabrous adaxially; filaments c. 0.5 mm long. Inner anthers c. 0.7 mm long, 0.5 mm wide, glabrous, or few hairs adaxially; filaments c. 0.7 mm long. Ovary c. 1.1 mm long, 0.4 mm wide, glabrous; style glabrous. Fruit globular, 9–10 mm long, 9.5–10 mm wide, black. Cotyledons white, cream.

Occurs on Cape York Penin., Qld; from 20–100 m alt. Usually grows in rainforests in moist, creekside situations in alluvial soils. Flowers Nov.–Dec.; fruits Sept., Dec. Map 157.

Qld: Bamaga, *B.Hyland 25038 RFK* (QRS); Bamaga, *B.Hyland 25012 RFK* (QRS); Hann Ck, 35 km E of Moreton, *B.Gray 3223* (QRS).

Differs from other species in having the leaf lamina white below, and cotyledons ruminate. Blaze odour often resembles cinnamon. Rudimentary style/s sometimes present.

3. *Cryptocarya bellendenkerana* B.Hyland, *Austral. Syst. Bot.* 2: 172 (1989)

T: State Forest Reserve 143, North Mary Logging Area, Qld, 2 Dec. 1982, *B.Gray 2868*; holotype: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 287, fig. 12 (1989).

Tree to 25 m. Stem sometimes buttressed. Twigs fluted, eventually almost glabrescent. Leaves: petiole, 4–7 mm long; lamina lanceolate to ovate, 2.5–5.4 cm long, 1.6–3.2 cm wide, penninerved, or somewhat triplinerved, glaucous below, eventually almost glabrescent. Inflorescence a panicle (almost racemose), not exceeding leaves. Flowers creamy green, unpleasantly perfumed. Perianth tube 0.9–1.6 mm long, 1.3–1.7 mm wide, inner surface pubescent, or lower half glabrous. Tepals 1.7–2.2 mm long, 1.1–1.6 mm wide, pubescent. Outer anthers 0.7–0.8 mm long, 0.5–0.8 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.5–0.9 mm long. Inner anthers 0.7–0.9 mm long, 0.5–0.6 mm wide, glabrous; filaments 0.6–0.9 mm long. Ovary 0.9–1.4 mm long, 0.5–0.6 mm wide, glabrous; style glabrous. Fruit globular, 10–11 mm long, 11–12.5 mm wide, black. Cotyledons cream.

Occurs from S of Cooktown to Mt Bartle Frere, N Qld; from 1100–1500 m alt. Grows in mountain rainforests in soils derived from granite. Flowers (June) Sept.–Jan.; fruits Jan., June, Oct. Map 158.

Qld: summit, Mt Finnigan (S of Cooktown), *V.Moriarty 1056* (QRS); S.F.R. 143, North Mary L.A. (Mt Lewis), *B.Gray 3299* (QRS); summit, Mt Bellenden Ker, *L.J.Webb & J.G.Tracey 11922* (BRI, QRS); Lamb Ra. (near Cairns), *F.Crome 480* (CANB, QRS); S.F.R. 755, Gosschalk L.A., Mt Bartle Frere, *B.Gray 697* (QRS).

Similar to *C. smaragdina*, differing in the lamina being glabrous at maturity. Blaze odour noticeable but difficult to describe.

4. *Cryptocarya bidwillii* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 74 (1864)

T: Wide Bay, Qld, *J.C.Bidwill 38*; holotype: K.

[*Cryptocarya moretoniana* auct. non Meisn.: W.D.Francis, *Austral. Rain-Forest Trees* 129 (1951), p.p.; A.G.Floyd & H.C.Hayes, *New South Wales Rain-Forest Trees, I, Lauraceae* 22 (1960)]

Tree to 20 m. Stem usually not buttressed. Twigs usually terete, eventually almost glabrescent. Leaves: petiole 3–10 mm long; lamina lanceolate to elliptic, 6–13 cm long, 1–5 cm wide, penninerved, sometimes triplinerved, green below, eventually almost glabrescent. Inflorescence usually exceeding leaves. Flowers creamy white; perfume unknown. Perianth tube 0.9–1.2 mm long, 1–1.3 mm wide, inner surface pubescent only towards apex. Tepals 1.2–1.7 mm long, 1–1.3 mm wide, pubescent. Outer anthers 0.5–0.7 mm long, 0.5–0.6 mm wide, glabrous, or pubescent abaxially; filaments 0.4–0.7 mm long. Inner anthers 0.7–0.8 mm long, 0.4–0.5 mm wide, glabrous, or pubescent adaxially; filaments 0.2–0.4 mm long. Ovary 0.7–0.9 mm long, 0.4–0.6 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 11–16 mm long, 8–12.5 mm wide, black. Cotyledons cream. *Yellow Laurel*.

Occurs from N of Mackay, Qld, to near Grafton, N.S.W.; from sea level to 1100 m alt. Grows in more seasonal rainforests. Flowers Dec.; fruits Nov. Map 159.

Qld: Port Mackay, *A.Dietrich 542* (MEL); Imbil, *W.T.Jones 3287* (CANB); Lamington Natl Park, SW of Cainbable Falls, *W.J.McDonald 2150* (BRI). N.S.W.: The Gorge, Clarence R., *A.G.Floyd 172* (NSW); Glenugie Peak, *H.C.Hayes NSW 121695* (NSW).

Blaze layering is encountered in this species, particularly specimens in very seasonal rainforests. Blaze odour distinctive, perhaps resembling limes.

5. *Cryptocarya brassii* C.K.Allen, *J. Arnold Arbor.* 23: 137 (1942)

T: Middle Fly River, Papua [New Guinea], *L.J.Brass 7516*; holo: A; iso: BO, BRI.

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 288, fig. 13; 345, fig. 70C (1989).

Tree to 20 m. Stem sometimes buttressed. Twigs fluted, pubescent. Leaves: petiole 7–13 mm long; lamina elliptic to oblong to lanceolate, 10–14 cm long, 3.5–6.5 cm wide, penninerved, ±glaucous below, pubescent. Inflorescence c. same length as leaves. Flowers cream, unpleasantly perfumed. Perianth tube 1.5–1.6 mm long, 1.6–1.8 mm wide, inner surface pubescent. Tepals pubescent: outer 1.4–1.7 mm long, 1.1–1.4 mm wide; inner 1.4–1.9 mm long, 1–1.3 mm wide. Outer anthers 0.7–0.9 mm long, 0.5–0.7 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.3–0.6 mm long. Inner anthers 0.8–1 mm long, c. 0.5 mm wide, glabrous abaxially, pubescent adaxially; filaments 0.5–0.6 mm long. Ovary 1–1.4 mm long, 0.5–0.6 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 14–15 mm long, c. 11 mm wide, black to blue-black. Cotyledons creamy yellow.

Occurs on Cape York Penin., from Bamaga to Coen, Qld; from 40–100 m alt. Grows in gallery forests in alluvial soils. Also found in New Guinea. Flowers Sept.; fruits Nov.–Dec. Map 160.

Qld: Bamaga, *B.Hyland 12372* (QRS); Lockerbie, *B.Hyland 10947* (QRS); Heathlands, *B.Hyland 10038* (QRS); Rocky R. (E of Cohen), *B.Hyland 5455* (QRS).

Blaze odour noticeable, difficult to describe.

6. *Cryptocarya burckiana* Warb., *Bot. Jahrb. Syst.* 13: 315 (1891)

T: Key Island - Malesia, *O.Warburg 20503*; iso: A.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 289, fig. 14 (1989).

Tree to 10 m. Stem sometimes buttressed. Twigs fluted, angular, pubescent. Leaves: petiole 6–13 mm long; lamina lanceolate to elliptic, 10.5–16.5 cm long, 4.5–8 cm wide, triplinerved, green below, eventually almost glabrescent; domatia usually present. Inflorescence a panicle, sometimes ±racemose, mainly axillary, scarcely exceeding leaves. Flowers cream, not perfumed. Perianth tube 1.4–2 mm long, 1.4 mm wide, pubescent only towards apex. Tepals 1.1–1.9 mm long, 0.8–1.3 mm wide, pubescent. Outer anthers 0.5–0.6 mm long, 0.5–0.6 mm wide, pubescent abaxially, mainly glabrous adaxially; filaments 0.3–0.4 mm long. Inner anthers 0.5–0.7 mm long, 0.4–0.5 mm wide, glabrous; filaments 0.3–0.6 mm long. Ovary 0.9–1.1 mm long, 0.5–0.6 mm wide, glabrous; style glabrous. Fruit globular, 13–15 mm long, 11–13 mm wide, black. Cotyledons cream. Plate 25.

Occurs on Cape York Penin., Qld; from sea level to 100 m alt. Grows in lowland rainforests and gallery forests, soil preference unknown. Also found in Malesia. Flowers Nov.–Jan.; fruits Oct.–Dec. Map 161.

Qld: Claudie R., *B.Gray* 3616 (QRS); Claudie R., *K.Sanderson* 1846 (QRS); Claudie R., *B.Hyland* 13100 (QRS); Claudie R., *B.Hyland* 3587RFK (QRS).

7. *Cryptocarya clarksoniana* B.Hyland, *Austral. Syst. Bot.* 2: 175 (1989)

T: State Forest Reserve 700, Gadgarra, Qld, 3 Feb. 1983, *B.Gray* 2966; holotype: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 290, fig. 15 (1989).

Tree to 19 m. Stem not buttressed. Twigs ±terete, eventually ±glabrescent. Leaves: petiole 5–10 mm long; lamina lanceolate to elliptic, 5.5–15 cm long, 2–5 cm wide, penninerved or somewhat triplinerved, green below, soon glabrescent. Inflorescence not exceeding leaves. Flowers creamy green, perfumed. Perianth tube 1.1–1.5 mm long, 1.1–1.4 mm wide, inner surface glabrous, sometimes sparsely pubescent. Tepals pubescent; outer 1.1–1.8 mm long, 0.8–1 mm wide; inner 1.2–1.7 mm long, 1.1–1.3 mm wide, pubescent. Outer anthers 0.5–0.6 mm long, 0.5–0.6 mm wide, glabrous, or pubescent abaxially; filaments 0.4–0.7 mm long. Inner anthers 0.6–0.7 mm long, 0.4–0.5 mm wide, usually glabrous; filaments 0.5–0.6 mm long. Ovary 0.9–1.2 mm long, 0.5–0.6 mm wide, glabrous; style glabrous. Fruit globular, ellipsoidal, 14–15 mm long, 11–13 mm wide, black. Cotyledons cream.

Occurs in N Qld, from Big Tableland (S of Cooktown) to Goldsborough (near Babinda); from sea level to 1100 m alt. Grows in rainforests, particularly the more seasonal rainforests rich in *Agathis robusta*, in soils derived from granite. Flowers Dec.–Mar.; fruits Jan.–Dec. Map 162.

Qld: T.R. 146, Tableland L.A., *B.Hyland* 10594 (QRS); T.R. 146, Monkhouse L.A., *B.Hyland* 12125 (QRS); Oliver Ck (S of Cape Tribulation), *K.Sanderson* 1376 (QRS); S.F.R. 310, Goldsborough L.A., *B.Hyland* 9638 (QRS).

Blaze odour noticeable but difficult to describe.

8. *Cryptocarya claudiana* B.Hyland, *Austral. Syst. Bot.* 2: 176 (1989)

T: Claudie R., Qld, 20 Jan. 1982, *B.Hyland* 11499; holotype: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 291, fig. 16 (1989).

Tree to 10 m. Stem not buttressed. Twigs ±terete, soon glabrescent. Leaves: petiole 5–13 mm long; lamina oblong to elliptic, 8.5–16 cm long, 3–6.5 cm wide, penninerved, green and glabrous below. Inflorescence usually axillary, not exceeding leaves. Flowers creamy green, perfumed. Perianth tube 1.2–1.3 mm long, 1.3–1.5 mm wide, inner surface pubescent. Tepals 1.6–1.8 mm long, 1.2–1.4 mm wide, pubescent. Outer anthers c. 0.7 mm long, 0.5–0.6 mm long, pubescent abaxially, glabrous adaxially; filaments c. 0.6 mm long. Inner anthers 0.7–0.8 mm long, c. 0.5 mm wide, glabrous; filaments c. 0.7 mm long. Ovary 0.9–1 mm long, c. 0.5 mm wide, glabrous; style glabrous. Fruit ellipsoidal, globular, 14–16 mm long, 11–13 mm wide, black. Cotyledons cream.

Occurs on Cape York Penin., from Claudie R. to Rocky R., E of Coen, Qld; from sea level to 500 m alt. Grows in rainforests in soils derived from granite and metamorphic rocks. Flowers Jan.; fruits Dec. Map 163.

Qld: Chester R., *B.Hyland* 9440 (QRS); Claudie R., *B.Hyland* 11499 (QRS); Rocky R. catchment, *B.Hyland* 2852 RFK (BRI, CANB, K, QRS)

This species is related to *C. clarksoniana*, differing in the usually larger leaves and the inner surface of the perianth tube pubescent throughout in *C. claudiana*.

9. *Cryptocarya cocosoides* B.Hyland, *Austral. Syst. Bot.* 2: 177 (1989)

T: State Forest Reserve 700, Gillies Logging Area, 16 Feb. 1977, *B.Gray* 297; holotype: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 292, fig. 17 (1989).

Tree to 30 m. Stem usually buttressed. Twigs fluted, tomentose. Leaves: petiole 8–17 mm long; lamina lanceolate to elliptic, 7.3–15 cm long, 2.5–5.5 cm wide, penninerved, tending triplinerved, glaucous and tomentose below. Inflorescence \pm exceeding leaves. Flowers creamy green, perfumed. Perianth tube 1.2–2.9 mm long, 1.7–2 mm wide, mainly glabrescent. Tepals pubescent: outer 1.8–2.5 mm long, 1.4–1.7 mm wide, inner 1.6–2.3 mm long, 1.3–1.6 mm wide. Outer anthers 0.6–0.9 mm long, 0.6–0.8 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.5–1 mm long. Inner anthers 0.7–1 mm long, 0.5–0.6 mm wide, pubescent; filaments 0.6–1 mm long. Ovary 0.9–1.2 mm long, 0.5–0.7 mm wide, glabrous; style glabrous. Fruit globular to depressed-globular, 14–15 mm long, 16–17 mm wide, black to purple. Cotyledons creamy white. *Coconut Laurel*.

Occurs from Tinaroo Hills, Lamb Ra. to Koombooloomba, N Qld; at 750–1150 m alt. Grows in mountain rainforests, most commonly in soils derived from granite. Flowers Jan.–Feb.; fruits Sept.–Dec. Map 164.

Qld: S.F.R. 185, Robson L.A., *B.Gray* 638 (QRS); S.F.R. 194, Western L.A., Herberton Ra., *B.Gray* 722 (QRS); S.F.R. 194, Western L.A., *G.Unwin* 687 (QRS); S.F.R. 605, Dawson L.A., Koombooloomba, *B.Hyland* 1114 (QRS).

All parts of this species emit a strong odour when cut or broken, usually equated with coconut, although the leaf odour may resemble citronella. The flowers may emit an unpleasant perfume, although it is impossible to detect on recently collected specimens due to the strong leaf and twig odours. This species is suspected of causing dermatitis.

10. *Cryptocarya corrugata* C.T.White & W.D.Francis, *Proc. Roy. Soc. Queensland* 37: 165 (1926)

T: Eungella Ra., Qld, Oct. 1922, *W.D.Francis s.n.*; holotype: BRI; isotype: K, MEL.

Tree to 35 m. Stem sometimes buttressed. Twigs \pm fluted, pubescent. Leaves: petiole 6–18 mm long; lamina ovate to elliptic, 3.5–11 cm long, 2–5.5 cm wide, penninerved, glaucous, eventually almost glabrescent. Inflorescence usually not exceeding leaves. Flowers cream, greenish, \pm perfumed. Perianth tube 0.8–1.4 mm long, 1.3–1.7 mm wide, inner surface pubescent only towards apex. Tepals 1.4–2.4 mm long, 0.8–1.4 mm wide, pubescent. Outer anthers 0.6–0.8 mm long, 0.5–0.7 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.5–0.8 mm long. Inner anthers 0.6–0.9 mm long, 0.4–0.5 mm wide, pubescent; filaments 0.4–0.9 mm long. Ovary 0.7–1.4 mm long, 0.5–0.7 mm wide, glabrous; style glabrous. Fruit wider than long, sometimes bilobed, 15–22 mm long, 22–34 mm wide, black to bluish black. Cotyledons yellowish. *Corduroy Laurel*.

Occurs from Cooktown to Eungella, Qld; from 350–1200 m alt. Grows in mountain rainforests in soils derived from a variety of rock types. Flowers Nov.–Jan.; fruits June–Jan. Map 165.

Qld: T.R. 146, Tableland L.A., *B.Hyland* 10555 (QRS); S.F.R. 700, Gillies L.A., *V.Moriarty* 2110 (QRS); Tully Falls Forestry Rd (Koombin Ck), *L.S.Smith* 4683 (A, BRI); Dotswood Holding, Paluma Ra., *B.Hyland* 2990 RFK (BRI, QRS); S.F.R. 62, Eungella, *B.Hyland* 11296 (QRS).

Blaze emits a conspicuous sugarcane odour. The sapwood surface is often corrugated.

11. *Cryptocarya cunninghamii* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 73 (1864)

Cryptocarya glaucescens var. *cunninghamii* (Meisn.) Benth., *Fl. Austral.* 5: 297 (1870). T: Hunters River, Brunswick Bay [W.A.], *A.Cunningham* 221; lectotype: G-DC; isotype: A, BM?, BRI, K, *fide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 179 (1989).

[*Cryptocarya glaucescens* auct. non R.Br.: C.A.Gardner, *Enum. Pl. Austral. Occ.* 44 (1930)]

Tree to 25 m. Stem sometimes buttressed. Twigs fluted or terete, pubescent. Leaves: petiole 5–12 mm long; lamina oblong to elliptic, 6.5–13.5 cm long, 2.4–5.6 cm wide, penninerved, green below, eventually almost glabrescent. Inflorescence scarcely exceeding leaves. Flowers creamy green, unpleasantly perfumed. Perianth tube 1–1.5 mm long, 1.2–1.7 mm wide, pubescent at apex, lower half glabrous. Tepals 1.3–2 mm long, 0.9–1.1 mm wide, pubescent. Outer anthers 0.7–0.8 mm long, 0.5–0.6 mm wide, glabrous; filaments 0.4–0.7 mm long. Inner anthers usually glabrous; filaments 0.4–0.7 mm long. Ovary 0.8–1.1 mm long,

c. 0.5 mm wide, glabrous or sparsely pubescent; style glabrous or sparsely pubescent. Fruit globular, 13–15 mm long, 13–16 mm wide, black to purplish black. Cotyledons creamy white. *Cunningham's Laurel*.

Occurs in the Kimberley, W.A., northern N.T., and from Cape York Penin. to Hinchinbrook Is., Qld; from sea level to 500 m alt. Grows in rainforests and monsoon forests. Also probably in New Guinea. Flowers May–Oct.; fruits (Mar.) June–Nov. Map 166.

W.A.: Mitchell Plateau, *J.S.Beard* 8225 (PERTH, QRS); SE of Cape Londonderry, northern Kimberley, *A.S.George* 13339 (PERTH). N.T.: Twin Falls, Kakadu Natl Park, *C.R.Dunlop* 5545 (BRI, DNA, K, QRS). Qld: Tozer Gap, Tozer Ra., *L.J.Brass* 19433 (A, CANB, K, L); Natl Park Res. 65, Hinchinbrook Is.–Bowen Ck, *B.Hyland* 10599 (QRS).

Blaze always emits a strong coconut or coconut-apricot odour. The fruits also emit a similar odour when cut, and can cause a burning sensation to the skin when handled. The sawdust has been known to cause dermatitis.

12. *Cryptocarya densiflora* Blume, *Bijdr. Fl. Ned. Ind.* 11: 556 (1826)

T: Mount Salak, Java, *C.Blume s.n.*; holo: BO.

Cryptocarya cinnamomifolia Benth., *Fl. Austral.* 5: 298 (1870); *C. cinnamomifolia* var. *cinnamomifolia*, F.M.Bailey, *Queensland Fl.* 4: 1301 (1901). T: Rockingham Bay, *J.Dallachy*; syn: K, MEL; ?isosyn: WRS�.

Tree to 30 m. Stem sometimes buttressed. Twigs fluted, eventually almost glabrescent. Leaves: petiole 7–16 mm long; lamina lanceolate to elliptic, 6.8–15 cm long, 2.5–6 cm wide, triplinerved, glaucous below, eventually almost glabrescent. Inflorescence \pm exceeding leaves. Flowers yellowish green, pale brown, not perfumed. Perianth tube 1–1.6 mm long, 1.4–1.9 mm wide, inner surface pubescent. Tepals pubescent; outer 1.9–2.7 mm long, 0.9–1.4 mm wide; inner 1.8–2.5 mm long, 1.1–1.6 mm wide. Outer anthers 0.6–0.9 mm long, c. 0.6 mm wide, usually glabrous; filaments 0.5–0.9 mm long. Inner anthers 0.7–1 mm long, c. 0.5 mm long, glabrous abaxially, pubescent adaxially; filaments 0.5–1 mm long. Ovary 0.9–1.2 mm long, 0.5–0.6 mm wide, glabrous; style glabrous. Fruit depressed-globular, ribbed, 11–14 mm long, 13–19.5 mm wide, reddish maroon, black when ripe. Cotyledons creamy white. *Cinnamon Laurel*.

Occurs from McIlwraith Ra. to Eungella, Qld; from 450–1200 m alt. (one specimen recorded at 180 m alt.). Grows in mountain rainforests most frequently in soils derived from granite. Also occurs throughout Malesia, W to Java. Flowers Oct.–Jan.; fruits Mar.–Dec. Map 167.

Qld: McIlwraith Ra., *G.Guymier* 47 (BRI); S.F.R. 144, Windsor Tableland, *B.Gray* 1204 (QRS); S.F.R. 62, Eungella, *B.Hyland* 11295 (QRS).

The sapwood surface is usually corrugated, cross sections of stems reveal ray-like markings, rather like those seen on cross sections of many proteaceous stems. Foveoles are sometimes visible in the axils of the primary veins.

13. *Cryptocarya dorrigensis* Frodin ex B.Hyland & A.G.Floyd, *Austral. Syst. Bot.* 2: 181 (1989)

T: Dorrig State Forest, N.S.W., 4 Oct. 1930, *C.T.White* 7497; holo: BRI.

Cryptocarya sp. nov. (*Dome Mountain*), A.G.Floyd, *New South Wales Rainforest Trees* part 1, 2nd edn, 30 (1979)

Illustration: B.P.M.Hyland, *op. cit.* 2: 293, fig. 18 (1989).

Shrub or tree to 20 m. Stem not buttressed. Twigs fluted or terete, pubescent. Leaves: petiole 4–5 mm long; lamina lanceolate, 3.6–5.9 cm long, 1.7–2 cm wide, penninerved, glaucous below, pubescent. Inflorescence usually a raceme, sometimes a panicle, usually axillary, not exceeding leaves. Flowers greenish cream, creamy yellow, not perfumed. Perianth tube 2.5 mm long, 1.4 mm wide, inner surface pubescent. Tepals 1.6–1.8 mm long, 1.3–1.4 mm wide, pubescent. Outer anthers c. 0.6 mm long, 0.5 mm wide, mainly glabrous; filaments c. 0.6 mm long. Inner anthers c. 0.8 mm long, 0.5 mm wide, usually glabrous; filaments c. 0.6 mm long.

Ovary c. 1.3 mm long, 0.6 mm wide, glabrous; style glabrous. Fruit globular to ellipsoidal, 16 mm long, 14–14.5 mm wide, black to blue-black. Cotyledons cream. Fig. 33.

Occurs in northern N.S.W., from W of Coffs Harbour to Point Lookout (S of Ebor); from 600–1000 m alt. Grows in mountain rainforests in soils of low fertility derived from sedimentary and metamorphic rocks. Flowers May–Nov.; fruits Feb.–May. Map 168.

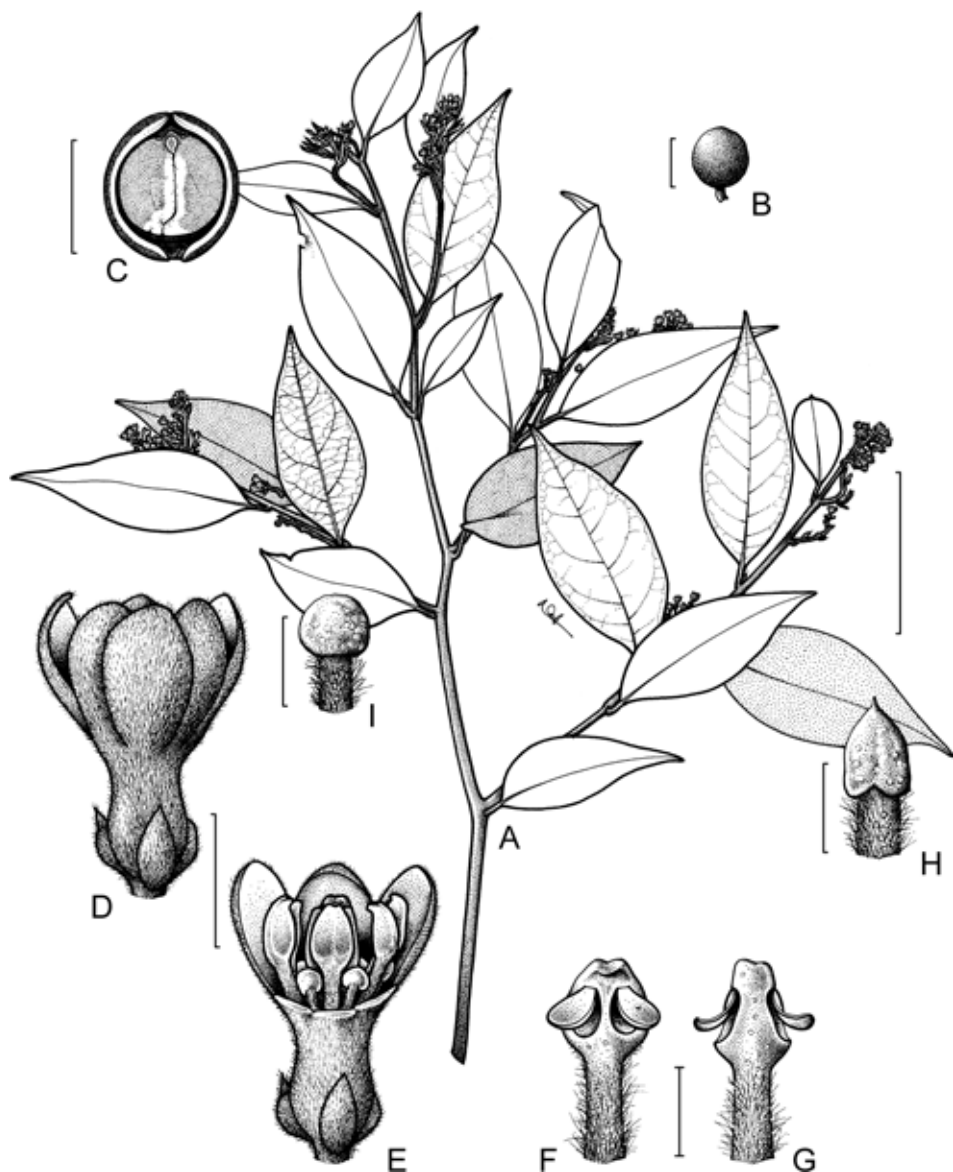


Figure 33. *Cryptocarya dorrigoensis*. A, habit; B, fruit; C, L.S. fruit; D, flower; E, flower, 3 tepals removed; F, anther (outer whorl, adaxial view); G, anther (inner whorl, abaxial view); H, staminode (adaxial view); I, gland (adaxial view) (A, D–I, C.T.White 7497, BRI; B, C, B.Hyland 10983, QRS). Scale bars: A = 40 mm; B, C = 10 mm; D, E = 2 mm; F–I = 0.5 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 293 (1989).

N.S.W.: Orara West State Forest, W of Coffs Harbour, *B.Hyland 4394 RFK* (QRS); Never Never Picnic Area, Dorrigo Natl Park, *A.G.Floyd 1156* (NSW); Point Lookout, S of Ebor, *J.B.Williams 812* (NSW).

Young twigs often conspicuously yellow. Differs from *C. bellendenkerana* and related species in the pubescent midrib on the upper leaf surface and the lateral veins forming an angle greater than 45° with the leaf midrib.

14. *Cryptocarya endiandrifolia* Kosterm., *Reinwardtia* 7: 306 (1968), as *endiandraefolia*

T: Madang District, New Guinea, 25 Aug. 1955, *R.D.Hoogland 5131*; holotype: L; iso: CANB, K.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 294, fig. 19 (1989).

Tree to 13 m. Stem usually buttressed. Twigs fluted or terete, pubescent. Leaves: petiole 7–13 mm long; lamina elliptic to oblong to lanceolate, 9.5–16 cm long, 3.5–5.5 cm wide, penninerved, green below, eventually almost glabrescent. Inflorescence exceeding leaves. Flowers cream, pale green, unpleasantly perfumed. Perianth tube 0.9–1 mm long, 0.9–1.4 mm wide, pubescent towards apex. Tepals 1–1.5 mm long, 0.8–1.2 mm wide, pubescent. Outer anthers 0.5–0.6 mm long, c. 0.5 mm wide, usually pubescent abaxially, glabrous adaxially; filaments 0.4–0.6 mm long. Inner anthers 0.5–0.7 mm long, c. 0.4 mm wide; filaments 0.4–0.6 mm long. Ovary 0.6–0.9 mm long, 0.3–0.4 mm wide, glabrous; style glabrous. Fruit globular or ellipsoidal, 10–13 mm long, 8–11 mm wide, black. Cotyledons cream.

Occurs on Cape York Penin., from Lockerbie (near Bamaga) to McIlwraith Ra., Qld; from sea level to 150 m alt. Confined to gallery forests in alluvium. Also occurs in New Guinea. Flowers Nov.–Dec.; fruits Nov.–Dec. Map 169.

Qld: Lockerbie, *B.Hyland 12365* (QRS); Claudie R., *B.Hyland 10802* (QRS); Claudie R., *G.Unwin 612* (QRS); Gordon Ck, *B.Hyland 12449* (QRS); T.R. 14, Massy L.A., McIlwraith Ra., *B.Hyland 10871* (QRS).

15. *Cryptocarya erythroxylon* Maiden & Betche ex Maiden, *Forest Fl. New South Wales* 3: 111 (1907)

T: Acacia Creek, via Killarney, *W.Dunn s.n.*; lectotype: NSW; isotype: BRI; Acacia Creek, via Killarney, *W.Dunn NSW 149930*; remaining syn.: NSW, *vide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 182 (1989).

Tree to 35 m. Stem usually buttressed. Twigs angular or terete, soon glabrescent. Leaves: petiole 8–19 mm long; lamina elliptic to lanceolate, 6.5–14.5 cm long, 1.5–6 cm wide, penninerved, glaucous and pubescent below. Inflorescence a panicle, c. same length as leaves. Flowers cream, perfume unknown. Perianth tube c. 0.9 mm long, c. 1.5 mm wide, few hairs at apex, otherwise glabrous. Tepals pubescent; outer c. 1.2 mm long, c. 0.8 mm wide; inner c. 1.4 mm long, c. 1 mm wide. Outer anthers c. 0.5 mm long, 0.5 mm wide, pubescent abaxially, glabrous adaxially; filaments c. 0.3 mm long. Inner anthers c. 0.7 mm long, 0.4 mm wide; filaments c. 0.4 mm long. Ovary c. 0.8 mm long, 0.5 mm wide, glabrous; style glabrous. Fruit pyriform 19.5–21 mm long, 13–15 mm wide, black. Cotyledons cream. *Rose Maple*.

Occurs from Gympie, southern Qld, to Comboyne, N.S.W.; from 500–1050 m alt. Grows in mountain rainforests. Flowers Nov.; fruits Mar.–Apr. Map 170.

Qld: Mt Glorious, *B.Hyland 4445 RFK* (QRS); CunninghamS Gap, *C.T.White 6861* (BRI). N.S.W.: Comboyne, *E.C.Chisholm NSW 149936* (NSW); Wiangaree State Forest, 38.4 km N of Kyogle, *R.Coveny 1626* (NSW).

Blaze odour resembles that of freshly cut peach or mango skins.

16. *Cryptocarya exfoliata* C.K.Allen, *J. Arnold Arbor.* 23: 135 (1942)

T: Middle Fly R., New Guinea, *L.J.Brass 7655*; holotype: A; iso: BO, BRI.

Tree to 20 m. Stem sometimes buttressed. Twigs fluted, pubescent. Leaves: petiole 3–11 mm long; lamina lanceolate, 5–13 cm long, 1.5–5.5 cm wide, triplinerved, sometimes penninerved, green or slightly glaucous below, pubescent. Inflorescence mainly pseudoterminal, not or scarcely exceeding leaves. Flowers creamy green, ±perfumed. Perianth tube 1–1.4 mm long, 1–1.2 mm wide, pubescent. Tepals 1.7–2.1 mm long, 1.2–1.5 mm wide, pubescent. Outer anthers 0.7–0.9 mm long, 0.5–0.6 mm wide, glabrous or few hairs abaxially; filaments

0.5–0.6 mm long. Inner anthers 0.9–1 mm long, 0.4–0.5 mm wide, glabrous; filaments 0.5–0.6 mm long. Ovary 0.7–1 mm long, 0.4–0.5 mm wide, glabrous; style glabrous. Fruit globular to ellipsoidal, 10–13 mm long, 9–11 mm wide, black. Cotyledons cream.

Occurs in Arnhem Land, N.T., and the Torres Strait Is. and Cape York Penin. S to Cairns, Qld; from sea level to 450 m alt. Grows in rainforests and gallery forests in soils derived from a variety of rock types. Also known from New Guinea. Flowers Jan.–Mar.; fruits July–Dec. Map 171.

N.T.: East Alligator R., *C.R.Dunlop 3214* (BRI, K, MO); 6.4 km S of East Alligator R., *D.J.Morgan 5* (DNA). Qld: Duan Is., Torres Strait, *E.Cameron 2269* (QRS); between Lockerbie and Somerset, *B.Hyland 3974 RFK* (QRS); Hartleys Ck, *L.J.Webb & J.G.Tracey 8235* (BRI).

Blaze odour is usually distinct, perhaps resembling pine resin. The cotyledons are mainly uniform in texture except for a narrow intrusion of the testa between the adaxial surfaces of the cotyledons.

17. *Cryptocarya floydii* Kosterm., *Brunonia* 2: 96 (1979)

T: Glenugie Peak (Mt Elaine), N.S.W., 30 Oct. 1959, *H.C.Hayes s.n.*; holotype: L; isotype: BRI, NSW.

Tree to 15 m. Stem not buttressed. Twigs ±terete, eventually almost glabrescent. Leaves: petiole 6–13 mm long; lamina lanceolate, 4.2–10 cm long, 1.2–3.5 cm wide, penninerved, green below, eventually almost glabrescent. Inflorescence a panicle (almost racemose), not exceeding leaves. Flowers pale green, perfumed. Perianth tube c. 1.6 mm long, 1.7 mm wide, inner surface pubescent only towards apex. Tepals c. 2.2 mm long, 1.1 mm wide, pubescent. Outer anthers c. 0.7 mm long, 0.5 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.8 mm long. Inner anthers c. 0.7 mm long, 0.4 mm wide, glabrous abaxially, few hairs adaxially; filaments 0.9 mm long. Ovary c. 1.4 mm long, 0.6 mm wide, glabrous; style glabrous. Fruit globular, 10–15 mm long, 12–18 mm wide, black. Cotyledons ?cream.

Occurs from the Bunya Mountains, southern Qld, to Wollomombi Falls, northern N.S.W.; from 300–1050 m alt. Grows in drier rainforests, particularly in rocky areas. Flowers Oct.–Feb.; fruits Feb.–June. Map 172.

Qld: Bunya Mtns, *B.Hyland 4462* (QRS). N.S.W.: Glenugie Peak, *B.Hyland 4386 RFK* (QRS); Guy Fawkes Natl Park, *A.G.Floyd 1148* (NSW); Wollomombi Falls, *A.G.Floyd 1090* (NSW).

18. *Cryptocarya foetida* R.T.Baker, *Proc. Linn. Soc. New South Wales* 30: 517 (1906)

T: Ballina, N.S.W., *W.Bäuerlen 1729*; lectotype: NSW; isotype: QRS; Moreton Bay, *A.Cunningham 130*; remaining syn: A, BM, K, *vide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 185 (1989).

Tree to 25 m. Stem not buttressed. Twigs fluted when young, eventually almost glabrescent. Leaves: petiole 6–10 mm long; lamina oblong to elliptic, 8–1.5 cm long, 3.3–4.4 cm wide, penninerved, green below, eventually ±glabrescent. Inflorescence usually not exceeding leaves. Flowers cream, unpleasantly perfumed. Perianth tube 1.1–1.2 mm long, 1.5–1.7 mm wide, inner surface glabrous. Tepals 1.7–1.9 mm long, 0.8–0.9 mm wide, pubescent. Outer anthers 0.7–0.8 mm long, 0.5–0.6 mm wide, glabrous or sparsely pubescent abaxially; filaments 0.5–0.7 mm long. Inner anthers 0.8 mm long, 0.4 mm wide, glabrous; filaments 0.6–0.8 mm long. Ovary 1 mm long, 0.5 mm wide, glabrous; style glabrous. Fruit globular, 8–13 mm long, 8–15 mm wide, black to purplish black. Cotyledons creamy white.

Occurs from E of Gympie, southern Qld, to Bruswick Heads, northern N.S.W.; from sea level to 150 m alt. Grows in littoral rainforests and rainforests on old sand dunes. Flowers Feb. (also May); fruits Jan.–Feb. Map 173.

Qld: S.F.R. 451, Cameron L.A., E of Gympie, *B.Hyland 4460 RFK* (QRS); Coolum, *B.Hyland 4452 RFK* (QRS); Burleigh Heads, *D.L.Jones 1285* (QRS). N.S.W.: Brunswick Heads, *B.Hyland 4638 RFK* (QRS); Cudgen L., 1.6 km S of Kingscliff, *E.F.Constable 4841* (A, BISH, BRI, G, K, L, NSW, RSA).

19. *Cryptocarya foveolata* C.T.White & W.D.Francis, *Proc. Roy. Soc. Queensland* 35: 75 (1924)

Cryptocarya cinnamomifolia var. *parvifolia* F.M.Bailey, *Queensland Fl.* 4: 1301 (1901); *C. parvifolia* (F.M.Bailey) Domin, *Biblioth. Bot.* 89: 122 (1925), *nom. illeg., non* Merr. (1915); *C. microphylla* Kosterm., *Reinwardtia* 5: 396 (1961). T: Mt Mistake?, Qld, *F.M.Bailey* 2; lecto: BRI; isolecto: K, MEL, NSW; Roberts Plateau, Macpherson Ra., *C.T.White*; remaining syn: BRI, MEL, NSW; ranges eastward of Emu Vale, *C.B.Saunders*; remaining syn: A, BR, *fide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 186 (1989).

Tree to 40 m. Stem sometimes buttressed. Twigs angular and pubescent when very young, later terete and glabrescent. Leaves: petiole 4–7 mm long; lamina elliptic to ovate, 3.5–7 cm long, 2–3.6 cm wide, usually triplinerved, green or ±glaucous below, conspicuously foveolate, soon glabrescent. Inflorescence a panicle or raceme, mainly axillary, not exceeding leaves. Flowers cream, perfumed. Perianth tube 1.5–1.6 mm long, 1.6–1.8 mm wide, inner surface pubescent. Tepals 1.9–2.5 mm long, 1–1.5 mm wide, pubescent. Outer anthers 0.9–1.1 mm long, 0.6–0.8 mm wide, pubescent abaxially, glabrous adaxially; filaments c. 0.5 mm long. Inner anthers c. 1 mm long, 0.6–0.7 mm wide, glabrous, or pubescent adaxially; filaments 0.8–0.9 mm long. Ovary 1–1.1 mm long, c. 0.6 mm wide, glabrous or pubescent; style glabrous. Fruit globular, 13–14 mm long, 15–16 mm wide, black. Cotyledons cream. *Small-Leaved Laurel*.

Occurs from Cunninghams Gap, southern Qld, to near Barrington Tops, N.S.W.; from 600–1300 m alt. Grows in mountain rainforests, usually in soils derived from basalt. Flowers Nov.–Dec. (Feb.); fruits Mar. Map 174.

Qld: Cunninghams Gap, *B.Hyland* 4610 RFK (QRS); Lamington Natl Park, *B.Hyland* 4294 RFK (QRS); Repeater Station Rd, Springbrook, *D.L.Jones* 1661 (QRS). N.S.W.: Mt Hyland, Marengo State Forest, 34 km NW of Dorrigo, *B.Hyland* 4400 RFK (QRS).

20. *Cryptocarya glaucescens* R.Br., *Prodr.* 402 (1810)

T: Hawkesbury R., N.S.W., *R.Brown* s.n.; lecto: BM; isolecto: MEL; Port Jackson and Hawkesbury R., *R.Brown*; remaining syn: BM, G-DC?, K, MEL, *fide* D.Frodin, *Telopea* 1: 222 (1976).

Cryptocarya moretoniana Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 74 (1864). T: Moreton Bay, [Qld], *A.Cunningham* 48; syn: BM, K; Moreton Bay [Qld], *A.Cunningham* 47; syn: K.

Cryptocarya hypoglaucula var. *attenuata* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 508 (1864); *C. meissneri* F.Muell., *Fragm.* 5: 170 (1866). T: Hastings R., N.S.W., *F.Mueller* s.n. (probably *H.Beckler*); holo: G-DC.

Cryptocarya glaucescens var. *nitida* Benth., *Fl. Austral.* 5: 297 (1870). T: Moreton Bay, [Qld], *A.Cunningham* 47; syn: K; Moreton Bay, [Qld], *A.Cunningham* 48; syn: K; Archers Ck, [Qld], *L.Leichhardt* [?199]; syn: MEL.

Tree to 30 m. Stem sometimes buttressed. Twigs angular, soon ±glabrescent. Leaves: petiole 5–9 mm long; lamina lanceolate to elliptic, 5.5–10 cm long, 2.5–4 cm wide, penninerved, glaucous below, soon ±glabrescent. Inflorescence mainly axillary, usually not exceeding leaves. Flowers cream, pale green, ±perfumed. Perianth tube 1–1.5 mm long, 1–1.3 mm wide, inner surface glabrous. Tepals 1.3–1.9 mm long, 0.7–0.9 mm wide, pubescent. Outer anthers 0.5–0.6 mm long, 0.4–0.5 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.5–0.7 mm long. Inner anthers 0.5–0.6 mm long, 0.2–0.4 mm wide, usually glabrous; filaments 0.5–0.8 mm long. Ovary 0.8–1 mm long, 0.4–0.5 mm wide, glabrous; style glabrous. Fruit laterally compressed, bilobed, ribbed, 12–21 mm long, 13–25 mm wide, black. Cotyledons creamy yellow. *Silver Sycamore*.

Occurs from Eungella, central Qld, to Mt Dromedary, southern N.S.W.; from sea level to 1000 m alt. Grows in rainforests, usually in poorer soils derived from sedimentary and acid volcanic rocks. Flowers Oct.–Nov.; fruits Mar.–Aug. Map 175.

Qld: Eungella, *P.J.Hickey* BRI 160490 (BRI); Natl Park Res. 573, Eungella, Broken R., *B.Hyland* 4490 RFK (QRS); Austinville Rd before Paradise Valley, *D.L.Jones* 1264 (QRS). N.S.W.: Foxground, near Gerringong, *F.A.Rodway* NSW 121723 (NSW); Cambewarra Ra., *P.Monaghan* NSW 121730 (NSW).

Blaze odour resembles sugarcane. Rudimentary style/s often present.



Figure 34. *Cryptocarya grandis*. A, habit; B, seedling; C, fruit; D, L.S. fruit; E, flower; F, flower with 3 tepals removed; G, stamen and gland (outer whorl, adaxial view); H, stamen (inner whorl, abaxial view); I, staminode (abaxial view) (A, E–I, B.Gray 1619, QRS; B–D, G.Stocker 1594, QRS). Scale bars: A, B = 40 mm; C = 20 mm; D = 10 mm; E, F = 2 mm; G–I = 1 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 296 (1989).

21. *Cryptocarya glaucocarpa* B.Hyland, *Austral. Syst. Bot.* 2: 188 (1989)

T: Claudie River, Qld, 21 Nov. 1977, *B.Hyland 3628 RFK*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 295, fig. 20 (1989).

Tree to 10 m. Stem buttressed. Twigs \pm terete, soon glabrescent. Leaves: petiole 7–9 mm long; lamina lanceolate to elliptic, 9–16 cm long, 3.5–6 cm wide, penninerved, green below, soon glabrescent. Inflorescence not exceeding leaves. Flower features unknown. Fruit ellipsoidal, 13–17 mm long, 10–12 mm wide, black to blue-black, colour often completely obscured by glaucous bloom. Cotyledons cream.

Occurs on the Claudie R. plain, Qld; from sea level to 80 m alt. Grows in rainforests in alluvial soils. Flowers ?Dec.; fruits Nov.–Dec. Map 176.

Qld: Claudie R., *B.Hyland 11512* (QRS); Claudie R., *B.Hyland 1301* (QRS); Claudie R., *B.Hyland 3616 RFK* (QRS).

Differs from other species of *Cryptocarya* in the very glaucous fruit.

22. *Cryptocarya grandis* B.Hyland, *Austral. Syst. Bot.* 2: 188 (1989)

T: Timber Reserve 1230, Boonjee Logging Area, 14 Jan. 1980, *B.Gray 1619*; holo: QRS.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 296, fig. 21 (1989).

Tree to 35 m. Stem sometimes buttressed. Twigs fluted, soon \pm glabrescent. Leaves: petiole 6–17 mm long; lamina lanceolate to elliptic, 6.5–15.5 cm long, 3–7.5 cm wide, triplinerved, slightly glaucous, pubescent. Inflorescence exceeding leaves. Flowers creamy green, unpleasantly perfumed. Perianth tube 0.9–1.6 mm long, 1.2–1.6 mm wide, inner surface pubescent at apex. Tepals pubescent, outer 1.6–2.4 mm long, 1–1.3 mm wide, inner 1.6–2.2 mm long, 1.2–1.6 mm wide. Outer anthers 0.6–0.8 mm long, 0.5–0.6 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.5–1 mm long. Inner anthers 0.7–0.8 mm long, 0.4–0.6 mm wide, usually glabrous; filaments 0.5–1 mm long. Ovary 1–1.3 mm long, 0.5–0.6 mm wide, glabrous; style glabrous. Fruit globular, 13–20 mm long, 14–22 mm wide. Cotyledons creamy white. *Cinnamon Laurel*. Fig. 34.

Occurs from near Iron Ra. to Eungella, Qld; from sea level to 1000 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Nov.–Feb.; fruits July–Dec. Map 177.

Qld: T.R. 146 Monkhouse, Lorna Doone L.A., near Cooktown, *B.Hyland 12216* (QRS); Portion 190 Alexandra, Maple Rd, *B.Gray 3813* (QRS); Natl Park Res. 904, Palmerston, *B.Gray 3865* (QRS); Eungella Ra., *C.T.White 12891* (A, BRI, CANB, L, MEL).

Tepals somewhat dimorphic, outer tepals being more spatulate than inner. Tepals opening c. 45° to vertical. Three distinctive ‘ribs’ are present on the abaxial surface of tepals. Domatia normally present in axils of basal pair of primary veins. Differs from other species of *Cryptocarya* in the triplinerved leaves, foetid flowers and ruminant cotyledons.

23. *Cryptocarya hypospodia* F.Muell., *Fragm.* 5: 170 (1866)

Cryptocarya obovata var. *hypospodia* (F.Muell.) C.T.White & W.D.Francis in W.D.Francis, *Austral. Rain Forest Trees* 114 (1929). T: Rockingham Bay, Qld, *J.Dallachy s.n.*; lecto: MEL; Rockingham Bay, Qld, *J.Dallachy s.n.*; remaining syn: K, MEL, NY; Richmond River, N.S.W., *H.Beckler s.n.*; remaining syn: MEL, *vide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 189 (1989).

Cryptocarya obovata var. *tropica* F.M.Bailey, *Queensland Fl.* 4: 1299 (1901). T: Mackay, Qld, *H.L.Griffith s.n.*; holo: ?BRI; iso: ?MEL.

Cryptocarya multicostata Domin, *Biblioth. Bot.* 89: 121 (1926). T: ?Brisbane River, Qld, *A.Dietrich 620*; holo: PR; iso: BO, MEL.

Cryptocarya percrassa Kosterm., *Reinwardtia* 7: 323 (1968). T: Bulolo, New Guinea, *D.Fryar NGF4051*; holo: A; iso: CANB.

Lauraceae D61875 Croker Island, C.R.Dunlop *et al.*, *Checklist Vasc. Pl. N. Terr.* 60 (1995)

Lauraceae D61875, D.T.Liddle *et al.*, *Atlas Vasc. Rainforest Pl. N. Terr.* 53 (1994)

Tree to 30 m. Stem usually buttressed. Twigs fluted or terete, pubescent. Leaves: petiole 7–17 mm long; lamina elliptic to ovate, 6.5–24.5 cm long, 2.5–13.5 cm wide, penninerved, green or ±glaucous below, ±pubescent. Inflorescence usually exceeding leaves. Flowers pale brown, creamy green, perfumed. Perianth tube 1–1.8 mm long, 1.3–1.5 mm wide, inner surface pubescent towards apex. Tepals pubescent; outer 1.4–1.9 mm long, 0.7–1.1 mm wide; inner 1.4–1.9 mm long, 1.1–1.5 mm wide. Outer anthers 0.6–0.8 mm long, 0.5–0.7 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.4–0.7 mm long. Inner anthers 0.6–0.8 mm long, 0.4–0.6 mm wide, glabrous abaxially, pubescent adaxially; filaments 0.5–0.7 mm long. Ovary 0.9–1.2 mm long, 0.5–0.6 mm wide, mainly glabrous; style sparsely hairy. Fruit globular, 13–18 mm long, 12–17 mm wide, black. Cotyledons cream. *Northern Laurel*. Plate 26.

Occurs from Lockerbie to Kilkivan, Qld; from sea level to 900 m alt. Grows in rainforests of various types but particularly gallery forests in soils derived from a variety of rock types. Also known from New Guinea. Flowers Nov.–May; fruits Sept.–Dec. Map 178.

Qld: Lockerbie, *B.Hyland 3931 RFK* (QRS); Claudie R., *B.Hyland 6201* (BRI, QRS); Kuranda Ra., *T.S.Risley 589* (QRS); Kilkivan, *A.F.Eccles BRI 299104* (BRI).

The tepals are dimorphic, with the outer ones oblong in shape, the inner ones more spatulate. This species is very closely related to *C. obovata*, but where the ranges of the two species coincide, they tend to occupy different ecological niches. *Cryptocarya hypospodia* occurs in low elevation gallery forests, while *C. obovata* mainly occurs in mountain rainforests, but sometimes descends to coastal plain in gallery forests. Blaze odour often peppery.

24. *Cryptocarya laevigata* Blume, *Bijdr. Fl. Ned. Ind.* 11: 556 (1826)

Caryodaphne laevigata (Blume) Nees, *Syst. Laur.* 227 (1836). T: 'In sylvis montanis' ?Java; iso: ?K.

Laurus australis A.Cunn. ex Hook., *J. Bot. (Hooker)* 4: 419, 436 (1842); *L. australis* A.Cunn. ex Hook., *Bot. Mag.* No. 3931 (1842); *L. bowiei* Hook., *J. Bot. (Hooker)* 4: 419 (1842), *nom illeg.*; *Oreodaphne bowiei* Walp., *Ann. Bot. Syst.* 1: 576 (1849), *nom illeg.*; *Caryodaphne australis* A.Braun, *Ind. Sem. Hort. Berol.* App. 13 (1851), *n.v.*; *Cryptocarya australis* (A.Cunn. ex Hook.) Benth., *Fl. Austral.* 5: 299 (1870); *Cryptocarya bowiei* (Walp.) Druce, *Bot. Exch. Club Brit. Isles Rep. for 1916*, Suppl. 2: 618 (1917), *nom illeg.*; *Cryptocarya bowiei* (Walp.) Domin, *Biblioth. Bot.* 89(2): 677 (1925), *nom illeg.*; *Cryptocarya laevigata* var. *bowiei* (Walp.) Kosterm., *Reinwardtia* 7: 470 (1969). T: cult. Royal Botanic Gardens, Kew, originally from Moreton Bay [Qld]; illustration in *J. Bot.* 4: t. 23 (1842); lecto, *fide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 192 (1989).

Illustration: B.P.M.Hyland, *op. cit.* 2: 345, fig. 70D–E (1989).

Shrub or tree to 7 m. Stem not buttressed. Twigs ±terete, soon glabrescent. Leaves: petiole 2–11 mm long; lamina lanceolate to elliptic, 5–15.5 cm long, 1.3–6.1 cm wide, triplinerved, green and glabrescent below. Inflorescence a raceme or panicle, mostly axillary, not exceeding leaves. Flowers creamy white, pale green, perfumed. Perianth tube 1.1–1.8 mm long, 1–2.8 mm wide, inner surface glabrous. Tepals glabrous; outer 2.2–3 mm long, 1.4–2 mm wide, inner 2.3–3.2 mm long, 1.4–2.1 mm wide. Outer anthers 0.7–1.2 mm long, 0.6–0.9 mm wide, glabrous; filaments 0.5–1.2 mm long, glabrous. Inner anthers 0.7–1.3 mm long, 0.4–0.7 mm wide, glabrous. Ovary 0.8–1.5 mm long, 0.6–0.9 mm wide, glabrous; style glabrous. Fruit globular to ellipsoidal, ribbed, 17–33 mm long, 17–38 mm wide, red to orange-yellow. Cotyledons creamy. Plate 27.

Occurs from Cooktown to Mission Beach, northern Qld, and from Imbil, southern Qld, to Clarence R., northern N.S.W.; from sea level to 450 m alt. Grows in rainforests in soils derived from a variety of rock types. Also widely distributed throughout Malesia. Flowers Sept.–Dec.; fruits Dec.–Mar., June. Map 179.

Qld: Daintree, *H.Flecker CAIRNS 04011* (K, QRS); S.F.R. 675 Mulgrave L.A., *B.Gray 775* (QRS); lower Tully R., *B.Gray 2050* (QRS); Currumbin Valley, *D.L.Jones 2* (QRS). N.S.W.: Brunswick R., *B.Hyland 10988* (NSW).

In the northern populations the blaze odour is pleasant, resembling that of Red Cedar (*Toona australis* (F.Muell.) Harms). Tepals ±horizontal at anthesis.

25. *Cryptocarya leucophylla* B.Hyland, *Austral. Syst. Bot.* 2: 192 (1989)

T: State Forest Reserve 194, East Barron, Hugh Nelson Ra., Qld, 21 Feb. 1985, *B.Gray 3919*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 297, fig. 22 (1989).

Tree to 25 m. Stem buttressed. Twigs fluted, eventually \pm glabrescent. Leaves: petiole 6–12 mm long; lamina elliptic to ovate to obovate, 6.8–13.3 cm long, 3–5 cm wide, penninerved, glaucous below, pubescent. Inflorescence usually not exceeding leaves. Flowers creamy green, unpleasantly perfumed. Perianth tube 0.9–1.3 mm long, 1.2–1.5 mm wide, inner surface pubescent towards apex. Tepals 1.4–2.1 mm long, 1.2–1.7 mm wide, pubescent. Outer anthers 0.7–0.9 mm long, 0.6–0.7 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.4–0.7 mm long. Inner anthers 0.8–0.9 mm long, c. 0.5 mm wide, usually glabrous; filaments 0.6–0.9 mm long. Ovary 1–1.3 mm long, 0.5–0.6 mm wide, glabrous or sparsely hairy; style often rudimentary, glabrous or sparsely hairy. Fruit ellipsoidal to globular, 13–18 mm long, 12–13 mm wide, black. Cotyledons yellowish.

Occurs from Mt Lewis to Tully, northern Qld; from 800–1300 m alt. Grows in mountain rainforests in soils derived from a variety of rock types. Flowers Jan.–Mar.; fruits Sept.–Jan. Map 180.

Qld: S.F.R. 143, North Mary L.A., Mt Lewis, *K.Sanderson 398* (QRS); S.F.R. 194, Western L.A., Herberton Ra., *B.Gray 807* (QRS); S.F.R. 650, Mt Fisher L.A., *B.Gray 3959* (QRS); S.F.R. 194, Western L.A., *G.Unwin 716* (QRS); Tully, *E.Volck 2832* (AFO, BRI).

Differs from *C. vulgaris* in the leaf laminae being white and pubescent below.

26. *Cryptocarya lividula* B.Hyland, *Austral. Syst. Bot.* 2: 193 (1989)

T: State Forest Reserve 310, Gillies Logging Area, 10 Dec. 1980, *B.Gray 1851*; holo: QRS.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 298, fig. 23 (1989).

Tree to 25 m. Stem usually buttressed. Twigs fluted, pubescent. Leaves: petiole 4–8 mm long; lamina lanceolate to ovate, 6–9.3 cm long, 1.9–4 cm wide, penninerved, usually glaucous below, eventually \pm glabrescent. Inflorescence usually not exceeding leaves. Flowers creamy green, unpleasantly perfumed. Perianth tube 0.8–1.6 mm long, 1.4–1.9 mm wide, inner surface glabrescent, or pubescent towards apex. Tepals pubescent; outer 1.5–2.1 mm long, 0.8–1.1 mm wide; inner 1.5–2 mm long, 1–1.3 mm wide. Outer anthers 0.7–1 mm long, 0.6–0.7 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.3–0.6 mm long. Inner anthers 0.8–1 mm long, 0.5–0.6 mm wide, usually glabrous; filaments 0.3–0.8 mm long. Ovary 0.8–1.1 mm long, 0.4–0.6 mm wide, glabrous; style glabrous. Fruit globular, 11.5–14 mm long, 11.5–14 mm wide, purplish black. Cotyledons cream.

Occurs from S of Cooktown to Koombooloomba, N Qld; from 180–1000 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Nov.–Jan.; fruits Oct.–Nov. Map 181.

Qld: T.R. 176, Monkhouse L.A., *B.Hyland 12605* (QRS); S.F.R. 144, Fantail L.A., Windsor Tableland, *S.Dansie 20151* (QRS); Mt Lewis, *L.J.Webb & J.G.Tracey 11925* (BRI); S.F.R. 605, Kawson L.A., Koombooloomba, *B.Hyland 11115* (QRS).

The leaves often exhibit a conspicuous bluish sheen. Differs from other species of *Cryptocarya* in the combination of ruminant cotyledons, penninerved leaves and vestigial style. Blaze odour noticeable, but difficult to describe.

27. *Cryptocarya macdonaldii* B.Hyland, *Austral. Syst. Bot.* 2: 193 (1989)

T: Bonogin Creek Rd, 5 Mar. 1983, *B.Hyland 4581 RFK*; holo: QRS.

Cryptocarya sp. 1, T.D.Stanley & E.M.Ross, *Fl. SE Queensland* 1: 160 (1983)

Illustration: B.P.M.Hyland, *op. cit.* 2: 299, fig. 24 (1989).

Tree to 30 m. Stem sometimes buttressed. Twigs terete or angular, soon glabrescent. Leaves: petiole 6–14 mm long; lamina elliptic to ovate to oblong, 9–13 cm long, 3–5 cm wide, penninerved, green and glabrous below. Inflorescence usually exceeding leaves. Flowers,

cream, unpleasantly perfumed. Perianth tube 1.1–1.3 mm long, 1.1–1.3 mm wide, inner surface glabrous. Outer anthers 0.5–0.6 mm long, 0.5–0.6 mm wide, pubescent abaxially, glabrous adaxially; filaments c. 0.5 mm long. Inner anthers 0.6–0.7 mm long, 0.4–0.5 mm wide, glabrous; filaments c. 0.4 mm long. Ovary 0.7–1.2 mm long, 0.4–0.5 mm wide, glabrous; style glabrous. Fruit ellipsoidal, sometimes longitudinally ribbed, c. 15 mm long, 11 mm wide, black. Cotyledons creamy yellow. Fig. 35.

Occurs in central and southern Qld (possibly extending into northern N.S.W.), from Proserpine–Eungella area, and from Miriam Vale to S of Brisbane; from sea level to 1000 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Jan.–Feb.; fruits Apr. Map 182.

Qld: S.F.R. 62, Eungella, *B.Hyland 11298* (QRS); Dalrymple Heights, *J.P.Martin & R.J.Gould 3327* (AFO); S.F.R. 451 Cameron L.A., near Gympie, *B.Hyland 4549 RFK* (QRS); Mooloolah R., lower reaches, *W.Ziesak 51* (BRI).

Differs from other species of *Cryptocarya* in the fetid, sessile flowers. Blaze odour sometimes emitted (a pine-like odour).

28. *Cryptocarya mackinnoniana* F.Muell., *Fragm.* 5: 169 (1896)

T: Seaview Ra., Rockingham Bay, Qld, *J.Dallachy 171*; holo: MEL; iso: ?K, ?WRSL.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 300, fig. 25 (1989).

Tree to 25 m. Stem sometimes buttressed. Twigs fluted, tomentose. Leaves: petiole 11–21 mm long; lamina oblong to narrowly elliptic to oval, 13–35 cm long, 4.5–8.5 cm wide, penninerved, ±glaucous below, pubescent. Inflorescence exceeding leaves. Flowers creamy green, pale brown, unpleasantly perfumed. Perianth tube 0.8–1.3 mm long, 1.2–1.8 mm wide, inner surface pubescent. Tepals 1.1–1.9 mm long, 0.9–1.3 mm wide, tomentose. Outer anthers 0.6–0.8 mm long, 0.5–0.8 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.4–0.6 mm long. Inner anthers 0.7–0.9 mm long, 0.4–0.5 mm wide, glabrescent or pubescent. Ovary 0.7–1.4 mm long, 0.3–0.6 mm wide, usually glabrous; style glabrous. Fruit ellipsoidal, sometimes ovoid or obpyriform, 19–28 mm long, 13–17 mm wide, spotted, black. Cotyledons creamy. *Mackinnon's Laurel*, *Rusty Laurel*. Plate 28.

Occurs from Iron Ra. to Ingham, northern Qld; from sea level to 1100 m alt. Grows in rainforests in soils derived from a variety of rock types. Also probably in New Guinea and the Philippines. Flowers Oct.–Apr.; fruits Apr.–Nov. Map 183.

Qld: T.R. 176, Shipton L.A., *B.Hyland 12067* (QRS); McIlwraith Ra., *K.D.Sanderson 1224* (QRS); Russell Rd, Pearamon, *P.Endress 4247* (QRS); Gillies Hwy, *B.Gray 3884* (QRS); Kirrama Ra., *L.S.Smith 3189* (A, BRI).

Blaze odour often pine-like.

29. *Cryptocarya meisneriana* Frodin, *Telopea* 1: 223 (1976), as *C. meisnerana*

T: Hastings R. near Port Macquarie, *H.Beckler s.n.*; holo: K; iso: BO, G-DC, MEL, NSW, NY.

[*Cryptocarya hypoglaucha* var. *attenuata* auct. non Meisn.: G.Bentham, *Fl. Austral.* 5: 298 (1870); F.M.Bailey, *Queensland Fl.* 4: 1301 (1901)]

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 345, fig. 70F; 346, fig. 71A (1989).

Tree or shrub to 10 m. Stem not buttressed. Twigs terete, soon ±glabrescent. Leaves: petiole 6–7 mm long; lamina lanceolate, 6.5–8.5 cm long, 1.9–2.6 cm wide, penninerved, green or ±glaucous below, soon glabrescent. Inflorescence usually a raceme, mainly axillary, scarcely exceeding petiole. Flowers cream, pale green, perfumed. Perianth tube 1.1–1.7 mm long, 1.1–1.4 mm wide, inner surface pubescent, rarely almost glabrous in lower half. Tepals 1.3–1.6 mm long, 0.9–1.1 mm wide, pubescent, or glabrous abaxially. Outer anthers 0.4–0.6 mm long, 0.4–0.5 mm wide, glabrous, or few hairs abaxially; filaments 0.2–0.4 mm long. Inner anthers 0.4–0.6 mm long, 0.3–0.5 mm wide, glabrous or few hairs abaxially; filaments c. 0.3 mm long, sometimes glabrous. Ovary 0.9–1.2 mm long, 0.5–0.6 mm wide, glabrous; style glabrous. Fruit ellipsoidal to ovoid, sometimes ribbed, 15–17 mm long, 12 mm wide, black. Cotyledon colour unknown. *Northern Rivers Laurel*.

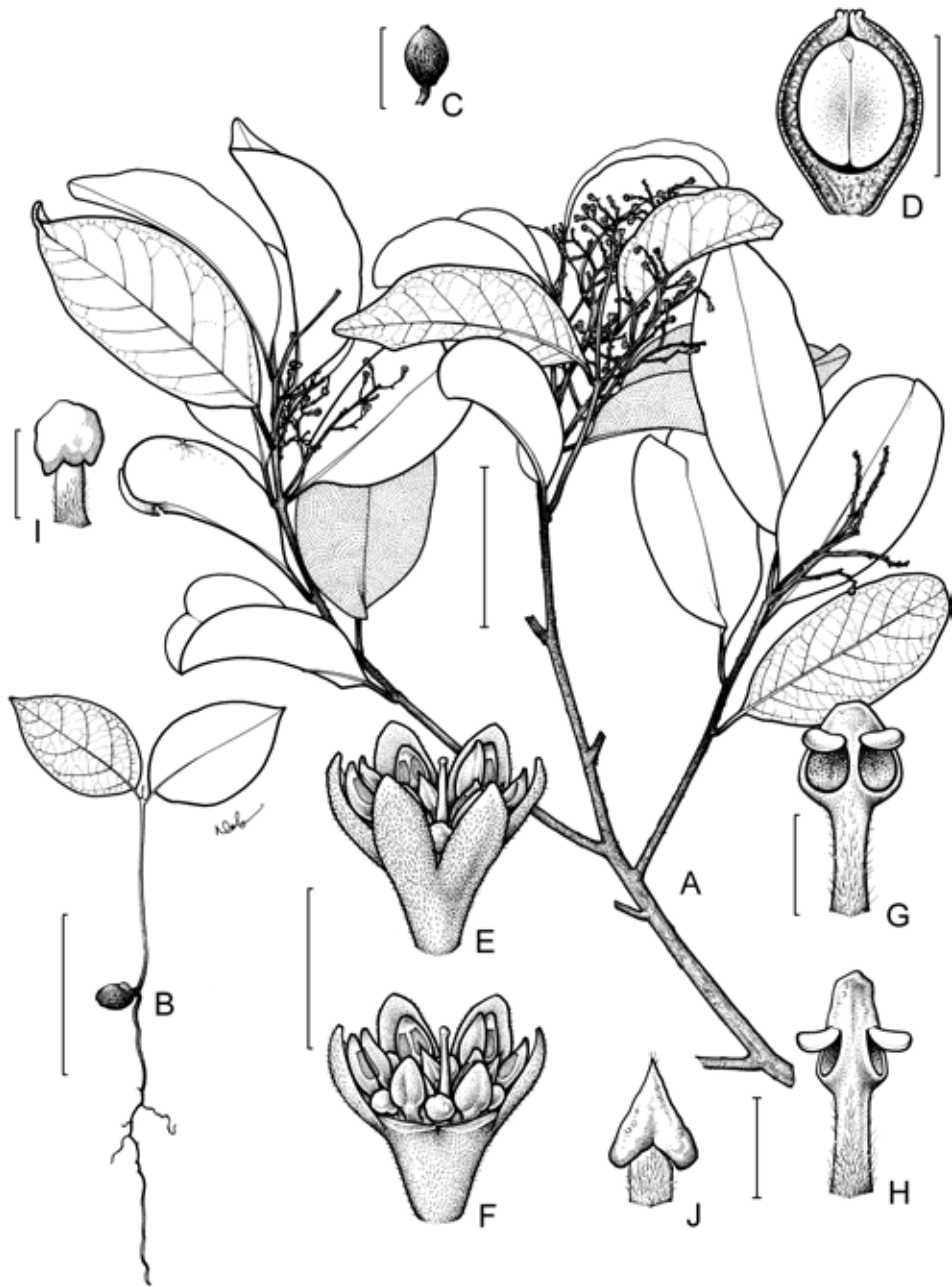


Figure 35. *Cryptocarya macdonaldii*. A, habit; B, seedling; C, fruit; D, L.S. fruit; E, flower; F, flower with 2 tepals removed; G, anther (outer whorl, adaxial view); H, anther (inner whorl, abaxial view); I, gland (adaxial view); J, staminode (adaxial view) (A, E–J, B. Hyland 4581, QRS; B–D, D.L. Jones 1284, QRS). Scale bars: A, B = 40 mm; C = 20 mm; D = 10 mm; E, F = 4 mm; G–J = 0.5 mm. Drawn by T. Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 299 (1989).

Occurs from Springbrook, southern Qld, to Gloucester, N.S.W.; from 60–900 m alt. Grows in rainforests in poorer soils derived from sedimentary and acid volcanic rocks. Flowers Oct.–Jan.; fruits Mar. Map 184.

Qld: Springbrook, *B.Hyland 12652* (QRS); upper Currumbin Ck, *B.Hyland 12653* (QRS). N.S.W.: Coramba, *B.Hyland 12332* (QRS); Dorrigo State Forest, *C.T.White 7496* (A, BRI, K, NSW, NY); 28.8 km WSW of Gloucester, *L.A.S.Johnson & B.G.Briggs NSW 121647* (NSW).

Tepals ±horizontal at anthesis.

30. *Cryptocarya melanocarpa* B.Hyland, *Austral. Syst. Bot.* 2: 196 (1989)

T: Gillies Highway, Boar Pocket Road junction, 3 Feb. 1983, *B.Gray 2968*; holotype: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 301, fig. 26 (1989).

Tree to 20 m. Stem sometimes buttressed. Twigs fluted, pubescent. Leaves: petiole 8–16 mm long; lamina elliptic to oblong to lanceolate, 6.5–13.5 cm long, 2–5.5 cm wide, penninerved, glaucous, pubescent. Inflorescence a panicle, often quite reduced, mainly axillary, not exceeding leaves. Flowers creamy green, unpleasantly perfumed. Perianth tube 1–1.1 mm long, 1–1.4 mm wide, mainly glabrescent. Tepals 1.3–1.8 mm long, 0.8–1 mm wide, pubescent. Outer anthers 0.5–0.7 mm long, 0.4–0.5 mm wide, usually glabrous; filaments 0.5–0.9 mm long. Inner anthers 0.5–0.8 mm long, c. 0.4 mm wide, usually glabrous; filaments c. 0.6 mm long. Ovary 0.6–0.7 mm long, c. 0.4 mm wide, glabrous; style glabrous. Fruit globular to depressed-globular, 8–10 mm long, 9–10.5 mm wide, black. Cotyledons white, occasionally cream.

Occurs from Windsor Tableland to Millaa Millaa, N Qld; at 700–1100 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Jan.–Mar.; fruits Nov.–Feb. Map 185.

Qld: corner of Boar Pocket Rd and Gillies Hwy, *T.Risley 216* (QRS); Millstream, Atherton–Ravenshoe road, *B.Gray 3056* (QRS); Mt Windsor, *T.Carr 7419* (BRI); near Millaa Millaa, *L.J.Webb & J.G.Tracey 11174* (BRI, QRS); Hugh Nelson Ra., *B.Gray 4262* (QRS).

Differs from other species of *Cryptocarya* in the combination of fetid flowers, ruminant cotyledons and short inflorescence.

31. *Cryptocarya microneura* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 73 (1864)

T: 'Colony, 1819', *A.Cunningham s.n.*; lectotype: K; isotype: ?BM, ?BRI, ?MO; remaining syn.: south-eastern Australia, *C.Fraser*, K.; south eastern Australia, *W.Macarthur*, K.; south-eastern Australia, *J.Backhouse*, K, *vide* D.Frodin, *Telopea* 1: 222 (1976).

[*Cryptocarya glaucescens* var. *reticulata* auct. non Meisn.: G.Bentham, *Fl. Austral.* 5: 297 (1870); F.M.Bailey, *Queensland Fl.* 4: 1300 (1901); F.M.Bailey, *Compr. Cat. Queensland Pl.* 430 (1913)]

[*Cryptocarya glaucescens* var. *nitida* auct. non Benth.: F.M.Bailey, *Queensland Fl.* 4: 1300 (1901), *p.p. excl. type*]

[*Cryptocarya moretoniana* auct. non Meisn.: W.D.Francis, *Austral. Rain-Forest Trees* 129 (1951), *p.p.*]

Tree to 15 m. Stem not buttressed. Twigs terete, eventually almost glabrescent. Leaves: petiole 5–11 cm long; lamina lanceolate to elliptic, 6.2–11.5 cm long, 2–4.5 cm wide, green or ±glaucous below, penninerved, eventually ±glabrescent. Inflorescence usually exceeding leaves. Flowers cream, not perfumed. Tepals pubescent; outer 1.4–1.7 mm long, 1–1.1 mm wide; inner 1.5–1.9 mm long, 1–1.4 mm wide. Outer anthers 0.7–0.8 mm long, 0.5–0.6 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.5–0.6 mm long. Inner anthers 0.6–0.8 mm long, 0.3–0.5 mm wide, glabrous abaxially, pubescent adaxially; filaments 0.6–0.7 mm long. Ovary 1.3–1.4 mm long, c. 0.7 mm wide, glabrous or sparsely pubescent; style glabrous or sparsely pubescent. Fruit globular to ellipsoidal, 12–14 mm long, 10–14 mm wide, black. Cotyledons creamy yellow. *Murrogun*.

Occurs from Gympie, southern Qld, to Batemans Bay, N.S.W.; from sea level to 600 m alt. Grows in rainforest and wet sclerophyll forests, more commonly in soils derived from sedimentary and acid volcanic rocks. Flowers Sept.–Nov.; fruits (Dec.–) Mar.–July. Map 186.

Qld: S.F.R. 344 Mudgeeraba, *B.Hyland 4378 RFK* (QRS); Tomewin, *B.Hyland 4433 RFK* (QRS). N.S.W.: c. 16 km N of Bulahdelah on Pacific Hwy, *R.Schodde 5111* (L, NSW); Minnamurra Falls, *H.K.Judd NSW 121679* (NSW); Gerroa near Gerringong, *E.J.Edwards NSW 96586* (NSW).

32. *Cryptocarya murrayi* F.Muell., *Fragm.* 5: 170 (1866)

T: Dalrymple's Gap, Qld, *J.Dallachy*; lecto: MEL; remaining syn: A, BO, ?K, MEL, WRSL, *vide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 198 (1989).

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 302, fig. 27 (1989).

Tree to 30 m. Stem buttressed. Twigs terete, villous. Leaves: petiole 8–19 mm long; lamina elliptic to oval to oblong, 11.5–30 cm long, 4.5–10.5 cm wide, penninerved, green or ±glaucous below, pubescent. Inflorescence exceeding leaves. Flowers cream, unpleasantly perfumed. Perianth tube 0.8–1.9 mm long, 1.5–2.1 mm wide, inner surface pubescent towards apex. Tepals pubescent; outer 1.4–2.7 mm long, 1.2–1.6 mm wide; inner 1.4–2.6 mm long, 0.9–1.7 mm wide. Outer anthers 0.6–0.8 mm long, 0.5–0.7 mm wide, glabrous, or sparsely pubescent abaxially; filaments 0.4–0.7 mm long. Inner anthers 0.6–0.9 mm long, 0.5–0.7 mm wide, glabrous; filaments 0.4–0.7 mm long. Ovary 1.2–1.5 mm long, 0.5–0.6 mm wide, glabrous; style usually glabrous. Fruit ellipsoidal to globular, 13–18 mm long, 12–15 mm wide, black. Cotyledons creamy.

Occurs from Cooktown to Mackay, Qld; from sea level to 750 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Dec.–July; fruits Aug.–Nov. Map 187.

Qld: T.R. 146, Tableland L.A., *B.Hyland 10549* (QRS); T.R. 1230, Boonjee L.A., *A.K.Irvine 390* (BRI, QRS); South Maria Ck (near El Arish), *I.Olsen 362* (BRI, NSW); Seaview Holding, Garrawalt, Burgoo L.A., *K.D.Sanderson 597* (QRS); Eungella Ra., *W.D.Francis s.n.* (BRI).

Blaze odour sometimes pine-like.

33. *Cryptocarya nova-anglica* B.Hyland & A.G.Floyd, *Austral. Syst. Bot.* 2: 198 (1989)

T: Point Lookout, New England Natl Park, N.S.W., Jan. 1965, *L.J.Webb & J.G.Tracey 8074*; holo: BRI.

Cryptocarya sp. nov. (New England N.P.), A.G.Floyd, *New South Wales Rainforest Trees* part 1, 2nd edn, 54 (1979)

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 303, fig. 28 (1989).

Tree to 20 m. Stem not buttressed. Twigs fluted, eventually ±glabrescent. Leaves: petiole 5–8 mm long; lamina lanceolate, 5.7–7.4 cm long, 2–2.5 cm wide, penninerved, glaucous below, eventually ±glabrescent. Inflorescence usually a raceme, mostly axillary, scarcely exceeding petiole. Flowers creamy green, perfume unknown. Perianth tube c. 2 mm long, 1.5 mm wide, inner surface pubescent. Tepals pubescent; outer c. 2.4 mm long, 1.4 mm wide; inner c. 2.3 mm long, 1.6 mm wide. Outer anthers c. 0.9 mm long, 0.6 mm wide, pubescent abaxially, glabrous adaxially; filaments c. 0.9 mm long. Inner anthers c. 0.9 mm long, 0.5 mm wide, glabrous abaxially, pubescent adaxially; filaments c. 0.9 mm long. Ovary c. 1.1 mm long, 0.6 mm wide, glabrous; style glabrous. Fruit globular to pyriform, 12.5–15 mm long, 13–13.5 mm wide, black. Cotyledons creamy.

Occurs in northern N.S.W., from Mt Nothofagus in the McPherson Ra., to Mt Boss near Wauchope; from 1100–1350 m alt. Grows in mountain rainforests, usually associated with *Nothofagus moorei*. Flowers Dec.–Jan.; fruits Mar. Map 188.

N.S.W.: Mt Nothofagus, *A.G.Floyd 765* (NSW); Point Lookout, New England Natl Park, *L.J.Webb & J.G.Tracey 8074* (BRI); 200 m SE of Mt Hyland Trig, Marengo State Forest, *A.G.Floyd 1272* (BRI, NSW); Mt Boss, Bellangry State Forest, *L.J.Webb & J.G.Tracey 8056* (BRI).

Blaze odour strong, resembling fish oil. Young twigs often conspicuously orange-yellow. Differs from other species in the racemose inflorescence, and the lamina being glaucous on the underside with 5 or 6 lateral veins.

34. *Cryptocarya oblata* F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 9: 11 (1894)

T: Daintree R., Qld, *E.Cowley* 7; holo: BRI; iso: K.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 304, fig. 29 (1989).

Tree to 35 m. Stem usually buttressed. Twigs angular, eventually ±glabrescent. Leaves: petiole 7–14 mm long; lamina lanceolate to elliptic, 7.5–14 cm long, 2.9–5.7 cm wide, penninerved, green and glabrous below. Inflorescence not exceeding leaves. Flowers creamy green, ±perfumed. Perianth tube 0.3–0.7 mm long, 1.4–2.2 mm wide, usually pubescent. Tepals 1.5–2 mm long, 0.9–1.4 mm wide, pubescent. Outer anthers 0.6–0.9 mm long, 0.6–0.8 mm wide, pubescent; filaments 0.3–0.6 mm long. Inner anthers 0.7–0.9 mm long, 0.5–0.6 mm wide, acute, pubescent; filaments 0.4–0.7 mm long. Ovary 0.6–1.1 mm long, 0.6–0.8 mm wide, glabrous; style glabrous. Fruit laterally compressed, 29–38 mm long, 32–47 mm wide (longer axis), 25–38 mm wide (shorter axis), red to orange. Cotyledons white or cream. *Bolly Silkwood*.

Occurs from S of Cooktown to Koombooloomba, N Qld; from sea level to 1150 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Nov.–Feb.; fruits June–Dec. Map 189.

Qld: S.F.R. 78, Dagmar L.A., *B.Hyland* 9232 (A, BO, BRI, K, KEP, NSW, QRS, RSA); S.F.R. 143, North Mary L.A., *T.Risley* 83 (BRI, L, QRS); Massey Ck, Ravenshoe–Millaa Millaa Rd, *B.Gray* 290 (BRI, QRS); Weinerts Ck, Babinda, *R.L.Jago* 553 (QRS).

The flowers differ somewhat from other species of *Cryptocarya* in the ovary not being closely surrounded by the perianth tube, they resemble the flowers of *Beilschmiedia*. Fruit is occasionally pyriform or bilobed. Blaze odour noticeable, difficult to describe.

35. *Cryptocarya obovata* R.Br., *Prodr.* 402 (1810)

T: Port Jackson - Hunter River, N.S.W., *R.Brown iter Austral.* 3016; holo: BM.

Tetranthera ferruginea var. *lanceolata* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 192 (1864); *Litsea ferruginea* var. *lanceolata* (Meisn.) F.M.Bailey, *Syn. Queensland Fl.* 427 (1883). T: Brisbane R., Qld, *C.Moore* 15; syn: K; Sydney, N.S.W., *W.Macarthur* 153; syn: K.

Tree to 40 m. Stem sometimes buttressed. Twigs fluted, pubescent. Leaves: petiole 4–14 mm long; lamina oblong to obovate, 5–10.5 cm long, 2–4 cm wide, penninerved, usually glaucous, pubescent. Inflorescence exceeding leaves. Flowers creamy green, unpleasantly perfumed. Perianth tube 1–1.6 mm long, 1.4–1.7 mm wide, inner surface pubescent. Tepals pubescent; outer 1.8–2 mm long, 0.9–1.3 mm wide; inner 1.7–2 mm long, 1.2–1.5 mm wide. Outer anthers 0.7–0.9 mm long, 0.6–0.7 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.4–0.7 mm long. Inner anthers 0.8–0.9 mm long, 0.5–0.7 mm wide, pubescent, or glabrous abaxially; filaments 0.6–0.9 mm long. Ovary 1–1.1 mm long, 0.4–0.5 mm wide, pubescent; ovary pubescent. Fruit globular, 12 mm long, 11–13 mm wide, black. Cotyledons white or cream. *White Walnut*.

Occurs from Gympie, southern Qld, to Gloucester, N.S.W.; from sea level to 1050 m alt. Grows in rainforests in soils derived from a variety of rock types, but frequently in alluvial soils. Flowers Jan.–May; fruits Jan.–May. Map 190.

Qld: Blue Ck, (Gympie district), *E.H.F.Swain s.n.* (BRI); Imbil, *L.J.Webb* 123 (CANB). N.S.W.: Coramba, *B.Hyland* 4390 RFK (QRS); Red Scrub, Whian Whian, *W.T.Jones* 3456 (CANB); upper Williams R., *G.Rodway NSW 149960* (NSW).

This species is closely related to *C. hypospodia*. Blaze odour sometimes peppery.

36. *Cryptocarya onoprienkoana* B.Hyland, *Austral. Syst. Bot.* 2: 201 (1989)

T: Reserve 353, Parish of Barron, Qld, 11 Nov. 1983, *B.Gray* 3286; holo: QRS.

[*Cryptocarya rigida* auct. non Meisn.: W.D.Francis, *Austral. Rain-Forest Trees* 128 (1951); T.D.Stanley & E.Ross, *Fl. SE Queensland* 1: 159 (1983)]

Illustration: B.P.M.Hyland, *op. cit.* 2: 305, fig. 30 (1989).

Tree to 35 m. Stem buttressed. Twigs fluted, pubescent. Leaves: petiole 7–19 mm long; lamina lanceolate to elliptic, often unequal sided, 8–15.5 cm long, 2.5–7 cm wide, penninerved, glaucous and pubescent below. Inflorescence mainly axillary, not exceeding leaves. Flowers creamy green, perfumed. Perianth tube 0.7–2 mm long, 1.3–1.8 mm wide, pubescent at apex. Tepals pubescent; outer 1.7–1.9 mm long, 0.8–1 mm wide; inner 1.8–2.6 mm long, 1–1.1 mm wide. Outer anthers 0.7–0.9 mm long, 0.6–0.8 mm wide, pubescent abaxially, usually glabrous adaxially; filaments 0.3–0.7 mm long. Inner anthers 0.7–0.9 mm long, 0.5–0.6 mm wide, pubescent; filaments 0.4–0.8 mm long. Ovary 1–1.2 mm long, 0.5–0.6 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 15–22 mm long, 11–15 mm wide, black to blue-black. Cotyledons creamy. *Rose Maple*.

Occurs from Windsor Tableland to Gympie, central and northern Qld; at 50–1000 m alt. Grows in rainforests, often in drier or somewhat marginal situations, in soils derived from granite or acid volcanic rocks. Flowers Sept.–Dec.; fruits Apr.–Oct. Map 191.

Qld: S.F.R. 144, Windsor Tableland, *B.Gray 1201* (QRS); S.F.R. 194 Barron, Scrubby L.A., *B.Gray 3938* (QRS); Natl Park Res. 573, Eungella, Finch Hatten Gorge, *B.Hyland 4517 RFK* (QRS); Palm Valley, 16 km S of Biggenden, *P.Young & J.Randall 403* (BRI).

Blaze odour obvious (?peach, ?mango). Domatia sometimes present. Differs from *C. erythroxylon* in the twig hairs erect and tortuous, and the tepals 1.7–1.8 mm long.

37. *Cryptocarya pleurosperma* C.T.White & W.D.Francis, *Proc. Roy. Soc. Queensland* 35: 77 (1924)

T: Bellenden Ker, Qld, *C.T.White 1287*; holo: BRI; iso: MEL.

Cryptocarya glabella Domin, *Biblioth. Bot.* 89: 122 (1926). T: Russell River, Qld, Dec. 1909, *K.Domin*; syn: PR; Harveys Creek, Qld, Jan. 1910, *K.Domin I*; syn: BO, PR.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 306, fig. 31 (1989).

Tree to 30 m. Stem sometimes buttressed. Twigs terete, soon glabrescent. Leaves: petiole 5–11 mm long; lamina oblong to elliptic, 7.2–16 cm long, 3.5–7 cm wide, triplinerved, green below, soon glabrescent. Inflorescence a panicle or raceme, mostly axillary, not exceeding leaves. Flowers creamy, ±perfumed. Perianth tube 1.2–1.6 mm long, 1.8–2.4 mm wide, inner surface pubescent towards apex. Tepals 1.7–2.9 mm long, 1–1.6 mm wide, pubescent. Outer anthers 0.6–0.8 mm long, 0.6–0.8 mm wide, mostly glabrous; filaments 0.4–1.2 mm long. Inner anthers 0.8–0.9 mm long, 0.5–0.6 mm wide, mostly glabrous; filaments 0.5–1.1 mm long. Ovary 0.5–0.6 mm long, glabrous; style rudimentary, glabrous. Fruit usually globular, ribbed, 41–62 mm long, 27–49 mm wide, red. Cotyledons cream. *Poison Laurel*, *Poison Walnut*.

Occurs in N Qld, from Gold Hill (near Bloomfield R.), to near Palmerston (W of Innisfail); from sea level to 700 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Jan.–Mar.; fruits Oct.–Mar. Map 192.

Qld: Gold Hill, near China Camp, S of Bloomfield R., *J.G.Tracey 14797* (QRS); Vacant Crown Land, Noah, Oliver Ck, *K.Sanderson 1252* (QRS); S.F.R. 310, Upper Goldsborough, *B.Gray 2833* (QRS); T.R. 755, Badgerly L.A., Palmerston, *B.Hyland 11270* (QRS).

Numerous alkaloids have been isolated from this species, and workers have developed quite severe skin irritation and blistering while handling the bark and timber.

38. *Cryptocarya putida* B.Hyland, *Austral. Syst. Bot.* 2: 203 (1989)

T: State Forest Reserve 607, Bridle Logging Area, Qld, 1 Dec. 1978, *B.Gray 1170*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 307, fig. 32 (1989).

Tree to 25 m. Stem usually buttressed. Twigs terete or fluted, eventually ±glabrescent. Leaves: petiole 7–14 mm long; lamina oblong to elliptic to narrowly obovate, 6–21 cm long, 2–8 cm wide, penninerved, ±glaucous below, soon ±glabrescent. Inflorescence c. same length as leaves. Flowers brownish, creamy green, unpleasantly perfumed. Perianth tube 1.1–1.6 mm long, 1.4–1.8 mm wide, sparsely pubescent, or lower half glabrous. Tepals

1.6–2.1 mm long, 1.3–1.6 mm wide, pubescent. Outer anthers 0.7–1 mm long, 0.7–0.8 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.5–0.6 mm long. Inner anthers 0.8–1.2 mm long, 0.5–0.7 mm wide, few hairs or glabrous; filaments 0.6–0.7 mm long. Ovary 0.9–1.3 mm long, 0.6–0.7 mm wide, glabrous; style glabrous. Fruit ovoid, 14–20 mm long, 12–15 mm wide, black to purplish. Cotyledons yellowish.

Occurs in N Qld, from Clohesy R. (Lamb Ra.) to near Townsville, and perhaps in central Qld near Eungella; from 600–1100 m alt. Grows in rainforests, probably more frequently in soils derived from granite. Flowers Nov.–Dec.; fruits Sept., Nov., Feb. Map 193.

Qld: Clohesy River Rd, *G.Stocker 1605* (QRS); Mt Spec, *B.Hyland 3385 RFK* (QRS); S.F.R., Gillies L.A., *B.Gray 612* (QRS); Natl Park Res. 573, Finch Hatton Gorge, Eungella, *B.Hyland 4506 RFK* (QRS).

Differs from other species in the combination of twig hairs being erect, tortuous and more than 0.4 mm long, and the leaf laminae glaucous below. Blaze odour sometimes pine-like.

39. *Cryptocarya rhodosperma* B.Hyland, *Austral. Syst. Bot.* 2: 204 (1989)

T: State Forest Reserve 310, Gadgarra, Qld, 25 May 1983, *B.Gray 3077*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 308, fig. 33 (1989).

Tree to 25 m. Stem usually buttressed. Twigs fluted, pubescent. Leaves: petiole 8–16 mm long; lamina lanceolate to elliptic, often unequal sided at base, 8–14.5 cm long, 3–8 cm wide, penninerved, glaucous below, pubescent. Inflorescence c. same length as leaves. Flowers greenish, perfumed (unpleasantly?). Perianth tube 0.8–1.1 mm long, 1.2–1.9 mm wide, usually pubescent towards apex. Tepals 1.5–2.1 mm long, 1–1.2 mm wide, pubescent. Outer anthers 0.6–0.8 mm long, 0.4–0.6 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.3–0.7 mm long. Inner anthers 0.7–0.8 mm long, 0.4–0.5 mm wide, few hairs or glabrous; filaments 0.5–0.7 mm long. Ovary 0.8–1.1 mm long, c. 0.5 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 16–27 mm long, 9.5–16.5 mm wide, black. Cotyledons pink.

Occurs from Lockerbie to Goldsborough, Cape York Penin., N Qld; at 40–120 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Jan.–May; fruits (June) Sept.–Dec. Map 194.

Qld: Cape York (Bamaga), *H.E.Volck 1984* (AFO); between Starcke and Hopevale, *J.G.Tracey 14276* (QRS); S.F.R. 310 Gadgarra, Goldsborough L.A., *B.Gray 3077* (QRS); Kuranda Ra., lower lookout, *B.Gray 3862* (QRS).

Differs from other species of *Cryptocarya* in the cotyledons being pink or purplish and the inflorescence hairs being more than 0.4 mm long. Blaze odour obvious, perhaps resembling that of peaches.

40. *Cryptocarya rigida* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 508 (1864)

Cryptocarya patentinervis F.Muell. ex Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 508 (1864), *nom. inval.*, in synonymy under *C. rigida*. T: Clarence River [Clouds Creek?], N.S.W., *F.Mueller s.n.* (probably *H.Beckler*); holo: G-DC; iso: MEL.

Shrub or tree to 10 m. Stem not buttressed. Twigs fluted or angular, pubescent. Leaves: petiole 5–13 mm long; lamina lanceolate to elliptic, 6–13.5 cm long, 1.2–5 cm wide, penninerved, glaucous below, pubescent. Inflorescence a panicle, or ±compound cyme, mainly axillary, not exceeding leaves. Flowers creamy green, without perfume. Perianth tube 1.4–1.6 mm long, 1.7–1.8 mm wide, inner surface pubescent. Tepals 1.5–2 mm long, 0.9–1.5 mm wide, pubescent. Outer anthers c. 0.8 mm long, 0.6–0.7 mm wide, few hairs abaxially, glabrous adaxially; filaments 0.5–0.6 mm long. Inner anthers 0.8–0.9 mm long, 0.5–0.6 mm wide, pubescent, or glabrous adaxially; filaments 0.5–0.7 mm long. Ovary 1.1–1.6 mm long, 0.6–0.7 mm wide, pubescent; style pubescent. Fruit ellipsoidal, 17–25 mm long, 11–17.5 mm wide, black. Cotyledons cream. *Rose Maple*.

Occurs from Springbrook, southern Qld, to Dungog, N.S.W.; from 150–900 m alt. Grows in rainforests, particularly rainforest margins, usually in poorer soils derived from sedimentary and acid volcanic rocks. Flowers Oct.–Mar.; fruits (Jan.–) Feb.–Mar. (–May). Map 195.

Qld: Springbrook, *M.S.Clemens s.n.* (BRI). N.S.W.: Watts Folly Rd, Nightcap Ra., Whian Whian State Forest, *R.Coveny 09917A* (NSW); Langleys Block, Orara West State Forest, *B.Hyland 4392 RFK* (QRS); Gibraltar Ra., *H.Salasoo 4659* (NSW); Lagoon Pinch, Barrington Tops, *H.Salasoo 2412* (NSW).

Blaze odour obvious, difficult to describe.

41. *Cryptocarya saccharata* B.Hyland, *Austral. Syst. Bot.* 2: 206 (1989)

T: State Forest Reserve 144, Whypalla, Qld, 18 Nov. 1976, *B.Hyland 3477 RFK*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 309, fig. 34 (1989).

Tree to 35 m. Stem sometimes buttressed. Twigs \pm fluted, pubescent. Leaves: petiole 5–11 mm long; lamina lanceolate, 5.5–12 cm long, 2–5 cm wide, penninerved, glaucous below, pubescent. Inflorescence not exceeding leaves. Flowers creamy green, perfumed. Perianth tube 0.7–1.1 mm long, 1.2–1.6 mm wide, inner surface glabrous, or pubescent towards apex. Tepals pubescent; outer 1.3–1.6 mm long, 0.9–1.1 mm wide; inner 1.2–1.5 mm long, 0.8–1 mm wide. Outer anthers 0.5–0.6 mm long, 0.5–0.6 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.2–0.4 mm long. Inner anthers 0.6–0.7 mm long, 0.4–0.6 mm wide, usually pubescent abaxially, glabrous adaxially. Ovary 0.7–1 mm long, c. 0.5 mm wide, mainly glabrous; style glabrous or pubescent. Fruit ellipsoidal or pyriform, 17–24 mm long, 11–15 mm wide, black to blue-black. Cotyledons yellowish. *Corduroy Laurel*.

Occurs from Windsor Tableland to Dotswood Holding, Bluewater Ra. N of Townsville, N Qld; from 650–1150 m alt. Grows in mountain rainforests particularly in soils derived from granite. Flowers Nov.–Dec.; fruits Mar.–June. Map 196.

Qld: Bakers Blue Mtn, *J.G.Tracey 14819* (BRI, QRS); S.F.R. 144, Fantail L.A., Windsor Tableland, *K.Sanderson 1778* (QRS); Hugh Nelson Ra., *B.Gray 1606* (QRS); Scrubby Ck, *G.Stocker 712* (QRS).

Blaze odour obvious, resembling sugarcane. Rudimentary style/s often present. Differs from *C. corrugata* in the fruit being ellipsoidal or pyriform.

42. *Cryptocarya sclerophylla* B.Hyland, *Austral. Syst. Bot.* 2: 207 (1989)

T: Nicholl's Property, Currumbin Ck, Qld, 14 Nov. 1982, *B.Hyland 12321*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 310, fig. 35 (1989).

Tree or shrub to 10 m. Stem not buttressed. Twigs \pm terete, soon glabrescent. Leaves: petiole 4–6 mm long; lamina elliptic, 6.5–12 cm long, 2–4.5 cm wide, penninerved, green below, soon glabrescent. Inflorescence mainly pseudoterminal, c. same length as leaves. Flowers creamy green, perfumed. Perianth tube 1.5–1.6 mm long, 1.3–1.5 mm wide, inner surface pubescent. Tepals c. 1.5 mm long, 1.1–1.4 mm wide, pubescent abaxially, usually glabrous adaxially. Outer anthers 0.7–0.8 mm long, 0.5–0.6 mm wide, glabrous, or few hairs abaxially; filaments 0.5 mm long. Inner anthers 0.6–0.8 mm long, 0.5 mm wide, glabrous, or few hairs adaxially; filaments 0.5 mm long. Ovary 1.1–1.2 mm long, c. 0.6 mm wide, glabrous; style glabrous. Fruit globular, ellipsoidal, 14–16 mm long, 11–12 mm wide, black. Cotyledons cream.

Occurs from Gympie to Currumbin, S Qld; from 50–200 m alt. Grows in rainforests, particularly in more seasonal areas where there is a long period of water stress each year, in soils derived from a variety of rock types. Flowers Sept.–Nov.; fruits June. Map 197.

Qld: Kin Kin, *W.D.Francis & C.T.White BRI230396–7* (BRI); Coolum, *B.Hyland 11001* (QRS); Currumbin Valley, *D.L.Jones 10* (QRS).

Differs from other species in the combination of petiole 4–6 mm long, midrib raised on the upper surface, lateral vein angle more than 45° and radicle lateral. The style bears a distinct, lateral swelling.

43. *Cryptocarya smaragdina* B.Hyland, *Austral. Syst. Bot.* 2: 208 (1989)

T: State Forest Reserve 607, Emerald Logging Area, Qld, 1 Nov. 1982, *B.Gray 2796*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 311, fig. 36 (1989).

LAURACEAE

Differs from other species in the combination of leaf lamina glaucous and sericeous below, fetid flowers and ruminant cotyledons.

44. *Cryptocarya triplinervis* R.Br., *Prodr.* 402 (1810)

Cryptocarya sp. RFK25231 (B.Hyland 1697RFK), D.C.Christophel & B.Hyland, *Leaf Atlas Austral. Tropical Rainforest Trees* 127 (1993); D.C.Christophel & A.I.Rowett, *Leaf Cuticle Atlas Austral. Leafy Lauraceae* 88 (1996)

Trees to 20 m. Stem sometimes buttressed. Twigs terete, angular or fluted, pubescent or villous. Leaves: petiole 3–13 mm long; lamina ovate to elliptic to lanceolate, 4.5–13.5 cm long, 1.5–5 cm wide, green below. Inflorescence paniculate, as long as or exceeding leaves. Flowers cream to pale green, not or only faintly perfumed. Perianth tube 1.2–2.7 mm long, 0.9–1.2 mm wide, pubescent inside at least in part. Tepals 1.4–2.2 mm long, 0.7–1.8 mm wide, pubescent. Outer anthers 0.5–0.8 mm long, 0.4–0.7 mm wide, glabrous, or pubescent abaxially; filaments 0.3–0.8 mm long. Inner anthers 0.5–0.8 mm long, 0.3–0.5 mm wide, glabrous, or pubescent adaxially; filaments 0.3–0.8 mm long. Ovary 0.9–1.4 mm long, glabrous, or sparsely pubescent; style glabrous or pubescent. Fruit 8–14 mm long, 6.5–12 mm wide, black. Cotyledons cream.

Occurs from northern Qld to northern N.S.W. Three varieties are recognised.

- | | | |
|----|---|-------------------------------|
| 1 | Underside of mature leaves ¹ clothed in tortuous, erect hairs | 44b. var. pubens |
| 1: | Underside of mature leaves clothed in straight, appressed hairs or glabrous | |
| 2 | Underside of mature leaves glabrous or almost glabrous; leaf hairs appressed, short (i.e. length less than diam. of each reticulation in leaf venation); twig hairs mainly appressed | 44c. var. riparia |
| 2: | Underside of mature leaves clothed in straight, white, mainly appressed (rarely some erect) hairs; leaf hairs long (i.e. length greater than diam. of each reticulation in leaf venation); twig hairs appressed and erect | 44a. var. triplinervis |

¹ Fully developed leaves should be examined, not old moribund ones.

44a. *Cryptocarya triplinervis* R.Br. var. *triplinervis*

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 346, fig. 71B–D (1989).

Stem not buttressed. Twigs terete or angular, pubescent with appressed and erect hairs. Leaf lamina ovate to elliptic to lanceolate, 4.5–13.5 cm long, 1.5–5 cm wide, triplinerved, green below, pubescent with hairs white, long, straight, mainly appressed; domatia often present. Inflorescence scarcely exceeding leaves. Flowers pale green, \pm perfumed. Tepals pubescent with hairs mainly appressed. Ovary glabrous or sparsely pubescent; style pubescent. Fruit \pm globular. *Brown Laurel*.

Occurs from Townsville, Qld, to Coffs Harbour, northern N.S.W.; from sea level to 100 m alt. Grows in rainforests and beach forests in soils derived from a variety of rock types. Also native on Lord Howe Is., and naturalised on Norfolk Is. Flowers Sept.–Nov.; fruits Oct., Jan. Map 199.

Qld: Hamilton Is., *B.Gray 4156* (QRS); Burnett R., Goodnight Scrub, *L.S.Smith 9820* (A, BISH, BRI, K, RSA). N.S.W.: 1 km S of Smoky Cape, *L.A.S.Johnson 7844* (NSW); Coffs Harbour jetty, *B.Hyland 12346* (QRS).

Blaze odour distinctive, but difficult to describe.

44b. *Cryptocarya triplinervis* var. *pubens* B.Hyland, *Austral. Syst. Bot.* 2: 210 (1989)

T: Currumbin Valley Bird Garden, Qld, 14 Nov. 1982, *B.Hyland 12325*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 346, fig. 71E (1989).

Stem sometimes buttressed. Twigs mainly terete, villous with hairs erect. Leaf lamina ovate to elliptic to lanceolate, 4.5–12.9 cm long, 1.6–4.5 cm wide, triplinerved, sometimes penninerved, green below, pubescent with hairs white or pale brown, straight or tortuous, erect; domatia absent. Inflorescence scarcely exceeding leaves. Flowers creamy green, \pm perfumed. Tepals pubescent with hairs appressed abaxially, erect adaxially. Ovary usually sparsely pubescent; style sparsely pubescent. Fruit ellipsoidal.

Occurs from Atherton Tableland, Qld, to Ballina, northern N.S.W.; from sea level to 750 m alt. Grows in drier rainforests in soils derived from a variety of rock types. Flowers Oct.–Nov.; fruits Dec.–Jan., Apr. Map 200.

Qld: Tolga Scrub, *B.Hyland 1762 RFK* (BRI, QRS); Mining Lease 165, Agnes Waters, *T.J.McDonald & G.N.Batianoff 1246* (BRI); Smiths Farm, Upper Brookfield, *B.Hyland 4443 RFK* (QRS); Tomewin, *B.Hyland 4434 RFK* (QRS). N.S.W.: Lismore, *H.Tanner NSW 149917* (NSW).

Blaze odour distinctive, ?peppery.

44c. *Cryptocarya triplinervis* var. *riparia* B.Hyland, *Austral. Syst. Bot.* 2: 211 (1989)

T: Gordon Creek, Qld, 13 Dec. 1982, *B.Hyland 12452*; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 346, fig. 71F (1989).

Stem sometimes buttressed. Twigs usually fluted, pubescent with hairs usually straight and appressed (occasionally tortuous or erect). Leaf lamina usually lanceolate, 6–13.5 cm long, 1.8–4.5 cm wide, penninerved or triplinerved, pubescent when young with white, short, appressed hairs, eventually \pm glabrescent; domatia usually absent, sometimes tufts of hair present. Inflorescence usually exceeding leaves. Flowers creamy green, not perfumed. Tepals pubescent with hairs appressed. Ovary glabrous; style glabrous or with a few hairs. Fruit ellipsoidal to globular.

Occurs in N Qld, from Iron Ra. to Cardwell; from sea level to 400 m alt. Grows in gallery forests, usually in alluvial soils derived from a variety of rock types. Flowers Aug.–Oct.; fruits Dec.–Mar. Map 201.

Qld: upper Massy Ck (Cohen), *L.S.Smith 11906* (QRS); Freshwater Ck, Cairns, *R.L.Jago s.n.* (QRS); Kennedy Hwy (Atherton–Ravenshoe), *B.Gray 4192* (QRS); Meunga Ck, Cardwell, *A. & M.Thorsborne 101* (BRI).

Blaze odour often resembles guava. Leaves sometimes with domatia present, foveoles rarely present. Inner tepals usually slightly wider than outer.

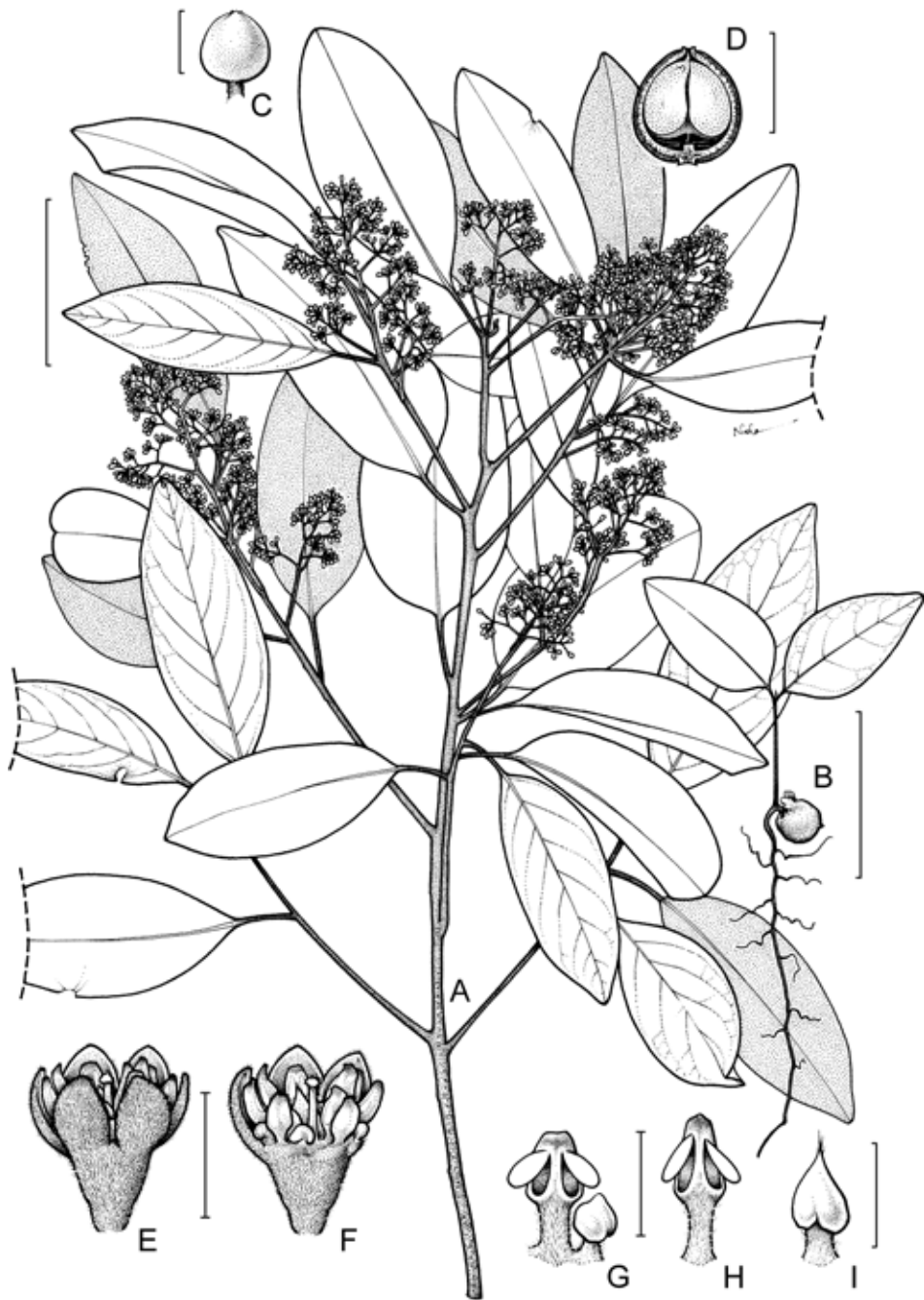


Figure 36. *Cryptocarya vulgaris*. **A**, habit (B.Gray 1367, QRS); **B**, seedling; **C**, fruit; **D**, L.S. fruit (**B–D**, B.Gray 1903, QRS); **E**, flower; **F**, flower with 3 tepals removed; **G**, stamen and gland (outer whorl, adaxial view); **H**, stamen (inner whorl, abaxial view); **I**, staminode (adaxial view) (**E–I**, B.Gray 1348, QRS). Scale bars: **A**, **B** = 40 mm; **C**, **D** = 10 mm; **E**, **F** = 2 mm; **G–I** = 1 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 312 (1989).

45. *Cryptocarya vulgaris* B.Hyland, *Austral. Syst. Bot.* 2: 212 (1989)

T: State Forest Reserve 933, Little Pine Logging Area, Qld, 30 Mar. 1979, *B.Gray 1367*; holo: QRS.

Cryptocarya glaucescens var. *coriacea* Benth., *Fl. Austral.* 5: 297 (1870). T: Rockingham Bay, Qld, *J.Dallachy s.n.*; holo: K.

Cryptocarya hypotephra F.Muell. ex Koord. & Valetton, *Bijdr. Boomsorten Java* 10: 224 (1904) *in nota*, *nom. inval.*

Illustration: B.P.M.Hyland, *op. cit.* 2: 312, fig. 37 (1989).

Tree to 30 m. Stem sometimes buttressed. Twigs fluted, pubescent. Leaves: petiole 6–19 mm long; lamina elliptic to oblong to lanceolate, 6.5–14 cm long, 2.5–6 cm wide, penninerved, glaucous, eventually ±glabrescent. Inflorescence paniculate, exceeding leaves. Flowers creamy yellow, pale green, perfumed. Perianth tube 0.8–1.4 mm long, 0.9–1.3 mm wide, inner surface glabrous, or pubescent towards apex. Tepals pubescent: outer 1–1.5 mm long, 0.8–1.1 mm wide; inner 1–1.5 mm long, 0.6–0.9 mm wide. Outer anthers 0.4–0.6 mm long, c. 0.5 mm wide, pubescent abaxially, glabrous adaxially; filaments 0.4–0.6 mm long. Inner anthers 0.5–0.7 mm long, 0.4–0.5 mm wide, glabrous; filaments 0.3–0.4 mm long. Ovary 0.7–1 mm long, 0.3–0.5 mm wide, glabrous; style glabrous. Fruit usually globular, 8–13 mm long, 8–12 mm wide, black. Cotyledons creamy yellow. *Northern Laurel*. Plate 29; Fig. 36.

Occurs from Iron Ra. to Yeppoon, Qld; from sea level to 850 m alt. Grows in rainforests in soils derived from granite, acid volcanic and metamorphic rocks. Flowers Nov.–Apr.; fruits Oct.–Feb. Map 202.

Qld: Iron Ra., *B.Hyland 11614* (QRS); Edge Hill, Cairns, *J.P.Martin 2740* (AFO, BRI); Kirrama Ra., *H.E.Volck 297* (BRI); Byfield Rd, *K.A.W.Williams 78002* (BRI).

This species differs from *C. leucophylla* in the underside of the lamina being glaucous and glabrous at maturity. Blaze odour sometimes pine-like.

46. *Cryptocarya whiffiniana* Le Cussan & B.Hyland, *Fl. Australia* 2: 457 (2007)

T: State Forest Reserve 310, Parish of Gadgarra, Qld, 24 Feb. 1988, *B.Gray 4760*; holo: QRS.

Tree to 20 m tall. Stem buttressed. Twigs usually fluted, pubescent. Leaves oblong, lanceolate, narrowly elliptic, triplinerved or penninerved, slightly glaucous and pubescent below; lamina 7–11 cm long, 2–4 cm wide; petiole 5–8 mm long. Inflorescence not exceeding leaves. Flowers cream-green, without perfume. Perianth tube 1.5–1.6 mm long, c. 0.6 mm wide, pubescent only towards apex. Outer tepals 1.9–2.1 mm long, 0.9–1.1 mm wide, inner tepals 1.8–2.1 mm long, c. 1.2 mm wide, pubescent. Outer anthers 0.4–0.8 mm long, 0.5–0.6 mm wide, glabrescent or few hairs abaxially; filaments 0.6–0.8 mm long. Inner anthers 0.7–0.9 mm long, 0.4–0.5 mm wide, glabrescent; filaments 0.5–0.65 mm long. Ovary 1.5–1.6 mm long, 0.5–0.6 mm wide, ovary and style glabrescent. Fruit ellipsoidal, 10–13 mm long, 8–9 mm wide, black, sometimes glaucous. Cotyledons cream.

Occurs in the Lamb Ra. and Gadgarra area, northern Qld; from 520–720 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers recorded Aug. & Nov.; fruits recorded Feb. Map 203.

Qld: S.F.R. 185, Lake L.A., (Tinaroo Hills, Lamb Ra.), *B.Hyland 1956 RFK* (QRS); S.F.R. 607, Ganyan L.A., (Lamb Ra., northern end), *B.Hyland 1700 RFK* (QRS); S.F.R. 607, Ganyan L.A., (Lamb Ra., northern end), *B.Hyland 1705 RFK* (QRS); S.F.R. 310, Tarden and Dreghorn L.A., Gadgarra, *B.Hyland 2014 RFK* (QRS).

Differs from other related species in the combination of leaves being slightly glaucous below, the radicle lateral, the ovary and style glabrous and the style 0.9–1.1 mm long. Domatia (tufts of hair) are usually present in the axils of the primary veins.

47. *Cryptocarya williwilliana* B.Hyland & A.G.Floyd, *Austral. Syst. Bot.* 2: 213 (1989)

T: Willi Willi, N.S.W., 17 Nov. 1982, *B.Hyland 12344*; holo: QRS.

Cryptocarya sp. nov. (Willi Willi), A.G.Floyd, *New South Wales Rainforest Trees* part 1, 2nd edn, 63 (1979)

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 313, fig. 38 (1989).

Tree or shrub to 6 m. Twigs fluted, terete, eventually \pm glabrescent. Leaves: petiole 3–4 mm long; lamina lanceolate, 2.5–3.5 cm long, 1.3–1.8 cm wide, penninerved, sometimes tending triplinerved, green below, soon glabrescent. Inflorescence racemose, mainly axillary, not exceeding leaves. Flowers creamy green, perfumed. Perianth tube 1.3–2 mm long, 0.9–1 mm wide, inner surface pubescent towards apex. Tepals pubescent; outer 1.4–2 mm long, 1–1.2 mm wide, inner 1.5–2.1 mm long, 1.1–1.4 mm wide. Outer anthers 0.5–0.7 mm long, 0.5–0.7 mm wide, mainly glabrous; filaments 0.5–0.7 mm long. Inner anthers 0.6–0.8 mm long, 0.4–0.6 mm wide, glabrous; filaments 0.5–0.7 mm long. Ovary 1–1.3 mm long, 0.5–0.6 mm wide, glabrous; style glabrous. Fruit globular to ellipsoidal, 10–12 mm long, 8.5–11 mm wide, black. Cotyledons creamy white.

Restricted to near Willi Willi, N.S.W.; at 250–800 m alt. Grows in dry rainforest on limestone. Flowers Oct.–Jan.; fruits Feb.–Mar. Map 204.

N.S.W.: Block & Tackle Ridge, Willi Willi, *A.G.Floyd 847* (NSW); Carrai State Forest 909, 48 km W of Kempsey, *E.F.Constable & H.Hughes NSW 46232* (NSW); Willi Willi, *B.Hyland 12341* (QRS); Block & Tackle Spur, Willi Willi, *B.Hyland 10987* (QRS).

Flowers opening widely with tepals \pm horizontal at anthesis. Similar to *C. triplinervis* and *C. bidwillii*, differing in the shorter leaf lamina. A relict species with limited distribution and narrow ecological amplitude.

Excluded names

Cryptocarya graveolens F.M.Bailey, *Dept. Agric. Bot. Bull.* 2: 16 (1891)

T: Qld, Tringilburra Creek, Bellenden Ker Expedition, 1889; syn: BRI *n.v.*; Johnstone River, *Dr. T.L.Bancroft*; syn: BRI *n.v.*

This is *Acmena graveolens* (F.M.Bailey) L.S.Sm. (Myrtaceae).

Cryptocarya hypoglaucha Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 73 (1864)

T: North Western coast of Australia, no date, *A.Cunningham*; holo: G.

Cryptocarya hypotephra F.Muell., *Fragm.* 5: 170 (1866), *nom. prov.* Based on: Rockingham Bay, Qld, ?*F.Mueller*.

This species is excluded due to doubts about the provenance of the type specimen and the absence of any matching Australian specimens. (See B.P.M.Hyland, *Austral. Syst. Bot.* 2: 270 (1989) for a full discussion.) Also tentatively reported from Rockingham Bay, Queensland by F.Mueller, *loc. cit.*

5. ENDIANDRA

Endiandra R.Br., *Prodr.* 402 (1810); from the Greek *endeia* (without, lack) and *andros* (man), alluding to the absence of an outer series of 6 stamens.

Type: *E. glauca* R.Br.

Dictyodaphne Blume, *Mus. Bot.* 1(17): 270 (1851). T: *D. rubescens* Blume

Brassiodendron C.K.Allen, *J. Arnold Arbor.* 23: 153 (1942). T: *B. fragrans* C.K.Allen

Trees, rarely shrubs. Twigs \pm sericeous to villous to almost glabrescent. Leaves spirally arranged, petiolate; lamina penninerved, rarely triplinerved. Inflorescence usually paniculate, pseudoterminal and/or axillary, rarely racemose or cymose and axillary, not enclosed in hemispherical decussate bracts before anthesis. Flowers bisexual, usually 3-merous (2-merous in *E. xanthocarpa*). Tepals 3 + 3, (rarely 2 + 2). Stamens usually 3 (occasionally 2–6); anthers extrorse (rarely \pm introrse), usually 2-locular (*E. monothyra* unilocular); glands usually 6 per flower, occasionally absent, sometimes fused to form disc. Staminodes usually 3, sometimes fewer or absent. Ovary \pm sessile; style usually short. Fruit to 100 mm diam.;

pedicel not swollen; mesocarp and exocarp usually fleshy. Seed: radicle usually apical, sometimes basal, central or lateral; cotyledons usually distinct, uniform in texture.

A genus of c. 100 species occurring in Asia, Malesia, Australia and the Pacific Islands; in Australia 38 species occur (33 or 34 endemic). Distributed from Cape York Penin., Qld, to southern N.S.W., with a single species extending to N.T.

The genus is of significant economic importance, including 16 species that produce millable logs of generally fine grade timbers (referred to as 'walnut'). A further 11 species also produce millable logs although they are not commonly utilised. The species are usually found in rainforest, gallery or littoral forests, although *E. discolor* and *E. sieberi* have developed mechanisms (*E. discolor*—lignotubers; *E. sieberi*—a very thick corky bark) to cope with periodic fires in ecotonal areas. A rare compound, endiandric acid, has been isolated from 2 closely related species, *E. introrsa* and *E. jonesii*. Domin observed aborigines eating the fruit of *E. anthropophagorum* (hence the specific epithet from the Greek *anthropos* (man) and *phago* (to eat)).

W.M.Bandaranayake *et al.*, Endiandric acid, a novel carboxylic acid from *Endiandra introrsa* (Lauraceae): X-ray structure determination, *J. Chem. Soc. Chem. Comm.* 1980: 162–163 (1980).

Flowering Material

- 1 Stamens 4–6 per flower
- 2 Staminal glands larger than anther openings **15. *E. globosa***
- 2: Staminal glands smaller than anther openings **28. *E. montana***
- 1: Stamens 2 or 3 per flower
- 3 Staminal glands fused to one another, either all fused to form a ring of tissue or pairs of glands fused to form 3 masses of tissue ±in a ring
- 4 Outer tepals > 4 mm long
- 5 Staminal glands fused to form a 3-partite ring of tissue; leaves green on underside **13. *E. floydii***
- 5: Staminal glands fused to form a continuous ring of tissue; leaves white or glaucous on underside
- 6 Inner surface of tepals pubescent **16. *E. grayi***
- 6: Inner surface of tepals glabrous **18. *E. hypotephra***
- 4: Outer tepals < 4 mm long
- 7 Ovary hairy
- 8 Each pair of staminal glands ±fused but separate from glands associated with adjacent anthers; staminodes hairy, quite free from glands **3. *E. bellendenkerana***
- 8: Staminal glands fused to form a ±continuous hexagonal disk-like ring of tissue; staminodes fused with disk and indistinguishable from it or absent **37. *E. wolfei***
- 7: Ovary glabrous
- 9 Anther valves opening upwards; backs of valves of each anther almost touching and projecting above apex of anther **14. *E. glauca***
- 9: Anther valves opening outwards or sideways; valves of each anther being quite widely separated at anthesis

- 10 Anther valves hinged \pm vertically so that valves open outwards like a door; young twigs clothed in tortuous, erect, brown or rusty brown hairs 25. *E. longipedicellata*
- 10: Anther valves hinged horizontally so the valves lift upwards; young twigs clothed in straight, appressed, white or pale brown hairs 13. *E. floydii*
- 3: Staminal glands quite separate from one another (sometimes touching but not fused) or absent
- 11 Staminal glands absent
- 12 Anther valves opening inwards
- 13 Ovary hairy; outer tepals greater than 1.3 mm long; hairs present on back of anther 22. *E. jonesii*
- 13: Ovary glabrous; outer tepals < 1.3 mm long; hairs absent on back of anther 21. *E. introrsa*
- 12: Anther valves opening upwards, outwards or sideways
- 14 Staminodes present
- 15 Anther openings longer than wide, not pore-like
- 16 Underside of lamina hairy, many hairs erect and \pm tortuous 32. *E. pubens*
- 16: Underside of lamina glabrous, or with scattered appressed hairs
- 17 Primary veins 4–6 pairs; pedicel 2.5–7.7 mm long 2. *E. anthropophagorum*
- 17: Primary veins 5–13 pairs; pedicel 0.6–2 mm long 36. *E. virens*
- 15: Anther openings pore-like, \pm circular or about as long as wide
- 18 Stamens usually 2 per flower; filaments not wider than anthers 38. *E. xanthocarpa*
- 18: Stamens usually 3 per flower; filaments wider than anthers 31. *E. phaeocarpa*
- 14: Staminodes absent
- 19 Outer tepals > 3 mm long; anthers > 1.5 mm long 19. *E. impressicosta*
- 19: Outer tepals < 3 mm long; anthers < 1.5 mm long
- 20 Anther openings pore-like, \pm circular or about as long as wide; filaments wider than anthers 31. *E. phaeocarpa*
- 20: Anther openings not pore-like, openings longer than wide; filaments not wider than anthers 33. *E. sankeyana*
- 11: Staminal glands present, quite separate from one another
- 21 Anthers opening by 1 valve, inwards 27. *E. monothyra*
- 21: Anthers opening by 2 valves, outwards, sideways or upwards
- 22 Staminodes absent
- 23 Outer tepals > 2.5 mm long; anthers > 1.5 mm long 7. *E. cooperana*
- 23: Outer tepals < 2.5 mm long; anthers < 1.5 mm long
- 24 Apex of anthers papillose; anthers laterally dehiscent 6. *E. compressa*
- 24: Apex of anthers glabrous; anthers almost extrorse 26. *E. microneura*
- 22: Staminodes present
- 25 Staminodes undifferentiated, i.e. staminode \pm subulate, not consisting of a head and distinctly different stalk
- 26 Tips of inner tepals \pm level with tips of outer tepals at anthesis
- 27 Anther valves projecting beyond tepals at anthesis 29. *E. muelleri*
- 27: Anther valves not projecting beyond tepals at anthesis

- 28 Anthers pubescent at apex or almost to apex **30. *E. palmerstonii***
- 28: Anthers glabrous at apex
- 29 Tepals \pm glabrous on outer surface; outer tepals 1.3–2.1 mm long **15. *E. globosa***
- 29: Tepals pubescent on outer surface; outer tepals 1.2–1.3 mm long **26. *E. microneura***
- 26: Tips of inner tepals well below tips of outer tepals (appearing about half the height) at anthesis
- 30 Hairs on underside of midrib erect **20. *E. insignis***
- 30: Hairs on underside of midrib appressed **2. *E. anthropophagorum***
- 25: Staminalodes differentiated, i.e. staminode consisting of a head and distinctly different stalk or sessile
- 31 Flowers not opening widely; tepals \pm erect at anthesis, closely surrounding anthers and style so that only anther tips are visible when viewed from above
- 32 Tepals (particularly outer tepals) cucullate or geniculate, angle formed by upper part of tepal and perianth tube is c. 90° or even less
- 33 Tepals and perianth tube clothed in long, erect hairs; flowers \pm triangular in transverse section, \pm flat topped at anthesis **17. *E. hayesii***
- 33: Tepals and perianth tube clothed in short, appressed and erect hairs; flowers \pm circular or hexagonal in transverse section, with curved apices at anthesis **23. *E. leptodendron***
- 32: Tepals curved or rounded, angle formed by upper part of tepal and perianth tube is much greater than 90°
- 34 Tips of inner tepals well below tips of outer tepals at anthesis; style projecting beyond tips of anthers at anthesis **20. *E. insignis***
- 34: Tips of inner tepals \pm level with tips of outer tepals at anthesis; style below or level with tips of anthers at anthesis
- 35 Style > 0.5 mm long; anther filaments 0.3–0.5 mm long; perianth tube 2.5 mm or more in diam. **29. *E. muelleri***
- 35: Style < 0.5 mm long; anther filaments 0.1–0.2 mm long; perianth tube < 2.5 mm in diam. **5. *E. collinsii***
- 31: Flowers opening quite widely; tepals erect, \pm horizontal or reflexed at anthesis, so that anthers, portions of style, ovary and staminal glands are visible when viewed from above
- 36 Anthers hairy at apex or almost to apex **30. *E. palmerstonii***
- 36: Anthers glabrous at apex (usually entire upper half of anther)
- 37 Base of filaments much wider than anthers **1. *E. acuminata***
- 37: Base of filaments usually narrower than anthers, rarely as wide as anthers
- 38 Tepals glabrous on outer surface
- 39 Inflorescence racemose; bracts > 3 mm long, present at anthesis **9. *E. crassiflora***
- 39: Inflorescence panicle; bracts < 3 mm long, absent at anthesis
- 40 Leaves glaucous on underside; midrib flush with upper surface; stem bark nondescript; petiole 6–21 mm long **11. *E. dielsiana***
- 40: Leaves green on underside; midrib raised on upper surface; stem bark corky; petiole 3–9 mm long

- 41 Inner tepals 1.6–1.8 mm wide; anthers 0.7–0.9 mm long; leaf lamina 10–17 cm long 15. *E. globosa*
- 41: Inner tepals 0.9–1 mm wide; anthers 0.5–0.6 mm long; leaf lamina 5.5–11.5 cm long 35. *E. sieberi*
- 38: Tepals hairy on outer surface
- 42 Adaxial surface of anther hairy
- 43 Leaves glaucous on underside; midrib depressed or flush with upper surface
- 44 Foveoles absent on underside of leaves 10. *E. dichrophylla*
- 44: Foveoles present on underside of at least 50% of leaves
- 45 Primary veins 6–11 pairs; apex of leaf lamina obtuse or rounded 4. *E. bessaphila*
- 45: Primary veins 3–7 pairs; apex of leaf lamina bluntly pointed or acuminate 12. *E. discolor*
- 43: Leaves green on underside; midrib raised or flush with upper surface
- 46 Foveoles present on underside of at least 50% of leaves 4. *E. bessaphila*
- 46: Foveoles absent on underside of leaves
- 47 Outer tepals 1.7–2 mm long; reticulate veins not very prominent even on dried leaves 34. *E. sideroxylon*
- 47: Outer tepals 1.2–1.3 mm long; reticulate veins prominent particularly on dried leaves 26. *E. microneura*
- 42: Adaxial surface of anther glabrous
- 48 Foveoles always absent
- 49 Inflorescence usually > 10 cm long and exceeding leaves 34. *E. sideroxylon*
- 49: Inflorescence < 10 cm long and not exceeding leaves 9. *E. crassiflora*
- 48: Foveoles usually present on underside of leaves
- 50 Leaves green on underside; inflorescence exceeding leaves 8. *E. cowleyana*
- 50: Leaves glaucous on underside; inflorescence not exceeding leaves
- 51 Inflorescence racemose; outer tepals 2.3–2.7 mm long 9. *E. crassiflora*
- 51: Inflorescence paniculate; outer tepals < 2 mm long
- 52 Older leaves glaucous on underside; perianth tube 1.2–2.1 mm diam. 12. *E. discolor*
- 52: Older leaves slightly glaucous on underside; perianth tube 1–1.3 mm diam. 24. *E. limnophila*

Fruiting material (*E. floydii* not included)

- 1 Fruits > 30 mm long
- 2 Radicle basal, central or lateral
- 3 Fruits black, blue-black or purplish black; radicle lateral or almost lateral 19. *E. impressicosta*
- 3: Fruits pink, red, orange-red, brown or yellow; radicle basal or central

- 4 Older leaves glabrous on underside
 - 5 Fruits globular
 - 6 Seeds 22–36 mm diam. **2. *E. anthropophagorum***
 - 6: Seeds c. 35–40 mm diam. **36. *E. virens***
 - 5: Fruits ellipsoidal or sausage-shaped
 - 7 Fruits scurfy brown when ripe **31. *E. phaeocarpa***
 - 7: Fruits yellow or orange when ripe
 - 8 Mesocarp with exocarp 2.5–3.5 mm thick; midrib depressed on upper surface **38. *E. xanthocarpa***
 - 8: Mesocarp with exocarp 4–5 mm thick; midrib raised on upper surface **26. *E. microneura***
- 4: Older leaves hairy on underside
 - 9 Fruits 40–75 mm diam.; mesocarp with exocarp 4–8 mm thick [southern Qld and northern N.S.W.] **32. *E. pubens***
 - 9: Fruits 50–100 mm diam.; mesocarp with exocarp 7–17 mm thick [northern Qld] **20. *E. insignis***
- 2: Radicle apical
 - 10 Fruits yellow, orange, orange-brown or scurfy brown when ripe
 - 11 Fruits globular
 - 12 Endocarp 1.5–2.5 mm thick; mature leaves shortly tomentose on underside, occasionally almost glabrous **30. *E. palmerstonii***
 - 12: Endocarp 0.5–1 mm thick; mature leaves glabrous on underside
 - 13 Endocarp 0.5–1 mm thick; mesocarp with exocarp 1.8–3.1 mm thick; cotyledons cream **28. *E. montana***
 - 13: Endocarp 1–1.5 mm thick; mesocarp with exocarp 4.3–6 mm thick; cotyledons pink **7. *E. cooperana***
 - 11: Fruits ellipsoidal or sausage shaped
 - 14 Fruits scurfy brown **31. *E. phaeocarpa***
 - 14: Fruits yellow or orange yellow
 - 15 Mesocarp with exocarp 4–5 mm thick; midrib raised on upper surface **26. *E. microneura***
 - 15: Mesocarp with exocarp 1.8–3.5 mm thick; midrib depressed or flush with upper surface
 - 16 Fruits 60–70 mm long; radicle \pm apical but 10–15 mm from testa **38. *E. xanthocarpa***
 - 16: Fruits 30–55 mm long; radicle apical (close to testa) **28. *E. montana***
 - 10: Fruits black, blue-black or purplish black when ripe
 - 17 Fruits globular, depressed globular, wider than long or laterally compressed (and then sometimes slightly longer than wide), circular or elliptic in T.S. **33. *E. sankeyana***
 - 18 Mature leaves hairy on underside
 - 18: Mature leaves glabrous, rarely shortly tomentose on underside
 - 19 Leaves green on underside even when young; lamina of typical leaves > 3 cm wide
 - 20 Fruits \pm circular in cross section **15. *E. globosa***
 - 20: Fruits oval or elliptic in cross section, i.e. fruits laterally compressed **6. *E. compressa***

- 19:** Leaves slightly glaucous on underside particularly when young; lamina of typical leaves < 3 cm wide
- 21** Margin of lamina recurved [northern Qld] **22. *E. jonesii***
- 21:** Margin of lamina flat [northern N.S.W.] **21. *E. introrsa***
- 17:** Fruits ellipsoidal, pyriform, cylindrical or longer than wide, circular in T.S.
- 22** Foveoles present on underside of some or most leaves
- 23** Foveole opening \pm pore-like and raised above underside of lamina **8. *E. cowleyana***
- 23:** Foveole opening \pm semicircular, not raised above underside of lamina
- 24** Twig hairs tortuous and erect **27. *E. monothyra***
- 24:** Twig hairs straight and appressed, or twigs almost glabrous
- 25** Lamina glaucous on underside (particularly when young); apex of leaf lamina obtuse to acuminate **24. *E. limnophila***
- 25:** Lamina green on underside; apex of leaf lamina obtuse to rounded **4. *E. bessaphila***
- 22:** Foveoles not present on underside of any leaves
- 26** Midrib depressed on upper surface or in a channel in lamina
- 27** Lamina margin usually recurved **22. *E. jonesii***
- 27:** Lamina margin flat
- 28** Primary veins 8–15 pairs; lamina of a typical leaf 5–9.5 cm wide **33. *E. sankeyana***
- 28:** Primary veins 3–9 pairs; lamina of a typical leaf 2–5.5 cm wide
- 29** Leaves green on underside, even when young **27. *E. monothyra***
- 29:** Leaves glaucous on underside, particularly when young
- 30** Primary veins 3–6 pairs; young twigs clothed in straight, appressed, pale brown hairs **1. *E. acuminata***
- 30:** Primary veins 6–9 pairs; young twigs clothed in tortuous, \pm erect, rusty hairs **16. *E. grayi***
- 26:** Midrib raised or flush with upper surface
- 31** Young twigs clothed in tortuous, \pm erect, rusty hairs
- 32** Fruits 30–50 mm long, 17–27 mm diam. **25. *E. longipedicellata***
- 32:** Fruits 50–60 mm long, 35–46 mm diam. **16. *E. grayi***
- 31:** Young twigs clothed in straight, appressed, pale brown hairs
- 33** Leaves usually glaucous on underside, at least when young; lamina margins often recurved
- 34** Cotyledons pink to burgundy when freshly cut; endocarp c. 0.5 mm thick **11. *E. dielsiana***
- 34:** Cotyledons cream or yellowish when freshly cut; endocarp 0.5–3 mm thick **22. *E. jonesii***
- 33:** Leaves green on underside even when young; lamina margins flat
- 35** Seed 16–23 mm diam.; endocarp 0.8–1.1 mm thick **34. *E. sideroxylon***
- 35:** Seed 22–50 mm diam.; endocarp 1–2.1 mm thick **15. *E. globosa***
- 1:** Fruits to 30 mm long
- 36** Foveoles (rarely tufts of hair) present on underside of some or most leaves
- 37** Lamina green on underside

- 38 Surface of foveoles projecting beyond level of midrib on underside of lamina 8. *E. cowleyana*
- 38: Surface of foveoles not projecting beyond level of midrib on underside of lamina
- 39 Twig hairs straight and appressed only
- 40 Underside of leaf lamina with straight and tortuous, erect and appressed hairs 29. *E. muelleri*
- 40: Underside of lamina almost glabrous, or with straight, appressed hairs only
- 41 Primary veins 6–11 pairs; leaves 3.5–8 cm wide 4. *E. bessaphila*
- 41: Primary veins 4–7 pairs; leaves 2–5 cm wide
- 42 Fruit shiny black, 22–23 mm long; endocarp 0.2–0.3 mm thick 5. *E. collinsii*
- 42: Fruit flat- or glaucous-black, 30 mm long; endocarp 0.7 mm thick 29. *E. muelleri*
- 39: Some or all twig hairs erect and tortuous
- 43 Mature leaves densely pubescent on underside
- 44 Primary veins 5–9 pairs; petiole 6–14 mm long [northern N.S.W., southern Qld] 17. *E. hayesii*
- 44: Primary veins 4–6 pairs; petiole 5–10 mm long [northern Qld] 27. *E. monothyra*
- 43: Mature leaves sparsely pubescent or almost glabrous on underside
- 45 Twig hairs tortuous and erect only; petiole flat on upper surface 27. *E. monothyra*
- 45: Twig hairs straight and tortuous, appressed and erect; petiole channelled on upper surface 29. *E. muelleri*
- 37: Lamina glaucous on underside
- 46 Fruits < 19 mm long; seeds < 16 mm long 12. *E. discolor*
- 46: Fruits > 19 mm long; seeds > 16 mm long
- 47 Foveole opening \pm pore-like and raised above underside of lamina 8. *E. cowleyana*
- 47: Foveole opening \pm semicircular, not raised above underside of lamina
- 48 Apex of leaf lamina obtuse to rounded; primary veins 6–11 pairs 4. *E. bessaphila*
- 48: Apex of leaf lamina obtuse to acuminate; primary veins 3–8 pairs
- 49 Underside of leaf lamina clothed in tortuous, erect hairs
- 50 Fruits ellipsoidal, 20–24 mm long; primary veins usually depressed on upper surface 37. *E. wolfei*
- 50: Fruits oval, 13–25 mm long; primary veins not depressed on upper surface 9. *E. crassiflora*
- 49: Underside of leaf lamina clothed in straight, appressed hairs
- 51 Young twigs sparsely clothed in straight, appressed hairs; often leaves lack foveoles, but when present, usually 1 or 2 per leaf 5. *E. collinsii*
- 51: Young twigs densely clothed in straight appressed hairs; most leaves foveolate, usually 3–6 per leaf (sometimes up to 10)
- 52 Fruits black, blue-black, ellipsoidal, 20–22 mm long 12. *E. discolor*
- 52: Fruits glaucous black, ellipsoidal, sometimes pyriform, 25–35 mm long 24. *E. limnophila*
- 36: Foveoles not present on underside of any leaves
- 53 Midrib raised or flush with upper surface of lamina
- 54 Fruits 17–60 mm diam.

- 55 Fruits yellow, orange, orange-red or maroon 28. *E. montana*
- 55: Fruits black or blue-black
- 56 Young twigs clothed in tortuous, erect hairs 25. *E. longipedicellata*
- 56: Young twigs clothed in straight, appressed hairs 15. *E. globosa*
- 54: Fruits 8–17 mm diam.
- 57 Lamina green on underside
- 58 Cotyledons pink when freshly cut; stem bark corky 35. *E. sieberi*
- 58: Cotyledons cream to yellow when freshly cut; stem bark nondescript
- 59 Lamina 9.5–16 cm long, 2.5–4.5 cm wide; petiole 4–11 mm long; primary veins 4–6 pairs 5. *E. collinsii*
- 59: Lamina 9.5–16 cm long, 4–7.5 cm wide; petiole 7–15 mm long; primary veins 5–8 pairs 23. *E. leptodendron*
- 57: Lamina glaucous on underside
- 60 Cotyledons mostly red, sometimes pink or purplish when freshly cut
- 61 Perianth remnants greater than 7 mm diam. 18. *E. hypotephra*
- 61: Perianth remnants < 7 mm diam. 37. *E. wolfei*
- 60: Cotyledons cream when freshly cut, sometimes pink near periphery
- 62 Twig hairs straight; primary veins 7–11 pairs 10. *E. dichrophylla*
- 62: Twig hairs tortuous; primary veins 4–9 pairs
- 63 Lamina underside clothed in straight, appressed hairs 14. *E. glauca*
- 63: Lamina underside clothed in tortuous, erect hairs 9. *E. crassiflora*
- 53: Midrib depressed on upper surface of lamina
- 64 Lamina green on underside
- 65 Petiole channelled on upper surface
- 66 Fruits 20–25 mm long; hairs on underside of leaf lamina straight and appressed 5. *E. collinsii*
- 66: Fruits 25–35 mm long; hairs on underside of leaf lamina straight and tortuous, appressed and erect 29. *E. muelleri*
- 65: Petiole flat on upper surface
- 67 Northern N.S.W. and southern Qld 17. *E. hayesii*
- 67: Northern Qld
- 68 Fruits 20–26 mm long 3. *E. bellendenkerana*
- 68: Fruits 27–40 mm long 27. *E. monothyra*
- 64: Lamina glaucous on underside
- 69 Cotyledons mostly red, sometimes pink or purplish when freshly cut
- 70 Perianth remnants greater than 7 mm diam. 18. *E. hypotephra*
- 70: Perianth remnants < 7 mm diam. 37. *E. wolfei*
- 69: Cotyledons mostly cream, sometimes pink when freshly cut
- 71 Twig hairs tortuous, erect or appressed
- 72 Primary vein angle > 40°; lamina arched between lateral veins on upper surface [northern N.S.W. and southern Qld] 9. *E. crassiflora*
- 72: Primary vein angle < 40°; lamina ±flat on upper surface [northern Qld, central Qld?]

- 73 Hairs on underside of lamina straight and appressed; primary veins not or scarcely impressed on upper surface of lamina 14. *E. glauca*
- 73: Hairs on underside of lamina tortuous and erect; primary veins conspicuously impressed on upper surface of lamina
- 74 Leaves very glaucous or almost white on underside 37. *E. wolfei*
- 74: Leaves only slightly glaucous on underside 3. *E. bellendenkerana*
- 71: Twig hairs straight and appressed
- 75 Primary veins 7–11 pairs 10. *E. dichrophylla*
- 75: Primary veins 3–6 pairs
- 76 Fruits > 27 mm long 1. *E. acuminata*
- 76: Fruits < 27 mm long 5. *E. collinsii*

1. *Endiandra acuminata* C.T.White & W.D.Francis, *Bot. Bull. Dept. Agric., Queensland* 22: 31 (1920)

T: Yarrabah, Qld, *N.Michael* 508; holo: BRI; iso: BO, K, MEL.

Endiandra subtripplinervis C.T.White & W.D.Francis, *op. cit.* 22: 34 (1920). T: Yarrabah, Qld, *N.Michael* 590; holo: BRI; iso: A, BO, K, MEL.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 347, fig. 72A–B (1989).

Tree to 30 m. Stem usually buttressed. Twigs ±terete, pubescent. Leaves: petiole 5–14 mm long; lamina lanceolate, 6.2–10.5 cm long, 2.2–4 cm wide, occasionally triplinerved, not foveolate, usually glaucous and hairy below. Inflorescence pseudoterminal and axillary, c. same length as leaves. Flowers opening widely with tepals often reflexed, cream, pale brown, ±perfumed. Tepals pubescent: outer 2.1–3 mm long, 1.7–2.4 mm wide; inner 1.9–3 mm long, 1.5–2.3 mm wide. Anthers 0.5–0.9 mm long, 0.5–1 mm wide, glabrous; filaments 0.3–0.7 mm long, pubescent; valves opening sideways; glands 6. Staminodes 3, differentiated. Ovary 0.5–1.1 mm long, 0.9–1.2 mm wide, sessile or shortly stalked, usually glabrous, style glabrous. Fruit ellipsoidal, 30–32 mm long, 17–21 mm wide, blue-black. Cotyledons cream. *Brown Walnut*.

Occurs from Cooktown to Rockingham Bay, N Qld; from sea level to 1000 m alt. Grows in lowland and mountain rainforests in soils derived from granite, rhyolite and metamorphic rocks. Flowers Mar.–Oct. (Dec.); fruits Nov.–Jan. Map 205.

Qld: T.R. 176, Shipton L.A., *B.Hyland* 12522 (QRS); S.F.R. 607, Shoteel L.A., Lamb Ra., *B.Gray* 3198 (QRS); S.F.R. 144, Windsor Tableland, *K.Sanderson* 1657 (QRS); Telegraph Line, Rockingham Bay, *J.Dallachy s.n.* (BRI, CANB, K, MEL).

2. *Endiandra anthropophagorum* Domin, *Biblioth. Bot.* 89: 123 (1925)

T: Harveys Ck, Qld, Dec. 1909, *K.Domin* 4098; holo: PR; iso: PR.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 347, fig. 72C–D (1989).

Tree to 8 m. Stem not buttressed. Twigs ±terete or slightly fluted, glabrous or pubescent. Leaves: petiole 4–14 mm long; lamina lanceolate to elliptic, 9–16 cm long, 3.5–6.5 cm wide, not foveolate, soon glabrescent. Inflorescence pseudoterminal and axillary, not exceeding leaves. Flowers scarcely opening with tepals remaining erect, creamy green, without perfume. Tepals sparsely pubescent: outer 0.5–1.1 mm long, 1–1.6 mm wide; inner 0.7–1.1 mm long, 0.7–1.2 mm wide. Anthers 0.5–0.7 mm long, 0.4–0.7 mm wide, glabrous; filaments 0.6–0.9 mm long, pubescent; valves opening sideways or outwards; glands usually absent. Staminodes 3, usually undifferentiated. Ovary 0.7–1 mm long, 0.6–0.9 mm wide, glabrous; style glabrous. Fruits globular, 43–65 mm long, 44–64 mm wide, pinkish red. Cotyledons creamy pink.

Rare tree known from Harveys Ck to Russell R., N Qld; from 40–200 m alt. with only one known collection at 900 m. Found only in a small area of lowland rainforest in soil derived from granite. Flowers Mar., July, Dec., Jan.; fruits Dec.–Jan. Map 206.

Qld: Bellenden Ker Cable Stn, *R.L.Jago* 579 (QRS); Harveys Ck, *K.Domin* 4096 (P); Weinerts Ck, Babinda, *R.L.Jago* 559 (QRS); Natl Park Res. 1394, *B.Hyland* 11383 (QRS).

Flowers scarcely opening at anthesis, the tepals remaining erect and forming a sheath around the exerted anthers and style.

3. *Endiandra bellendenkerana* B.Hyland, *Austral. Syst. Bot.* 2: 221 (1989)

T: Frenchmans Ck, Reserve 843, Bellenden Ker, Qld, 26 Jan. 1983, *B.Gray* 2948; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 314, fig. 39; 347, fig. 72E–F (1989).

Tree to 15 m. Stem often buttressed. Twigs \pm terete, pubescent. Leaves: petiole 10–12 mm long; lamina lanceolate, 9–12 cm long, 4–5 cm wide, not foveolate, usually green and densely pubescent below. Inflorescence axillary, not exceeding leaves. Flowers scarcely opening, outer tepals geniculate, enclosing inner tepals, creamy green, without perfume. Tepals pubescent: outer 1.1–1.2 mm long, 1.7–2.3 mm wide; inner 0.8–1.1 mm long, 1–1.3 mm wide. Anthers 0.5–0.7 mm long, 0.5–0.6 mm wide, glabrous; filaments 0.2–0.6 mm long, pubescent; valves opening sideways or outwards; glands pubescent, forming 3 masses, the glands on each anther being \pm fused. Staminodes undifferentiated. Ovary 0.7–1.1 mm long, 0.8–1.2 mm wide, hairy. Fruits ellipsoidal, 20–26 mm long, 10–15 mm wide, shiny, black. Cotyledons cream.

Occurs in N Qld, in the Bellenden Ker to Palmerston area; from sea level to 250 m alt. Grows in very wet, lowland rainforest in soil derived from granite and basalt. Flowers recorded Jan., Mar., June, Dec.; fruits Aug., Nov. Map 207.

Qld: Bellenden Ker Cable Stn, *B.Gray* 4118 (QRS); Bellenden Ker (lowlands), *C.T.White* 1289 (BO, BRI); S.F.R. 755, Barong L.A., Palmerston, *B.Gray* 3370 (QRS).

4. *Endiandra bessaphila* B.Hyland, *Austral. Syst. Bot.* 2: 222 (1989)

T: State Forest Reserve 194, Parish of Western, Qld, 15 Mar. 1978, *B.Gray* 939; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 315, fig. 40; 348, fig. 73A–B (1989).

Tree to 35 m. Stem usually buttressed. Twigs fluted, eventually almost glabrescent. Leaves: petiole 5–15 mm long; lamina elliptic, 6.5–17 cm long, 3.5–8 cm wide, green (rarely \pm glaucous) below, eventually almost glabrescent; foveoles up to 6. Inflorescence axillary and pseudoterminal, exceeding leaves. Flowers opening widely with tepals \pm horizontal, creamy green, yellow, perfumed. Tepals pubescent: outer 1–1.6 mm long, 0.8–1.2 mm wide; inner 0.9–1.5 mm long, 0.6–1.1 mm wide. Anthers 0.3–0.5 mm long, 0.5–0.7 mm wide, \pm glabrous abaxially, pubescent adaxially; filaments 0.2–0.4 mm long, pubescent; valves opening outwards; glands 6. Staminodes 3, differentiated. Ovary 0.4–0.9 mm long, 0.5–1 mm wide, glabrous; style glabrous. Fruits ellipsoidal, 28–34 mm long, 14–22 mm wide, black to purplish black. Cotyledons cream. *Blush Walnut*. Fig. 37.

Occurs from Big Tableland, S of Cooktown, to Mt Spec, N Qld; from 150–1100 m alt. Grows in rainforests in soils derived from a variety of rock types, often in gullies. Flowers Jan.–Apr.; fruits Sept.–Dec. Map 208.

Qld: T.R. 755, Gosschalk, Bartle Frere, *G.Unwin* 100 (QRS); Mission Beach, *F.Crome* 476 (CANB); Topaz, *G.Sankowsky* 427 (QRS); Bonjee, *P.Endress* 4271 (QRS); Mt Spec, *B.Hyland* 1556 RFK (AFO, BR, QRS).

Differs from other species in the combination of foveoles on the leaf lamina and the flowers opening widely with the tepals pubescent on the outer surface.

5. *Endiandra collinsii* B.Hyland, *Austral. Syst. Bot.* 2: 223 (1989)

T: Timber Reserve 14, Parish of Kesteven, Qld, 19 May 1981, *B.Hyland* 25005 RFK; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 316, fig. 41; 348, fig. 73C–D (1989).

Tree to 15 m. Stem usually buttressed. Twigs terete or fluted, almost glabrescent. Leaves: petiole 4–11 mm long; lamina lanceolate, 6–11 cm long, 2.5–4.5 cm wide, green or \pm glaucous, glabrous or \pm pubescent; foveoles c. 1 or 2, usually present on some leaves.



Figure 37. *Endiandra bessaphila*. **A**, habit; **B**, seedling; **C**, fruit; **D**, L.S. fruit; **E**, flower; **F**, flower with 2 tepals removed; **G**, stamen (abaxial view) (**A**, **E**–**G**, B.Gray 939, QRS; **B**–**D**, B.Gray 809, QRS). Scale bars: **A**, **B** = 40 mm; **C** = 20 mm; **D** = 10 mm; **E**, **F** = 2 mm; **G** = 0.5 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 315 (1989).

Inflorescence axillary and pseudoterminal, c. same length as leaves. Flowers scarcely opening with tepals remaining erect, creamy green, not perfumed. Tepals pubescent: outer 0.9–1 mm long, 1.1–1.2 mm wide; inner 0.8–0.9 mm long, 0.8–1 mm wide. Anthers 0.5–0.6 mm long, 0.4–0.5 mm wide, glabrous; filaments 0.1–0.2 mm long, pubescent; valves opening sideways or outwards; glands 6. Staminodes 3, differentiated. Ovary 0.9–1.4 mm long, 0.8–1.4 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 22–23 mm long, 13–14 mm wide, shiny black. Cotyledons cream.

Occurs on Cape York Penin., from Iron Ra. to the S end of McIlwraith Ra., Qld; from 60–500 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers May, Oct.; fruits Oct.–Nov. Map 209.

Qld: T.R. 14, McIlwraith Ra., *B.Hyland 11135* (QRS); Puffdelooney Ridge, Iron Ra., *B.Hyland 10816* (QRS); Claudie R., *B.Hyland 3570* (QRS); T.R. 14, Massy L.A., *L.J.Webb & J.G.Tracey 9193* (BRI).

Differs from other species by the combination of flowers not opening widely, the presence of staminodes and staminal glands, and the lamina green on the underside. Flowers scarcely opening at anthesis, the tepals remaining erect and forming a sheath around the enclosed anthers and style.

6. *Endiandra compressa* C.T.White, *Bot. Bull. Dept. Agric., Queensland* 21: 14 (1919)

T: Imbil, Qld, *F.H.Weatherhead 352*; holo: BRI; iso: K, MEL.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 348, fig. 73E–F (1989).

Tree to 20 m. Stem usually buttressed. Twigs terete or ±fluted, soon glabrescent. Leaves: petiole 10–22 mm long; lamina lanceolate to elliptic, 13–20.5 cm long, 4.5–8.5 cm wide, not foveolate, green and glabrous below. Inflorescence axillary and pseudoterminal, scarcely exceeding petioles. Flowers not opening widely, with tepals remaining erect with incurved tips, creamy yellow, perfumed. Tepals usually pubescent abaxially, pubescent adaxially: outer 1–1.9 mm long, 1.7–2.2 mm wide; inner 1.6–1.7 mm long, 1.4–1.8 mm wide. Anthers 0.6–1.1 mm long, 0.5–1 mm wide, sessile, hairy (papillose at apex); valves opening sideways; glands 6. Staminodes absent. Ovary square-sided, 0.8–1 mm long, 0.6–0.7 mm wide, glabrous; style glabrous. Fruit usually laterally compressed globular or pyriform, 48–54 mm long, 39–60 mm wide (longer axis), 25–38 mm wide (shorter axis), blue-black. Cotyledons creamy pink. *Queensland Greenheart*. Plate 30.

Occurs from Cape Tribulation, through central Qld, and from S Qld to Lismore, N.S.W.; from sea level to 450 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Nov.–Dec.; fruits Mar., June–Nov. Map 210.

Qld: between Noah Head and Cape Tribulation, *L.J.Webb & J.G.Tracey 10567* (BRI); Mossman Gorge, *R.F.Thorne 22844* (RSA); Dryander Ck, Mt Dryander, *L.J.Webb & J.G.Tracey 10069* (BRI); Tamborine Mtn, *J.H.Simmons BRI 112860* (BRI). N.S.W.: Kyogle, *W.T.Jones BRI 024465* (BRI).

7. *Endiandra cooperana* B.Hyland, *Austral. Syst. Bot.* 2: 224 (1989)

T: Cooper Ck, Portion 54v Alexandra, Qld, 28 Aug. 1979, *B.Gray 1507*; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 317, fig. 42; 349, fig. 74A–B (1989).

Tree to 25 m. Stem usually buttressed. Twigs fluted, eventually glabrescent. Leaves: petiole 7–18 mm long; lamina lanceolate, 8.5–15 cm long, 3–6 cm wide, often foveolate, green below, eventually glabrescent. Flowers scarcely opening with tepals erect, yellow, perfumed. Tepals glabrous abaxially, papillose adaxially: outer 2.8–3.3 mm long, 2.3–2.8 mm wide; inner 2.3–2.6 mm long, 2–2.3 mm wide. Anthers 2–2.2 mm long, 1.5–1.7 mm wide, sessile, papillose; valves opening sideways or outwards; glands 3–6. Staminodes absent. Ovary with style 1.2–1.5 mm long, 1–1.1 mm wide, glabrous; style scarcely developed. Fruits globular, 44–53 mm long, 43–52 mm wide, orange, yellow. Cotyledons pink.

A rare species found only near Cooper Ck, N of Mossman, N Qld; from sea level to 10 m alt. Grows in high rainfall, lowland rainforest. Flowers Aug.–Sept.; fruits Aug.–Sept. Map 211.

Qld: Cooper Ck, *B.Gray 1337* (QRS); Cooper Ck, *B.Hyland 9966* (QRS); Cooper Ck, *B.Gray 4080* (QRS).

Differs from other species by the combination of presence of staminal glands, absence of staminodes in the flowers, fruit orange or yellow and cotyledons pink. Flowers scarcely opening at anthesis, the tepals remaining erect and forming a sheath around the enclosed anthers and style.

8. *Endiandra cowleyana* F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 5: 23 (1892)

T: Barron River, Qld, *E.Cowley* 42; holo: BRI; iso: ?BM, ?K.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 349, fig. 74C–D (1989).

Tree to 30 m. Stem usually buttressed. Twigs terete or fluted, soon glabrescent. Leaves: petiole 4–11 mm long; lamina lanceolate to elliptic, 5.5–9 cm long, 2–4 cm wide, usually green, sometimes glaucous, glabrous or pubescent below; foveoles 1–4, conspicuous on some leaves. Inflorescence pseudoterminal and axillary, exceeding leaves. Flowers opening quite widely with tepals sometimes \pm horizontal, creamy green, \pm perfumed. Tepals pubescent: outer 0.9–1.4 mm long, 0.8–1.2 mm wide; inner 0.8–1.3 mm long, 0.6–0.9 mm wide. Anthers 0.3–0.4 mm long, 0.4–0.6 mm wide, glabrous; filaments 0.3–0.4 mm long, pubescent; valves opening sideways or outwards; glands 6. Staminodes 3, differentiated. Ovary 0.4–0.7 mm long, 0.5–0.7 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 24–33 mm long, 14–17 mm wide, black, blue-black. Cotyledons cream. *Northern Rose Walnut*.

Occurs in central and N Qld, from McIlwraith Ra. to Eungella; from sea level to 1000 m alt. Grows in lowland and mountain rainforests in soils derived from a variety of rock types. Flowers Jan.–Apr.; fruits Mar., July–Nov. Map 212.

Qld: T.R. 14 Lingen, Leo Creek Rd, *B.Hyland* 11035 (QRS); Reserve 843, Parish of Bellenden Ker, Frenchmans Ck, *B.Gray* 4123 (QRS); S.F.R. 299 Conway, *B.Hyland* 4075 RFK (A, BRI, K, KEP, NSW, QRS, RSA); Eungella Ra., *M.S.Clemens* BRI 152624-9 (BRI).

9. *Endiandra crassiflora* C.T.White & W.D.Francis, *Proc. Roy. Soc. Queensland* 33: 64 (1922)

T: McPherson Ra., Qld, *C.T.White s.n.*; holo: BRI; iso: K.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 349, fig. 74E–F (1989).

Tree to 20 m. Twigs terete or fluted, pubescent. Leaves: petiole 7–14 mm long; lamina lanceolate to elliptic, 6–11.5 cm long, 3–4.5 cm wide, not foveolate, glaucous and pubescent below. Inflorescence a few-flowered raceme, axillary, scarcely exceeding petiole. Flowers opening widely with tepals \pm horizontal, greenish or greenish pink. Tepals fleshy, glabrous, or few hairs abaxially: outer 2.6–2.8 mm long, 2.3–2.7 mm wide; inner 2.5–3.2 mm long, 2.1–2.7 mm wide. Anthers 0.7–0.9 mm long, 0.7–1.2 mm wide, sessile or shortly stalked, glabrous; valves opening outwards or sideways; glands 6. Staminodes 3, differentiated. Ovary 1–2.3 mm long, 0.7–1.3 mm wide, sessile or shortly stalked, glabrous; style glabrous. Fruits ovoid, 13–25 mm long, blue-black. Cotyledons unknown. *Dorrigo Walnut*.

Occurs from Springbrook, S Qld, to Mt Boss near Wauchope, N coastal N.S.W.; from 460–760 m alt. Grows in mountain rainforests particularly in poorer soils derived from sedimentary rocks. Flowers Aug., Nov.–Mar.; fruits Sept.–Dec. Map 213.

Qld: Repeater Station, Springbrook, *D.L.Jones* 1281 (QRS); Springbrook, *B.Hyland* 12965 (QRS). N.S.W.: Bruxner Park Flora Reserve, *A.G.Floyd* (NSW); Gibraltar State Forest, *J.B.Williams* NSW 150052 (NSW); Mt Boss trig., Mt Boss State Forest, *J.Cousins* 198 (NSW).

10. *Endiandra dichrophylla* F.Muell., *Victorian Naturalist* 9: 12 (1892)

T: Russell R. (Towalla), Qld, 1892, *S.Johnson*; holo: MEL 622315; iso: K, NSW.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 350, fig. 75A–B (1989).

Tree to 20 m. Stem usually buttressed. Twigs fluted or terete, pubescent. Leaves: petiole 7–20 mm long; lamina elliptic to lanceolate, 6.5–15.5 cm long, 2.5–6 cm wide, not foveolate, glaucous and pubescent below. Inflorescence axillary and pseudoterminal, not exceeding leaves. Flowers opening widely but with tepals tips pointing upwards, creamy brown, creamy

green, ±perfumed. Tepals pubescent: outer 1.1–1.7 mm long, 1–1.6 mm wide; inner 0.9–1.3 mm long, 0.8–1.1 mm wide. Anthers 0.4–0.6 mm long, 0.4–0.6 mm wide, mainly glabrous; filaments 0.2–0.4 mm long, pubescent; valves opening outwards or sideways; glands 6. Staminodes 3, usually differentiated. Ovary 0.5–0.8 mm long, 0.5–0.8 mm wide, usually glabrous (occasionally hairy), style glabrous. Fruits ellipsoidal, 22–28 mm long, 10–12 mm wide, purplish black. Cotyledons cream. *Brown Walnut*.

Occurs in northern Qld, from Gillies Ra., W of Gordonvale, to Koombooloomba; at 80–1200 m alt. Grows in mountain rainforests, more commonly in poorer soils derived from sedimentary and acid volcanic rocks. Flowers Nov.–Jan.; fruits Jan. Map 214.

Qld: T.R. 755, Badgery L.A., Palmerston, *B.Gray 3181* (QRS); T.R. 605, Dawson L.A., Koombooloomba, *B.Gray 2943* (QRS); Mt Fisher, *K.Sanderson 813* (BRI, QRS); Boonjee, *B.Hyland 1391 RFK* (QRS).

11. *Endiandra dielsiana* Teschner, *Bot. Jahrb. Syst.* 58: 417 (1923)

Beilschmiedia pustulata Kosterm., *Reinwardtia* 8: 28 (1970). T: Ettapenberg, Sepik Dist., New Guinea, *C.L.Ledermann 8885*; lecto: SING; remaining syn: Felsspitze, Sepik Dist., New Guinea, *C.L.Ledermann 12438*, *fide* A.J.G.H. Kostermans, *Reinwardtia* 8: 28 (1970).

Endiandra glandulosa C.K.Allen, *J. Arnold Arbor.* 23: 148 (1942). T: Bernhard Camp, Idenburg River, New Guinea, *L.J.Brass 13678*; holo: A; iso: BO, BRI, L.

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 318, fig. 43; 350, fig. 75C–D (1989).

Tree to 35 m. Stem usually buttressed. Twigs ±terete, eventually ±glabrescent. Leaves: petiole 6–21 mm long; lamina elliptic to lanceolate to oblong, 6.5–16 cm long, 2–5.5 cm wide, not foveolate, glaucous below, eventually ±glabrescent. Inflorescence axillary and pseudoterminal, c. same length as leaves. Flowers opening quite widely with tepals erect, pale green, yellowish, perfumed. Tepals 1.6–2.2 mm long, 0.9–1.2 mm wide, glabrous abaxially, pubescent adaxially. Anthers 0.5–0.6 mm long, 0.8–0.9 mm wide, glabrous abaxially, pubescent adaxially; filaments 0.4–0.5 mm long, pubescent; valves opening upwards, outwards, and sideways; glands 6. Staminodes 3, differentiated. Ovary 0.5–0.8 mm long, 0.6–0.8 mm wide, glabrous; style glabrous. Fruit ellipsoidal, c. 40 mm long, 23–27 mm wide, black. Cotyledons pink, sometimes mauve or burgundy. *Candle Walnut*. Fig. 38.

Occurs in northern and central Qld, from McIlwraith Ra. to Eungella; at 150–1200 m alt. Grows in rainforests in soils derived from a variety of rock types but probably reaches its best development in mountain rainforests in soils derived from granite. Also found in New Guinea. Flowers Nov.–Feb.; fruits Nov. Map 215.

Qld: T.R. 14 McIlwraith Ra., *B.Hyland 3089 RFK* (QRS); S.F.R. 310, Gillies L.A., *B.Gray 1259* (QRS); Dotswood Holding, Bluewater Ra., *B.Hyland 4075 RFK* (A, BRI, K, KEP, NSW, QRS, RSA); S.F.R. 62, Eungella, *B.Hyland 4532 RFK* (QRS).

Leaves and young twigs of this species exhibit numerous very distinctive glandular protuberances. Leaf margins are often recurved.

12. *Endiandra discolor* Benth., *Fl. Austral.* 5: 301 (1870)

T: Coast Range, Rockingham Bay, Qld, *J.Dallachy s.n.*; lecto: MEL; isolecto: ?K; remaining syn: Macleay, Richmond and Hastings Rivers, C.Moore *s.n.* A, K, MEL, *fide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 228 (1989).

Illustration: B.P.M.Hyland, *op. cit.* 2: 350, fig. 75E–F (1989).

Tree to 25 m. Stem usually buttressed. Twigs fluted, pubescent. Leaves: petiole 4–13 mm long; lamina elliptic to lanceolate, 5.5–10.5 cm long, 2–4.5 cm wide, glaucous and pubescent below; foveoles c. 3–6, conspicuous. Inflorescence usually axillary, c. same length as leaves. Flowers opening widely with tepals sometimes ±horizontal, creamy green, perfumed. Tepals pubescent: outer 1.1–1.9 mm long, 1–1.6 mm wide; inner 1–1.6 mm long, 0.8–1.2 mm wide. Anthers 0.4–0.6 mm long, usually mainly glabrous; filaments 0.2–0.5 mm long, pubescent; valves opening outwards or sideways; glands 6. Staminodes 3, differentiated. Ovary 0.5–0.8 mm long, 0.5–0.7 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 16–17 mm long, 10–13 mm wide, black, blue-black. Cotyledons cream to pink. *Rose Walnut*. Plate 31.



Figure 38. *Endiandra dielsiana*. **A**, habit; **B**, seedling; **C**, fruit; **D**, L.S. fruit; **E**, flower; **F**, flower with 3 tepals removed; **G**, staminode (abaxial view); **H**, stamen and glands (abaxial view) (**A**, **E**–**H**, B.Gray 1259, QRS; **B**–**D**, A.K.Irvine 396, QRS). Scale bars: **A**–**D** = 40 mm; **E**, **F** = 2 mm; **G**, **H** = 1 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 318 (1989).

Occurs from Mt Lewis, N Qld, to the Illawarra region, N.S.W., in a variety of habitats; from sea level to 1000 m alt. The higher elevations are attained in the northern part of its range where it tends to occur in mountain rainforest margins in soils derived from a variety of rock types. In the southern part of its range it often occurs in rainforests on alluvial flats. Flowers Sept.–Mar.; fruits Feb.–July. Map 216.

Qld: S.F.R. 438 Ravenshoe, *S.J.Dansie 2011* (AFO, BRI); Dawes Ra., Kroombit Tops, S.F.R. 218 Cania, *W.J.McDonald 2265* (BRI). N.S.W.: Brunswick R. near Mullumbimby, *C.T.White 10514* (BRI); Gosford, *A.Murphy NSW 150070* (BISH, NSW); Illawarra, *W.Macarthur 224* (BM).

13. *Endiandra floydii* B.Hyland, *Austral. Syst. Bot.* 2: 229 (1989)

T: Tomewin, Qld, 11 Mar. 1985, *B.Hyland 4619 RFK*; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 319, fig. 44; 351, fig. 76A–B (1989).

Tree to 15 m. Stem not buttressed. Twigs fluted and pubescent when young, ±terete and glabrescent when older. Leaves: petiole c. 9 mm long; lamina lanceolate, c. 10.5 cm long, 3.5 cm wide, not foveolate, green and glabrous below. Inflorescence axillary, not exceeding leaves. Flowers opening widely with tepals ±horizontal at anthesis, creamy green, not perfumed. Tepals glabrous: outer 3.2–4.2 mm long, 2.4–3.2 mm wide; inner 2.8–3.9 mm long, 2–2.9 mm wide. Anthers 0.6–0.7 mm long, 0.7–0.8 mm wide, almost sessile, glabrous; filaments 0.1–0.4 mm long, glabrous or with few hairs; valves opening sideways; glands fused, forming 3-partite disc. Staminodes undifferentiated, fused to glands. Ovary 1.3–1.9 mm long, 0.8–1 mm wide, glabrous; style glabrous. Fruit oblong, 50–70 mm long, purplish black to red. Cotyledons cream, pink towards centre.

A rare species restricted to the extreme NE corner of N.S.W. and just over the border into SE Qld; from sea level to 200 m alt. Grows in rainforests. Flowers May; fruits Dec.–Jan. Map 217.

Qld: Tomewin, *Holmes 604* (HOLMES). N.S.W.: near Lookout, Tomewin Road, *D.L.Jones 1277* (QRS); Brunswick Heads, *J.B.Williams NSW 150027* (NSW).

This species differs from *E. grayi* and *E. hypotephra* in the lamina being green on the underside and the glands fused into a 3-partite disc.

14. *Endiandra glauca* R.Br., *Prodr.* 402 (1810)

T: Endeavour River, [Qld], *J.Banks and Solander s.n.*; holo: BM; iso: ?MEL.

Endiandra merrilliana C.K.Allen, *J. Arnold Arbor.* 23: 149 (1942). T: Tarara, Wassi Kussa River, Papua [New Guinea], *L.J.Brass 8589*; holo: A; iso: BRI, L.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 351, fig. 76C–D (1989).

Tree to 20 m. Stem not buttressed. Twigs terete, fluted or angular, pubescent. Leaves: petiole 5–13 mm long; lamina lanceolate to elliptic, 6–10.5 cm long, 2–4.5 cm wide, not foveolate, glaucous (almost white) below, pubescent. Inflorescence axillary, pseudoterminal, not exceeding leaves. Flowers opening widely, but tepals remaining ±erect, usually creamy green, without perfume. Tepals pubescent: outer 1.5–2.2 mm long, 1.2–1.7 mm wide; inner 1.5–2.2 mm long, 1.2–2.2 mm wide. Anthers 0.2–0.4 mm long, 0.5–0.8 mm wide, glabrous; filaments 0.2–0.3 mm long, pubescent; valves opening upwards and sideways; glands fused forming disc. Staminodes absent. Ovary 1.1–1.6 mm long, 0.9–1.4 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 15–26 mm long, 11.5–14 mm wide, glaucous, blue-black, black. Cotyledons cream, often margins pink. *Brown Walnut*.

Extends from islands in Torres Strait through Cape York Penin., S to Cairns, Qld; from sea level to 450 m alt. Grows in rainforests, rainforest margins and gallery forests in soils derived from a variety of rock types. Also found in New Guinea. Flowers Jan.–June; fruits July–Oct. Map 218.

Qld: Horn Is., Torres Strait, *E.Cameron 2110* (QRS); McIlwraith Ra., *K.D.Sanderson 1230* (QRS); Natl Park Res. 164, Parish of Noah, *B.Gray 3442* (QRS).

15. *Endiandra globosa* Maiden & Betche, *Proc. Linn. Soc. New South Wales* 24: 149 (1899)

T: Murwillumbah (Tweed R.), N.S.W., Dec. 1898, *J.A.Goldsamid s.n.*; holotype: NSW.

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 320, fig. 45; 351, fig. 76E–F (1989).

Tree to 30 m. Stem sometimes buttressed. Twigs terete or ±fluted, eventually ±glabrescent. Leaves: petiole 5–17 mm long; lamina elliptic to lanceolate, 7–16.5 cm long, 2.7–7.5 cm wide, not foveolate, green below, eventually ±glabrescent. Inflorescence axillary, sometimes pseudoterminal, not exceeding leaves. Flowers not opening widely, with tepals remaining erect, cream, perfumed. Tepals glabrous abaxially, hairy adaxially: outer 1.2–2.1 mm long, 1.2–2 mm wide; inner 1.5–2 mm long, 1.6–1.8 mm wide. Anthers 0.7–0.9 mm long, 0.7–0.9 mm wide, glabrous; filaments 0.1–0.3 mm long, pubescent; valves opening outwards or sideways; glands up to 6, distinct or sometimes fused forming 3 masses. Staminalodes usually 3, undifferentiated. Ovary 0.6–1 mm long, 0.6–1.5 mm wide, glabrous; style glabrous. Fruit globular, 34–60 mm long, 33–60 mm wide, black. Cotyledons cream, with pinkish margins. *Ball-fruited Walnut*. Plate 32.

Occurs with a very restricted distribution near Innisfail, northern Qld, and from Currumbin, southern Qld, to Murwillumbah, northern N.S.W., with one occurrence at Johns River, near Kempsey, N.S.W. In northern Qld it is found in lowland rainforests from sea level to 360 m alt. In the southern part of its range it usually grows as an open tree on alluvial flats in former rainforest sites, but is also found in hillside situations in better soils. Flowers Nov.–Jan.; fruits Mar.–Sept. Map 219.

Qld: Liverpool Ck, *M.S.Hopkins & A.W.Graham 3224* (QRS); Natl Park Res. 904 Palmerston, *B.Gray 3796* (QRS); Currumbin Valley, *B.Gray 1505* (QRS). N.S.W.: Brunswick R., *R.F.Thorne 21864d* (RSA); few miles S of Johns River, *L.J.Webb & J.G.Tracey 8261* (BRI).

The number of anthers in this species, usually 3–5 (occasionally 6), is unusual in the genus.

16. *Endiandra grayi* B.Hyland, *Austral. Syst. Bot.* 2: 231 (1989)

T: Portion 188, Parish of Alexandra, 13 Dec. 1983, *B.Gray 3305*; holotype: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 321, fig. 46; 352, fig. 77A–B (1989).

Tree to 35 m. Stem buttressed. Twigs fluted, eventually ±glabrescent. Leaves: petiole 13–20 mm long; lamina lanceolate to elliptic, 11.5–14.5 cm long, 3.5–5 cm wide, not foveolate, glaucous below, eventually ±glabrescent. Inflorescence usually paniculate, sometimes almost racemose, not exceeding leaves. Flowers opening quite widely with tepals tips remaining erect, yellowish green inside, rusty brown outside, not perfumed. Tepals pubescent: outer 4.5–5.1 mm long, 4.7–5.2 mm wide; inner 3.3–4.1 mm long, 3.3–4.2 mm wide. Anthers 0.7–0.9 mm long, 0.8–0.9 mm wide, glabrous; filaments 0.2–0.5 mm long, pubescent; valves opening sideways; glands and staminalodes fused forming disc. Ovary 1.7–1.9 mm long, 1.8–2.3 mm wide, pubescent or glabrous; style glabrous. Fruit ellipsoidal, globular, ovoid, 50–65 mm long, 35–50 mm wide, black, blue-black, sometimes glaucous. Cotyledons cream.

Extends from Daintree R. to Cape Tribulation, N Qld; from sea level to 40 m alt. Grows in lowland rainforests in soils derived from metamorphic rocks. Flowers Nov.–Dec.; fruits June–Sept. Map 220.

Qld: Natl Park Res. 164, Noah Ck, *B.Gray 4162* (QRS); Noah Ck, *B.Gray 3157* (QRS); Natl Park Res. 164, Noah Ck, *B.Hyland 25057 RFK* (QRS).

Differs from *E. hypotephra* in the tepals being pubescent on the adaxial surface and the fruit 50–65 mm long.

17. *Endiandra hayesii* Kosterm., *Reinwardtia* 8: 81 (1970)

T: Minyon Falls, N.S.W., 25 Oct. 1962, *R.D.Hoogland & H.Hayes 8598*; holotype: BO; iso: A, BRI, K, L, MEL, NSW.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 352, fig. 77C–D (1989).

Tree to 20 m. Stem sometimes buttressed. Twigs mainly fluted, villous. Leaves: petiole 6–14 mm long; lamina lanceolate to elliptic, 8.5–15.5 cm long, 3.5–6 cm wide, sometimes foveolate,

green and pubescent below. Inflorescence cymose or paniculate often with long slender peduncles, axillary, not exceeding leaves. Flowers scarcely opening with tepals geniculate, cream, pale green, perfume? Tepals villous abaxially, pubescent adaxially: outer 1.1–1.2 mm long, 2.1–2.4 mm wide; inner 1–1.4 mm long, 1.3–1.7 mm wide. Anthers 0.6–0.8 mm long, 0.4–0.6 mm wide, glabrous; filaments absent or c. 0.2 mm long, pubescent; valves opening outwards; glands 6; staminodes 3, \pm differentiated. Ovary 0.7–1 mm long, 1.7–1 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 28–30 mm long. Cotyledons cream.

A tree with restricted occurrence extending from Currumbin, southern Qld, to Alstonville, northern N.S.W.; from sea level to 300 m alt. Grows in rainforests and gallery forests most commonly in alluvial soils. Flowers Oct., Nov., Mar.; fruits Mar.–May. Map 221.

Qld: Currumbin, *B.Hyland 4553 RFK* (QRS); Mudgeeraba, *B.Hyland 4585 RFK* (QRS). N.S.W.: Minyon Falls, *B.Hyland 4578 RFK* (QRS); in valley just below Minyon Falls, *R.D.Hoogland & H.C.Hayes 8598* (A, BO, BRI, K, L, MEL, NSW); Victoria Park, 4 miles [c. 6 km] SSW of Alstonville, *R.Coveny 1268* (NSW).

18. *Endiandra hypotephra* F.Muell., *Fragm.* 15: 166 (1866)

T: Meunga Ck, Rockingham Bay, Qld, *J.Dallachy s.n.*; lecto: MEL, *fide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 233 (1989).

Illustration: B.P.M.Hyland, *op. cit.* 2: 352, fig. 77E–F (1989).

Tree to 30 m. Stem buttressed. Twigs terete or fluted, tomentose. Leaves: petiole 5–16 mm long; lamina lanceolate, 3.5–14 cm long, 2.5–5.5 cm wide, not foveolate, glaucous and pubescent below. Inflorescence racemose or paniculate, usually axillary, not exceeding leaves. Flowers opening widely with tepals remaining \pm erect, usually pinkish red, without perfume. Tepals pubescent abaxially, glabrous adaxially: outer 4.3–6 mm long, 3.7–5.7 mm wide; inner 3.5–4.4 mm long, 3.1–4.7 mm wide. Anthers 0.7–1 mm long, 0.7–1.2 mm wide, glabrous; filaments 0.2–0.5 mm long, pubescent; valves opening outwards or sideways; glands and staminodes fused forming disc. Ovary sometimes stalked, 1.4–2.2 mm long, 1.4–2 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 20–28 mm long, 12–16 mm wide, blackish blue. Cotyledons pinkish red to purplish. *Northern Rose Walnut*. Plate 33.

Occurs in N and central Qld, from Cooktown to Eungella; from sea level to 650 m alt., usually more common at lower elevations. Grows in rainforests in soils derived from a variety of rock types. Flowers Mar.–June; fruits Sept.–Nov. Map 222.

Qld: T.R. 176 Monkhouse, Lorna Doone L.A., *B.Hyland 12593* (QRS); Bellenden Ker Ra., Babinda, *R.L.Jago 295* (QRS); E fall of Mt Dryander, *V.K.Moriarty 1899* (QRS); Wilkin Hill, Hinchinbrook Is., *L.J.Webb & J.G.Tracey 12001* (BRI, QRS).

19. *Endiandra impressicosta* C.K.Allen, *J. Arnold Arbor.* 23: 151 (1942)

T: Lake Daviumbu, Middle Fly R., Papua [New Guinea], *L.J.Brass 7619*; holotype: A; isotype: BO, BRI, L.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 322, fig. 47; 353, fig. 78A–B (1989).

Tree to 25 m. Stem usually buttressed. Twigs terete or fluted, very soon glabrescent. Leaves: petiole 8–14 mm long; lamina elliptic to oblong to oval, 7.5–14.5 cm long, 4–8 cm wide, not foveolate, green and glabrous below. Inflorescence axillary and pseudoterminal, exceeding leaves. Flowers opening widely with tepals eventually \pm horizontal, cream, perfumed. Tepals predominantly glabrous, sometimes a few hairs present: outer 3.2–4.3 mm long, 2.4–3.3 mm wide; inner 3.3–4.4 mm long, 2.1–2.6 mm wide. Anthers 2–2.4 mm long, 1.2–1.6 mm wide, sparsely pubescent; filaments 0.1–0.3 mm long, pubescent; valves opening outwards. Staminal glands and staminodes absent. Ovary 0.8–1.1 mm long, 0.8–1.1 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 45–60 mm long, 30–37 mm wide, blue-black to purplish black. Cotyledons cream.

Occurs at Iron Ra. and from Mossman S to Cairns, N Qld; from sea level to 500 m alt. Grows in rainforests, tending to be more abundant in the more seasonal forests. Also found in New Guinea. Flowers Apr.–June; fruits Sept.–Dec., Feb. Map 223.

Qld: Iron Ra., *H.E.Volck 2323* (AFO); Hunters Ck on the Mt Molloy–Julatten road, *V.K.Moriarty 2178* (QRS); Clohesy R., *B.Hyland 1287 RFK* (QRS); S.F.R. 1073 Smithfield, *S.J.Dansie 2993* (AFO, BRI, L).

This species is distinctive in the absence of staminal glands and staminodes.

20. *Endiandra insignis* (F.M.Bailey) F.M.Bailey, *Queensland Agric. J.* 1: 80 (1897)

Cryptocarya insignis F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 2: 15 (1891). T: Cairns–Bellenden Ker Ra., Qld, *F.M.Bailey s.n.*; holo: BRI.

Endiandra exostemonea F.Muell., *Victorian Naturalist* 9: 42 (1892). T: Daintree R., Qld, *T.Pentzke s.n.*; holo: MEL; iso: BRI, K.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 353, fig. 78C–D (1989).

Tree to 25 m. Stem sometimes buttressed. Twigs terete or fluted, pubescent. Leaves: petiole 8–25 mm long; lamina elliptic, 10–22.5 cm long, 2.5–13 cm wide, not foveolate, green and pubescent below (rarely ±glabrescent). Inflorescence mainly axillary, or on twigs below leaves, not exceeding leaves. Flowers scarcely opening with tepals remaining erect, creamy green, perfumed. Tepals usually pubescent: outer 0.6–1.3 mm long, 1–1.4 mm wide; inner 0.4–0.9 mm long, 0.4–0.8 mm wide. Anthers 0.6–1 mm long, 0.5–0.8 mm wide, usually pubescent; filaments 0.7–1 mm long, pubescent; valves opening sideways; glands 6. Staminodes 3, ±differentiated. Ovary 0.6–1.1 mm long, 0.6–0.9 mm wide, mainly glabrous; style glabrous. Fruit usually globular, ribbed, 60–80 mm long, 65–100 mm wide, red, orange-red, pink. Cotyledons creamy apricot. *Hairy Walnut*.

Occurs from Alexandra Ra. to Tully, northern Qld; from sea level to 1000 m alt. Grows in rainforests in soils derived from a variety of rock types but reaches best development in soils derived from basalt. Flowers Nov.–Feb.; fruits Dec.–Mar., July. Map 224.

Qld: Portion 188, Alexandra, *B.Gray* 3725 (QRS); S.F.R. 755, Gosschalk L.A., Mt Bartle Frere, *G.Unwin* (QRS); Curtain Fig, Yungaburra, *F.Crome* 878 (QRS); Weinerts Ck, Babinda, *B.Jago* 605 (QRS); Jarra Ck, Tully, *L.S.Smith* 4898 (BRI).

Seedlings exhibit a thick tap root. This species is very closely related to *E. pubens*, but flowering specimens can be readily distinguished by the staminal glands which are present on *E. insignis* but absent on *E. pubens*. Flowers scarcely opening at anthesis, the tepals remaining erect and forming a sheath around the exerted anthers and style.

21. *Endiandra introrsa* C.T.White, *Proc. Roy. Soc. Queensland* 59: 151 (1948)

T: Orara West, N.S.W., May 1947, *W.T.Jones* 3; holo: BRI; iso: NSW.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 353, fig. 78E–F (1989).

Tree to 40 m. Stem sometimes buttressed. Twigs mainly terete, eventually almost glabrescent. Leaves: petiole 5–10 mm long; lamina elliptic to lanceolate, 6–9.5 cm long, 1.8–2.7 cm wide, not foveolate, glaucous below, eventually almost glabrescent. Inflorescence axillary, not exceeding leaves. Flowers not opening widely with tepals geniculate, yellowish green, not perfumed. Tepals sparsely pubescent: outer 0.6–0.8 mm long, 1.3–1.6 mm wide; inner 0.5–0.7 mm long, 1.2–1.3 mm wide. Anthers 0.7–0.9 mm long, 1–1.2 mm wide, glabrous, or pubescent adaxially; filaments 0.2 mm long; valves opening inwards; glands absent. Staminodes 3, undifferentiated. Ovary 0.4–0.7 mm long, 0.5–0.7 mm wide, glabrous; style glabrous. Fruit usually globular, 40–55 mm long, 40–50 mm wide, black. Cotyledons yellowish orange. *Red Plum*.

Occurs from S of Brunswick Heads to Dorrigo, northern N.S.W.; from 300–1000 m alt. Grows in rainforests in poorer soils derived from sedimentary and acid volcanic rocks. Flowers Nov.; fruits Feb.–Mar. Map 225.

N.S.W.: Geebung Rd, Whian Whian State Forest, 21 km SW of Brunswick Heads, *J.Banfield* 11 (QRS); Whian Whian State Forest, *H.C.Hayes NSW 150026* (NSW); Dorrigo Natl Park, *B.Hyland* 12338 (QRS).

This species is closely related to *E. jonesii*, but is specifically distinct and geographically separated by a gap of approximately 1500 km. High levels of the rare compound endiandric acid have been found in both species. The tepals are geniculate, at anthesis surrounding the style and anthers so only the style and anther tips are visible.

22. *Endiandra jonesii* B.Hyland, *Austral. Syst. Bot.* 2: 236 (1989)

T: State Forest Reserve 143, South Mary Logging Area, Qld, 10 Oct. 1974, *B.Hyland 7755*; holotype: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 323, fig. 48; 354, fig. 79A–B (1989).

Tree to 35 m. Stem usually buttressed. Twigs terete, eventually \pm glabrescent. Leaves: petiole 6–11 mm long; lamina mainly elliptic, 5–8.8 cm long, 1.5–2.6 cm wide, not foveolate, green or \pm glaucous below, pubescent. Inflorescence axillary, exceeding leaves. Flowers opening widely with tepals reflexed, creamy yellow, perfumed. Tepals pubescent: outer 1.6–2.4 mm long, 1.3–1.8 mm wide; inner 1.9–2.3 mm long, 1.7–1.8 mm wide. Anthers 0.7–1.1 mm long, 0.9–1.3 mm wide, pubescent abaxially, glabrous adaxially; filaments absent or to 0.1 mm long; valves opening inwards; glands absent. Staminodes 3, undifferentiated. Ovary 0.4–0.8 mm long, 0.5–0.9 mm wide, pubescent; style glabrous or with few hairs. Fruit usually depressed globular and laterally compressed, 43–55 mm long, 40–61 mm wide (longer axis), 35–55 mm wide (shorter axis), blue-black. Cotyledons creamy yellow.

Occurs in the Mt Carbine–Mt Lewis region, N Qld; from 600–1300 m alt. Grows in rain-forests in granite-derived soils. Flowers Aug.–Dec.; fruits Apr.–May, Aug.–Nov. Map 226.

Qld: S.F.R. 143, South Mary L.A., Mt Lewis, *B.Gray 4142* (QRS); S.F.R. 143, North Mary L.A., *B.Gray 651* (QRS); Mt Misery on Mt Carbine Tableland, *L.J.Webb & J.G.Tracey 11681* (BRI).

Differs from *E. introrsa* in the outer tepals being more than 1.3 mm long, and from other species of *Endiandra* in the introrse anthers. Leaf margins are recurved.

23. *Endiandra leptodendron* B.Hyland, *Austral. Syst. Bot.* 2: 237 (1989)

T: State Forest Reserve 755, Boonjee Logging Area, 22 Feb. 1983, *B.Gray 2978*; holotype: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 324, fig. 49; 354, fig. 79C–D (1989).

Tree to 18 m. Stem usually buttressed. Twigs terete or fluted, eventually \pm glabrescent. Leaves: petiole 7–15 mm long; lamina usually elliptic, 9.5–16 cm long, 4–7.4 cm wide, not foveolate, green and mainly glabrescent below. Inflorescence axillary, not exceeding leaves. Flowers scarcely opening with tepals erect, pale or bluish green, \pm perfumed. Tepals pubescent abaxially, often glabrous adaxially: outer 0.9–1.8 mm long, 1.8–2.5 mm wide; inner 0.9–1.6 mm long, 1.3–1.9 mm wide. Anthers 0.4–0.6 mm long, 0.5–0.7 mm wide, glabrous abaxially, papillose adaxially; filaments 0.3–0.5 mm long, pubescent; valves opening outwards or sideways; glands 6. Staminodes 3, differentiated. Ovary 0.5–0.7 mm long, 0.9–1 mm wide, stipitate, glabrous; style glabrous. Fruit 18–29 mm long, 12–14 mm wide, shiny or glaucous, black. Cotyledons cream or yellow.

Extends from Cooktown to Ingham, northern Qld; from sea level to 1000 m alt. Grows in rain-forests in soils derived from a variety of rock types. Flowers Feb.–June; fruits Dec. Map 227.

Qld: T.R. 176, Monkhouse, Home Rule L.A., *B.Hyland 12876* (QRS); Heights of Alexander, Cape Tribulation Rd, *B.Gray 3089* (QRS); Fishery Ck, near Gordonvale, *L.J.Webb & J.G.Tracey 7033* (BRI); Seaview Holding, Garrawalt, Burgoo L.A., near Ingham, *K.Sanderson 583* (QRS).

This species may be closely related to *E. hayesii* which has a similar flower; however, the inflorescence of *E. leptodendron* is much more complex and the flowers are not densely clothed in long hairs. Tepals at anthesis surrounding the style and anthers so only the style and anther tips are visible.

24. *Endiandra limnophila* B.Hyland, *Austral. Syst. Bot.* 2: 238 (1989)

T: between Lockerbie and Somerset, Qld, 8 Dec. 1982, *B.Hyland 12377*; holotype: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 325, fig. 50; 354, fig. 79E–F (1989).

Tree to 20 m. Stem usually buttressed. Twigs terete, pubescent. Leaves: petiole 8–17 mm long; lamina elliptic, 5.5–12.5 cm long, 3–5 cm wide, usually somewhat glaucous below, pubescent; foveoles 3–5. Inflorescence axillary, not exceeding leaves. Flowers opening widely with tepals \pm horizontal, creamy green, brown when older, perfumed. Tepals pubescent: outer 1.2–1.4 mm long, 0.7–0.8 mm wide; inner 1.2–1.4 mm long, 0.6–0.7 mm

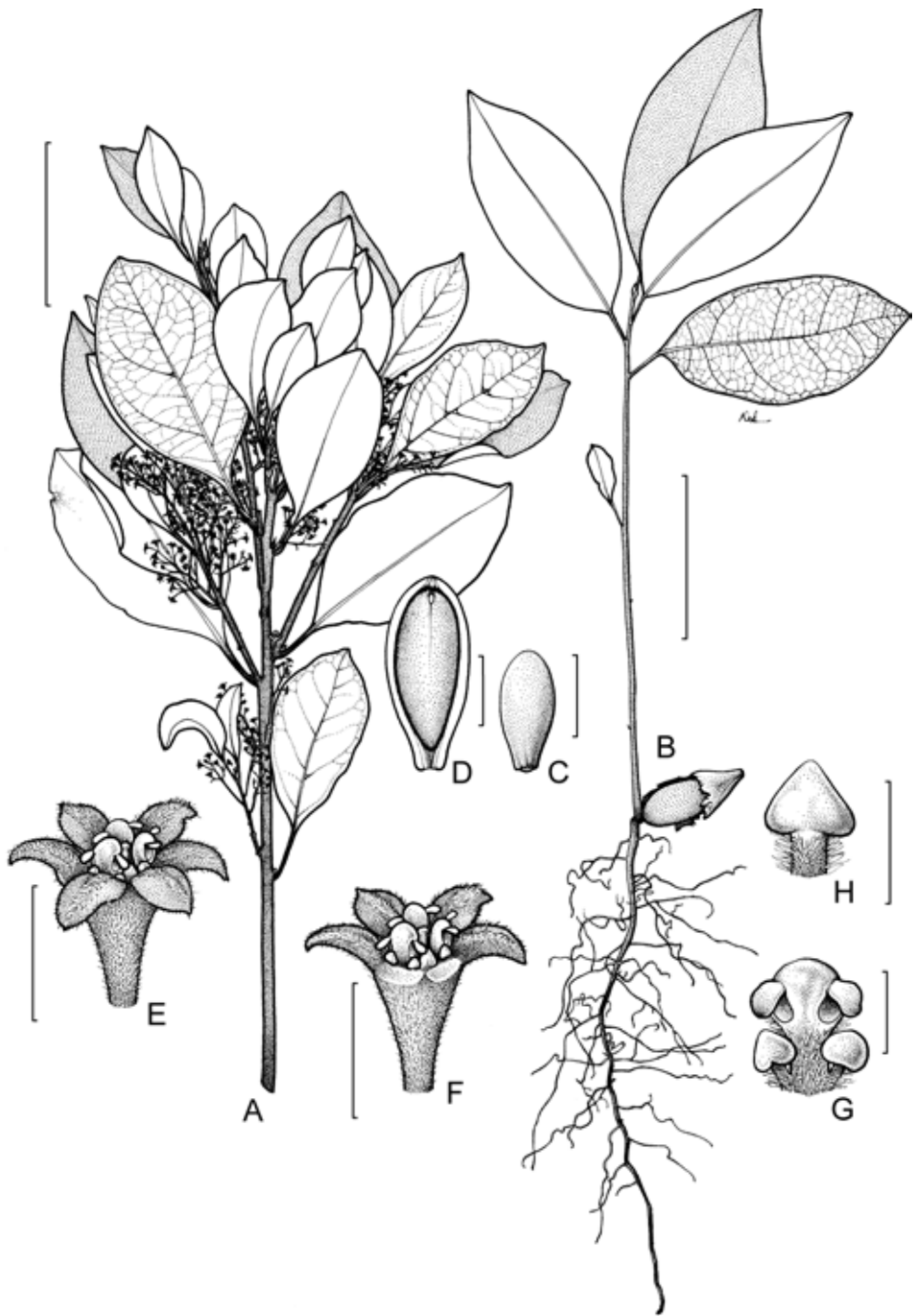


Figure 39. *Endiandra limnophila*. **A**, habit; **B**, seedling; **C**, fruit; **D**, L.S. fruit; **E**, flower; **F**, flower with 2 tepals removed; **G**, anther and glands (abaxial view); **H**, staminode (**A–H**, B.Hyland 12377, QRS). Scale bars: **A**, **B** = 40 mm; **C** = 20 mm; **D** = 10 mm; **E**, **F** = 2 mm; **G**, **H** = 0.5 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 325 (1989).

wide. Anthers c. 0.4 mm long, 0.4–0.5 mm wide, glabrous; filaments 0.3–0.4 mm long, pubescent; valves opening outwards or sideways; glands 6. Staminodes 3, differentiated. Ovary 0.5–0.6 mm long, 0.4–0.5 mm wide, glabrous; style glabrous. Fruit usually ellipsoidal, 28–35 mm long, 14–15 mm wide, glaucous, black. Cotyledons cream. Fig. 39.

Occurs on Melville Is. and nearby mainland, N.T., and at Bamaga, Cape York Penin., Qld; from sea level to 80 m alt. A gallery rainforest species normally found in swampy creek margins. Flowers Nov.–Dec.; fruits Sept.–Dec. Map 228.

N.T.: Taracumbie Ck, Melville Is., *L.J.Webb & J.G.Tracey 12573* (BRI, DNA). Qld: Jardine R., 1 km N of McHenry R. junction, *A.K.Irvine 1954* (QRS); between Somerset and Lockerbie, *B.Hyland 10262* (QRS); Bamaga, *L.S.Smith 12373* (BRI).

Differs from other species in the small perianth tube 1–1.3 mm diameter and the opening of the foveoles being \pm semicircular.

25. *Endiandra longipedicellata* C.T.White & W.D.Francis, *Bot. Bull. Dept. Agric., Queensland* 22: 31 (1920)

T: Atherton District, Qld, *H.W.Mocatta s.n.*; holo: BRI; iso: K.

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 326, fig. 51; 355, fig. 80A–B (1989).

Tree to 30 m. Stem usually buttressed. Twigs fluted, tomentose. Leaves: petiole 6–16 mm long; lamina lanceolate, 7.5–16.5 cm long, 2–6.5 cm wide, not foveolate, green or slightly glaucous below, mainly pubescent. Inflorescence mainly axillary, exceeding leaves. Flowers opening fairly widely with tepals remaining \pm erect, green, olive-green, not perfumed. Tepals pubescent: outer 1.9–3 mm long, 1.9–2.6 mm wide; inner 2.1–2.5 mm long, 1.5–2.1 mm wide. Anthers 0.5–0.6 mm long, 0.7–0.9 mm wide, glabrous; filaments 0.2–0.4 mm long, pubescent; valves opening outwards and sideways; glands fused forming disc. Staminodes indistinguishable (absent or fused with disc). Ovary 1.7–2.3 mm long, 1.2–1.7 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 30–50 mm long, 17–27 mm wide, black, blue-black. Cotyledons pink, sometimes cream. *Buff Walnut*.

Occurs from Bamaga to Goldsborough, northern Qld; from sea level to 700 m alt. Grows in rainforests and gallery forests (tending to be more common in more seasonal forests) in soils derived from a variety of rock types. Flowers Sept.–Oct.; fruits Oct.–Jan. Map 229.

Qld: Long Scrub, Bamaga, *L.J.Webb & J.G.Tracey 6968* (BRI); upper Massy Ck (E of Cohen), *L.S.Smith 11914* (A, BRI, L); Yarrabah, *J.P.Martin BRI70675* (BRI); S.F.R. 165 Danbulla, Python L.A., *T.S.Risley 100* (BRI, K, KEP, L, QRS); S.F.R. 310, Goldsborough L.A., *B.Hyland 9637* (QRS).

26. *Endiandra microneura* C.T.White, *Proc. Roy. Soc. Queensland* 59: 152 (1948)

Endiandra reticulata C.T.White, *Proc. Roy. Soc. Queensland* 47: 76 (1936), *nom. illeg., non* Gillespie (1931).

T: Daintree River, Qld, 7 Mar. 1932, *L.J.Brass 2244*; holo: BRI; iso: A, BISH, BO, SING.

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 327, fig. 52; 355, fig. 80C–D (1989).

Tree to 30 m. Stem buttressed. Twigs fluted and pubescent when young, \pm terete and glabrous when older. Leaves: petiole 8–17 mm long; lamina elliptic, 8.5–15 cm long, 3–6.5 cm wide, not foveolate, green and glabrous below. Inflorescence axillary and pseudoterminal, exceeding leaves. Flowers opening widely with tepals becoming \pm horizontal, cream, perfumed (resembling cut watermelon). Tepals pubescent: outer 1.2–1.3 mm long, 1–1.2 mm wide; inner 1–1.4 mm long, 0.8–1.3 mm wide. Anthers 0.5–0.7 mm long, 0.5–0.8 mm wide, mainly glabrous; filaments 0.1–0.2 mm long, pubescent; valves opening outwards; glands 6. Staminodes usually absent. Ovary 0.6–0.8 mm long, 0.7–0.8 mm wide, glabrous; style glabrous. Fruit ellipsoidal, laterally compressed, 50–78 mm long, 28–43 mm wide, yellow, orange. Cotyledons cream.

Restricted to the Daintree R. area, northern Qld; from sea level to 250 m alt. Grows in lowland rainforests in soils usually derived from metamorphic rocks. Flowers Dec., Mar.–Apr.; fruits Aug.–Dec. Map 230.

Qld: Vacant Crown Land Noah, near Noahs Ck, *B.Hyland 5965* (A, BISH, BRI, K, KEP, L, NSW, QRS); Baileys Ck, *H.E.Volck 4184* (BRI); Daintree R., *L.J.Brass* (A, BISH, BO, BRI, SING).

27. *Endiandra monothyra* B.Hyland, *Austral. Syst. Bot.* 2: 240 (1989)

T: State Forest Reserve 185, Robson Logging Area, 22 Feb. 1977, *B.Gray* 317; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 328, fig. 53 (1989).

Tree to 35 m. Stem usually buttressed. Twigs tomentose. Leaves: petiole 5–14 mm long; lamina lanceolate to elliptic to ovate, 5.5–15 cm long, 2–7.5 cm wide, sometimes foveolate, green or slightly glaucous below, pubescent to almost glabrescent at maturity. Inflorescence axillary and pseudoterminal, not exceeding leaves; pedicel 0.3–2.4 mm long. Flowers scarcely opening with tepals remaining \pm erect, greenish brown, not perfumed. Tepals pubescent or tomentose: outer 0.9–1.3 mm long, 0.45–2 mm wide; inner 0.8–1.2 mm long, 1.1–1.6 mm wide. Anthers 0.35–0.5 mm long, 0.35–0.6 mm wide, pubescent or glabrous; filaments 0.2–0.75 mm long, hairy or glabrous; valve opening inwards (1 valve only); glands 6, distinct, glabrous. Staminalodes 3, differentiated. Ovary 0.6–0.7 mm long, 0.5–0.7 mm wide, glabrous; style glabrous. Fruit usually ellipsoidal, 30–40 mm long, 15–20 mm wide, shiny black. Cotyledons cream to creamy yellow.

Occurs in northern Qld. Two subspecies are recognised.

This species is remarkable in the genus for its single-valved anthers.

Pedicel 0.3–1.3 mm long; mature leaves sparsely pubescent or almost glabrous on underside

27a. subsp. *monothyra*

Pedicel 1.5–2.4 mm long; mature leaves pubescent on underside

27b. subsp. *trichophylla*

27a. *Endiandra monothyra* B.Hyland subsp. *monothyra*

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 355, fig. 80E–F (1989).

Tree to 35 m. Stem usually buttressed. Twigs fluted. Leaves: petiole 5–14 mm long; lamina lanceolate to elliptic to ovate, 6–15 cm long, 2.5–7.5 cm wide, green below and almost glabrescent at maturity. Pedicel 0.3–1.3 mm long. Tepals pubescent. Anthers usually glabrous; filaments hairy or glabrous. Fruit 30–40 mm long, 15–20 mm wide. Cotyledons creamy yellow.

Occurs in N Qld, from Big Tableland (S of Cooktown) to Dotswood Holding and Bluewater Ra. (near Townsville); from 200–1000 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Jan.–June; fruits Sept.–Nov. Map 231.

Qld: Mt Windsor Tableland, *F.Crome* 928 (QRS); Natl Park Res. 904, Palmerston, *B.Gray* 4232 (QRS); 2 km SW of The Pinnacle, *V.K.Moriarty* 2321 (QRS); T.R. 146, Tableland L.A., *B.Hyland* 3225 *RFK* (BRI, QRS).

27b. *Endiandra monothyra* subsp. *trichophylla* B.Hyland, *Austral. Syst. Bot.* 2: 241 (1989)

T: State Forest Reserve 310, Gadgarra, Presley Logging Area, 12 Dec. 1979, *B.Gray* 1589; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 356, fig. 81A–B (1989).

Tree to 25 m tall. Stem buttressed. Twigs terete or fluted. Leaves: petiole 5–10 mm long; lamina lanceolate to elliptic, 5.5–8.5 cm long, 2–3.5 cm wide, green or slightly glaucous below, pubescent with hairs erect, tortuous, brown, persistent at maturity. Pedicel 1.5–2.4 mm long. Tepals tomentose. Anthers pubescent or glabrous; filaments pubescent. Fruit c. 35 mm long, 15 mm wide. Cotyledons cream.

Occurs in the Atherton Tableland area, northern Qld; from 650–800 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Nov.–Feb.; fruits Sept.–Dec. Map 232.

Qld: S.F.R. 310 Gadgarra, Presley L.A., *B.Gray* 3293 (QRS); S.F.R. 607, Davies L.A., *B.Hyland* 25022 *RFK* (QRS); S.F.R. 607, Dinden, Bridle L.A., *B.Gray* 3743 (QRS).

Differs from subsp. *monothyra* in the pedicel length and the lamina pubescent on the underside.

28. *Endiandra montana* C.T.White, *Contr. Arnold Arbor.* 4: 36 (1933)

T: Mt Alexander, 18 Dec. 1929, *S.F.Kajewski 1497*; holo: A; iso: B, BRI, K, L, NSW.

Brassiendron fragrans C.K.Allen, *J. Arnold Arbor.* 23: 153 (1942); *Endiandra fragrans* (C.K.Allen) Kosterm., *J. Sci. Res. (Jakarta)* 1: 151 (1952). T: Lake Daviumbu, Middle Fly River, Papua [New Guinea], *L.J.Brass 7465*; holo: A; iso: BO, BRI, L.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 356, fig. 81C–D (1989).

Tree to 30 m. Stem buttressed. Twigs angular or terete, soon glabrescent. Leaves: petiole 6–16 mm long; lamina elliptic to lanceolate, 7–13.5 cm long, 3–6.2 cm wide, not foveolate, green and glabrous below. Inflorescence racemose, axillary, not exceeding leaves. Flowers opening widely with outer tepals almost horizontal, cream, perfumed. Tepals papillose abaxially, usually glabrous adaxially: outer 2.4–3.9 mm long, 1.9–2.7 mm wide; inner 2.3–4.1 mm long, 1.9–2.7 mm wide. Anthers 0.9–1.8 mm long, 0.7–1.3 mm wide, papillose; filaments absent or 0.2–0.6 mm long and pubescent; valves usually opening sideways and outwards; glands 2 per anther. Staminodes absent. Ovary 0.7–1.1 mm long, 0.6–1 mm wide, glabrous; style glabrous. Fruit globular, pyriform, ellipsoidal, 30–52 mm long, 20–41 mm wide, yellow, orange, maroon. Cotyledons cream. *Brown Walnut*.

Occurs in northern Qld, from Cooktown to Kirrama (W of Cardwell); from sea level to 1300 m alt. Grows in rainforests in soils derived from a variety of rock types. Also found in New Guinea and possibly the Mollucas. Flowers Oct.–Feb.; fruits Apr.–Oct. Map 233.

Qld: Thornton Peak, *L.J.Brass & C.T.White 316* (A, BRI, CANB, K); S.F.R. 310, Swipers L.A., *B.Hyland 2120* (A, AFO, BRI, K, MEL, QRS); summit of Mt Finnigan, *V.K.Moriarty 1060* (QRS); 4.8 km W of Mission Beach, *A.C.Robinson BRI194333* (BRI).

The flowers of this species can be rather variable and the tepals can sometimes appear to be spirally arranged and not in 2 whorls. The number of tepals can also vary and cases have been encountered where tepals have developed as anthers and vice versa. The number of anthers can likewise vary, but there are always more than 3 and usually 6 (3 small + 3 larger).

29. *Endiandra muelleri* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 509 (1864), as *mulleri*

T: Clarence River, N.S.W., *F.Mueller s.n.* (probably *H.Beckler*); holo: G-DC; iso: BO, DNA.

Tree to 20 m. Stem sometimes buttressed. Twigs fluted or terete. Leaves: petiole 4–14 mm long; lamina elliptic to lanceolate, 5–11 cm long, 2–5 cm wide, green below, foveoles or hair tufts (domatia) often visible. Inflorescence mainly axillary, not exceeding leaves. Flowers scarcely opening with tepals remaining erect. Tepals: outer 0.7–1.5 mm long, 1.1–2.1 mm wide; inner 0.6–1.6 mm long, 0.7–1.7 mm wide. Anthers 0.4–0.8 mm long, 0.4–0.7 mm wide, glabrous; filaments 0.2–0.9 mm long, pubescent; valves opening sideways or outwards; glands 6, distinct. Staminodes differentiated, 3. Ovary 0.7–1.3 mm long, 0.7–1.3 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 25–30 mm long, 15 mm wide, black, sometimes glaucous. Cotyledons cream.

Occurs from central Qld to northern N.S.W. Two subspecies are recognised.

Twig hairs straight and appressed

29a. subsp. *muelleri*

Twig hairs straight and tortuous, appressed and erect

29b. subsp. *bracteata*

29a. *Endiandra muelleri* Meisn. subsp. ***muelleri***

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 356, fig. 81E–F (1989).

Twigs with straight, appressed hairs when young, but eventually ±terete and glabrous. Leaf lamina eventually ±glabrescent; hairtufts often visible. Inflorescence mainly axillary. Flowers reddish, cream, pale brown or green, not perfumed. Tepals pubescent: outer 0.8–1.5 mm long, 1.2–2.1 mm wide; inner 0.7–1.6 mm long, 1–1.7 mm wide. Anther valves opening sideways. Ovary 0.7–1.3 mm long, 0.8–1.3 mm wide. *Mueller's Walnut*.

Occurs from near Gympie, southern Qld, to Comboyne, northern N.S.W.; from sea level to 900 m alt. Grows in rainforests in poorer soils derived from sedimentary rocks. Flowers Mar.–Apr., Nov.–Dec.; fruits ?Apr. Map 234.

Qld: Olson's Property, Currumbin Valley, *D.L.Jones 185* (QRS); Mt Glorious, *M.S.Clemens BRI 017591* (A, BM, BRI, G, K, L, MEL, NY, RSA). N.S.W.: Whian Whian State Forest, *C.T.White 12829* (A, BO, BRI, NSW); Coffs Harbour, *R.D.Johnson s.n.* (QRS).

29b. *Endiandra muelleri* subsp. *bracteata* B.Hyland, *Austral. Syst. Bot.* 2: 243 (1989)

T: Austinville, Qld, 7 Oct. 1983, *D.L.Jones 1263*; holotype: QRS.

Endiandra pubens var. *glabriflora* Benth., *Fl. Austral.* 5: 303 (1870). T: Richmond River, N.S.W., *J.A.Henderson s.n.*; holotype: MEL; isotype: K.

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 329, fig. 54; 357, fig. 82A–B (1989).

Twigs with straight and tortuous, appressed and erect, hairs persisting. Leaf lamina usually pubescent; foveoles usually visible. Inflorescence axillary. Flowers creamy green, perfume unknown. Tepals glabrous abaxially, few hairs adaxially: outer 0.7–1 mm long, 1.1–1.6 mm wide; inner 0.6–0.9 mm long, 0.7–1.4 mm wide. Anther valves opening sideways or outwards. Ovary 0.7–0.9 mm long, 0.7–0.9 mm wide.

Occurs in central and southern Qld from near Eungella and from Lamington Natl Park, Qld, to near Minyon Falls, northern N.S.W.; from 150–800 m alt. Grows in rainforests in poorer soils derived from sedimentary or acid volcanic rocks. Flowers Jan., May, Nov.; fruits recorded in Mar., Oct. and Nov. Map 235.

Qld: Natl Park Res. 573, Pelion, *P.Qualishefski 277* (QRS); Broken R., *B.Hyland 4217RFK* (QRS); Lamington Natl Park, *C.T.White BRI 329258* (BRI). N.S.W.: Minyon Falls, *B.Hyland 4576RFK* (QRS).

30. *Endiandra palmerstonii* (F.M.Bailey) C.T.White & W.D.Francis, *Bot. Bull. Dept. Agric., Queensland* 22: 36 (1920), as *Palmerstoni*

Cryptocarya palmerstonii F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 2: 16 (1891). T: ?Bellenden Ker Expedition, Qld; lectotype: BRI; northern Qld, *C.Palmerston s.n.*; remaining syn: K, MEL, *vide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 244 (1989).

Illustrations: B.P.M.Hyland, *op. cit.* 2: 330, fig. 55; 357, fig. 82C–D (1989).

Tree to 30 m. Stem usually buttressed. Twigs fluted, pubescent. Leaves: petiole 5–21 mm long; lamina lanceolate to elliptic, 7–22.5 cm long, 2.5–13 cm wide, not foveolate, green or slightly glaucous below, pubescent. Inflorescence axillary and pseudoterminal, exceeding leaves. Flowers opening widely with tepals recurved, cream, yellow, perfumed. Tepals tomentose: outer 1–1.4 mm long, 0.6–1 mm wide; inner 0.9–1.3 mm long, 0.5–1 mm wide. Anthers 0.3–0.5 mm long, 0.4–0.6 mm wide, tomentose; filaments 0.1–0.2 mm long; valves opening outwards; glands 6. Staminodes 3, differentiated or undifferentiated, 0.1–0.25 mm long, glabrous or pubescent. Ovary 0.3–0.5 mm long, 0.35–0.6 mm wide, mainly glabrous; style glabrous. Fruit globular, 45–60 mm long, 45–65 mm wide, yellow or orange-brown. Cotyledons cream, pinkish, apricot. *Queensland Walnut, Black Walnut*.

Occurs from Lamb Ra. to Koombuloomba (W of Tully), northern Qld; from sea level to 1100 m alt. Grows in rainforests in soils derived from a variety of rock types, but probably reaches its best development in soils derived from basalt. Flowers Nov.–Mar.; fruits Dec.–Mar. Map 236.

Qld: S.F.R. 933, Trinity, Little Pine L.A., *B.Gray 3775* (QRS); Bellenden Ker Ra., Babinda, *R.L.Jago 210* (QRS); Ravenshoe, *J.B.Manuell 15* (BRI); Koolmoon Ck, *L.S.Smith 10460* (BRI); S.F.R. 605, Bankton, Cascade L.A., *B.Gray 3053* (QRS).

31. *Endiandra phaeocarpa* B.Hyland, *Austral. Syst. Bot.* 2: 245 (1989)

T: State Forest Reserve 143, South Mary Logging Area, Qld, 1 Mar. 1983, *B.Gray 3009*; holotype: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 331, fig. 56; 357, fig. 82E–F (1989).

Tree to 30 m. Stem sometimes buttressed. Twigs fluted, soon glabrescent. Leaves: petiole 8–27 mm long; lamina elliptic, 9.8–18.5 cm long, 3.4–8.5 cm wide, not foveolate, green and glabrous below. Inflorescence axillary or on twigs below leaves, not exceeding leaves. Flowers scarcely opening with tepals erect, yellow, cream, ±perfumed. Tepals glabrous: outer 0.6–1.3 mm long, 1.2–1.7 mm wide; inner 0.9–1.3 mm long, 0.9–1.4 mm wide. Anthers

0.2–0.5 mm long, 0.7–0.9 mm wide, opening by terminal, \pm circular pores, glabrous; filaments 1–1.5 mm long, pubescent; glands absent. Staminalodes 2 or 3 (sometimes absent), undifferentiated. Ovary 0.6–1 mm long, 0.8–1 mm wide, ovary and style glabrous. Fruit sausage-shaped to ellipsoid, 65–89 mm long, 32–35 mm wide, scurfy brown. Cotyledons cream.

Restricted to the Mt Lewis area, NE Qld; from 950–1100 m alt. Grows in mountain rainforests. Possibly also occurs in New Guinea. Flowers Dec.–Mar.; fruits Nov.–Dec. Map 237.

Qld: Mt Hemmant, *L.J.Webb & J.G.Tracey 11714* (BRI); S.F.R. 143, South Mary L.A., *B.Hyland 6741* (QRS); S.F.R. 143, North Mary L.A., *B.Gray 897* (QRS).

Differs from *E. xanthocarpa* in the combination of 6 tepals, 3 anthers and scurfy, brown fruit. Tepals at anthesis surrounding the style and anthers so only the style and anther tips are visible. Leaf margin often recurved.

32. *Endiandra pubens* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 509 (1864)

Endiandra pubens var. *typica* Domin, *Biblioth. Bot.* 89: 124 (1925), *nom. inval.* T: Clarence River, N.S.W., *F.Mueller* (probably *H.Beckler*) *s.n.*; holo: G-DC; iso: BO, K, MEL.

Cryptocarya muelleri Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 73 (1864). T: Brisbane River, Qld, *F.Mueller* (& *W.Hill?*); holo: K.

Endiandra pubens var. *obtusifolia* Domin, *Biblioth. Bot.* 89: 124 (1925). T: Tambourine Mtn, Qld, Mar. 1910, *K.Domin s.n.*; holo: PR.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 358, fig. 83A–B (1989).

Tree to 25 m. Stem usually not buttressed. Twigs terete or fluted, pubescent. Leaves: petiole 7–26 mm long; lamina lanceolate to elliptic to ovate, 7–22.5 cm long, 2.5–13 cm wide, not foveolate, green and pubescent below. Inflorescence axillary and pseudoterminal, not exceeding leaves. Flowers scarcely opening with tepals remaining erect, cream to greenish cream, dull orange, \pm perfumed. Tepals pubescent: outer 0.8–1.2 mm long, 1.1–1.8 mm wide; inner 1–1.2 mm long, 0.8–1.3 mm wide. Anthers 0.5–0.8 mm long, 0.5–0.8 mm wide, glabrous; filaments 0.7–1.4 mm long; valves opening sideways or outwards, pubescent; glands absent. Staminalodes 3, undifferentiated. Ovary 0.5–0.7 mm long, 0.5–0.8 mm wide, glabrous; style glabrous or sparsely pubescent. Fruit globular, depressed globular, 45–70 mm long, 40–75 mm wide, red. Cotyledons creamy apricot. Plate 34.

Occurs in northern N.S.W. and southern Qld; from sea level to 500 m alt. Grows in rainforests in soils derived from a variety of rock types, but reaching best development in alluvial soils. Flowers Feb.–May; fruits Feb.–Mar. Map 238.

Qld: S.F.R. 191, Wongabel, *G.L.Unwin 163* (CANB, QRS); S.F.R. 185, Danbulla, *B.Hyland 1829* (BRI, CANB). N.S.W.: Repentance Ck below Minyon Falls, *A.G.Floyd 987* (CANB); Red Scrub, Whian Whian, *W.T.Jones 3488* (CANB).

This species is very closely related to *E. insignis* and *E. virens*; however, flowering specimens can be readily distinguished by the staminal glands which are present on the anther filaments of *E. insignis* but absent in *E. pubens* and *E. virens*. *Endiandra pubens* has flowers scarcely opening at anthesis, the tepals remaining erect and forming a sheath around the exerted anthers and style.

33. *Endiandra sankeyana* F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 8: 82 (1893)

T: Barron R., Qld, *E.Cowley 81D*; holo: BRI; iso: MEL.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 358, fig. 83C–D (1989).

Tree to 30 m. Stem buttressed. Twigs angular or fluted, pubescent. Leaves: petiole 6–18 mm long; lamina lanceolate to elliptic to \pm obovate, 8–17 cm long, 5–9.5 cm wide, not foveolate, green or \pm glaucous below, pubescent. Inflorescence axillary, not exceeding leaves. Flowers not opening widely with tepals \pm erect, yellow, cream-yellow, \pm perfumed. Tepals glabrous or few hairs abaxially, pubescent adaxially: outer 1–1.9 mm long, 1.2–1.6 mm wide; inner 1.1–1.6 mm long, 1.2–1.5 mm wide. Anthers 0.8–0.9 mm long, 0.8–1 mm wide, glabrous;

filaments 0.2–0.3 mm long, pubescent; valves opening sideways or outwards; glands absent. Staminodes absent. Ovary 0.5–0.6 mm long, 0.4–0.6 mm wide, glabrous or pubescent; style glabrous. Fruit ellipsoidal, occasionally pyriform, globular, 33–54 mm long, 27–41 mm wide, black, blue-black. Cotyledons apricot. *Sankey's Walnut*.

Occurs from Cooktown to Mission Beach, northern Qld; from sea level to 1300 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Oct.–Dec.; fruits May–Nov. Map 239.

Qld: 3.2 km S of Crater Natl Park, *F.Crome 505* (CANB); Peeramon, *S.F.Kajewski 1072* (A, BO, BRI, K, MEL, NSW, NY, SING); Lacey's Ck, Mission Beach, *F.Crome s.n.* (CANB).

34. *Endiandra sideroxylon* B.Hyland, *Austral. Syst. Bot.* 2: 248 (1989)

T: State Forest Reserve 194, near Portion 69, Herberton, Qld, 12 Jan. 1977, *B.Gray 226*; holotype: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 332, fig. 57; 358, fig. 83E–F (1989).

Tree to 35 m. Stem buttressed. Twigs fluted, eventually ±glabrescent. Leaves: petiole 5–14 mm long; lamina elliptic to ovate, 6–11 cm long, 3–6 cm wide, not foveolate, green below, soon glabrescent. Inflorescence axillary, sometimes pseudoterminal, exceeding leaves. Flowers opening widely with tepals ±horizontal, creamy yellow, ±perfumed. Tepals pubescent: outer 1.6–2 mm long, 1.1–1.4 mm wide; inner 1.2–2.2 mm long, 0.9–1.5 mm wide. Anthers 0.4–0.6 mm long, 0.5–0.7 mm wide, glabrous apically, pubescent basally; filaments 0.2–0.4 mm long, pubescent; valves opening outwards or sideways; glands 6. Staminodes 3, differentiated. Ovary 0.6–0.8 mm long, 0.6–0.9 mm wide, sessile or shortly stalked, glabrous or sparsely pubescent; style glabrous. Fruit ellipsoidal, 37–54 mm long, 22–28.5 mm wide, black. Cotyledons creamy pink. *Buff Walnut*. Fig. 40.

Occurs on the Atherton Tableland, northern Qld; from 140–1000 m alt. Grows in rainforests in soils derived from a variety of rock types, but reaching best development in soils derived from basalt. Flowers Nov.–Feb.; fruits Aug.–Nov. Map 240.

Qld: Boonjee (via Peeramon), *J.Dawson BRI 176901* (BRI); Gourka Pocket, Atherton Tableland, *L.S.Smith 10497* (BRI); Palmerston Hwy, 2 km N of Beatrice R., *B.Gray 3792* (QRS).

Differs from other species in the combination of flowers opening widely, twig hairs straight and appressed, fruit 37–54 mm long and cotyledons pink or cream.

35. *Endiandra sieberi* Nees, *Syst. Laur.* 194 (1836)

T: New Holland, *F.W.Sieber 275*; iso: ?B, BM, G, G-DC, K, L, MEL, NY.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 359, fig. 84A–B (1989).

Tree to 30 m. Stem not buttressed. Twigs terete or fluted, eventually ±glabrescent. Leaves: petiole 3–9 mm long; lamina lanceolate to elliptic, 5.5–11.5 cm long, 1.5–4.5 cm wide, not foveolate, green and glabrous below. Inflorescence axillary and pseudoterminal, c. same length as leaves. Flowers opening quite widely with tepals ±horizontal, pinkish cream, yellow, perfumed. Tepals glabrous abaxially, pubescent adaxially: outer 1.5–2 mm long, 1.2–1.4 mm wide; inner 1.3–1.9 mm long, 0.9–1 mm wide. Anthers 0.5–0.6 mm long, 0.5–0.7 mm wide, mainly glabrous, few hairs adaxially; filaments 0.3–0.5 mm long, pubescent; valves opening outwards; glands 6. Staminodes 3, differentiated. Ovary 0.8–1.3 mm long, 0.6–1.1 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 20–24 mm long, 14–17 mm wide, black, shiny. Cotyledons pink. *Pink Walnut*.

Occurs from Byfield, Qld, to Jervis Bay, N.S.W.; from sea level to ?700 m alt. Grows in rainforests and other closed forests usually in the poorer soils derived from sedimentary rocks or deep sands. In coastal areas it is a very characteristic tree on the margins of littoral rainforest and fringing rainforest on creek banks. Flowers Apr.–Oct.; fruits May–Oct. Map 241.

Qld: between Byfield and Stockyard Point, *J.R.Clarkson 1011A* (BRI); Noosa Heads, *T.E.Hunt s.n.* (BRI, K, NSW). N.S.W.: Brunswick Heads, *B.Hyland 13044* (QRS); Avoca Beach, *S.Martin NSW 150005* (NSW); Mt Pigeonhouse, W of Ulladulla, *V.Hadley NSW 150021* (NSW).

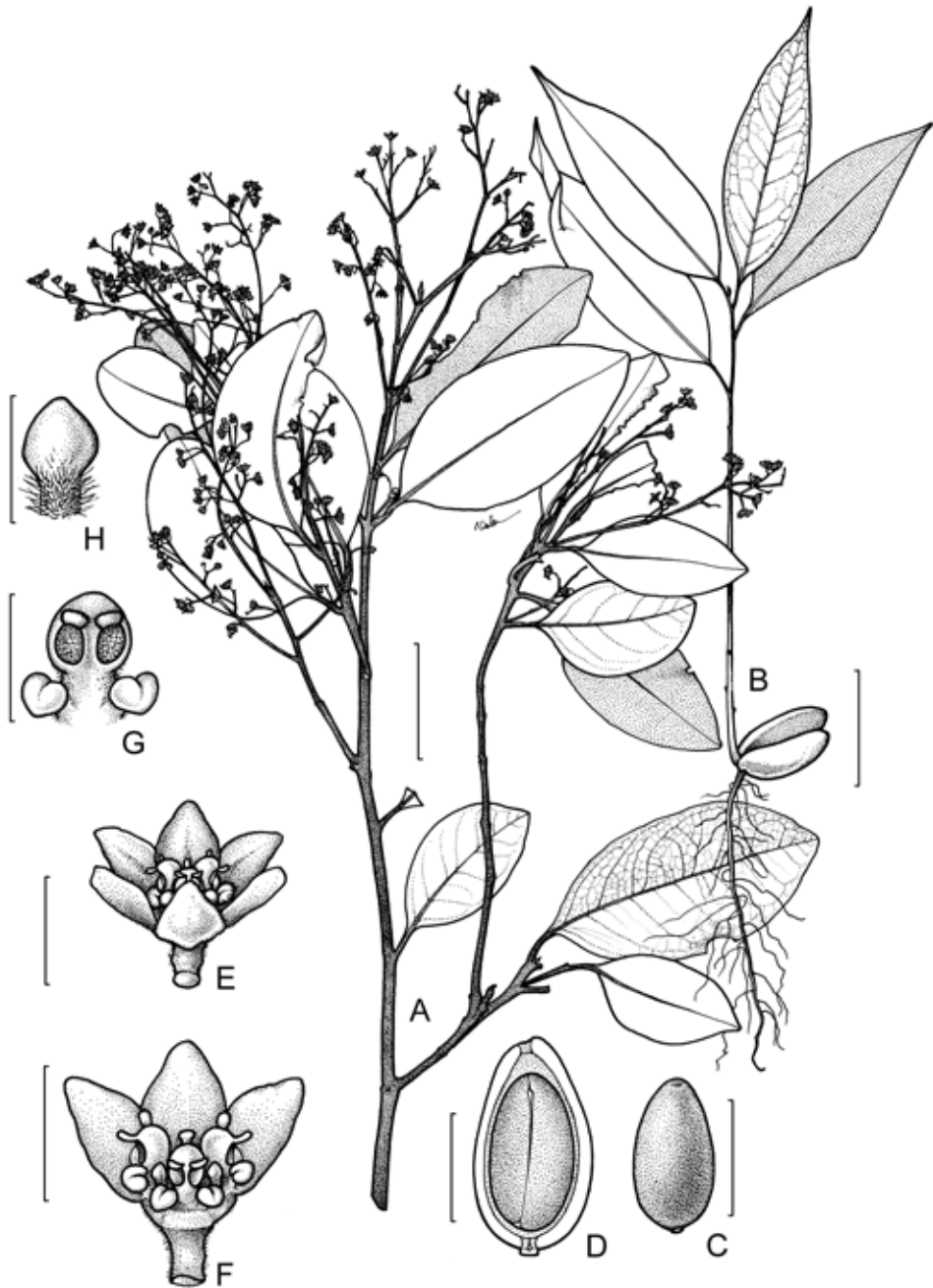


Figure 40. *Endiandra sideroxylon*. A, habit; B, seedling; C, fruit; D, L.S. fruit; E, flower; F, flower with 3 tepals removed; G, stamen and glands (abaxial view); H, staminode (abaxial view) (A, E–H, B.Gray 226, QRS; B–D, B.Gray 808, QRS). Scale bars: A–C = 30 mm; D = 20 mm; E, F = 2 mm; G = 1 mm; H = 0.5 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 322 (1989).

Endiandra sieberi has developed a characteristic thick, corky bark, which is apparently an adaptive response to periodic firing. It survives quite well in the ecotone between the fire-prone eucalypt forests of the coastal 'wallum' country and the rainforests fringing water courses over a wide latitudinal range.

36. *Endiandra virens* F.Muell., *Fragm.* 2: 90 (1860)

T: Clarence River, N.S.W., *H.Beckler s.n.*; lecto: MEL; ?isolecto: BO, G-DC, K, L, MEL, NY, *fide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 249 (1989).

Endiandra lowiana F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 5: 24 (1892). T: Maroochie (Yandina), Qld, *J.A.Low s.n.*; syn: BRI; isosyn: K, MEL; Eudlo, Qld, *Field Naturalists*; syn: BRI.

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 359, fig. 84C–D (1989).

Tree to 10 m. Stem sometimes buttressed. Twigs fluted, eventually almost glabrescent. Leaves: petiole 4–17 mm long; lamina lanceolate to narrowly lanceolate, 6–14 cm long, 1.5–4.5 cm wide, penninerved, not foveolate, green and glabrous below. Inflorescence axillary, not exceeding leaves. Flowers scarcely opening with tepals remaining erect, colour and perfume unknown. Tepals sparsely pubescent: outer 0.6–1 mm long, 1–1.4 mm wide; inner 0.8–0.9 mm long, 0.8–0.9 mm wide. Anthers 0.7–0.8 mm long, c. 0.6 mm wide, glabrous; filaments 0.7–0.8 mm long, pubescent; valves opening outwards or sideways; glands absent. Staminodes 3, undifferentiated. Ovary 0.6–0.7 mm long, 0.5–0.6 mm wide, glabrous; style glabrous. Fruit globular, depressed globular, 35–60 mm long, 45–60 mm wide, yellow, orange-red. Cotyledons creamy apricot. *New South Wales Walnut*.

Occurs from Kin Kin, S Qld, to Comboyne, N.S.W.; from sea level to 1000 m alt. Grows in rainforests, often in fringing rainforests along water courses. Flowers Feb.–June; fruits May, July, Sept. Map 242.

Qld: Kin Kin, *C.T.White s.n.* (BO, NSW); Kin Kin, *W.D.Francis & C.T.White s.n.* (A, BRI, K, L, LA, NSW, SING). N.S.W.: Boambee State Forest, 6 km SW of Coffs Harbour, *B.Hyland 4554 RFK* (QRS); Dorriggo Natl Park, *B.Hyland 12337* (QRS).

The flowers and fruits of this species are very similar to those of *E. pubens* and *E. anthropophagorum*. It is possible that *E. virens* could be a segregate of *E. pubens*. The two species are distinguished relatively easily in N.S.W.; however, proceeding northwards into southern Qld, it becomes more difficult to confidently place specimens into one or other of the species. Geographically *E. anthropophagorum* is quite distinct, being separated from *E. pubens* and *E. virens* by a gap of about 8° in latitude. *Endiandra virens* has flowers scarcely opening at anthesis, the tepals remaining erect and forming a sheath around the exerted anthers and style.

37. *Endiandra wolfei* B.Hyland, *Austral. Syst. Bot.* 2: 250 (1989)

T: State Forest Reserve 1073, Black Mountain Rd, 23 Feb. 1977, *B.Gray 325*; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit.* 2: 333, fig. 58; 359, fig. 84E–F (1989).

Tree to 25 m. Stem buttressed. Twigs fluted, pubescent. Leaves: petiole 4–15 mm long; lamina lanceolate, 6.5–12.5 cm long, 2–5 cm wide, not foveolate, glaucous (almost white) and pubescent below. Inflorescence racemose or paniculate, axillary, not exceeding leaves. Flowers opening widely with tepals remaining ±erect, creamy green, not perfumed. Tepals tomentose: outer 2.2–3 mm long, 2–2.8 mm wide; inner 1.8–2.6 mm long, 1.4–2.3 mm wide. Anthers 0.5–0.8 mm long, 0.6–0.9 mm wide, glabrous; filaments 0.2–0.5 mm long, pubescent; valves opening outwards; glands fused forming disc. Staminodes absent or fused with disc. Ovary sometimes stalked, 1.1–2 mm long, 1–1.5 mm wide, pubescent, style glabrous. Fruit ellipsoidal, 20–24 mm long, 10–13 mm wide, black, blue-black. Cotyledons pink.

Extends from Cooktown to Eungella, northern Qld; from sea level to 1100 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Nov.–Mar., July; fruits Aug.–Dec. Map 243.

Qld: T.R. 146, Tableland L.A., *B.Hyland 10548* (QRS); Portion 275 Alexandra, Milky Pine Rd, *B.Gray 3718* (QRS); Natl Park Res. 573 Eungella, Finch Hatton Gorge, *B.Hyland 4508 RFK* (QRS).

This species differs from others in the combination of staminal glands fused to form a disc, staminodes fused to the disc and outer tepals 2.2–3 mm long.

38. *Endiandra xanthocarpa* B.Hyland, *Austral. Syst. Bot.* 2: 251 (1989)

T: Timber Reserve 1230, Boonjee Logging Area, 11 Jan. 1983, *B.Gray* 2913; holotype: QRS.

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 334, fig. 59; 360, fig. 85A–B (1989).

Tree to 30 m. Stem sometimes buttressed. Twigs fluted or terete, eventually glabrescent. Leaves: petiole 10–27 mm long; lamina elliptic, 9–15.5 cm long, 4–7 cm wide, not foveolate, green and glabrescent below. Inflorescence axillary, or on twigs below leaves, not exceeding leaves. Flowers scarcely opening with tepals erect, creamy yellow, perfumed. Tepals predominantly glabrous: outer 0.7–0.9 mm long, 1–1.6 mm wide; inner 0.7–1 mm long, 0.8–0.9 mm wide. Anthers opening by lateral pores near apex, 0.4–0.7 mm long, 0.6–0.9 mm wide, glabrous; filaments 0.7–0.9 mm long, pubescent; glands absent. Staminodes usually 2, ±differentiated. Ovary 0.6–1 mm long, 0.6–0.8 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 60–70 mm long, 33–45 mm wide, yellow. Cotyledons pale pink.

Known only from the Boonjee area NW of Innisfail, northern Qld; from 350–750 m alt. Grows in upland rainforests in soils derived from basalt. Flowers Nov.–Feb.; fruits Jan.–May. Map 244.

Qld: S.F.R. 310, Swipers L.A., *B.Hyland* 2119 (AFO, BRI, NSW); T.R. 1230, Boonjee L.A., *B.Gray* 1622 (QRS); S.F.R. 310 Gadgarra, Swipers L.A., *S.J.Dansie* 2082 (BRI).

Differs from *E. phaeocarpa* in the combination of 4 tepals, 2 anthers and yellowish fruit. Tepals at anthesis surrounding the style and anthers so only the style and anther tips are visible. Flowers 2-merous.

Excluded Name

Endiandra rubescens (Blume) Miq. in F.A.W.Miquel, *Pl. Jungh.* 1: 176 (1851)

Dictyodaphne rubescens Blume, *Mus. Bot.* 1: 270 (1851). T: Java; holotype: *n.v.*

C.T.White, in *Proc. Roy. Soc. Queensland* 50: 84 (1939), stated that he considered his *E. montana* to be the same as *E. rubescens*, originally described from Java. However, in this treatment *E. montana* is considered to be specifically distinct.

6. LINDERA

Lindera Thunb., *Nova Gen. Pl.* 64 (1783), *nom. cons.*; named after Johann Linder (1678–1723), a Swedish botanist and physician.

Type: *L. umbellata* Thunb.

Dioecious trees. Twigs shortly pubescent when young. Leaves spirally arranged, petiolate; lamina penninerved. Inflorescence umbellate, axillary, enclosed in hemispherical decussate bracts before anthesis. Flowers ?3-merous. Male flowers: perianth tube and tepals absent; anthers introrse, 2-locular; staminodes absent; staminal glands peltate. Female flowers: perianth tube and tepals absent; staminodes differentiated; staminal glands peltate; ovary sessile; stigma thallose. Fruit seated on a slightly swollen receptacle; mesocarp fleshy; endocarp thin. Seed: testa thin; radicle almost apical; cotyledons distinct, uniform in texture.

A widely distributed genus of about 100 species occurring in Asia (as far north as Korea and Japan), Malesia, Australia and North America; 1 species endemic to Australia.

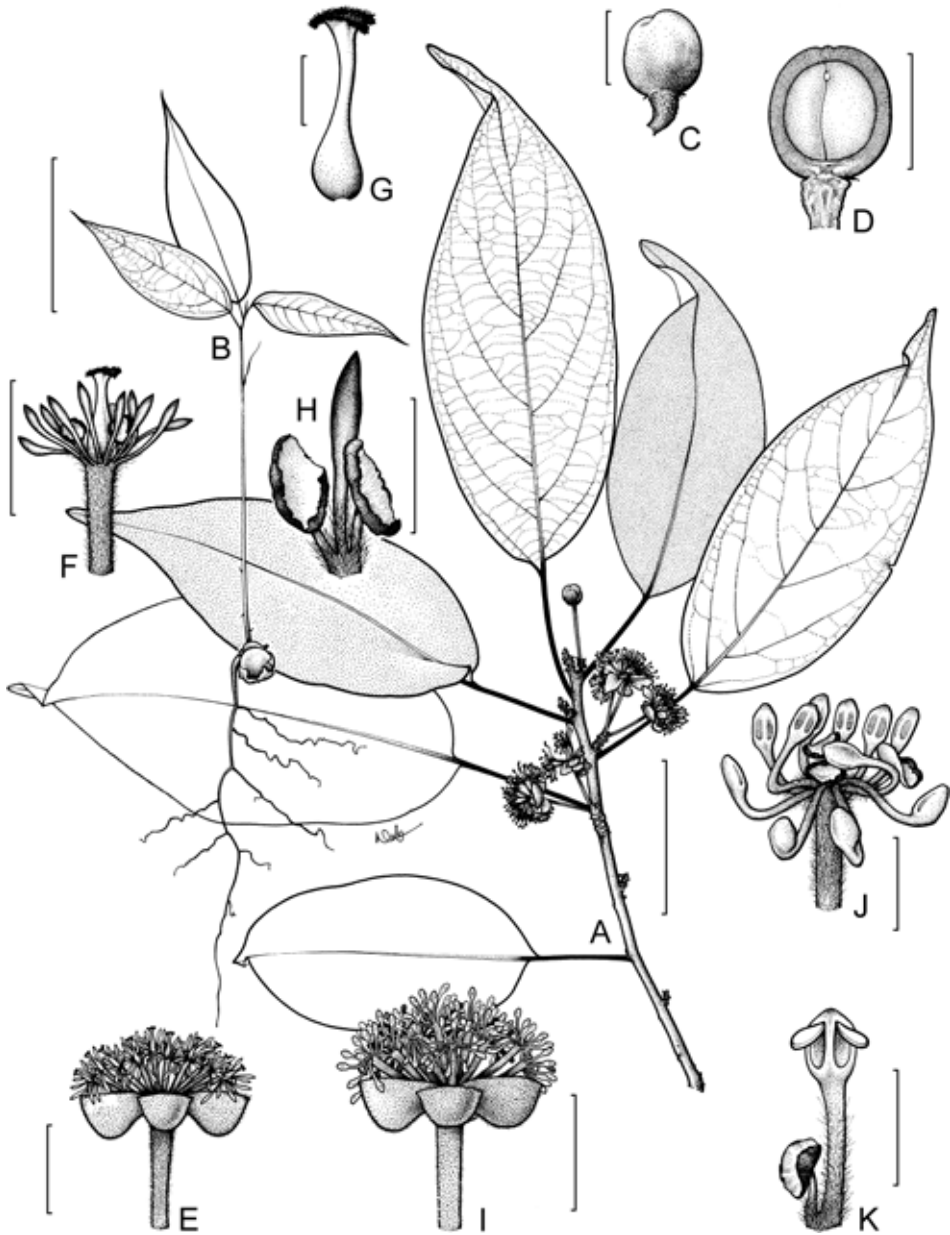


Figure 41. *Lindera queenslandica*. A, habit; B, seedling; C, fruit; D, L.S. fruit; E, female umbel; F, female flower; G, ovary, style and stigma; H, staminode and gland; I, male umbel; J, male flower; K, stamen and gland (A, I–K, B.Gray 1277; B–D, B.Gray 2516; E–H, B.Gray 1276, all QRS). Scale bars: A, B = 40 mm; C, D = 10 mm; E, I = 5 mm; F = 3 mm; G, H = 1 mm; J, K = 2 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 335 (1989).

***Lindera queenslandica* B.Hyland, *Austral. Syst. Bot.* 2: 252 (1989)**

T: State Forest Reserve 191, Qld, 14 Feb. 1979, *B.Gray* 1277; holo: QRS.

Illustrations: B.P.M.Hyland, *op. cit* 2: 335, fig. 60; 360, fig. 85C–F (1989).

Tree to 35 m. Stem sometimes buttressed. Twigs \pm terete, eventually almost glabrescent. Leaves: petiole 17–46 mm long; lamina lanceolate to ovate to elliptic, 8–27 cm long, 4–8 cm wide, green below, eventually almost glabrescent. Inflorescence umbellate, axillary. Flowers 9–15 per umbel, green, creamy green, perfumed. Male flowers: perianth tube and tepals absent; stamens 10–14; anthers 1–1.1 mm long, c. 0.9 mm wide; filaments 2.5–2.6 mm long; outer staminal whorl often eglandular; inner staminal whorl similar but filaments shorter, with or without 1 or 2 glands; pistillode present. Female flowers: perianth and tepals absent; staminodes 7–15, in 1 series, with or without 1 or 2 glands; ovary 1–1.1 mm long, 0.7–0.9 mm wide, glabrous; style glabrous. Fruit globular, 12–14 mm long, 11.5–14 mm wide, red. Cotyledons cream. *Bollywood*. Fig. 41.

Occurs from Iron Ra. to Mission Beach, northern Qld; from sea level to 800 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Nov.–Feb.; fruits Jan.–May. Map 245.

Qld: Claudie R., *B.Hyland* 13111 (QRS); Reserve 440 Danbulla, L. Euramoo, *B.Gray* 3353 (QRS); Clump Point, Mission Beach, *F.Crome* 220 (CANB).

Differs from other species in the combination of being evergreen, tepals absent and fruit red.

7. LITSEA

Litsea Lam., *Encycl.* 3: 574 (1792), *nom. cons.*; from *Litse*, the Chinese name of *Litsea chinensis*, the first species described.

Type: *L. chinensis* Lam.

Malapoenna Adans., *Fam. Pl.* 2: 447 (1763). T: not designated.

Cylicodaphne Nees in N.Wallich, *Pl. Asiat. Rar.* 61, 67 (1830). T: *C. wightiana* Nees

Tetranthera Jacq., *Pl. Hort. Schoenbr.* 1: 59, t. 113 (1797). T: *T. laurifolia* Jacq.

Dioecious trees, sometimes shrubby. Twigs usually pubescent, sometimes eventually glabrescent. Leaves spirally arranged, petiolate; lamina penninerved. Inflorescence umbellate, axillary or on twigs below leaves, enclosed in \pm hemispherical decussate bracts before anthesis. Flowers ?2–4-merous; pedicel gradually tapering into perianth tube; perianth tube hairy externally; flowers opening widely; tepals (when present) in one series, usually \pm horizontal at anthesis (sometimes reflexed, or \pm erect). Male flowers: tepals 0–8; stamens 5–16 (–20); anthers introrse; anthers 4-locular; staminal glands variable; staminodes usually absent (sometimes 1 or 2). Female flowers: tepals ?absent or to 8; staminodes 5–16, scarcely differentiated; staminal glands variable; ovary sessile; stigma usually thallose, sometimes bilobed. Fruit seated in a cup shaped receptacle or on a swollen receptacle (*L. glutinosa*). Seed: radicle below apex; cotyledons distinct, uniform in texture.

A widely distributed genus of about 400 species occurring in Asia (as far N as Korea and Japan), Malesia, Australia, Pacific Islands, New Zealand and Central and North America. Eleven species occur in Australia, 8 endemic. This genus is of important commercial value: 4 species produce millable logs, usually a fine, lightweight timber referred to as 'bollywood'. A further 5 species produce millable logs but these are not commonly utilised.

Flowering material

- 1 Flowers male
 - 2 Glands not attached to anther filaments **7. *L. glutinosa***
 - 2: Glands attached to anther filaments
 - 3 Twig hairs mainly appressed
 - 4 Primary veins straight, then forking and curving well inside lamina margin; stamens 6–10 per flower
 - 5 Primary vein angle 50–80°; staminal glands pink-red in fresh flowers **11. *L. reticulata***
 - 5: Primary vein angle 30–65°; staminal glands cream in fresh flowers **6. *L. fawcettiana***
 - 4: Primary veins curved throughout their length, usually curving inside lamina margin without forking; stamens 8–14 per flower
 - 6 Outer anther filaments 0.7–1.8 mm long; underside of young leaves clothed in straight and tortuous erect hairs **1. *L. australis***
 - 6: Outer anther filaments 1.8–2.6 mm long; underside of young leaves clothed in straight, appressed hairs **5. *L. connorsii***
 - 3: Twig hairs mainly erect
 - 7 Leaf lamina < 6 times length of petiole; apex of lamina usually rounded
 - 8 Mature leaves puberulous or shortly tomentose on underside **3. *L. bindoniana***
 - 8: Mature leaves glabrous on underside **8. *L. granitica***
 - 7: Leaf lamina > 6 times length of petiole; apex of lamina usually acute or acuminate
 - 9 Umbel peduncle > 14 mm long; primary veins 8–18 pairs **10. *L. macrophylla***
 - 9: Umbel peduncle < 14 mm long; primary veins 4–11 pairs
 - 10 Stamens c. 8–16 per flower
 - 11 Hairs on midrib and primary veins on underside of younger leaf laminae tortuous only
 - 12 Perianth tube with pedicel 0.6–1.9 mm long [southern Qld, northern N.S.W.] **1. *L. australis***
 - 12: Perianth tube with pedicel 1.3–3.4 mm long [northern Qld]
 - 13 Primary veins 7–12 pairs; flowers 3–6 per umbel; twigs clothed in tortuous hairs **4. *L. breviumbellata***
 - 13: Primary veins 4–7 pairs; flowers 1–3 per umbel; twigs clothed in straight and tortuous hairs **2. *L. bennettii***
 - 11: Hairs on midrib and primary veins on underside of younger leaf laminae straight and tortuous
 - 14 Base of leaf lamina attenuate; perianth tube with pedicel 0.6–1.9 mm long; outer anther filaments 0.7–1.8 mm long **1. *L. australis***
 - 14: Base of leaf lamina truncate or rounded, rarely attenuate; perianth tube with pedicel 2.2–3.8 mm long; outer anther filaments 1.3–2.5 mm long **9. *L. leefeana***
 - 10: Stamens c. 6–9 per flower
 - 15 Staminal glands usually mauve in fresh flowers; twigs clothed in tortuous hairs **4. *L. breviumbellata***
 - 15: Staminal glands cream in fresh flowers; twigs clothed in straight and tortuous hairs

- 16** Perianth tube with pedicel 1.3–2.5 mm long; underside of young leaves clothed in tortuous, erect, brown hairs [mountain tops, northern Qld] **2. *L. bennettii***
- 16:** Perianth tube with pedicel 0.6–0.9 mm long; underside of young leaves clothed in straight and tortuous, erect, white or pale brown hairs [southern Qld, northern N.S.W.] **1. *L. australis***
- 1:** Flowers female
- 17** Glands not attached to staminodes **7. *L. glutinosa***
- 17:** Glands attached to staminodes
- 18** Twig hairs mainly appressed
- 19** Primary veins straight, forking well inside lamina margin
- 20** Primary vein angle 50–80°; staminal glands pink-red in fresh flowers **11. *L. reticulata***
- 20:** Primary vein angle 30–65°; staminal glands cream in fresh flowers **6. *L. fawcettiana***
- 19:** Primary veins curved throughout their length, usually curving inside lamina margin without forking
- 21** Underside of young leaves clothed in erect, straight and tortuous hairs **1. *L. australis***
- 21:** Underside of young leaves clothed in appressed, straight hairs **5. *L. connorsii***
- 18:** Twig hairs mainly erect
- 22** Leaf lamina < 6 times length of petiole; apex of lamina usually rounded
- 23** Mature leaves puberulous or shortly tomentose on underside **3. *L. bindoniana***
- 23:** Mature leaves glabrous on underside **8. *L. granitica***
- 22:** Leaf lamina > 6 times length of petiole; apex of lamina usually acute or acuminate
- 24** Ovary pubescent
- 25** Petiole 17–42 mm long; leaf lamina 25–40 cm long **10. *L. macrophylla***
- 25:** Petiole 7–21 mm long; leaf lamina 4.5–15 cm long
- 26** Pedicel with perianth tube c. 1.5–2 mm long; underside of young leaves clothed in straight and tortuous, erect, white or pale brown hairs [southern Qld, northern N.S.W.] **1. *L. australis***
- 26:** Pedicel with perianth tube 2.1–2.5 mm long; underside of young leaves clothed in tortuous, erect, brown hairs [mountain tops, northern Qld] **2. *L. bennettii***
- 24:** Ovary mainly glabrous
- 27** Staminal glands usually mauve in fresh flowers **4. *L. brevumbellata***
- 27:** Staminal glands cream in fresh flowers
- 28** Underside of young leaves clothed in tortuous, brown, erect hairs **2. *L. bennettii***
- 28:** Underside of young leaves clothed in straight and tortuous, white or pale brown, erect hairs
- 29** Base of leaf lamina attenuate; perianth tube with pedicel 0.6–1.9 mm long **1. *L. australis***
- 29:** Base of leaf lamina truncate or rounded, rarely attenuate; perianth tube with pedicel 2.2–3.8 mm long **9. *L. leefeana***

Fruiting Material

- 1 Cotyledons white, cream or yellow when freshly cut
- 2 Fruiting carpel > 19 mm long **8. *L. granitica***
- 2: Fruiting carpel < 19 mm long
- 3 Fruiting carpel attached to apex of a swollen receptacle, base of carpel not enclosed by receptacle, apex of receptacle \pm flat **7. *L. glutinosa***
- 3: Fruiting carpel seated in a cupule, like an egg in an egg cup, apex of receptacle obviously concave
- 4 Twig hairs mainly erect
- 5 Axis of infructescence usually > 10 mm long **3. *L. bindoniana***
- 5: Axis of infructescence never more than 10 mm long **10. *L. macrophylla***
- 4: Twig hairs mainly appressed
- 6 Primary vein angle 50–80°; fruiting carpels 10–12 mm diam.; receptacle c. 10 mm diam. **11. *L. reticulata***
- 6: Primary vein angle 30–65°; fruiting carpels 7–10 mm diam.; receptacle 6.5–9 mm diam. **6. *L. fawcettiana***
- 1: Cotyledons purple when freshly cut
- 7 Fruiting carpels 10–14 mm long; receptacle 4.5–7 mm diam. **4. *L. breviumbellata***
- 7: Fruiting carpels 12–22.5 mm long; receptacle 7–11.5 mm diam.
- 8 Mature leaves almost glabrous on underside; apex rounded or obtuse, rarely acute; secondary veins scarcely raised on underside of leaf lamina **5. *L. connorsii***
- 8: Mature leaves pubescent or sparsely pubescent on underside; apex acuminate, acute or obtuse; secondary veins conspicuously raised on underside of leaf lamina
- 9 Hairs on midrib and primary veins on underside of younger leaf tortuous **2. *L. bennettii***
- 9: Hairs on midrib and primary veins on underside of younger leaf straight and tortuous
- 10 Receptacle 3.5–7 mm long **9. *L. leefeana***
- 10: Receptacle 7.5–10 mm long **1. *L. australis***

1. *Litsea australis* B.Hyland, *Austral. Syst. Bot.* 2: 255 (1989)

T: Brunswick Heads, Qld, 20 Mar. 1985, *D.L. Jones 1772*; holo: QRS.

[*Litsea leefeana* auct. non (F.Muell.) Merr.: A.G.Floyd, *New South Wales Rainforest Trees* part 1, 2nd edn, 86 (1979)]

Illustration: B.P.M.Hyland, *op. cit.* 2: 336, fig. 61 (1989).

Tree to 20 m. Stem not buttressed. Twigs terete or fluted, with hairs straight and tortuous, erect and appressed when young, eventually almost glabrescent. Leaf lamina elliptic to lanceolate to oblong, 8–14.7 cm long, 2–4.7 cm wide, foveolate; underside green, with straight and tortuous, erect hairs, sparsely pubescent at maturity; primary veins 6–10 pairs. Inflorescence a fascicle or raceme of umbels; umbel peduncle 3–10.2 mm long. Flowers 1–3 per umbel, yellow, green or cream, without perfume. Male flowers: pedicel + perianth tube 0.6–1.9 mm long; tepals 5–8, 1.5–2.6 mm long, 0.8–1.5 mm wide; stamens 7–13 per flower; outer anthers 0.8–1 mm long, 0.5–0.8 mm wide; outer filaments 0.7–1.8 mm long, sometimes glandular; inner anthers similar; inner filaments shorter, with 2 glands; pistillode usually present. Female flowers: pedicel + perianth tube 1.5–2.6 mm long; tepals 5–8, 1.4–2 mm long, 0.6–1.2 mm wide; staminodes 6–11, mostly glandular; ovary 1–1.5 mm long, 0.9–1.4 mm

wide, usually pubescent; style usually pubescent. Fruit ellipsoidal, c. 15 mm long, 11.5 mm wide, black; receptacle c. 9 mm long, 11.5 mm wide. Cotyledons purple.

Occurs from Fraser Is., S Qld, to Forster, N.S.W.; from sea level to 700 m alt. Grows in rainforests in soils derived from a variety of sources (beach sand to basalt). Flowers Mar.–May; fruits Oct.–Nov. Map 246.

Qld: Fraser Is., *L.J.Webb & J.G.Tracey 6357* (BRI); near Lookout, Tomewin Rd, *D.L.Jones 1276* (QRS); SW of Cainbale Falls, Lamington Natl Park, *W.J.McDonald 2154* (A, BRI). N.S.W.: Bundagen Flora Res., near Coffs Harbour, *B.Hyland 13035* (QRS); Lennox Head, Ballina, *W.Bäuerlen 1168* (BRI, QRS).

Differs from *L. leefeana* in the fruiting receptacle being 8–10 mm long. Small foveoles (pits) usually present in the axils of the primary veins.

2. *Litsea bennettii* B.Hyland, *Austral. Syst. Bot.* 2: 256 (1989)

T: State Forest Reserve 310, Bellenden Ker, Qld, 6 Dec. 1983, *B.Hyland 12916*; holotype: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 337, fig. 62 (1989).

Tree to 25 m. Stem sometimes buttressed. Twigs ±terete, densely tomentose when young with tortuous, erect hairs, eventually ±glabrescent. Leaf lamina elliptic, 4.5–9 cm long, 2.5–3.5 cm wide; underside green, tomentose, with tortuous, erect hairs; primary veins 4–7 pairs. Inflorescence a sessile fascicle, or shortly stalked raceme of umbels; umbel peduncle 2.5–8.1 mm long. Flowers 3–5 per umbel, greenish cream, perfumed. Male flowers: pedicel + perianth tube 1.3–2.5 mm long; tepals 4–6, 1.7–2 mm long, 1.5–1.6 mm wide; stamens 5–11; anthers 0.6–1.2 mm long, 0.8–1.1 mm wide; filaments 0.6–1.4 mm long, glandular; glands 2; pistillode sometimes present. Female flowers: pedicel + perianth tube 2.1–2.6 mm long; tepals 4–7, 1.6–1.9 mm long, 1–1.1 mm wide; staminodes 5–11, some glandular; ovary 1.1–1.4 mm long, 0.9–1.2 mm wide, mainly glabrous; style glabrous. Fruit ellipsoidal, 15.5–18 mm long, 11.5–14 mm wide, black; receptacle c. 6 mm long, 10 mm wide. Cotyledons purple.

Occurs from the Mt Carbine Tableland to Mt Bartle Frere, northern Qld; at 1100–1550 m alt. Grows in mountain rainforests in soils derived from granite. Flowers Dec.–Feb.; fruits Nov.–Dec. Map 247.

Qld: S.F.R. 143 Riflemead, Carbine L.A., *B.Gray 3889* (QRS); S.F.R. 755 Bartle Frere, NW Peak, *B.Gray 3950* (QRS); summit of Centre Peak, Bellenden Ker, *L.J.Webb & J.G.Tracey 11919* (BRI).

Differs from *L. australis* and *L. leefeana* in having only tortuous hairs on the underside of the lamina.

3. *Litsea bindoniana* (F.Muell.) F.Muell., *Syst. Census Austral. Pl.* 4 (1882)

Cylicodaphne bindoniana F.Muell., *Fragm.* 5: 167 (1866); *Tetranthera bindoniana* (F.Muell.) Benth., *Fl. Austral.* 5: 305 (1870); *Malapoenna bindoniana* (F.Muell.) Kuntze, *Revis. Gen. Pl.* 2: 571 (1891). T: Mt McAllister, Qld, *J.Dallachy, s.n.*; holotype: MEL; isotype: A, BO, K?, MEL, NSW.

Tree to 30 m. Stem buttressed. Twigs terete or fluted, tomentose, with straight and tortuous, erect hairs. Leaf lamina elliptic to oblong, 11–27.5 cm long, 5–18 cm wide; underside green, inconspicuously tomentose, with short, straight and tortuous, appressed and erect hairs; primary veins 6–11 pairs. Inflorescence a raceme of umbels; umbel peduncle 5–22 mm long. Flowers 4–6 per umbel, greenish cream, yellow or brownish, perfumed. Male flowers: pedicel + perianth tube 1.7–4.1 mm long; tepals 5–7, 1.8–2.8 mm long, 0.8–1.4 mm wide; stamens 8–12; outer anthers 0.7–1.3 mm long, 0.7–1.1 mm wide; outer filaments 1.8–3.4 mm long, sometimes with 1 or 2 glands; inner anthers similar, but filaments always with 2 glands; pistillode sometimes present. Female flowers: pedicel + perianth tube 1.4–2.3 mm long; tepals 5–8, 1.2–2.4 mm long, 0.5–0.9 mm wide; staminodes 9–12; outer staminodes sometimes with 1 or 2 glands; inner staminodes with 2 glands; ovary 1–1.6 mm long, 1–1.5 mm wide, pubescent; style pubescent. Fruit ellipsoidal, 14–15.5 mm long, 11.5–12.5 mm wide, black; receptacle 10–11 mm long, 9–11 mm wide. Cotyledons cream or yellowish. *Bollywood*.

Occurs from Mt Lewis to Eungella, N and central Qld; from sea level to 1000 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Apr.–Aug.; fruits Oct.–Nov. Map 248.

Qld: Mt Lewis Rd, *L.W.Jessup* 275 (BRI); S.F.R. 310 Gadgarra, *B.Gray* 4007 (QRS); Gillies Hwy, Atherton Tableland, *I.Olsen* 374 (BRI); Lacey's Ck, Mission Beach, *F.Crome* 29 (CANB); S.F.R. 652 Cauley (near Eungella), *B.Hyland* 4541 *RFK* (QRS).

Shallow pits (small foveoles) often present in the axils of the primary veins.

4. *Litsea breviumbellata* C.K.Allen, *J. Arnold Arbor.* 23: 121 (1942)

T: Lake Daviumbu, Middle Fly River, Papua [New Guinea], *L.J.Brass* 7585; holotype: A; isotype: BO, BRI, L.

Tetranthera ferruginea R.Br., *Prodr.* 403 (1810); *Litsea ferruginea* (R.Br.) F.M.Bailey, *Syn. Queensland Fl.* 426 (1883), *nom. illeg., non* Blume (1826); *L. ferruginea* var. *ferruginea*, F.M.Bailey, *op. cit.* 427 (1883). T: Cape Grafton and Endeavour River, [Qld], *Banks and Solander s.n.*; syn: BM; isosyn: BRI, MEL.

Tetranthera nesogena F.Muell., *Fragm.* 5: 169 (1866), *nom. prov.* as *Tetratheca nesogena*. T: Family Is. Qld; holotype: *n.v.*

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 361, fig. 86A (1989).

Tree to 20 m. Stem sometimes buttressed. Twigs ±terete, tomentose, with hairs tortuous, erect. Leaf lamina elliptic to lanceolate, 8–21.5 mm long, 2.4–5.8 mm wide; underside green, pubescent, with tortuous, erect hairs; primary veins 7–12 pairs. Inflorescence a raceme of umbels; umbel peduncle 3–9.5 mm long. Flowers 3–6 per umbel, yellow, creamy brown or greenish, ±perfumed. Male flowers: pedicel + perianth tube 1.8–3.4 mm long; tepals 4–8, 1.5–2.6 mm long, 0.7–1 mm wide; stamens c. 9; outer anthers 0.7–1.1 mm long, 0.6–0.9 mm wide; outer filaments 1.5–3 mm long, usually 3 with glands and 3 without; inner anthers 0.5–1 mm long, 0.7–1 mm wide; inner filaments 0.9–1.8 mm long, with 2 glands; pistillode present. Female flowers: pedicel + perianth tube 1.5–2.7 mm long; tepals 5–7, 1.1–1.7 mm long, 0.5–0.9 mm wide; staminodes c. 9; outer staminodes sometimes glandular, with 1 or 2 glands; inner staminodes glandular, with 2 glands; ovary 0.9–1.3 mm long, 0.7–1.1 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 10–13 mm long, 7.5–11.5 mm wide, black; receptacle 4–8 mm long, 4.5–7 mm wide. Cotyledons pink to purple. Plate 35.

Occurs on Melville Is., N.T., and northern Qld (with a dubious southern collection from the Percy Is.); from sea level to 700 m alt. Grows in rainforests, monsoon forests, beach forests and fire free open forests. This species is favoured by disturbance in fire free areas as it can flower and fruit while young and quickly colonise any niche in which it becomes established. Also occurs in New Guinea. Flowers May–Sept.; fruits Mar.–July, Nov. Map 249.

N.T.: Taracumbie Ck, Melville Is., *C.R.Dunlop* 6566 (BRI, DNA, QRS). Qld: Badu Is., Torres Strait, *E.Cameron* 2722 (QRS); McIlwraith Ra., *K.D.Sanderson* 1229 (QRS); Natl Park Res. 95, Hinchinbrook Is. - Bowen Ck, *B.Hyland* 10600 (QRS).

Staminal glands usually mauve in fresh flowers.

5. *Litsea connorsii* B.Hyland, *Austral. Syst. Bot.* 2: 259 (1989)

T: State Forest Reserve 143, Riflemead, Windmill Logging Area, 1 Mar. 1979, *B.Gray* 1302; holotype: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 338, fig. 63 (1989).

Tree to 30 m. Stem usually buttressed. Twigs terete, with straight and tortuous, appressed hairs, eventually ±glabrescent. Leaves: lamina narrowly elliptic to narrowly obovate, 6.5–12 cm long, 2–4 cm wide; underside green, with straight, appressed hairs, eventually ±glabrescent, primary veins 6–9 pairs. Inflorescence a raceme of umbels; umbel peduncle 3.7–15 mm long. Flowers 1–6 per umbel, greenish cream or yellow, perfumed. Male flowers: pedicel + perianth tube 1.5–3.2 mm long; tepals (4–) 5 or 6 (–8), 1.8–2.6 mm long, 1–2.1 mm wide; stamens 8–13; outer anthers 0.9–1.1 mm long, 0.5–1 mm wide; outer filaments 1.8–2.6 mm long, sometimes glandular; inner filaments shorter, with 2 glands; pistillode present. Female flowers: pedicel + perianth tube 1.6–2.7 mm long; tepals (4–) 6 (–8), 1.3–1.7 mm long, 0.7–1.1 mm wide; staminodes 8–14; outer whorl usually eglandular; inner whorl with 2 glands; ovary 1.1–1.6 mm long, 1–1.3 mm wide, glabrous; style glabrous. Fruit ellipsoidal,

15.5–19 mm long, 8.5–13 mm wide, black; receptacle 5–9.5 mm long, 8–11 mm wide. Cotyledons purple. *Bollywood*.

Occurs from Cooktown to Dotswood Holding, Bluewater Ra., N of Townsville, northern Qld; from 600–1200 m alt. Grows in rainforests and rainforest margins, particularly in soils derived from granite and acid volcanic rocks. Flowers Jan.–Mar.; fruits Oct.–Dec. Map 250.

Qld: T.R. 146, Tableland L.A., near Cooktown, *B.Hyland 10546* (QRS); 16 km NE of Atherton, *J.P.Martin BRI 63757* (BRI); Mt Spec, *H.E.Volck 1482* (AFO, BRI, L); Dotswood Holding, *B.Hyland 10084* (QRS).

Similar to *L. australis*, differing in having appressed hairs on the underside of the lamina and foveoles absent.

6. *Litsea fawcettiana* (F.Muell.) B.Hyland, *Austral. Syst. Bot.* 2: 260 (1989)

Cylicodaphne fawcettiana F.Muell., *Fragm.* 5: 168 (1866). T: Mt Archer, Qld, *A.Thozet 76*; lecto: MEL; Mt Archer, Rockhampton, [Qld], *A.Thozet*; remaining syn: MEL, K, *vide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 260 (1989).

Illustration: B.P.M.Hyland, *op. cit.* 2: 361, fig. 86B–C (1989).

Tree to 30 m. Stem sometimes buttressed. Twigs ±terete, with straight, appressed hairs, eventually glabrescent. Leaves: lamina elliptic to obovate, 6–14 cm long, 2–7.5 cm wide; underside green, with straight and tortuous, appressed hairs, soon glabrescent; primary veins 6–11 pairs. Inflorescence a raceme of umbels; umbel peduncle 4–14 mm long. Flowers 4–6 per umbel, cream, green or rarely brownish, perfumed. Male flowers: pedicel + perianth tube 1–2.4 mm long; tepals 4–6, 1.5–4 mm long, 0.8–1.4 mm wide; stamens 6–10; anthers 1.1–1.6 mm long, 0.6–1 mm wide; outer filaments 1.1–3.7 mm long, usually eglandular; inner filaments 1.1–3.7 mm long, with 1 or 2 glands; pistillode sometimes present. Female flowers: tepals 4–7, 1.5–2.3 mm long, 0.6–1.1 mm wide; staminodes 6–9, usually 3 with glands and 3–6 without; ovary 1–1.2 mm long, 0.8–1.2 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 11–15.5 mm long, 7–10 mm wide; receptacle 8–12.5 mm long, 6.5–9 mm wide. Cotyledons cream or white. *Bollywood*.

Extends from Iron Ra. to Rockhampton, Qld; from sea level to 1350 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers Mar.–July; fruits Oct.–Jan. Map 251.

Qld: Puffdellooney Ridge, Iron Ra., *B.Hyland 10820* (QRS); S.F.R. 144 Windsor Tableland, *B.Hyland 5531* (BRI, QRS); Kairi–Danbulla Rd, Atherton Tableland, *J.P.Martin 2226* (AFO, BRI, L, NSW); Airlie Beach, Proserpine, *F.Perry s.n.* (BRI); The Springs, 20 km N of Glen Geddes, *E.R.Anderson 3616* (BRI).

7. *Litsea glutinosa* (Lour.) C.B.Rob., *Philipp. J. Sci. Bot.* 6: 321 (1911)

Sebifera glutinosa Lour., *Fl. Coch.* 638 (1790). T: Cochinchina, *J.Loureiro s.n.*; holotype: BM.

Litsea chinensis Lam., *Encycl.* 3: 574 (1792). T: ‘Martin?’, China, Ille de France?; holotype: n.v.

Tetranthera laurifolia Jacq., *Pl. Hort. Schoenbr.* 1, pl. 113 (1797). T: Mauritius; holotype: n.v.

Tetranthera apetala Roxb., *Pl. Corom.* 2: 25 (1800); *T. citrifolia* Spreng., *Syst. Veg.* edn 17: 2: 266 (1825), *nom. illeg.* (*T. apetala* in synonymy); *T. laurifolia* var. *citrifolia* (Spreng.) Blume, *Mus. Bot.* 1: 374 (1851). T: India, *W.Roxburgh*; ?isosyn: MO, NY.

Litsea brassii O.C.Schmidt in C.White, *J. Arnold Arbor.* 10: 214 (1929). T: Kappa Kappa, Papua New Guinea, *L.J.Brass 813*; holotype: B n.v.; isotype: A, BRI.

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 339, fig. 64; 361, fig. 86D–E (1989).

Tree to 12 m. Stem usually not buttressed. Twigs terete, pubescent, with tortuous, erect and appressed hairs. Leaves: lamina elliptic, 7–28.5 cm long, 3–18.5 cm wide; underside green, with tortuous, erect hairs, sometimes glabrescent at maturity; primary veins 6–13 pairs. Inflorescence a compound umbel or raceme of umbels; umbel peduncle 5–24 mm long. Flowers 6–14 per umbel, cream, greenish, yellowish, perfumed. Male flowers: pedicel + perianth tube 2–6.5 mm long; tepals 0–4, 2–2.9 mm long, 0.3–1.5 mm wide; stamens 8–20; anthers 0.9–1.5 mm long, 0.7–1.2 mm wide; outer filaments 1.5–3.5 mm long; inner filaments slightly shorter; staminodes sometimes present; glands 5–10, stalked, but not attached to anther filaments; pistillode usually present. Female flowers: pedicel + perianth tube

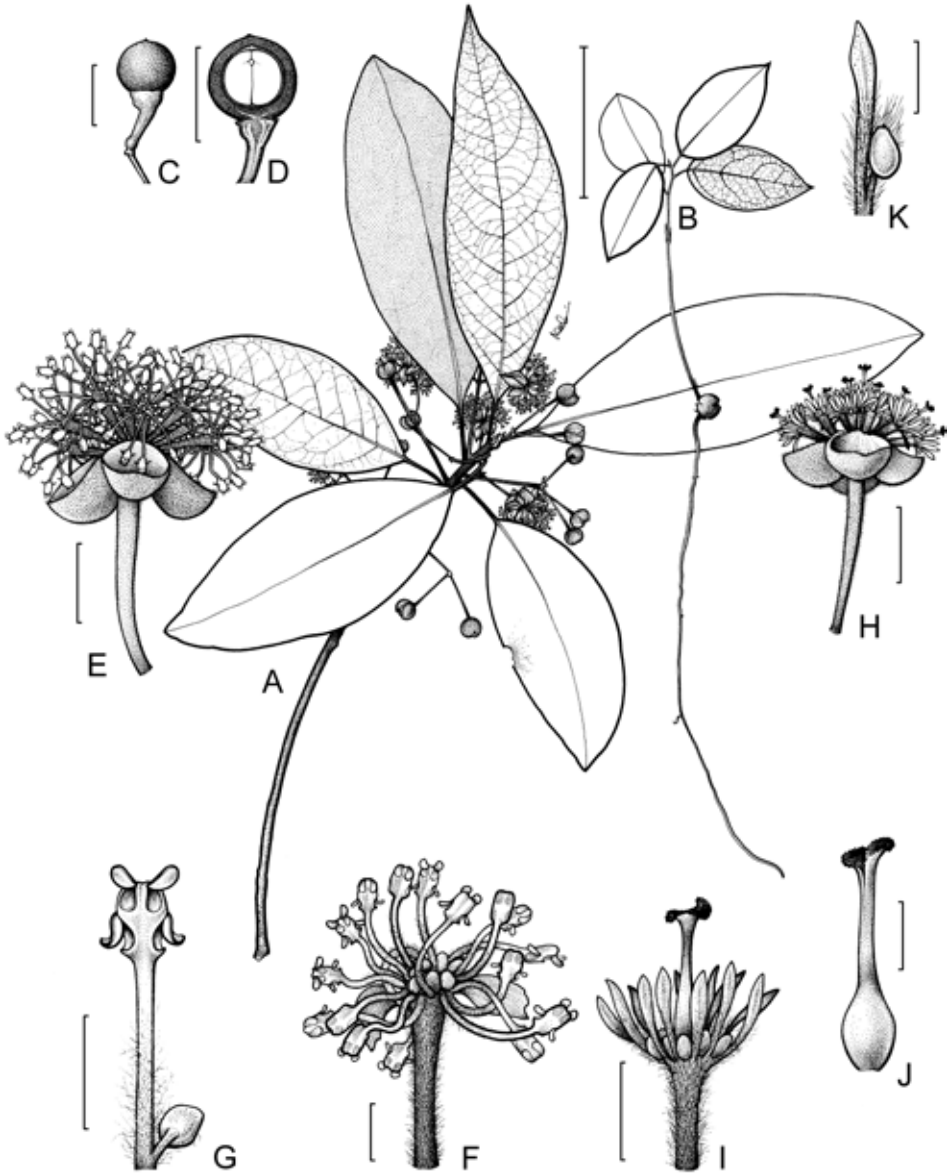


Figure 42. *Litsea glutinosa*. A, habit; B, seedling; C, fruit; D, L.S. fruit; E, male umbel; F, male flower; G, stamen and gland; H, female umbel; I, female flower, J, ovary, style and stigma; K, staminode and gland (abaxial view) (A, E–G, B.Hyland 12608, QRS; B–D, B.Gray 2028, QRS; H–K, B.Hyland 11608, QRS). Scale bars: A, B = 40 mm; C, D = 10 mm; E, H = 5 mm; F, G, I = 2 mm; J, K = 1 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 339 (1989).

1.7–3.2 mm long; tepals 0–6, sometimes difficult to distinguish from staminodes; staminodes 9–16, \pm differentiated; glands on staminodes 3–10, without any obvious attachment to filaments; ovary 0.8–1.8 mm long, 0.7–1.2 mm wide, glabrous; style glabrous. Fruit globular, 8.5–10 mm long, 8.5–11 mm wide, black; receptacle \pm flat. Cotyledons cream. Fig. 42.

Occurs in the Kimberley, W.A., N.T., northern and central coastal Qld; from sea level to 600 m alt. Usually grows in open forests, monsoonal forests and gallery forests, occasionally found in rainforests. A widespread species occurring naturally from China to Australia and apparently naturalised in Madagascar and Mauritius. Grows in soils derived from a variety of rock types. Flowers Dec.–May; fruits Mar.–July, Nov. Map 252.

W.A.: Mitchell Plateau, *J.S.Beard* 7015 (DNA, PERTH). N.T.: East Alligator R., *C.R.Dunlop* 3209 (K, MEL, MO, NSW); Winnellie, Darwin, *M.O.Rankin* 1495 (BRI, DNA). Qld: Duan Is., Torres Strait, *E.Cameron* 2335 (QRS); Stony Hill, Yeppoon, *G.N.Batianoff* & *T.J.McDonald* 584 (BRI).

Small pits or foveoles sometimes present in the axils of the primary veins. Differs from other species of *Litsea* in having a \pm flat fruit receptacle (rather than cup-shaped).

8. *Litsea granitica* B.Hyland, *Austral. Syst. Bot.* 2: 262 (1989)

T: State Forest Reserve 143, Riflemead, Carbine Logging Area, 3 Jan. 1985, *B.Gray* 3833; holo: QRS.

Illustration: B.P.M.Hyland, *op. cit.* 2: 340, fig. 65 (1989).

Tree to 30 m. Stem sometimes buttressed. Twigs \pm terete, with tortuous, erect hairs, eventually \pm glabrescent. Leaves: lamina orbicular to oblong to elliptic, 12–19 cm long, 6–12 cm wide; underside green (or \pm glaucous), with tortuous, erect hairs, glabrescent; primary veins 6–10 pairs. Inflorescence a raceme of umbels; umbel peduncle 7.5–9.5 mm long. Flowers 4–6 per umbel, greenish cream, brown, perfumed. Male flowers: pedicel + perianth tube 2.9–3 mm long; tepals 6–8, 3–3.3 mm long, 1.5–1.7 mm wide; stamens 9–12; anthers 1.2–1.3 mm long, 1–1.2 mm wide; outer filaments 1.2–1.3 mm long, with or without 1 or 2 glands; inner filaments similar, but always with 2 glands; pistillode absent. Female flowers: pedicel + perianth tube 4.2–4.6 mm long; tepals 6–8, 2–3 mm long, 1–1.3 mm wide; staminodes 9–12; outer staminodes sometimes glandular, with 1 or 2 glands; inner staminodes with 2 glands; ovary 1.9–2 mm long, 1.8–2.3 mm wide, pubescent; style pubescent. Fruit ellipsoidal to globular, c. 23 mm long, 18–19 mm wide, black; receptacle 25–32 mm long, 16.5–19 mm wide. Cotyledons cream.

Occurs from Thornton Peak to Mt Carbine Tableland, northern Qld; from 1000–1200 m alt. Grows in mountain rainforests in soils derived from granite. Flowers Jan.–Mar.; fruits Nov.–Dec. Map 253.

Qld: S.F.R. 143, Parish of Riflemead, Carbine L.A., *B.Gray* 3444 (QRS); S.F.R. 143, Riflemead, North Mary L.A., *B.Gray* 3891 (QRS); Thornton Peak, *A.K.Irvine* 2241 (QRS).

Differs from *L. bindoniana* in the leaf lamina being glabrous below and the fruiting carpel longer than 18 mm.

9. *Litsea leefeana* (F.Muell.) Merr., *Philipp. J. Sci.* 14: 242 (1919)

Cylicodaphne leefeana F.Muell., *Fragm.* 5: 169 (1866). T: Rockingham Bay, Qld, *J.Dallachy s.n.*; holo: MEL; ?iso: MEL.

Illustrations: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 341, fig. 66; 361, fig. 86F (1989).

Tree to 30 m. Stem usually buttressed. Twigs terete or fluted, pubescent, with straight and tortuous, erect hairs. Leaves: lamina elliptic to lanceolate, 5–20.5 cm long, 2.5–9.5 cm wide; underside green, pubescent, with straight and tortuous, erect hairs; primary veins 5–11 pairs. Inflorescence a fascicle or raceme of umbels; umbel peduncle 2.5–10.5 mm long. Flowers 3–6 per umbel, cream, yellow, green, sometimes perfumed. Male flowers: pedicel + perianth tube 2.2–3.8 mm long; tepals 4–7, 1.6–3.1 mm long, 1.1–1.9 mm wide; stamens 8–16; outer anthers 0.8–1.3 mm long, 0.6–1 mm wide; outer filaments 1.3–2.5 mm long, sometimes glandular; inner filaments shorter, with 2 glands; pistillode usually present. Female flowers: pedicel + perianth tube 2–2.5 mm long; tepals 4–7, 1.4–2 mm long, 1–1.5 mm wide;

staminodes 8–13; outer staminodes often eglandular; inner staminodes with 2 glands; ovary 1–1.4 mm long, 0.9–1.3 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 12–22.5 mm long, 10–15 mm wide, black; receptacle 3.5–7 mm long, 7–10.5 mm wide. Cotyledons purple. *Bollywood*. Plate 36.

Occurs from Cooktown to Nambour, Qld; from sea level to 1100 m alt. This species is favoured by disturbance and is a typical component of rainforest regrowth, grows in soils derived from a variety of rock types. Flowers Dec.–July; fruits Aug.–Dec. Map 254.

Qld: T.R. 176 Shipton L.A., *B.Hyland 12064* (QRS); Natl Park Res. 904, Palmerston, *B.Gray 4153* (QRS); summit of Mt Dryander, *V.K.Moriarty 1857* (QRS); Eumundi, *C.T.White s.n.* (NSW).

10. *Litsea macrophylla* Blume, *Bijdr. Fl. Ned. Ind.* 567 (1826)

Actinodaphne macrophylla (Blume) Nees, *Syst. Laur.* 598 (1836). T: Nusa Kambangan, ?*C.Blume*; holotype: n.v.

Litsea domariensis O.C.Schmidt, *J. Arnold. Arbor.* 10: 215 (1929). T: Domara R., New Guinea, *L.J.Brass 1595*; holotype: A; isotype: BRI.

Tree to 25 m. Stem sometimes buttressed. Twigs slightly fluted, with tortuous, erect hairs, eventually becoming almost glabrescent. Leaves: lamina elliptic to lanceolate, 25–40 cm long, 11–17 cm wide; underside usually glaucous, tomentose, with straight and tortuous, erect hairs; primary veins 8–18 pairs. Inflorescence a shortly stalked fascicle of umbels; umbel peduncle 16–19 mm long. Flowers 5 or 6 per umbel, ?cream, ?white, perfume unknown. Male flowers: pedicel + perianth tube 1.4–1.6 mm long; tepals 6, 2.4–2.5 mm long, 0.8–1.2 mm wide; stamens 15 in 3 whorls (6 + 6 + 3); outer anthers 1.1–1.3 mm long, 0.8–0.9 mm wide; outer filaments c. 1.5 mm long, with usually 2 glands; innermost stamens similar but smaller; pistillode present or absent. Female flowers unknown. Fruit ellipsoidal, 13–14 mm long, 10–11.5 mm wide, black; receptacle 7–10.5 mm long, 9–11 mm wide. Cotyledons cream.

Occurs in rainforests and monsoonal forests of Cape York Penin., from Lockerbie to McIlwraith Ra., Qld; from sea level to 100 m alt. Grows in soils derived from a variety of rock types. Also occurs in New Guinea and Indonesia. Flowers June; fruits Nov.–?Jan. Map 255.

Qld: Lockerbie, *B.Hyland 10933* (QRS); between Lockerbie and Somerset, *B.Hyland 13128* (QRS); 500 m from Gordon Ck, towards Portland Roads, *K.D.Sanderson 1872* (QRS); Goanna Ck, E of McIlwraith Ra., *L.J.Webb 3145* (BRI).

11. *Litsea reticulata* (Meisn.) F.Muell., *Syst. Census Austral. Pl.* 4 (1882)

Tetranthera reticulata Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 192 (1864); *Malapoenna reticulata* (Meisn.) Kuntze, *Revis. Gen. Pl.* 2: 571 (1891). T: N.S.W., *W.Macarthur 192*; holotype: K.

Tetranthera reticulata var. *parviflora* Meisn. in A.L.P.P. de Candolle, *loc. cit.* T: N.S.W., *W.Macarthur 228*; ?holotype: K.

Tree to 35 m. Stem sometimes buttressed. Twigs terete, with straight, appressed hairs, eventually almost glabrescent. Leaves: lamina elliptic to obovate, 5–13 cm long, 2–6 cm wide; underside green, with straight, appressed hairs, soon glabrescent; primary veins 8–12 pairs. Inflorescence a raceme of umbels; umbel peduncle 2–11 mm long. Flowers 4–6 per umbel, cream, green, rarely brownish, (glands pink, reddish) perfumed. Male flowers: pedicel + perianth tube 1.5–2.4 mm long; tepals 4–6, 2.5–5 mm long, 1.1–1.8 mm wide; stamens 6–9; anthers 1.1–1.7 mm long, 0.7–1.1 mm wide; filaments 1.5–4.5 mm long; outer filaments usually eglandular; inner filaments with 1 or 2 glands; pistillode sometimes present. Female flowers: pedicel + perianth tube 1.2–2.2 mm long; tepals 4–6, 1.5–3.3 mm long, 0.7–0.9 mm wide; staminodes 6–9, usually 3 with glands and 3–6 without; ovary 0.9–1.3 mm long, 0.9–1 mm wide, glabrous; style glabrous. Fruit ellipsoidal, 13–14 mm long, 10–12 mm wide, black; receptacle 8.5–14 mm long, c. 10 mm wide. Cotyledons white, cream. *Bollywood*.

Occurs from Eungella, Qld, to Ulladulla, N.S.W.; from sea level to 1050 m alt. Grows in rainforests in soils derived from a variety of rock types. Flowers May–July; fruits Nov., Feb.–May. Map 256.

Qld: Natl Park Res. 573 Eungella, *B.Hyland 12982* (QRS); Cooloolo Natl Park, *T.J.McDonald 451* (BRI). N.S.W.: Dome Mtn, Dorriggo Natl Park, *B.Hyland 4635 RFK* (QRS); Comerong Is., mouth of Shoalhaven R., *F.A.Rodway NSW 150139* (NSW); Minnamurra, *R.Melville 3789* (A, K, MEL, NSW).

Differs from *L. fawcettiana* in the primary vein angle being 50–80°. Staminal glands pink-red in fresh flowers.

8. NEOLITSEA

Neolitsea Merr., *Philipp. J. Sci.* 1, suppl. 56 (1906), *nom. cons.*; from the Greek, *neos* (new), and *Litsea*.

Type: *N. zeylanica* (Nees & T.Nees) Merr.

Bryantea Raf., *Sylva Tell.* 165 (1838), *nom. rej.* T: *B. dealbata* (R.Br.) Raf.

Diocious trees, usually small. Twigs pubescent when young, pubescent or almost glabrescent at maturity. Leaves spirally arranged, sometimes closely spaced and appearing almost whorled, petiolate; lamina often triplinerved. Inflorescence umbellate, ±sessile, axillary or on twigs below leaves, enclosed in hemispherical decussate bracts before anthesis. Flowers 2–4-merous. Male flowers: tepals usually 4 (or 5); stamens usually 6 (4–8); anthers introrse, 4-locular; staminal glands capitate, fungiform or peltate; staminodes absent. Female flowers: tepals usually 4 (–6); staminodes 5–9, with peltate staminal glands; ovary sessile; stigma ?thallous. Fruit seated on a slightly swollen receptacle not enclosing base of fruit; mesocarp fleshy; endocarp thin. Seed: radicle below apex; cotyledons uniform in texture.

A genus of about 80 species occurring in Asia, Malesia and Australia; 3 species in Australia, 1 (perhaps 2) endemic.

E.D.Merrill, *Philipp. J. Sci.* suppl. 1, 56 (1906); E.D.Merrill, *J. Arnold Arbor.* 29: 198–201 (1948).

Flowering Material

1 Flowers male

- | | | |
|----|--|----------------------------|
| 2 | Inflorescence bracts absent at anthesis; flowers usually with a pistillode | 3. <i>N. dealbata</i> |
| 2: | Inflorescence bracts present at anthesis; flowers usually without a pistillode | |
| 3 | Occurs in N.S.W. and southern Qld | 1. <i>N. australiensis</i> |
| 3: | Occurs in N.T. and northern Qld | 2. <i>N. brassii</i> |

1: Flowers female

- | | | |
|----|---|----------------------------|
| 4 | Inflorescence bracts absent at anthesis; tepal margins sericeous; glands attached close to base of inner staminodes | 3. <i>N. dealbata</i> |
| 4: | Inflorescence bracts present at anthesis; tepal margins ±glabrous; glands attached to middle of inner staminodes | |
| 5 | Occurs in N.S.W. and southern Qld | 1. <i>N. australiensis</i> |
| 5: | Occurs in N.T. and northern Qld | 2. <i>N. brassii</i> |

Fruiting Material

- 1 Fruits red when fully ripe, 9–12 mm long, 7.5–10.5 mm wide; seeds 6–9.5 mm long, 5–8 mm wide 2. *N. brassii*
- 1: Fruits black when fully ripe, 9–20 mm long, 8.5–14 mm wide; seeds 5.5–11 mm long, 5.5–9 mm wide
- 2 Mature leaf petioles clothed in tortuous hairs 3. *N. dealbata*
- 2: Mature leaf petioles glabrous 1. *N. australiensis*

1. *Neolitsea australiensis* Kosterm., *Brunonia* 2: 93 (1979)

T: Bunya Mountains, Qld, 21 Mar. 1937, *H.H.Haines 108*; holotype: K.

[*Neolitsea cassia* auct. non (L.) Kosterm. (1952): W.D.Francis, *Austral. Rain-forest Trees* 118 (1951); A.G.Floyd, *New South Wales Rainforest Trees* part 1, 2nd edn, 92 (1979)]

[*Litsaea zeylanica* auct. non Nees & T.Nees: G.Bentham, *Fl. Austral.* 5: 307 (1870), *p.p.*; F.M.Bailey, *Compr. Cat. Queensland Pl.* 431 (1913); J.H.Maiden & E.Betche, *Census New South Wales Pl.* 80 (1916); W.D.Francis, *Austral. Rain-Forest Trees* 101 (1929)]

[*Neolitsea zeylanica* auct. non (Nees & T.Nees) Merr.: W.D.Francis, *Austral. Rain-Forest Trees* 118 (1970)]

Tree to 40 m. Stem sometimes buttressed. Twigs ±terete, soon glabrescent. Leaves: petiole 8–31 mm long; lamina lanceolate, 6.5–13.5 cm long, 2–5 cm wide, slightly glaucous and pubescent when young, soon glabrescent and often becoming green. Inflorescence bracts ±hemispherical, present at anthesis. Flowers 4 or 5 per umbel, cream to pale brown, perfumed. Male flowers: tepals 4, 2.4–3.9 mm long, 1.3–2.6 mm wide; stamens usually 6, glabrous; outer staminal whorl eglandular; inner staminal whorl glandular, with 1 or 2 glands; pistillode absent. Female flowers: tepals 4, 2.5–3 mm long, 1.4–2.2 mm wide; staminodes 6–8, ±differentiated, glabrous; outer whorl of staminodes eglandular, inner whorl of staminodes glandular; ovary 1.2–1.5 mm long, 0.9–1 mm wide, glabrous; style glabrous. Fruit globular to ellipsoidal, 12–20 mm long, 11–14 mm wide, black; receptacle 9–14 mm long, 6–8 mm wide. Cotyledons cream. *Grey Bollywood*.

Occurs from Gympie, Qld, to Gloucester, N.S.W.; from sea level to 1000 m alt. Grows in mountain and lowland rainforests in soils derived from a variety of rock types. Flowers Mar.–May; fruits Feb.–May. Map 257.

Qld: Bunya Mtns, *M.S.Clemens 43816* (A, BRI, NY); Lamington Natl Park, *B.Hyland 4293 RFK* (QRS); Tomewin, *B.Hyland 10993* (QRS). N.S.W.: Whian Whian State Forest, *B.Hyland 12353* (QRS); Gloucester, *E.Betche s.n.* (NSW).

2. *Neolitsea brassii* C.K.Allen, *J. Arnold Arbor.* 23: 118 (1942)

T: Tarara, Wassi Kussa R., Papua [New Guinea], Jan. 1937, *L.J.Brass 8704*; holotype: A; isotype: BO, BRI, L.

[*Litsaea zeylanica* auct. non Nees & T.Nees (1823): G.Bentham, *Fl. Austral.* 5: 307 (1870), *p.p.*; F.M.Bailey, *Queensland Fl.* 4: 1311 (1901)]

Illustration: B.P.M.Hyland, *Austral. Syst. Bot.* 2: 362, fig. 87A–E (1989).

Tree to 25 m. Stem sometimes buttressed. Twigs ±terete, soon glabrescent. Leaves: petiole 10–31 mm long; lamina lanceolate to elliptic, 6.5–15.5 cm long, 2.5–7.1 cm wide, penninerved or triplinerved, usually ±glaucous below (sometimes green), soon glabrescent. Inflorescence bracts ±hemispherical, present at anthesis. Flowers 3–5 per umbel, creamy green, perfumed. Male flowers: tepals 4, 2.3–3.4 mm long, 1.9–2.7 mm wide; stamens usually 6; outer staminal whorl eglandular; inner staminal whorl glandular, with 1 or 2 glands; pistillode rarely present. Female flowers: tepals 4, 2.4–2.8 mm long, 1.3–2.1 mm wide; staminodes usually 8; outer whorl of staminodes eglandular, inner whorl of staminodes glandular, with 2 glands; ovary 0.8–1.2 mm long, 0.6–1.1 mm wide, glabrous; style glabrous. Fruit globular, sometimes ellipsoidal, 9–12 mm long, 7.5–10.5 mm wide, red; receptacle 7.5–9.5 mm long, 4.5–5.5 mm wide. Cotyledons cream.

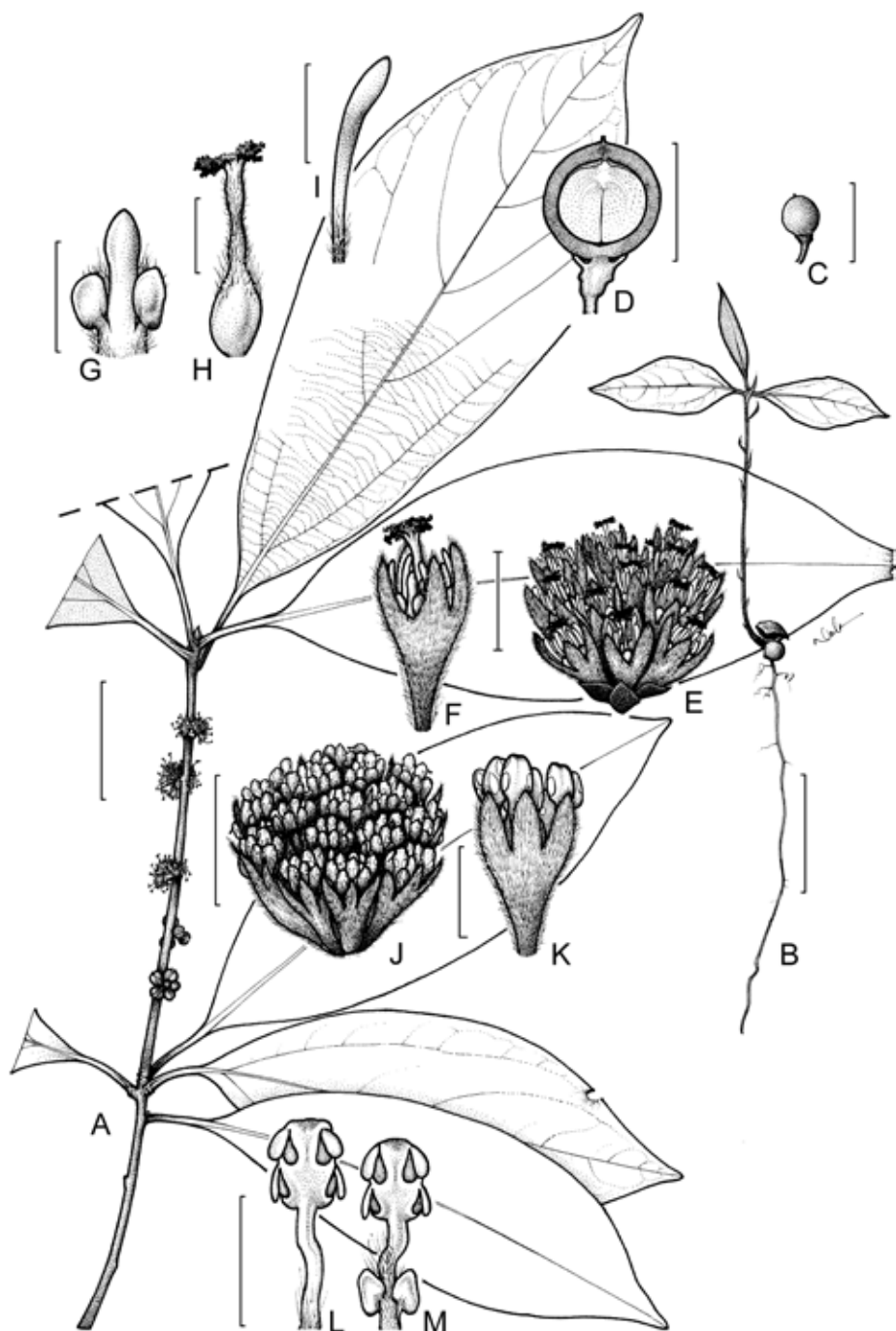


Figure 43. *Neolitsea dealbata*. A, habit; B, seedling; C, fruit; D, L.S. fruit; E, female umbel; F, female flower; G, staminode and glands; H, ovary and style; I, staminode; J, male umbel; K, male flower; L, stamen; M, stamen and glands (A, E–I, A.Dockrill 1461, BRI; B, T.Whiffin 636, QRS; C–D, D.Fitzsimon 291, QRS; J–M, A.Dockrill 1458, BRI). Scale bars: A, B = 30 mm; C = 20 mm; D, J = 10 mm; E = 5 mm; F, L, M = 2 mm; G, H = 1 mm; I = 0.5 mm; K = 3 mm. Drawn by T.Nolan. Reproduced with permission from *Austral. Syst. Bot.* 2: 342 (1989).

Occurs in north western N.T. and from Cape York Penin. S to Biggenden, Qld; from sea level to 900 m alt. Grows in rainforests, monsoon forests and wet sclerophyll forests in soils derived from a variety of rock types. Also occurs in New Guinea. Flowers Jan.–Apr.; fruits May–Nov. Map 258.

N.T.: Pickertaramoor, Melville Is., *C.R.Dunlop 3981* (DNA). Qld: Long Scrub, Bamaga, *L.J.Webb & J.G.Tracey 6988* (BRI); Tolga, *B.Gray 868* (QRS); Brampton Is., *D.A.Schultz* (QRS).

3. *Neolitsea dealbata* (R.Br.) Merr., *J. Arnold Arbor.* 29: 200 (1948)

Tetranthera dealbata R.Br., *Prodr.* 403 (1810); *Litsea dealbata* (R.Br.) Steud., *Nomencl. Bot.* 1: 488 (1821), G.Bentham, *Fl. Austral.* 5: 307 (1870); *Bryantea dealbata* (R.Br.) Raf., *Sylva Tell.* 165 (1838); *Malapoenna dealbata* (R.Br.) Kuntze, *Revis. Gen. Pl.* 2: 571 (1891); *Litsea dealbata* var. *typica* Domin, *Biblioth. Bot.* 89: 125 (1926), *nom. inval.* T: Port Jackson, N.S.W., *R.Brown 3013*; lecto: BM; isolecto: K, MEL, NY, QRS, *fide* B.P.M.Hyland, *Austral. Syst. Bot.* 2: 135–367 (1989).

Litsea rufa Nees, *Syst. Laur.* 631 (1836). T: Brisbane River, [Qld], *anon. s.n.*; *holo*: E.

Litsea baueri Endl., *Icon. Gen. Pl.* t. 44 (1838); *Tetradenia baueri* (Endl.) Pax in H.G.A.Engler & K.A.E.Prantl, *Nat. Pflanzenfam.* T. III 2 (29): 119 (1889). T: New Holland, *F.Bauer*; *holo*: *n.v.*

Litsea dealbata var. *glabrata* Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 224 (1864), as *Litsaea*. T: Australia (East Coast), *Mus. Par. n.* 299, *M.Verreaux 299*; *holo*: G-DC; *iso*: ?A, P.

Litsea dealbata var. *incisa* F.Muell. ex Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 515 (1864), as *Litsaea*. T: Pine R., Moreton Bay, Qld, *F.Mueller*; *iso*: K.

Litsea dealbata var. *rufo* Benth., *Fl. Austral.* 5: 308 (1870), as *Litsaea*. T: Brisbane R., Qld, *Hill & Mueller*; *syn* or *isosyn*: MEL; East Coast, *Leichhardt 136*; *syn* or *isosyn*: MEL; Blue Mountains, *L.Atkinson*; *syn* or *isosyn*: MEL.

Illustration: B.P.M.Hyland, *op. cit.* 2: 342, fig. 67; 362, fig. 87F (1989).

Tree to 15 m. Stem sometimes buttressed. Twigs terete, tomentose. Leaves: petiole 7–24 mm long; lamina lanceolate to elliptic, 8–22 cm long, 3.5–8.5 cm wide, penninerved or triplinerved, glaucous and pubescent below. Inflorescence bracts hemispherical or navicular, absent at anthesis. Flowers 3–5 per umbel, cream, pale brown, yellow, perfumed. Male flowers: tepals 4 or 5, 2.4–6 mm long, 0.9–2.5 mm wide; stamens 4–8; outer staminal whorl eglandular; inner staminal whorl glandular, with 2 glands; pistillode present. Female flowers: tepals 4–6, 1.7–2.3 mm long, 0.4–0.9 mm wide; staminodes 6–9; outer whorl of staminodes eglandular; inner whorl of staminodes glandular, with 2 glands; ovary 0.8–1.2 mm long, 0.6–0.9 mm wide, usually pubescent towards apex; style pubescent. Fruit globular, 9–11 mm long, 8.5–11 mm wide, red; receptacle 7–9.5 mm long, 3.5–5 mm wide. Cotyledons cream or white. Plate 37; Fig. 43.

Occurs along most of the east coast and adjacent tablelands of Australia, from Iron Ra., Qld, to the Illawarra region, N.S.W.; from sea level to 1150 m alt. Grows in rainforests and wet sclerophyll forests in soils derived from a variety of rock types. This species is favoured by disturbance and is a typical species in rainforest regrowth. Possibly also occurs in E Asia to New Guinea. Flowers Mar.–June, Sept.; fruits Feb.–May, Nov. Map 259.

Qld: Claudie R., *B.Hyland 3265 RFK* (QRS); Daintree R., *S.F.Kajewski 1467* (A, BM, BRI, K, MEL, NY); Fraser Is., *P.Baxter 841* (BRI). N.S.W.: Wingham Brush, Wingham, *H.Salasoo 2821* (NSW); Ourimbah, *A.Meebold 3205* (MO).

Excluded Name

Tetranthera monopetala Roxb., *Pl. Corom.* 2: 26, t. 148 (1800)

T: India, *n.v.*

J.D.Hooker, in his introductory essay to *Fl. Tasman.* (1855), refers to this species in a ‘list of Indian Plants in Australia’, with the comment that the Australian plants may probably prove to be distinct from their Indian relatives on closer examination. Indeed, *T. monopetala* does not occur in Australia.

HERNANDIACEAE

I.R.H.Telford¹

Trees or shrubs, sometimes (not in Australia) scandent, monoecious or dioecious. Leaves alternate, simple, palmately lobed or (not in Australia) palmately compound, exstipulate, petiolate. Inflorescence usually an axillary cymose panicle of bracteate or ebracteate flower clusters, often corymbose. Flowers regular, bisexual or unisexual. Perianth segments 6–12 in 2 whorls or 1 whorl of 4–8 lobes. Stamens 3–7, rarely 1 or 2, sometimes alternating with staminodes; anthers 2-locular, dehiscent by valves laterally or antrorsely. Pollen grains subglobose, inaperturate, usually echinate. Female or bisexual flowers subtended by 2 bracteoles or a cupule formed by inflated upper part of pedicel, or bracteoles absent. Ovary inferior, 1-locular; ovule 1, pendulous. Style simple. Stigma discoid, capitate, oblique or lobed. Fruit drupaceous to dry, ±ribbed longitudinally, often ±enclosed by enlarged bracteoles or cupule or fruit winged apically from accrescent perianth lobes or (not in Australia) fruit winged longitudinally. Seed 1; endosperm absent.

A pantropical and subtropical family of 4 genera and c. 60 species; 2 genera and 4 species in Australia. The trifoliolate climber *Illigera elegans* Duyfjes (treated as *I. appendiculata* Blume by Du Puy in Du Puy & Telford, 1993) is endemic to Christmas Is. (Indian Ocean) but the genus is not in continental Australia.

Hernandiaceae subfam. Gyrocarpoideae is often treated at family rank. Studies of vegetative anatomy (Metcalf, *op. cit.*), palynology (Kubitzki, 1969) and embryology (Heo & Tobe, *op. cit.*) are inconclusive on the monophyly or otherwise of the family but indicate closeness to Lauraceae.

F.Pax, Hernandiaceae, in H.G.A.Engler & K.A.E.Prantl, *Nat. Pflanzenfam.* 3(2): 126–129 (1889); C.F.Shutts, Wood anatomy of Hernandiaceae and Gyrocarpaceae, *Trop. Woods* 113: 85–123 (1960); K.Kubitzki, Monographie der Hernandiaceen, *Bot. Jahrb. Syst.* 89: 78–209 (1969); A.C.Smith, Hernandiaceae, *Fl. Vit. Nova* 2: 108–113 (1981); A.C.Smith, Gyrocarpaceae, *Fl. Vit. Nova* 2: 143–145 (1981); C.R.Metcalf, *Anatomy of the Dicotyledons* 2nd edn, 3: 174–184 (1987); K.Kubitzki, Hernandiaceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 334–338 (1993); D.Du Puy & I.R.H.Telford, Hernandiaceae, *Fl. Australia* 50: 69–73 (1993); K.Heo & H.Tobe, Embryology and relationships of *Gyrocarpus* and *Hernandia*, (Hernandiaceae), *J. Pl. Res.* 108: 327 (1995); B.E.E.Duyfjes, Hernandiaceae, *Fl. Males.* ser. I, 12(2): 737–761 (1996).

KEY TO SUBFAMILIES

Inflorescence with flower clusters subtended by involucre bracts; female or bisexual flowers and fruit subtended by bracteoles or a cupule; fruit not winged; leaves not lobed

subfam. **1. HERNANDIOIDEAE**

Inflorescence lacking involucre bracts; flowers not subtended by bracteoles or cupules; fruit winged; leaves often palmately lobed

subfam. **2. GYROCARPOIDEAE**

Subfam. 1. HERNANDIOIDEAE

Hernandiaceae subfam. *Hernandioideae* Pax in H.G.A.Engler & K.A.E.Prantl, *Nat. Pflanzenfam.* 3(2): 129 (1889)

Type: *Hernandia* L.

Inflorescence with flower clusters subtended by involucre bracts. Bracteoles or cupules subtending female or bisexual flowers. Perianth of 2 whorls. Anther valves opening laterally.

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HERNANDIACEAE

Cotyledons plano-convex. Fruit \pm enclosed by the enlarged bracteoles or cupule or (not in Australia) with 2–4 lateral wings.

A subfamily of 2 genera, both occurring in the Australasian region, *Hernandia* in continental Australia and on Cocos (Keeling) and Christmas Islands, and *Illigera* on Christmas Is. (Indian Ocean).

1. HERNANDIA

Hernandia L., *Sp. Pl.* 2: 981 (1753); *Gen. Pl.* 5th edn, 421 (1754); after Francisco Hernandez, 16th century Spanish naturalist and physician.

Type: *H. sonora* L.

Biasolettia C.Presl, *Rel. Haenk.* 2: 141 (1835). T: *B. nymphaeifolia* C.Presl

Valvanthera C.T.White, *Proc. Roy. Soc. Queensland* 47: 76 (1936). T: *V. albiflora* C.T.White

Trees, monoecious or (not in Australia) dioecious. Leaves simple, entire. Inflorescence an axillary thyse, often grouped towards stem apices forming corymbs. Flowers in bracteate clusters of 1 female or bisexual and 2 male flowers, or 1 bisexual and 2 male or sterile flowers; involucre bracts caducous or \pm persistent. Perianth segments or lobes 6–12 in 2 \pm similar whorls. Male flowers: perianth segments usually 6–10; stamens usually 3–5, each usually subtended by 2 glands. Female flowers: subtended by 2 bracteoles or a cupule; perianth segments usually 8–12; style sigmoid or straight with 4 or 5 free or connate glands basally; stigma discoid, oblique or lobed. Bisexual flowers: subtended by a cupule; perianth lobes 6–8; stamens 6; ovary as in females; stigma 2-lobed. Fruit drupaceous to leathery, \pm longitudinally ribbed, \pm enclosed by the enlarged bracteoles or cupule.

A pantropical genus of 2 subgenera containing 23 species, of which both subgenera and 3 species occur in Australia, one of which also occurs on Cocos (Keeling) Is. *Hernandia ovigera* L. occurs on Christmas Is. but not in continental Australia.

Included in Lauraceae by G.Bentham, *Fl. Austral.* 5: 313–315 (1870).

KEY TO SUBGENERA

Flowers bisexual or sterile in clusters of 1 fertile and 2 sterile; seeds not ruminated; cotyledons free

subg. **1. VALVANTHERA**

Flowers unisexual in bracteate clusters of 1 female and 2 males; seeds extremely ruminate; cotyledons connate

subg. **2. HERNANDIA**

Subg. 1. VALVANTHERA

Hernandia subg. *Valvanthera* (C.T.White) Kubitzki, *Bot. Jahrb. Syst.* 89: 125 (1969)

Valvanthera C.T.White, *Proc. Roy. Soc. Queensland* 47: 76 (1936). T: *V. albiflora* C.T.White

Inflorescences scattered, not corymbose; partial inflorescences 3-flowered clusters of a central bisexual flower flanked by 2 male or sterile flowers; involucre bracts 3 or 4, caducous. Stigma sessile, lobed. Seeds not ruminated; cotyledons free.

The subgenus is monotypic, endemic to north-eastern Australia.

1. *Hernandia albiflora* (C.T.White) Kubitzki, *Bot. Jahrb. Syst.* 89: 126 (1969)

Valvanthera albiflora C.T.White, *loc. cit.* T: Daintree R., Qld, 29 Nov. 1929, *S.F.Kajewski 1407*; holo: BRI; iso: BRI, US, *fide* K.Kubitzki, *loc. cit.*

Illustration: K.Kubitzki, *op. cit.* 89: 116, abb. 21 (1969).

Tree or large shrub to 15 m. Leaves with petiole c. 1 cm long; lamina ovate, acuminate, 5–22 cm long, appearing glabrous but with sunken multicellular clavate hairs, discolorous. Panicle to 6 cm long; peduncle 1–3 cm long. Involucral bracts narrowly ovate, acute, c. 1 mm long, caducous before flowers mature, green. Bisexual flowers: sessile, subtended by cupule 1–2 mm long; perianth lobes 6–8, ovate, 1–2 mm long, white; stamens 6. Sterile flowers: pedicels c. 1 mm long; buds obovoid, c. 1 mm long, perianth apparently fails to open. Fruit ellipsoidal, 20–25 mm long, dark brown; fruiting cupule membranous, closely enveloping fruit, purplish red; aperture 1–2 mm diam. Fig. 44A–B.

Endemic in north-eastern Qld between Cape Tribulation and Innisfail; grows in rainforest on near-coastal hills. Flowers Nov.–Dec.; fruits Apr.–Aug. Map 260.

Qld: Thornton Ra., Macleans Ck, at Cape Tribulation road crossing, *I.R.Telford 12220* & *S.Donaldson* (BRI, CBG, MEL); State Forest Reserve 78, *B.Hyland 3478QFF* (BRI, CANB, NSW, QRS); Rumula, SW of Mossman, *H.S.McKee 9097* (BRI, CANB, NSW); Miriwinni, near Mt Bartle Frere, *L.J.Webb* & *J.G.Tracey 6616* (BRI, CANB).

Classified as rare and endangered, the species is conserved in several reserves.

Subg. 2. HERNANDIA

Hernandia L. subg. *Hernandia*

Inflorescences axillary, usually corymbose; partial inflorescences of bracteate 3-flowered clusters of a central female flower flanked by two male flowers; involucral bracts 3 or 4, ±persistent. Stigma discoid, oblique or lobed. Seeds extremely ruminant; cotyledons connate.

A subgenus of 22 species, 2 in continental Australia. *Hernandia ovigera* occurs on Christmas Is. (Indian Ocean).

Stems minutely pubescent; leaves not peltate

2. *H. bivalvis*

Stems glabrous; leaves peltate

3. *H. nymphaeifolia*

2. *Hernandia bivalvis* Benth., *Fl. Austral.* 5: 314 (1870)

T: Wide Bay, Qld, *J.C.Bidwill*; lecto: K n.v., *fide* K.Kubitzki, *Bot. Jahrb. Syst.* 89: 127 (1969).

Illustrations: F.M.Bailey, *Compr. Cat. Queensland Pl.* 438, fig. 426 (1910); K.Kubitzki, *op. cit.* 89: 116, abb. 22 (1969); K.A.W.Williams, *Native Pl. Queensland* 1: 151 (1979).

Tree to 8 m; stems minutely pubescent. Leaves with petiole 1.5–7 cm long; lamina ovate, bluntly acuminate, 3–11 cm long, chartaceous, 3-nerved at base with pilose domatia, glabrous above, minutely pubescent beneath on major nerves. Panicle to 13 cm long, minutely pubescent; peduncle 1.5–9 cm long. Involucral bracts elliptic to obovate, 6–9 mm long, white. Perianth segments 8, narrowly ovate, 5–7 mm long, white. Male flowers: pedicels 1–3 mm long; stamens 4. Female flowers: sessile, subtended by 2 bracteoles c. 2 mm long; ovary c. 2 mm long; style sigmoid. Fruit ovoid, 15–20 mm long, black; fruiting bracteoles ovate, 4–7 cm long, fleshy, red. *Grease Nut*. Fig. 44D–F.

Endemic in eastern Qld, occurring sporadically from near Proserpine S to Tamborine Mtn; grows in drier rainforests of the lowlands or hills often in soils derived from volcanics. Flowers recorded Oct.; fruits Feb.–Mar. Map 261.

Qld: Mt Larcom Ra., *N.Gibson 1090* (BRI, MEL); Stony Ck, 4 km E of Didcot, *P.I.Forster 7519* (BRI, CANB, DNA, MEL, NSW, PERTH); Mt Biggenden, 8 km W of Biggenden, *P.Young 412* & *J.Randall* (BRI, CANB); Hazeldean, *S.T.Blake 22784* (BRI, CBG, NSW); Pine Mtn, Worlds End Pocket, 2 Jan. 1978, *L.Bird* (BRI).



Figure 44. *Hernandia*. A–B, *H. albiflora*. A, flowering and fruiting branchlet; B, partial inflorescence (A–B, I.Telford 12220 & S.Donaldson, CANB). C, *H. nymphaeifolia*, fruiting branchlet (I.Telford 10616 & J.Wallington, CANB). D–F, *H. bivalvis*. D, fruit with one bracteole removed (S.Blake 22784, CANB); E, partial inflorescence; F, flowering branchlet (E–F, P.Forster 7519, CANB). Scale bars: A, C, F = 20 mm; B = 2 mm; D, E = 10 mm. Drawn by I.R.H.Telford.

The soft wood was used for brake linings for horse-drawn vehicles. Use of the oily seed to provide a substitute for grease has been reported. Classified as rare and endangered, the species is conserved in several reserves.

3. *Hernandia nymphaeifolia* (Presl) Kubitzki, *Bot. Jahrb. Syst.* 89: 272 (1969)

Biasolettia nymphaeifolia Presl, *Rel. Haenk.* 2: 141 (1835). T: Mariana Is., Guam, *T.P.X.Haenke*; holo: PR n.v., *fide* A.C.Smith, *Fl. Vit. Nova* 2: 111 (1981).

Hernandia peltata Meisn. in A.L.P.P. de Candolle, *Prodr.* 15: 263 (1864). T: 'in China & Penins. Ind. or ? in Ceylon, Staunton! Thwaites CP 2914'; lecto: C-DC; isolecto: B, BM, G, L, W n.v., *fide* K.Kubitzki, *op. cit.* 89: 154 (1969).

Illustrations: F.M.Bailey, *Compr. Cat. Queensland Pl.* t. 13 (1910), as *H. peltata*; A.C.Smith, *Fl. Vit. Nova* 2: 110, fig. 39 (1981); A.B.Cribb & J.W.Cribb, *Pl. Life Great Barrier Reef & Adjacent Shores* 137 (1985), as *H. peltata*.

Tree to 15 m; stems glabrous. Leaves with petiole 6–24 cm long inserted 1–4 cm above base margin; lamina broadly ovate, bluntly acuminate, peltate, 10–30 cm long, coriaceous, glabrous, 3-nerved at base. Panicle to 25 cm long; peduncle 7–18 cm long, glabrescent. Involucral bracts obovate, 3–5 mm long, greenish white. Perianth segments elliptic, 4–6 mm long, minutely pubescent, white. Male flowers: pedicel c. 3 mm long; perianth segments 6; stamens 3. Female flowers: pedicel c. 2 mm; cupule c. 2 mm long; perianth segments 8; ovary c. 2 mm long; style straight. Fruit ovoid, 8-ribbed with a rounded apical protuberance, 20–23 mm long, black; fruiting cupule \pm broadly obovate, 2–3 cm long, translucent white, ageing pink; aperture 8–12 mm diam. *Sea Hearse*. Plate 40; Fig. 44C.

Occurs disjunctly on tropical coasts of north-eastern Australia, in north-eastern N.T. and from Cape Tribulation S to near Ingham, Qld; grows in strand forest with *Calophyllum inophyllum* and *Casuarina equisetifolia*, usually in coralline sand. Also tropical beaches of the N Indian and W Pacific Oceans from Madagascar and E Africa E to Pitcairn Is., including Cocos (Keeling) Is. Flowers recorded Oct., Mar.; fruits June–Sept. Map 262.

N.T.: Groote Eylandt, Manalimandja Point, Umbakumba, *J.Russell-Smith 5108* & *D.Lucas* (DNA, MEL, NSW, QRS). Qld: Myall Beach, c. 1 km S of Cape Tribulation, *I.R.Telford 10616* & *J.Wallington* (BISH, BRI, CBG, NSW); Garners Beach, N of Clump Point, *F.H.J.Crome 86* (CANB); Mission Beach, 16 km E of Feluga, *T.J.McDonald 1679* & *G.N.Batianoff* (BRI); Hinchinbrook Is., Zoe Bay, *C.Warrian 7084* (BRI).

The fruit are dispersed by ocean currents, the spongy testa of the seeds providing buoyancy.

Excluded name

Hernandia sonora L., *Sp. Pl.* 2: 981 (1753)

T: India; lecto: 'Hernandia' in Linnaeus, Hort. Cliff., t. 33; LINN, *fide* W.T.Stearn, *Introd. Linnaeus' Sp. Pl.* (Ray Soc. ed.) 47 (1957)

This West Indian species, mistakenly attributed by some also to the East Indies, was listed by J.D.Hooker (*Fl. Tasman.* xlvii (1859)) as an 'Indian' plant that might be present in Australia. It does not occur in Australia.

Subfam. 2. GYROCARPOIDEAE

Hernandiaceae subfam. *Gyrocarpoideae* (Dumort.) Pax in H.G.A.Engler & K.A.E.Prantl, *Nat. Pflanzenfam.* 3(2): 129 (1889).

Gyrocarpaceae Dumort., *Anal. Fam. Pl.* 13, 14 (1829), as *Gyrocarpeae*. T: *Gyrocarpus* Jacq.

Inflorescence lacking involucral bracts. Bracteoles absent. Perianth of a single whorl of lobes. Anther valves opening antorsely. Cotyledons spirally twisted. Fruit with 2 apical wings or (not in Australia) not winged.

A subfamily of 2 genera, 1 in Australia.

HERNANDIACEAE

2. GYROCARPUS

Gyrocarpus Jacq., *Sel. Stirp. Amer. Hist.* 282 (1763); from the Greek, *gyros* (circle, turn) and *carpos* (fruit), referring to the spinning of the winged fruit as it falls.

Type: *G. americanus* Jacq.

Trees, monoecious. Leaves simple, sometimes palmately lobed. Inflorescence an axillary panicle, often corymbose. Flowers bisexual or unisexual. Perianth lobes 4–8, usually 7, minute. Bisexual flowers: stamens 4–7, exserted, usually alternating with as many staminodes; anther filaments usually glandular; style terete; stigma capitate. Male flowers: stamens as in bisexual flowers; pistillode sometimes present. Female flowers: gynoeceium as in bisexual flowers; staminodes usually present. Fruit nut-like, usually \pm ribbed longitudinally, with 2 apical, spatulate wings.

A pantropical genus of 3 species; 1 in northern Australia, also on Cocos (Keeling) and Christmas Islands (Indian Ocean).

Sometimes placed in family Gyrocarpaceae. Included in Combretaceae by G.Bentham, *Fl. Austral.* 2: 505 (1864).

***Gyrocarpus americanus* Jacq., *Sel. Stirp. Amer. Hist.* 282, t. 178, fig. 80 (1763)**

Gyrocarpus jacquinii Gaertn., *Fruct. Sem. Pl.* 2: 92, t. 97, fig. 3 (1791), *nom. illeg.*, *G. americanus* in *syn.* T: Colombia, Cartagena, *N.Jacquin*; holo: BM n.v., *fide* K.Kubitzki *Bot. Jahrb. Syst.* 89: 184 (1969).

Medium-sized dry season deciduous trees. Leaves dimorphic. Juvenile leaves with lamina strongly 3- or 5-lobed. Adult leaves with petiole 2–12 cm long; lamina ovate to broadly ovate or kidney-shaped, often shallowly 3-lobed, sometimes 2- or 5-lobed, acuminate, 5–20 cm long, chartaceous to subcoriaceous, variously hairy with simple hairs to glabrescent. Panicles in upper axils to 30 cm long, becoming pendulous; peduncles 2–12 cm long. Perianth pubescent; lobes c. 1 mm long. Stamens usually 4; filaments usually pilose. Staminodes clavate. Fruit body 8–20 mm long, pilose to glabrescent; wings 2.5–12 cm long, pilose to glabrescent. *Helicopter Tree*, *Twirly-whirly Tree*, *Corkwood*.

An almost pantropic species of 8 subspecies, 3 in northern Australia. The Australian subspecies are broadly circumscribed and further study, particularly field work, is required to elucidate the considerable variation. Fruiting specimens are often leafless and flowering material is poorly represented in herbaria.

- | | | |
|----|--|--------------------------------|
| 1 | Adult leaves usually subcoriaceous, unlobed, concolorous or slightly discolorous, shortly yellow-brown hairy to glabrescent | 1c. subsp. pachyphyllus |
| 1: | Adult leaves chartaceous, 3–5-lobed to unlobed, discolorous with lower surface pubescent, less densely hairy on upper surface | |
| 2 | Leaves with venation usually depressed and lamina surface pilose to glabrescent above, undersurface \pm evenly velvety or hirsute with curved grey hairs; fruit wings 5–10 cm long | 1a. subsp. americanus |
| 2: | Leaves with venation raised and lamina surface shortly hairy above, more densely so on undersurface with crisped \pm appressed yellowish hairs denser along veins; fruit wings 2.5–7 cm long | 1b. subsp. sphenopterus |

1a. *Gyrocarpus americanus* Jacq. subsp. *americanus*

Gyrocarpus rugosus R.Br., *Prodr.* 405 (1810). T: Arnhem Bay, [N.T.], *R.Brown iter Austral.* 4468; holo: BM; iso: E, NY n.v., *fide* K.Kubitzki, *Bot. Jahrb. Syst.* 89: 184 (1969).

Gyrocarpus acuminatus Meisn. in A.L.P.P. de Candolle, *Prodr.* 15, 1: 248 (1864). T: Port Denison, Qld, *F.Mueller*; holo: G-DC; iso: NY n.v., *fide* K.Kubitzki, *loc. cit.*

Illustrations: K.Kubitzki, *op. cit.* 89: 189 (1969); A.C.Smith, *Fl. Vit. Nova* 2: 144, fig. 46 (1981).

Tree to 20 m; bark smooth to flaky, grey. Juvenile leaves 3- or 5-lobed, discolorous. Adult leaves with petiole 3–12 cm long; lamina ovate to broadly ovate, often 3-lobed, rarely 2-lobed, acuminate, 5–20 cm long, chartaceous, strongly discolorous, venation usually

depressed and lamina surface glabrescent above, underside \pm evenly velvety or hirsute with curved white or pale grey hairs. Fruit body pilose to glabrescent; wings 5–10 cm long, usually exceeding 7 cm, sparsely pilose. *Kaper* (Torres Strait). Fig. 45A–D.

Occurs sporadically in coastal and subcoastal northern Australia from Walcott Inlet, W.A., across northern N.T., to near Gayndah, Qld. The typical strand form grows on coastal dunes in strand forest with *Casuarina equisetifolia*, *Pongamia pinnata* and *Thespesia populnea* or near-coastal hills in monsoon rainforest, often on limestone or volcanics. Inland populations appear to be variants, localised or perhaps clinal, and are discussed below. The pantropical strand form is widespread in tropical America and Asia, Malesia, the western Pacific and northern Indian Oceans, including Christmas and Cocos (Keeling) Islands. Flowers Mar.–July; fruits Mar.–Nov. Map 263.

N.T.: Conder Point, Melville Is., *G.Wightman* 2475 & *M.Clark* (CANB, DNA), Port Bradshaw, *R.L.Specht* 733 (BRI, CANB). Qld: Bathurst Bay, 'Kalpowar' Pastoral Holding, 71.4 km N of 'Lakefield' HS, *D.G.Fell* 2964 & *J.P.Stanton* (BRI, CBG); St Bees Is., 36 km NE of Mackay, *G.N.Batianoff* 11198 (AD, BRI); Olsens Caves, N of Rockhampton, *S.T.Blake* 15685 & *L.J.Webb* (BRI).

Inland populations occur in the western Kimberley, W.A., northern N.T. and in central Qld. The Kimberley trees, e.g. Edkins Ra., c. 132 km from 'Mt Elizabeth' HS along Walcott Inlet track, *I.R.Telford* 11625 (CBG, DNA, PERTH); Isdell R., May 1983 *D.G.Fell* (BRI, PERTH), bear leaves more densely hairy above and with denser crisped hairs on the veins on the undersurface similar to subsp. *sphenopterus* but with grey, not yellowish hairs. These occur near Walcott Inlet in woodland on sandstone outcrops to 450 m altitude. Those of the Arnhem Land escarpment, e.g. Kakadu Natl Park, 0.5 km E of Koongarra Saddle, *I.R.Telford* 11684 & *J.Palmer* (BISH, BRI, CBG, DNA, MO, PERTH); Ja Ja Ck, near Cannon Hill, *H.S.Thompson* 341 (CBG), more closely resemble the strand form but differ in the very short indumentum of the leaf undersurface. They grow in monsoon rainforest with *Allosyncarpia ternata*, *Planchonella arnhemica* and *Myristica insipida* in gullies of sandstone escarpments to 250 m altitude. Some northern Qld populations, e.g. 0.5 km NW of 'Toomba' HS, Great Basalt Wall, *P.I.Forster* 3677 (BRI, CBG), resemble the Kimberley and Arnhem Land populations. This geographic variation requires more detailed investigation.

1b. *Gyrocarpus americanus* subsp. *sphenopterus* (R.Br.) Kubitzki, *Bot. Jahrb. Syst.* 89: 185 (1969)

Gyrocarpus sphenopterus R.Br., *Prodr.* 405 (1810). T: Carpentaria, [Qld], *R.Brown iter Austral.* 4468; holo: BM; iso: E, NY, P n.v., *fide* K.Kubitzki, *loc. cit.*

Tree to 15 m; bark smooth, grey to yellowish. Juvenile leaves with lamina 3- or 5-lobed, discolorous, shortly pubescent to glabrescent. Adult leaves with petiole 3–12 cm long; lamina ovate to broadly ovate, usually shallowly 3- or 5-lobed, shortly acuminate, 5–10 cm long, chartaceous, discolorous, venation raised above, pubescent on both surfaces particularly along veins, more densely beneath, with yellowish hairs. Fruit body sparsely pubescent; wings 4–7 cm long, sparsely pubescent. Fig. 45F.

Occurs around the southern end of the Gulf of Carpentaria, N.T. and Qld, E to Chillagoe and S to near Charters Towers, Qld; grows in woodland and monsoonal rainforest often associated with rock outcrops in soils derived from sandstone or limestone to 350 m altitude. Collections from the Lesser Sunda Is. and the Philippines have been referred tentatively to this subspecies by Kubitzki, *loc. cit.* Flowers ?Feb.–?May; fruits recorded Aug., Dec., Feb. Map 264.

Qld: 'Gregory Downs'-Camooweal road, c. 10 km N of 'Thorntonia', *A.Rodd* 3211 (BRI, NSW); Georgetown, *S.T.Blake* 14726 (BRI, NSW); junction of Burke Development & Blackdowns roads, 22 km NW of Chillagoe, *H.Streimann* 80001 (A, B, BRI, CBG, DNA, L, NY); track to Big Bend, 25 km NNW of Charters Towers, *H.Streimann* 80009 (BRI, CBG, L).

Some populations, such as in the Forty Mile Scrub, near Mount Garnet, and near Charters Towers, Qld, appear to approach subsp. *americanus*. Western populations in the 'Lawn Hill'-'Riversleigh' area, approach subsp. *pachyphyllus*.

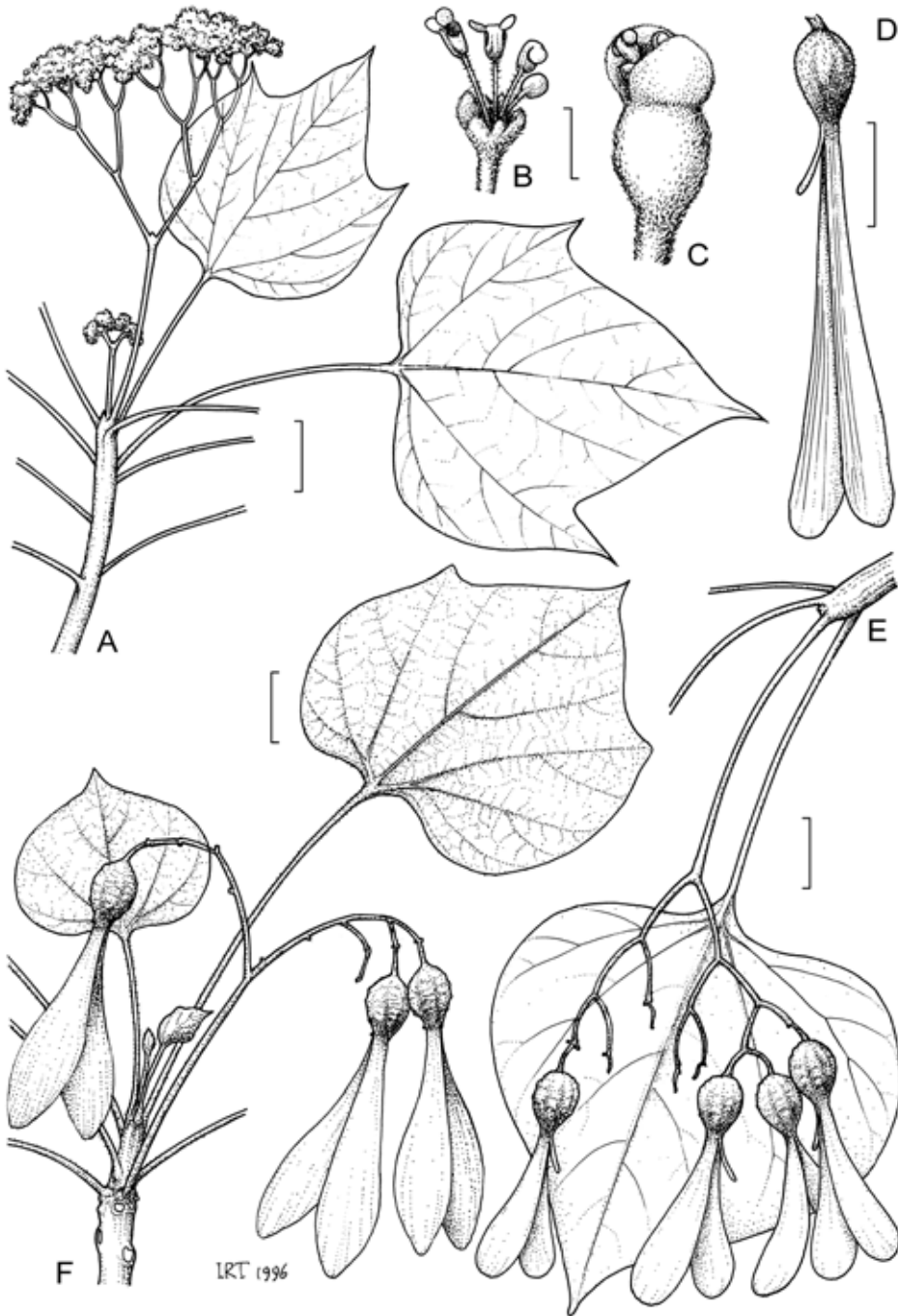


Figure 45. *Gyrocarpus americanus*. A–D, *G. americanus* subsp. *americanus*. A, flowering branchlet; B, male flower; C, bisexual flower (A–C, I.Telford 11684 & J.Palmer, CANB); D, fruit (Rockhampton, F.Bailey, BRI). E, *G. americanus* subsp. *pachyphyllus*, fruiting branchlet (I.Telford 11728, CANB). F, *G. americanus* subsp. *sphenopteris*, fruiting branchlet (H.Streimann 80001, CANB). Scale bars: A, D–F = 20 mm; B, C = 2 mm. Drawn by I.R.H.Telford.

1c. *Gyrocarpus americanus* subsp. *pachyphyllus* Kubitzki, *Bot. Jahrb. Syst.* 89: 185 (1969)

T: Broome, W.A., *B.P.G.Hochreutiner 2831*; holo: G; iso: L n.v., *vide* K.Kubitzki, *loc. cit.*

Tree to 10 m; bark smooth and shiny to flaky, yellowish. Juvenile leaves with lamina 3-lobed, shortly pubescent, concolorous. Adult leaves with petiole 4–9 cm long; lamina broadly ovate to reniform, shortly acuminate to obtuse, 5–13 cm long, chartaceous to subcoriaceous, concolorous or slightly discolorous, venation raised, shortly and ±evenly pubescent or scabrous with pale yellowish brown hairs to glabrescent on both surfaces. Fruit body sparsely pubescent, glabrescent; wings 2.5–7 cm long, glabrous. *Cooliman Tree, Shitwood*. Fig. 45E.

Endemic in sub-humid tropical north-western Australia from near Broome, through the Kimberley, W.A., and northern N.T. to near Katherine; grows in open woodland, often with *Adansonia gregorii* and *Lysiphyllum cunninghamii* on sandy or limestone flats, and granitic, sandstone or limestone outcrops. Flowers and fruits recorded in most months. Map 265.

W.A.: Kunanurra, *I.R.Telford 11654* (AD, BISH, BRI, CBG, PERTH); 62.5 km W of Halls Creek, *J.R.Maconochie 1140* (CANB, DNA, PERTH). N.T.: Stuart Hwy, 5.5 km NW of Katherine, *M.Lazarides 6982* (CANB, PERTH); 18 km N of Top Springs along Delamere Rd, *I.R.Telford 11661* (CBG, DNA, US).

The soft wood has been used to make toys and by aboriginal people for carving coolimans and water containers.

Populations of the upper Fitzroy R.–Halls Creek area, W.A., bear leaves with a considerably denser, persistent vestiture.

PIPERACEAE

*T.M.Spokes*¹ (*Piper*)

*P.I.Forster*² (*Peperomia*)

Small trees, shrubs, vines, or herbs; monoecious, dioecious or bisexual. Leaves simple, entire, alternate, opposite or whorled; stipules present or absent. Inflorescences spicate or racemose, pedunculate, axillary, terminal or apparently leaf-opposed, solitary, multiple or numerous and arranged in an umbel. Flowers minute, usually crowded, unisexual or bisexual, each subtended by a peltate bract. Perianth absent. Stamens 2–4. Ovary unilocular; ovule solitary; style present or absent; stigmas 1–5. Fruit pedicellate, subsessile, sessile or immersed in the rachis.

A widespread pantropical and subtropical family of 10 genera and c. 3000 species. Two genera in Australia, 12 species, 5 endemic, 1 naturalised. The genus *Macropiper* is confined to Norfolk and Lord Howe Islands.

Several species of the genus *Piper* are cultivated for spices, various narcotic effects and for medicinal purposes. *Piper nigrum* L. is cultivated for black pepper (the common table spice), *Piper betle* L. for wrapping around the palm betel seed and chewing to produce a mildly narcotic effect and *Piper methysticum* G.Forst., for the mildly narcotic effect produced by drinking a mixture of ground roots and basal stems of the plant in water, commonly called Kava by Polynesian and some Melanesian nations.

F.A.W.Miquel, *Syst. Piperac.* 1–575 (1843–1844); F.A.W.Miquel, *Pip. Nov. Holl.* (1866); A.L.P.P. de Candolle, *Prodr.* 16(1): 235–471 (1869); G.Bentham, *Piperaceae, Fl. Austral.* 6: 203–206 (1873); F.A.W.Miquel, *Piperacearum Clavis Analyticum, Candollea* 1: 65–415

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PIPERACEAE

(1923); T.G.Yunker, The Piperaceae – a Family Profile, *Brittonia* 10: 1–7 (1958); D.J.DuPuy, Piperaceae, *Fl. Australia* 50: 73–76 (1993); M.C.Tebbs, Piperaceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 516–520 (1993); P.S.Green, Piperaceae, *Fl. Australia* 49: 46–50 (1994).

KEY TO GENERA

Vines or shrubs to 4 m tall

1. PIPER

Fleshy perennial herbs, 10–30 cm tall

2. PEPEROMIA

1. PIPER

T.M.Spokes

Piper L., *Sp. Pl.* 1: 28 (1753); *Gen. Pl.* 5th edn, 18 (1754); from the Latin *piper* (pepper), in reference to the spice obtained from a species of the genus.

Type: *P. nigrum* L.

Shrubs, or vines climbing by adventitious roots, occasionally epiphytic, monoecious, dioecious or bisexual. Indumentum present or absent; hairs simple, multicellular, uniseriate. Stems thickened at nodes. Leaves alternate, variously stipulate, petiolate, entire, with a prominent midvein, secondary veins emerging variously along midvein or palmately from base. Inflorescences spicate, solitary and leaf-opposed or umbellate and axillary. Flowers sessile. Stamens 2–4. Stigmas 2–5, usually sessile or with an attenuate style. Fruit pedicellate, subsessile or sessile, free and closely packed or arranged in clusters or with seeds embedded within a fleshy compound fruit.

A pantropical genus of c. 2000 species, the majority neotropical, with over 400 species in the Malaysian region; 7 species in Australia, 2 endemic. Generally growing in moist habitats, often in cleared or disturbed areas, along creeks, roads and forest margins.

E.Quisumbing, Philippine Piperaceae, *Philipp. J. Sci.* 43: 1–246 (1930); W.-L.Chew, The genus *Piper* (Piperaceae) in New Guinea, Solomon Islands and Australia, 1. *J. Arnold Arbor.* 53: 1–25 (1972); M.A.Jaramillo & P.S.Manos, Phylogeny and patterns of floral diversity in the genus *Piper* (Piperaceae). *Amer. J. Bot.* 88: 706–716 (2001).

- 1** Shrub; flowering/fruiting spikes umbellate, up to 15 arranged on an axillary peduncle

1. *P. umbellatum*

- 1:** Vine; flowering/fruiting spikes solitary, leaf-opposed

- 2** Inflorescence erect; fruiting spike with numerous seeds enclosed within a fleshy compound fruit

- 3** Fruit oblong-ovoid, 0.5–2 cm long, 0.5–1.4 cm diam.; stigmas sessile

2. *P. fungiforme*

- 3:** Fruit cylindrical, 2–6 cm long, 1–1.7 cm diam.; styles prominent, c. 2 mm long

3. *P. mestonii*

- 2:** Inflorescence pendulous; fruiting spike with fruit closely packed or free, arranged along fertile axis

- 4** Fruit subsessile or sessile

- 5** Fruits sessile, oblong-ovoid, closely packed, obscuring the fertile axis; fruiting spike cylindrical, 5–15 cm long, 0.6–1 cm diam.

4. *P. macropiper*

- 5:** Fruits subsessile or sessile, ovoid to spherical, arranged at intervals along the fertile axis; fruiting spike 7–19 cm long, 2–4 mm diam.

5. *P. interruptum*

- 4:** Fruit pedicellate

- 6 Fertile fruiting axis 0.5–7 cm long; bract margins minutely ciliate; fruit 0.8–2.5 cm long; pedicel uniform, terete throughout
- 6: Fertile fruiting axis 1.2–18 cm long; bract margins entire, glabrous; fruit 0.6–1.2 cm long; pedicel broader and flattened at base

6. *P. hederaceum*7. *P. caninum***1. *Piper umbellatum* L., *Sp. Pl.* 2: 43 (1762)**

T: Domingo; lecto: illustration in C.Plumier, *Descr. Pl. Amér.* 53, t. 73 (1693), *fide* H.Huber, in M.D.Dassanayake & F.R.Fosberg (eds), *Rev. Handb. Fl. Ceylon* 6:289 (1987).

Piper subpeltatum Willd., *Sp. Pl.* 1: 166 (1797); *Pothomorphe subpeltata* (Willd.) Miq., *Comm. Phytogr.* 37 (1840); *Piper umbellatum* var. *subpeltatum* (Willd.) C.DC. in J.D.Smith, *Enum. Pl. Guatem.* 6: 39 (1903). T: Ambon, Indonesia, *coll. unknown*; *holo: n.v.*

Illustrations: E.Quisumbing, *Philipp. J. Sci.* 43(1): 18, fig. 1, pl. 17, fig. 11 (1930), as *P. umbellatum* var. *subpeltatum*.

Aromatic shrub to 3 m high. Leaves: petioles to 30 cm long, shortly sheathing nodes, short-hairy; lamina broadly ovate to suborbicular, subpeltate, to 40 cm wide, cordate at base, acute, acuminate or rounded at apex, short-hairy on nerves, minutely ciliate on margin; veins c. 15 radiating from base, one pair above, the remainder arising from midvein. Spike erect, cylindrical; rachis to 11 cm long; peduncle 0.3–1.5 cm long; up to 15 spikes arranged umbellately on an axillary peduncle. Flowers bisexual; bracts triangular, margin conspicuously white-ciliate. Stamens 3. Stigmas 3, sessile. Fruit \pm obovoid, 0.7–1 mm long, free. Fig. 47A.

Occurs in the McIlwraith Ra. region and from Cape Tribulation to Cardwell and E of Proserpine to Mt Ossa, Qld; also in the Philippines and Malesia. Occurs in low altitudes up to c. 350 m in tropical and subtropical rainforest, in dense closed forest or in open areas along creeks and roadsides, often in red clay-loam soils. Flowers Apr.–July. Map 266.

Qld: upper reaches of Chester R., towards Double Hill, *G.Butler* 503 (CBG); State Forest 310, Gadgarra, *P.I.Forster PIF17159* & *S.J.Figg* (BRI); 39 km from Bloomfield Mission Rd on China Camp Rd, *K.Hill et al.* 1977 (BRI, NSW); S.F.R. 756, *B.Hyland* 7232 (BRI, CANB, QRS); Conway State Forest, 17 May 1993, *F.Perry* (BRI).

2. *Piper fungiforme* Spokes, *Fl. Australia* 2: 457 (2007)

T: Timber Reserve 14, Leo Ck Rd, Qld, 19 Sept. 1972, *B.Hyland* 6367; *holo:* BRI; *iso:* CANB, NSW, QRS.

Piper sp. aff. *abbreviatum*, D.L.Jones & B.Gray, *Climbing Pl. Australia* 305 (1988)

Piper sp. *Leo Creek* (B.P.Hyland 6367), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 145 (2002)

Illustration: D.L.Jones & B.Gray, *op. cit.* 319, as *Piper* sp. aff. *abbreviatum*.

Dioecious, glabrous vine. Leaves with petioles 0.3–1.5 cm long; lamina ovate, narrowly ovate or elliptic, 2.5–14.5 cm long, 1.4–7.5 cm wide; secondary veins 2 or 3, spaced along both sides of basal third of midvein; base cuneate to rounded; apex acute to acuminate. Spike solitary, leaf-opposed, erect; bracts circular. Male spikes cylindrical, slightly tapering apically, 2.5–4.5 cm long, 0.3–0.6 cm diam.; peduncle 0.4–0.6 cm long. Stamens 3; anthers each with 2 sets of bivalves concealed under fleshy apical tissue. Female spikes oblong; peduncle 0.2–1 cm long; bracts subsessile. Flowers cream. Stigmas 4, sessile. Fruit oblong-ovoid, 0.5–2 cm long, 0.5–1.4 cm diam., red and fleshy when mature. Seeds embedded within compound fruit. Figs 46C, 47B.

Endemic in north-eastern Qld, from Table Ra. S to the Mt Lewis–Julatten area; a rainforest vine, sometimes forming a dense mass climbing over tree roots, tree trunks and boulders, occasionally reaching the canopy. Growing in lowland areas and to c. 1000 m alt., in mesophyll and notophyll vine forest, often in soils derived from granite. Flowers recorded in Sept. Map 267.

Qld: S.F.R. 144, *B.Gray* 1707 (BRI); Puffdellooney Ridge, *B.Hyland* 10825 (QRS); Timber Reserve 176, Monkhouse, *B.Hyland* 12598 (QRS); Coopers Ck, Turpentine Rd, *L.W.Jessup GJD2812 et al.* (BRI); Mt Lewis, *K.A.W.Williams* 82063 (BRI).



Figure 46. *Piper*. **A**, *P. caninum*, fruiting branchlet (B.Hyland 12145, QRS). **B**, *P. macropiper*, flowering branchlet (S.Dansie 20130, BRI). **C**, *P. fungiforme*, fruiting branchlet (B.Hyland 6367, QRS). **D**, *P. hederaceum* var. *longiorispicum*, fruiting branchlet (G.Stocker 987, QRS). **E**, *P. mestonii*, flowering branchlet (A.Dockrill 903, BRI). Scale bar = 20 mm. Drawn by W.A.Smith.

3. *Piper mestonii* F.M.Bailey in A.Meston & F.M.Bailey, *Rep. Exped. Bellenden-Ker* 54 (1889), as *P. mestoni*

T: Harvey's Ck, Russell R., Qld, *A.Meston & F.M.Bailey s.n.*; holo: BRI.

?*Piper harveyanum* Domin, *Biblioth. Bot.* 89(4): 557 (1921). T: Harvey's Ck, Qld, Jan. 1910, *K.Domin*; holo: ?PR *n.v.*

Illustrations: F.M.Bailey, *Compr. Cat. Queensland Pl.* t. 12, fig. 402 (1913); D.L.Jones & B.Gray, *Climbing Pl. Australia* 320 (1988).

Dioecious vine; hairs minute, transparent, sparse on most surfaces. Leaves with petioles 1–8.5 cm long; lamina broadly to narrowly ovate, 12–27 cm long, 2–20 cm wide, upper surface glabrous; base rounded, cuneate or cordate; apex acuminate; secondary veins 2 or 3, spaced along both sides of basal half of midvein. Male spikes not seen. Female spikes solitary, leaf-opposed, erect; rachis glabrous; peduncle 1–4 cm long; bracts shortly peltate. Flowers cream. Stigmas 2 (or 3); styles prominent, to 2 mm long. Fruit cylindrical, tapering apically, 2–6 cm long (–12 cm in New Guinea), 1–1.7 cm diam., red and fleshy when mature. Seeds numerous, closely packed within compound fruit. *Long Pepper, Queensland Long Pepper.* Fig. 46E.

Limited to a small region in north-eastern Qld, between Meerawa and Innisfail and W to the Atherton region, also New Guinea; climbing over tree roots and tree trunks, often along creek and river banks in rainforest and dense mixed swamp forest in lowland areas to 350 m alt. Flowers recorded Apr.; fruits Aug.–Sept. Map 268.

Qld: Parish of Bellenden Ker, *B.Gray 3582* (BRI); Bellenden Ker Ra., near Babinda, *R.L.Jago 108* (QRS); Bramston Beach, 17 km N of Innisfail, *M.Lazarides 8144* (NSW).

4. *Piper macropiper* Pennant, *Outl. Globe* 4: 242 (1800)

T: Moluccas, Indonesia; illustration in G.E.Rumphius, *Herb. Amboin.* 5: t. 28, fig. 1 (1747).

Piper rothianum F.M.Bailey, *Queensland Agric. J.* 5(4): 390, pl. 136 (1899), as *P. rothiana*. T: Atherton, Qld, *J.F.Bailey*; holo: BRI.

?*Piper rothianum* var. *gracilescens* Domin, *Biblioth. Bot.* 89(4): 558 (1921). T: Russell R., Qld, Jan. 1910, *K.Domin*; holo: ?PR *n.v.*

Illustrations: F.M.Bailey, *Compr. Cat. Queensland Pl.* t. 12, fig. 403 (1913); D.L.Jones & B.Gray, *Climbing Pl. Australia* 320 (1988), as *P. rothianum*; N. & H.Nicholson, *Austral. Rainforest Pl.* 4: 53 (1994), as *P. rothianum*.

Dioecious vine. Leaves with petioles 0.3–2 cm long; lamina broadly to narrowly ovate, 6.3–16.5 cm long, 3–10 cm wide, upper surface glabrous, transparent hairs on petiole extending along nerves on lower surface, glabrescent; secondary veins 2 or 3 pairs, radiating from midvein base or slightly above; base rounded, cuneate or cordate, commonly asymmetric with a small auricle; apex acuminate. Spikes solitary, leaf-opposed, pendulous; rachis hairy; peduncle 2.2–5.5 cm long; bracts peltate. Stamens 2 or 3. Female flowers cream. Stigmas 3, sessile. Fruiting spike cylindrical, 5–15 cm long, 0.6–1 cm diam. Fruit sessile, oblong-ovoid, closely packed, red when mature. Fig. 46B.

Occurs in N.T., in near-coastal regions from Sugarloaf Range NE to the Port Darwin region, Melville Is., and the northern end of the Mitchell Ra. in eastern Arnhem Land. Occurs in the Garraway Ra., northern Qld and E of Atherton between Cairns and Cardstone. Also Malesia, India, Sri Lanka and the Solomon Islands. Grows from lowland areas to 800 m alt., in rainforest, creeping along the ground, climbing over rocks, tree roots and up tree trunks to the canopy. Flowers Dec.–Jan.; fruits Feb. Map 269.

N.T.: Jumpup Jungle, Melville Is., *J.Russell-Smith 8150 & R.Petherick* (BRI, DNA); Banalminan R., E Arnhem Land, *J.Russell-Smith 8538 & I.Morris* (BRI, DNA). Qld: Noah Ck, *A.W.Dockrill 790* (BRI, CANB, QRS); Garraway Ra., *B.Hyland 9533* (BRI); S.F.R. 191, *A.K.Irvine 109* (BRI, CANB, NSW, QRS).

The hair on the stems, petioles, leaves and peduncles varies from absent to dense both on individuals and over the species. Leaves have a citrus smell when crushed. The name *Piper holtzei* was written on several MEL specimens collected near Port Darwin by Maurice Holtze in 1891, but apparently this name was never published.

5. *Piper interruptum* Opiz in K.Presl, *Reliq. Haenk.* 1: 157 (1828)

T: Luzon, Philippines, 1792, *T.Haenke s.n.*; holo: PR (photo seen).

Piper triandrum F.Muell., *Fragm.* 5: 197 (1866). T: Mackay's R., Qld, *J.Dallachy*; holo: MEL.

Illustrations: E.Quisumbing, *Philipp. J. Sci.* 43(1): figs 85, 1–3 & 86, pl. 17, fig. 1, pl. 21 (1930).

Dioecious vine. Leaves with petioles 0.4–3 cm long; lamina ovate to narrowly ovate-elliptic, 5–16 cm long, 2.2–8.5 cm wide, glabrous or with a few short hairs at base and on petiole; base cuneate or lobed, commonly asymmetric; apex acuminate; 1 or 2 pairs of secondary veins radiating from base of midvein, another pair slightly above. Spikes solitary, leaf-opposed, pendulous, 2–4 mm wide; peduncle 0.8–1.8 cm long; bracts adnate to rachis, broadened apically, margins free. Rachis hairy: male 5.2–11.5 cm long; female 7–19 cm long. Stamens 3. Stigmas 3, sessile. Fruiting spike 7–19 cm long, 2–4 mm diam. Fruit subsessile to sessile, ovoid to spherical, free, arranged at intervals along rachis, green to black.

Occurs in NE Qld from Kuranda SE along the Great Dividing Ra. to Mackay; also in Papua New Guinea and Malesia. Climbs up tree trunks in complex mesophyll and notophyll vine forest, littoral closed forest and dense tropical rainforest; commonly in basalt-derived soils at altitudes from 10 to 2500 metres. Fruits June–Aug. Map 270.

Qld: St Helens Ck, Eungella Natl Park, *A.R.Bean* 4951 (BRI); State Forest 268, N end of Paluma Ra., *P.I.Forster PIF15642* (BRI, MEL, QRS); The Boulders near Babinda, 1967, *W.Rijkers* (BRI); Yungaburra, *J.Wrigley & I.Telford NQ693* (CBG).

6. *Piper hederaceum* (Miq.) C.DC. in A.L.P.P. de Candolle, *Prodr.* 16(1): 353 (1869)

Cubeba hederacea Miq., *London J. Bot.* 4: 435 (1845). T: Five Islands, (near Wollongong), N.S.W., Jan. 1829, *A.Cunningham*; holo: ?K *n.v.*

Rainforest vine, mature growth glabrous. Leaves with petioles 0.5–5 cm long; lamina broadly to narrowly ovate, 3–15 cm long, 1.2–12 cm wide; base cuneate, rounded or slightly lobed, asymmetric or symmetric; apex acute to acuminate; veins palmate in cordate leaves or of 2–4 pairs of secondary veins radiating from midvein. Spikes solitary, leaf-opposed, narrow; rachis densely hairy; bract margins minutely ciliate. Female rachis 0.5–7 cm long; peduncle to 4 cm long. Stigmas 3–5, sessile. Fruit pedicellate, spherical, ovoid or obovoid, 0.3–0.6 cm diam., forming an obloid or cylindrical cluster, red at maturity; pedicel terete, base perpendicular to rachis.

Occurs from Iron Ra., north-eastern Qld, S to Mt Dromedary, southern N.S.W. Grows in tropical to temperate rainforest and vine forest. There are 2 varieties.

This species was previously known as *P. novae-hollandiae* Miq., but the name *P. hederaceum* (Miq.) C.DC. has priority, the epithet *hederaceum* predating *novae-hollandiae* by 21 years.

Fruit spherical to ovoid on a long narrow pedicel, 0.8–2.5 cm long, forming obloid to shortly cylindrical clusters on a rachis 0.5–2.7 cm long

6a. var. *hederaceum*

Fruit ovoid on a robust pedicel tapering towards the base, 0.8–1.6 cm long, forming cylindrical clusters on a rachis 2–7 cm long

6b. var. *longiorispicum*

6a. *Piper hederaceum* (Miq.) C.DC. var. *hederaceum*

Piper novae-hollandiae Miq., *Pip. Nov. Holl.* 6 (1866). T: Keppel Bay, Moreton Bay & Pine River, Qld, *F.Mueller*; syn: *n.v.*

Piper australasicum C.DC. in A.L.P.P. de Candolle, *Prodr.* 16(1): 353 (1869). T: Australia, *K.Hügel*; holo: ?W *n.v.*

Piper hugelianum (Miq.) Miq., *Pip. Nov. Holl.* 6 (1866); *Chavica huegeliana* Miq., *Linnaea* 26: 218 (1853). T: Port Jackson, N.S.W., *K.Hügel*, in *Herb. Zuccarini*; holo: ?M, ?TUB, *n.v.*

Piper paramattense C.DC. in A.L.P.P. de Candolle, *Prodr.* 16(1): 353 (1869). T: Paramatta, N.S.W., *K.Hügel*; holo: ?W *n.v.*

Illustrations: D.L.Jones & B.Gray, *Climbing Pl. Australia* 320 (1988); N. & H.Nicholson, *Austral. Rainforest Pl.* 4: 52 (1994).

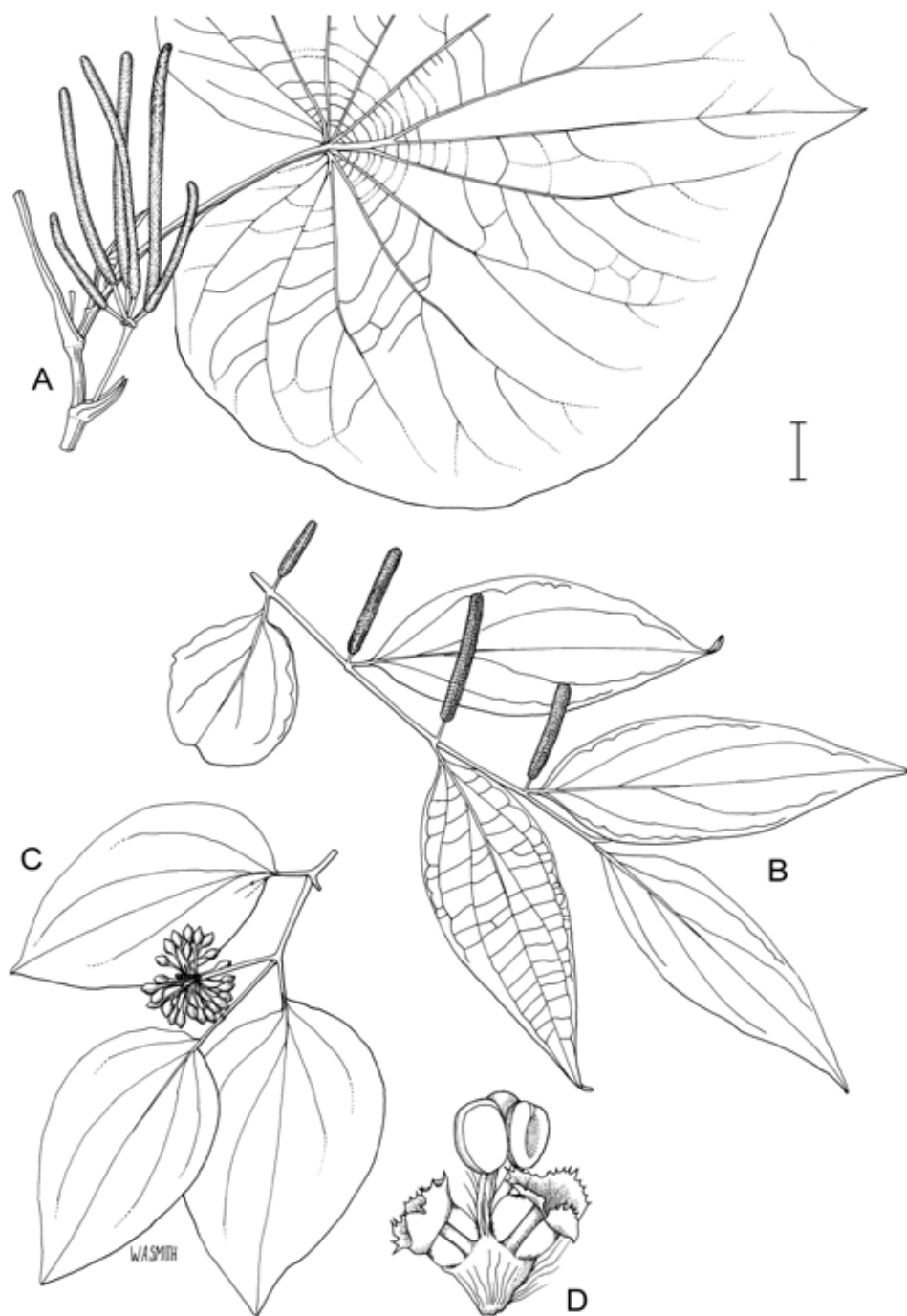


Figure 47. *Piper*. **A**, *P. umbellatum*, flowering branchlet (B.Hyland 9420, QRS). **B**, *P. fungiforme*, flowering branchlet, male (K.Williams 82063, BRI). **C–D**, *P. hederaceum* var. *hederaceum*. **C**, fruiting branchlet, female (L.Brass 20182, BRI); **D**, male flower (L.Durrington 734 & P.Sharpe, BRI). Scale bar: **A–C** = 20 mm; **D** = 0.4 mm. Drawn by W.A.Smith.

Diocious, monoecious or rarely bisexual vine. Male spikes: rachis to 6 cm long; peduncle 0.7–1.3 cm long. Stamens 3; anthers very large; filament as long as anthers. Female rachis 0.5–2.5 cm long; peduncle 0.9–4 cm long; bract 3-lobed, with margin minutely ciliate. Fruit spherical to ovoid, 0.8–2.5 cm long, 0.3–0.6 cm diam., forming obloid to shortly cylindrical clusters; pedicel narrow, uniform. *Giant Pepper Vine*. Fig. 47C–D.

Occurs from Iron Ra., north-eastern Qld, S to Mt Dromedary, southern N.S.W. Growing over tree roots, rocks and up tree trunks to the canopy, forming a dense mass with pendulous branches; along creek banks, forest margins and in disturbed sites in tropical to temperate rainforest and vine forest from lowland areas to 800 m alt. Flowers Apr.–Sept.; fruits most of year. Map 271.

Qld: McIlwraith Ra., Leo Ck Rd, *B.Hyland* 8436 (BRI); Mt Toowoona, *P.I.Forster* PIF11147 & *D.Halford* (BRI, L, MEL, QRS); Eungella Ra., *C.T.White* 12996 (BRI, CANB). N.S.W.: Barrington Tops Natl Park, Rocky Crossing, Williams R., *P.Hind* 954 (BRI, NSW); 22 km NNW of Dungog, *R.Story* 7327 (CANB, NSW).

6b. *Piper hederaceum* var. *longiorispicum* Spokes, *Fl. Australia* 2: 458 (2007)

T: Windsor Tableland, Qld, 5 Oct. 1971, *B.Hyland* 5538; holotype: BRI; isotype: NSW, QRS.

Piper sp. aff. *caninum*, D.L.Jones & B.Gray, *Climbing Pl. Australia* 305 (1988)

Piper novae-hollandiae var. Windsor Tableland (B.P.Hyland 5538), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 145 (2002)

Illustration: D.L.Jones & B.Gray, *op. cit.* 319, as *Piper* sp. aff. *caninum*.

Diocious vine. Male spikes not seen. Female spikes: rachis 2–7 cm long; peduncle 1–2.2 cm long; bract subsessile, with margin minutely ciliate, entire to slightly undulate. Fruit obovoid, 0.8–1.6 cm long, crowded in cylindrical clusters; pedicel tapering towards base. Fig. 46D.

Endemic in north-eastern Qld from Windsor Tableland–Mt Carbine area S to Cardstone, also in the Mackay region. Growing over tree roots, climbing to mid canopy or epiphytic on fallen logs in rainforest, generally at altitudes of 600–1200 m. Map 272.

Qld: Mt Lewis, *B.Gray* 114 (QRS); S.F.R. 756, Upper Charappa Logging Area, *G.C.Stocker* 987 (BRI, QRS).

7. *Piper caninum* Blume, *Verh. Batav. Genootsch. Kunsten* 3rd edn, 2: 214 (1826)

T: Java, *C.L.Blume*; holotype: ?L n.v.

Piper banksii Miq., *Pip. Nov. Holl.* 9 (1866). T: Endeavour R., [Qld], *J.Banks*; holotype: n.v.

Illustrations: F.M.Bailey, *Compr. Cat. Queensland Pl.* fig. 401 (1913), as *P. banksii*; E.Quisumbing, *Philipp. J. Sci.* 43(1): figs 62–65 (1930).

Diocious vine, sparsely covered with erect hairs. Leaves with petioles 0.4–3.6 (–8) cm long; lamina broadly to narrowly ovate or elliptic, 6–21 cm long, 1.7–12 cm wide, upper surface glabrous; base cuneate to lobed, asymmetric or symmetric; apex acuminate; 2 or 3 pairs of secondary veins arising basally from midvein, one pair slightly above. Spikes solitary, leaf-opposed, narrow; peduncle 0.4–3 cm long; bract margins entire, glabrous. Rachis hairy: male 1.5–7 cm long; female pendulous, 1.2–18 cm long. Stamens 2; anthers minute on long filaments. Stigmas 3 or 4, sessile. Fruit pedicellate, spherical to ovoid, 0.6–1.2 cm long, 0.25–0.7 cm diam., sparsely arranged into a narrow cylinder, red-brown at maturity; pedicel basally broad and flattened. Plate 38; Fig. 46A.

Occurs in north-eastern Qld from Iron Ra., SE along the Great Dividing Ra. S to Ingham and Palm Is., also Solomon Is. and throughout Malesia. Grows over tree roots and up tree trunks to considerable heights (with branches hanging down) in lowland rainforest and on rainforest margins to c. 300 m alt. Flowers Apr.–June; fruits May–Oct. Map 273.

Qld: Alexandra, near Noah Ck, *A.W.Dockrill* 634 (BRI, QRS); near Noah Ck, *B.Hyland* 5990 (BRI, NSW, QRS); Mulgrave Logging Area, *B.Hyland* 7247 (BRI, QRS); W Claudie R., *G.C.Stocker* 884 (BRI, QRS); Babinda Ck, The Boulders, *J.Wrigley* & *I.Telford* NQ814 (CANB).

PIPERACEAE

2. PEPEROMIA

P.I.Forster

Peperomia Ruiz & Pav., *Prodr.* 8 (1794), from the Greek *peperi* (pepper) and *homoios* (alike), referring to the similarity to *Piper*.

Type: *P. secunda* Ruiz & Pav.

Perennial herbs, terrestrial, epiphytic or lithophytic, bisexual. Indumentum present or often absent; hairs simple. Stems not thickened at nodes (in Australia). Leaves alternate, opposite or whorled, exstipulate, petiolate, usually palmately 3- or 5-veined, succulent to membranous. Spikes terminal, axillary, leaf-opposed or extra-axillary, terete, usually simple. Flowers sessile. Stamens 2. Ovary sessile or contracted at base and substipitate; apex obtuse or rostrate. Stigma simple, capitate. Fruit a drupe, sessile or shortly stipitate, ovoid, obovoid or turbinate, exserted, not fleshy, often mucilaginous.

A genus of over 1000 species with its centre of distribution in Central and South America. Five native and 1 naturalised species in Australia.

F.M.Bailey, *Peperomia*, *Queensland Fl.* 4: 1286 (1900); R.Düll, Die *Peperomia* - arten Afrikas, *Bot. Jahrb. Syst.* 93: 56–129 (1973); S.C.Tucker, Inflorescence and flower development in the Piperaceae. I. *Peperomia*, *Amer. J. Bot.* 67: 686–702 (1980); P.I.Forster, A taxonomic revision of the genus *Peperomia* Ruiz & Pav. (Piperaceae) in mainland Australia, *Austrobaileya* 4: 93–104 (1993); P.D.Bostock & P.I.Forster, Distribution, habitat and conservation status of *Peperomia bellendenkerensis* (Piperaceae), a rare endemic from the 'Wet Tropics' of north-eastern Queensland, *Austrobaileya* 4: 449–450 (1995).

1 Leaves alternate

2 Leaves 3-nerved at base, foliage with scattered trichomes

1. *P. bellendenkerensis*

2: Leaves 5-nerved at base, foliage glabrous

2. *P. pellucida*

1: Leaves opposite or whorled

3 Leaves in whorls of 4

4. *P. tetraphylla*

3: Leaves opposite or in a whorl of 3

4 Leaves opposite

3. *P. blanda*

4: Leaves usually in a whorl of 3

5 Stems and leaves glabrous or minutely hispid

5. *P. enervis*

5: Stems and leaves with dense trichomes

6. *P. hunteriana*

1. *Peperomia bellendenkerensis* Domin, *Biblioth. Bot.* 89(4): 559 (1928)

T: Bellenden Ker, Qld, Dec. 1909, *K.Domin* 2630; lecto: PR, *fide* P.I.Forster, *Austrobaileya* 4: 95 (1993).

Illustration: P.I.Forster, *op. cit.* 96.

Erect, fleshy herb to 15 cm high. Leaves alternate; lamina orbicular to elliptic-ovate, to 16 mm long, 13 mm wide, 3-nerved; base cuneate; apex obtuse to rounded. Spike terminal, solitary, to 4 cm long; peduncle 4–8 mm long; fertile axis 1.8–3.2 cm long. Flowers slightly sunken into axis, spaced 1–1.3 mm apart; bracts rounded, 0.4–0.5 mm long, 0.4–0.5 mm wide. Anthers c. 0.2 mm long, 0.2 mm wide. Ovary rounded, c. 0.4 mm long, 0.4 mm diam. Drupes papillose, c. 0.6 mm long.

Occurs in the 'Wet Tropics', north-eastern Qld. Grows in lowland rainforest on rock outcrops near water. Flowers Sept.–Dec.; fruits Dec. Map 274.

Qld: Reserve 1692, Majuba Ck, *P.D.Bostock* 1459 & *R.L.Jago* (BRI); Frenchmans Ck, Natl Park 226 Bartle Frere, *P.D.Bostock* 1549 & *R.J.Chinnock* (BRI); Josephine Falls, Natl Park 226 Bartle Frere, *P.D.Bostock* 1611 & *R.J.Chinnock* (BRI); State Forest 757, Nyleta Ck, 8 km SW of Silkwood, *P.I.Forster* 27641 (BRI); Weinerts Ck, Babinda, *R.L.Jago* 3055 (BRI).

Rarely collected.

2. **Peperomia pellucida* (L.) Kunth, *Nov. Gen. Sp.* 1: 64 (1815)

Piper pellucidum L., *Sp. Pl.* 1: 30 (1753). T: '*Piper foliis cordatis, caule procumbente*' in Linnaeus, Hort. Cliff., t. 4, 1738; lecto: LINN, fide W.T.Stearn in *Introd. Linnaeus' Sp. Pl.* (Ray Soc. edn) 47 (1957).

Illustration: R.Düll, *op. cit.* 73.

Erect, fleshy herb to 30 cm high. Leaves alternate; lamina ovate-elliptic, to 3.5 cm long, 3 cm wide, 5-nerved; base rounded to cuneate; apex acute. Spike terminal or axillary in upper axils, solitary, to 7 cm long; peduncle 5–13 mm long; fertile axis 2–5 cm long. Flowers not sunken into axis, spaced 0.4–1 mm apart; bracts rounded, 0.3–0.4 mm long, 0.2–0.3 mm wide. Anthers oblong, c. 0.1 mm long, 0.1 mm wide. Ovary rounded-oblong, c. 0.3 mm long, 0.3 mm diam. Drupes sticky, papillose in ridges, 0.5–0.6 mm long.

Occurs as an occasional garden or nursery escape in W.A., N.T. and Qld. Native to the Americas and also naturalised in Malesia. Flowers Nov.–Mar.; fruits Jan.–July. Map 275.

W.A.: corner of Frederick & Weld St, Broome, A.A.Mitchell 4293 (BRI, PERTH). N.T.: Darwin, H.S.McKee 8264 (DNA); Darwin, Lakes Cres., Northlakes, J.Gallen 111 (DNA). Qld: Lamond Hill, Iron Ra., P.I.Forster 13582 et al. (BRI, QRS); Qld Agric. Coll. Nursery, Gatton, J.Swarbrick WNA193 (BRI).

3. *Peperomia blanda* (Jacq.) Kunth, *Nov. Gen. Sp.* 1: 67 (1816)

var. **floribunda** (Miq.) H.Huber, *Revis. Handb. Fl. Ceylon* 6: 294 (1987)

Peperomia arabica var. *floribunda* Miq., *Syst. Pip.* 122 (1843). T: Goudot in herb. Delessert; holo: G n.v.

Peperomia leptostachya Hook. & Arn., *Bot. Beechey Voy.* 96 (1832); *P. blanda* var. *leptostachya* (Hook. & Arn.) R.Düll, *Bot. Jahrb. Syst.* 93: 110 (1973) non *P. leptostachya* (Nutt.) Chapman [= *P. humilis* A.Dietr.], fide, D.E.Boufford, *J. Arnold Arbor.* 63: 820 (1982). T: Hawaii (Sandwich Is.), Oahu (on Kew sheet), Beechey; ?holo: G n.v., fide B.Verdcourt, *Fl. Trop. E. Africa* 18 (1996); ?iso: K.

Peperomia dindygulensis Miq., *Syst. Pip.* 122 (1843). T: Prov. Dindygul [Arabian Peninsula], Wallich 6663A; holo: K-W.

Peperomia valantoides Miq., *Syst. Pip.* 174 (1843); *P. reflexa* var. *valantoides* (Miq.) C.DC. in A.L.P.P. de Candolle, *Prodr.* 16(1): 452 (1869). T: Brasil; holo: n.v.

Peperomia leptostachya var. *laxiflora* Miq., *Pip. Nov. Holl.* 6 (1866). T: Pine-river, Qld, F.Mueller; holo: n.v.

Peperomia baueriana var. *brisbaniana* C.DC., *Prodr.* 16: 414 (1869). T: Brisbane River, [Qld], 1855, F.Mueller; holo: G-DC; iso: MEL.

Illustrations: R.Düll, *Bot. Jahrb. Syst.* 93: 80, abb. 16 (1973); K.A.W.Williams, *Native Pl. Queensland* 2: 217 (1984); P.I.Forster, *Austrobaileya* 4: 98, 100 (1993).

Erect, succulent herb to 30 cm high. Leaves opposite, rarely whorled; lamina ovate-elliptic to obovate, to 3 cm long, 2.5 cm wide, 5-nerved; base cuneate to rounded; apex obtuse or acute. Spikes terminal or axillary in upper axils, 1–3-branched, to 13 cm long; peduncle 5–15 mm long; fertile axis 3–11.5 cm long. Flowers not sunken into axis, spaced 1.4–2 mm apart; bracts rounded, 0.6–0.9 mm long, 0.7–0.8 mm wide. Anthers c. 0.2 mm long, 0.3 mm wide. Ovary rounded, c. 0.4 mm long, 0.4 mm diam. Drupes sticky, papillose, c. 0.8–0.9 mm long. Fig. 48C.

Occurs from northern Qld to northern N.S.W. Also in Melanesia, Malesia, Africa and Asia. Grows terrestrially, epiphytically or lithophytically in rainforest, vine forest, vine thickets, or rock outcrops. Flowers Jan.–May; fruits Apr.–July. Map 276.

Qld: Finch Hatton Gorge, Eungella Ra., c. 48 km W of Mackay, M.Fagg 665 (AD, BRI); Garraway Ck, P.I.Forster 4225 & D.J.Liddle (BRI); Mt Windsor Tableland, 27 May 1986, R.Lockyer (BRI, QRS); Mt Bauple, C.T.White 3534 (BRI). N.S.W.: Middle Arm Ck, 6 km WSW of Limpinwood, P.I.Forster 2610, L.H.Bird & M.C.Tucker (BRI).

Putative hybrids between *P. blanda* var. *floribunda* and *P. tetraphylla* have been recorded on two occasions (i.e. Bullocky Toms Ck, Mt Spec Natl Park, S of Ingham, Qld, A.R.Bean 4013 (BRI); Springbrook, Qld, Mar. 1997, G.McDonald s.n. (BRI)). The putative hybrids are rare and generally occur together with both parents.



Figure 48. *Peperomia*. **A**, *P. tetraphylla*, flowering stem (P.Forster 3584 *et al.*, BRI). **B**, *P. enervis*, flowering stem (Tucker *s.n.*, Oct. 1986, BRI). **C**, *P. blanda* var. *floribunda*, flowering stem (P.Forster 2784, BRI). Scale bars: **A–C** = 10 mm. Drawn by L.G.Jessup. Reproduced with permission from *Austrobaileya* 4: 93–104 (1993).

4. *Peperomia tetraphylla* (G.Forst.) Hook. & Arn., *Bot. Beechey Voy.* 97 (1832)

Piper tetraphyllum G.Forst., *Fl. Ins. Austr.* 5 (1786). T: Society Islands, *J.R.Forster & J.G.Forster*; lecto: K; isolecto: LE, *fide* J.Florence, *Fl. Polynésie Française* 189 (1997).

Piper reflexum L.f., *Suppl. Pl.* 91 (1781); *Peperomia reflexa* (L.f.) A.Dietr., *Sp. Pl.* 6th edn, 1: 180 (1831), *nom. illeg. non Peperomia reflexa* Kunth (1815). T: South Africa, *C.P.Thunberg*; *holo: n.v.*

Peperomia affinis Domin ex F.M.Bailey in F.M.Bailey, *Queensland Agric. J.* 24: 222 (1910). T: Atherton, Qld, *J.F.Bailey*; lecto: BRI, *fide* P.I.Forster, *Austrobaileya* 4: 99 (1993).

Illustrations: R.Düll, *Bot. Jahrb. Syst.* 93: 74 abb. 2 (1973); K.A.W.Williams, *Native Pl. Queensland* 2: 217 (1984); P.I.Forster, *Austrobaileya* 4: 98, 102 (1993).

Erect to decumbent, succulent herb to 10 cm high. Leaves in whorls of 4; lamina ovate-rhomboidal to orbicular, to 14 mm long, 9 mm wide, secondary veins obscure; base cuneate to rounded; apex obtuse. Spike terminal, solitary, to 43 mm long; peduncle 7–8 mm long, fertile axis 1–3.5 cm long. Flowers deeply sunken into axis, spaced 0.6–1 mm apart; bracts rounded, 0.3–0.5 mm long, 0.3–0.5 mm wide. Anthers c. 0.2 mm long, 0.4 mm wide. Ovary rounded, 0.4–0.6 mm long, 0.3–0.5 mm diam. Drupes sticky, not papillose, c. 1 mm long. Plate 39; Fig. 48A.

Occurs from northern Qld to central N.S.W. Also in Africa, the Americas, Malesia, Asia, New Zealand and Melanesia. Grows as an epiphyte or lithophyte in rainforests. Flowers Jan.–May; fruits Apr.–June. Map 277.

Qld: Davies Creek Logging Area, 13.5 km past Davies Creek Falls, *P.I.Forster 3915* (BRI); Mt Cooroy, *P.I.Forster 4817 & L.H.Bird* (BRI, CANB, K, MEL); Kroombit State Forest 316, *N.C.Gibson 642* (BRI). N.S.W.: Malara State Forest, c. 32 km NE of Tenterfield, 11 May 1961, *E.F.Constable* (BRI); Moss Gardens, *P.I.Forster 6214 et al.* (BRI).

Putative hybrids between *P. blanda* var. *floribunda* and *P. tetraphylla* occur. See note under previous species.

5. *Peperomia enervis* C.DC. & F.Muell., *Victorian Naturalist* 8: 109 (1891)

T: Bartle Frere, Qld, 1890, *S.Johnson*; lecto: MEL; isolecto: BRI, *fide* P.I.Forster, *Austrobaileya* 4: 101 (1993).

Peperomia johnsonii C.DC., *Ann. Conserv. Jard. Bot. Geneve* 1898: 286 (1898). T: in Australiae borealis-orientalis monte Bartle Frere, Qld, *Stephen Johnson in h. Cand.*; *holo: ?G-DC n.v.*

Illustrations: K.A.W.Williams, *Native Pl. Queensland* 3: 243 (1988); P.I.Forster, *Austrobaileya* 4: 98, 102 (1993).

Erect, succulent herb to 30 cm high. Leaves usually in a whorl of 3, occasionally opposite; lamina cuneate to obovate, to 15 mm long, 7 mm wide, secondary venation obscure; base cuneate; apex obtuse. Spike terminal, solitary or very rarely paired, to 6 cm long; peduncle 5–8 mm long; fertile axes 2.1–5 cm long. Flowers slightly sunken into axis, spaced 0.9–1.3 mm apart; bracts rounded, 0.4–0.5 mm long, 0.4–0.5 mm wide. Anthers c. 0.2 mm long, 0.2 mm wide. Ovary rounded, 0.3–0.4 mm long, 0.2–0.3 mm diam. Drupes papillose, c. 1 mm long. Fig. 48B.

Endemic to the wet tropics of northern Qld, with disjunct populations in the Eungella region. Grows as an epiphyte or lithophyte in high altitude rainforest. Flowers Jan.–May; fruits Apr.–July. Map 278.

Qld: Bartle Frere, *S.T.Blake 9814* (BRI); Broken River walking track, Eungella Natl Park, *P.I.Forster 8071* (BRI); Kauri Creek road, 4 km from Tinaroo Dam end, State Forest 185 Danbulla, *P.I.Forster 9547* (BRI, K, L, MEL, QRS); Forest Reserve 756, Carter Logging Area, *B.Hyland 4116* (BRI); Zillie Falls, Theresa Creek road, Millaa Millaa area, *K.A.W.Williams 80116* (BRI).

Closely allied to *P. tenuipila* C.DC. from New Guinea, which differs mainly in the densely hirsute stems and young leaves.

6. *Peperomia hunteriana* P.I.Forst., *Austrobaileya* 5: 573, fig. 1 (1999)

T: Wooroonooran Natl Park, Bartle Frere, Qld, 25 Oct. 1997, *P.I.Forster et al.*, *PIF21777*; *holo: BRI*; *iso: MEL, QRS*.

Illustration: P.I.Forster, *loc. cit.*

Erect, succulent herb to 10 cm high. Leaves usually in a whorl of 3, occasionally 4; lamina obovate to orbicular, to 15 mm long, 10 mm wide, densely hairy, secondary venation obscure; base cuneate to rounded; apex notched, obtuse or rounded. Spike terminal, solitary or up to 5 branches, to 5 cm long; peduncle 5–12 mm long; fertile axes 0.5–4.5 cm long. Flowers slightly sunken into axis, spaced 1–1.5 mm apart; bracts rounded, 0.4–0.5 mm long, 0.4–0.5 mm wide. Anthers c. 0.4 mm long, 0.3 mm wide. Ovary rounded, 0.2–0.3 mm long, 0.2–0.3 mm diam. Drupes not seen.

Endemic to the wet tropics of northern Qld. Grows as a lithophyte on exposed granite outcrops adjacent to or within simple, microphyll to notophyll vineforest at 1100–1520 m. Flowers Oct.–Dec. Map 279.

Qld: slopes of Mt Demi, *L.J.Brass 2084* (BRI); Black Mtn, Daintree Natl Park, *P.I.Forster et al., PIF22960* (BRI, QRS); Bartle Frere, *J.Hunter JH1621* (BRI); summit area of Mt Lewis, *J.M.Powell 783 & J.Armstrong* (BRI, NSW).

This species appears nearest to *P. enervis* but is immediately distinguishable by the copious indumentum on the foliage, the thinner peduncles and the ovaries that are much smaller than the floral bracts. The leaf lamina also tends to be more obovate in *P. hunteriana* as opposed to the largely oblong ones encountered in *P. enervis*.

Peperomia hunteriana is an inconspicuous species and while poorly collected is probably not infrequent at higher altitudes in the Wet Tropics.

ARISTOLOCHIACEAE

*E.M.Ross*¹ & *D.A.Halford*²

Vines or less often perennial herbs or small to large erect shrubs. Stems of woody species showing broad medullary rays. Leaves spirally arranged, simple, entire or lobed, petiolate; true stipules absent. Inflorescence axillary or cauline, racemose or cymose, or flowers solitary or clustered, with or without bracts. Flowers bisexual, zygomorphic or rarely actinomorphic, usually fetid. Calyx gamosepalous, petaloid, tubular at least below, 1–3-lobed or lobeless. Petals absent (in Australia), much reduced or well developed. Stamens 6–24 in 1 or 2 series around apex of ovary or stylar column; filaments thick, short, free or scarcely distinguishable from column; anthers free or adnate with 2 parallel loculi, extrorse, opening longitudinally. Ovary inferior or rarely semi-superior, 4–6-locular or imperfectly locular; styles thick, short, united into a column, divided into 3–many stigmatic lobes; ovules numerous per cell. Fruit usually capsular or rarely indehiscent. Seeds numerous, often immersed in pulpy endocarp; raphe sometimes thickened or winged; endosperm copious, fleshy; embryo small.

A family of 12 genera and c. 475 species in tropical and warm temperate regions; 2 genera and 17 species in Australia.

Several species of *Aristolochia* and *Pararistolochia* are used as food plants by butterfly larvae, particularly by the birdwing butterflies (*Troides* spp.). Some species are pollinated by flies or midges.

G.Bentham, Aristolochiaceae, *Fl. Austral.* 6: 206–209 (1873); F.M.Bailey, Aristolochiaceae, *Queensland Fl.* 4: 1281–1283 (1901); J.Hutchinson, Aristolochiaceae, *Families Fl. Pl.* 2nd edn, 1: 414–415 (1959); C.A.Backer & R.C.Bakhuizen van den Brink Jr., Aristolochiaceae, *Fl. Java* 1: 161–164 (1963); A.Cronquist, Aristolochiaceae, *Integrated Syst. Classif. Fl. Pl.*

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ARISTOLOCHIACEAE

90–93 (1981); B.D.Morley & H.R.Toelken (eds), *Aristolochiaceae, Fl. Pl. Australia* 46–47 (1983); Ding Hou, *Aristolochiaceae, Fl. Males. ser. I*, 10: 53–108 (1984); H.Huber, *Samenmerkmale und Gliederung der Aristolochiaceen, Bot. Jahrb. Syst.* 107 (1–4): 277–320 (1985); B.Verdcourt, *Aristolochiaceae, Fl. Trop. E. Africa* 1–11 (1986); D.J.Mabberley, *Aristolochiaceae, Pl. Book* 43–44 (1987); D.L.Jones & B.Gray, *Aristolochiaceae, Climbing Pl. Australia* 148–155 (1988); D.J.Du Puy, *Aristolochiaceae, Fl. Australia* 50: 77–78 (1993); H.Huber, *Aristolochiaceae*, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 129–137 (1993); M.J.Parsons, *New species of Aristolochia and Pararistolochia (Aristolochiaceae) from Australia and New Guinea, Bot. J. Linn. Soc.* 120: 199–237 (1996).

KEY TO GENERA

Fruit indehiscent, slightly to strongly ribbed; calyx limb 3-lobed

1. PARARISTOLOCHIA

Fruit dehiscent; calyx limb 1- or 2-lobed

2. ARISTOLOCHIA

1. PARARISTOLOCHIA

Pararistolochia Hutch. & Dalziel, *Bull. Misc. Inform. Kew* 1928: 22 (1928); from the Greek prefix *para-* (similar to) and *Aristolochia*, the name of a similar, related genus.

Type: *P. flos-avis* (A.Chev.) Hutch. & Dalziel

Twining herbaceous or robust vines with mostly little-branched stems sometimes extending up to 30 m or more. Roots fibrous or tuberous. Leaves entire, mostly coriaceous; pseudo-stipules absent. Flowers zygomorphic, borne on old wood or on young leafy shoots, axillary or leaf-opposed, solitary or in few-flowered racemes. Calyx tube sigmoid, inflated basally forming utricle that encloses sexual organs, then constricted before slightly or gradually widened upwards into limb; limb regularly or irregularly 3-lobed; lobes spreading or connate at apex. Petals absent. Anthers 6–24, sessile, entirely united with dorsal side of stigma (including stigmatic lobes). Ovary inferior, 6-locular; stigmatic lobes 6–12 (6 in Australia). Fruit capsular, indehiscent, slightly to strongly 6-ribbed, somewhat fleshy, yellow to orange when ripe. Seeds dorsiventrally compressed, flat or convex-concave, without lateral wing; elaiosome absent.

A genus of over 31 species in Africa, Malesia and Australia. In Australia 7 endemic species.

O.Poncy, *Le genre Pararistolochia, Aristolochiaceae D'Afrique tropicale, Adansonia* ser. 2, 17: 465–494 (1978).

1 Flowers with filiform appendages on tips of calyx lobes

2 Leaves triangular-ovate or oblong-ovate; flowers in condensed racemes on older stems; calyx tube greyish white with purple veins; calyx lobes purple on edge, yellow inside [Bellenden Ker Range area, Qld]

1. P. australopithecurus

2: Leaves oblong-triangular or sagittate; flowers solitary or in 2- or 3-flowered elongated racemes; calyx tube green to greenish yellow with maroon veins; calyx lobes yellow inside [Mt Lewis area, Qld]

2. P. sparusifolia

1: Flowers without filiform appendages

3 Plants with straight and hooked hairs on underside of leaves

4 Upper leaves linear-lanceolate, more than 4 times as long as wide; calyx lobes 3–4 mm long; herbaceous vine of woodlands

7. P. linearifolia

4: Upper leaves not as above, less than 4 times as long as wide; calyx lobes 7–10 mm long; vigorous, slender to robust vine of rainforests

4. P. deltantha

3: Plants glabrous or pubescent, but never with hooked hairs

- 5 Leaf base truncate or rounded, occasionally oblique; mature leaves glabrous

5. *P. laheyana*

- 5: Leaf base cordate or subcordate; mature leaves ±glabrous above, pubescent on veins below

- 6 Calyx cream with rich purplish brown stripes and spots [Atherton and south-eastern Qld, north-eastern N.S.W.]

6. *P. praevenosa*

- 6: Calyx maroon with darker longitudinal or reticulate veins [Iron Ra., Cape York Penin., Qld]

3. *P. peninsulensis*

1. *Pararistolochia australopithecus* Michael J.Parsons, *Bot. J. Linn. Soc.* 120: 227 (1996)

T: State Forest Reserve 310, Qld, 8 Nov. 1977, *B.Gray* 784; holo: QRS.

Aristolochia sp. (Bartle Frere), D.L.Jones & B.Gray, *Climbing Pl. Australia* 154 (1988)

Aristolochia sp. (Woopen Creek, *G.Sankowsky* 685 & *N.Sankowsky*), R.Henderson (ed.), *Queensland Vasc. Pl.* 26 (1994); R.Henderson (ed.), *Queensland Vasc. Pl.* 22 (1997)

Illustrations: D.L.Jones & B.Gray, *op. cit.* 151, as *Aristolochia* sp. (Bartle Frere); H.Matsuka, *Nat. Hist. Birdwing Butterflies* 276 (2001); W.Cooper, *Fr. Austral. Trop. Rainforest* 77 (2004).

Understorey vine; stems to 30 m long; young branches ferruginous-pubescent, glabrescent. Leaves: petiole 1.5–3.5 cm long; lamina triangular-ovate to oblong-ovate, 10–20 (–26) cm long, 2.5–9.5 (–11.5) cm wide, appressed pubescent, glabrescent above, pubescent mainly on veins with straight and rarely hooked hairs below; base cordate; apex acuminate. Inflorescences axillary, condensed 2- or 3-flowered racemes on older stems. Calyx greyish white with purple veins, pubescent outside; utricle 14–17 mm long; tube 20–30 mm long; lobes erect, remaining joined together at apices, broadly triangular, 12–16 mm long, purple on revolute edge, yellow inside; apex filiform, 22–27 (–40) mm long. Fruit elongate-ovoid, 5–8 cm long, 2.5–3.5 cm diam. Seed not seen. Plate 41; Fig. 49H.

Endemic in north-eastern Qld in the Bellenden Ker Ra. area, between the Little Mulgrave and South Johnstone Rivers; in complex mesophyll vine forest. Flowers Oct.–Nov.; fruits July–Oct. Map 280.

Qld: cultivated from cuttings at Woopen Ck, *G.Sankowsky* 685 & *N.Sankowsky* (BRI); Beatrice R., Oct. 1974, *R.Collins* (QRS); Gregory Falls - lower Palmerston via Innisfail, *L.J.Webb* & *J.G.Tracey* 6833 (BRI); Jordan L.A., 16.5 km SE of Millaa Millaa, *J.W.Jessup et al. GJM2062* (BRI).

This species has affinities with the Malesian species *P. momandul* (K.Schum.) Michael J.Parsons. It has been recorded as a host for the larvae of the Cairns Birdwing Butterfly, *Troides euphorion*, and the Redbodied Swallowtail, *Atrophaneura polydorus queenslandicus*.

2. *Pararistolochia sparusifolia* Michael J.Parsons, *Bot. J. Linn. Soc.* 120: 228 (1996)

T: State Forest Reserve, Bushy Logging Area, Qld, 2 Dec. 1982, *B.Gray* 2876; holo: QRS; iso: BRI.

Aristolochia sp. (Mt Lewis), D.L.Jones & B.Gray, *Climbing Pl. Australia* 154 (1988)

Illustration: D.L.Jones & B.Gray, *op. cit.* 151, as *Aristolochia* sp. (Mt Lewis).

Slender twiner; stems to 10 m long; young branches minutely pubescent, glabrescent. Leaves: petiole 1–2.5 cm long; lamina oblong-triangular or sagittate, 7–15 cm long, 2–5 cm wide, ±glabrous on both surfaces; base cordate to sagittate; apex acuminate. Flowers leaf-opposed, solitary or in elongated axillary 2- or 3-flowered racemes. Calyx green to greenish yellow with maroon veins, puberulent outside; utricle 8–13 mm long; tube 16–22 mm long; lobes erect, remaining joined together at apices, semi-circular, 10–12 mm long, yellow inside; apex filiform, 5–7 mm long. Fruit elongate-ovoid, 4–5.5 cm long, c. 2.5 cm diam. Seed not seen. Fig. 49G.

Known only from near Mt Lewis, northern Qld, at 1100–1300 m; understorey vine in rainforest. Flowers Nov.–Jan.; fruits May–Dec. Map 281.

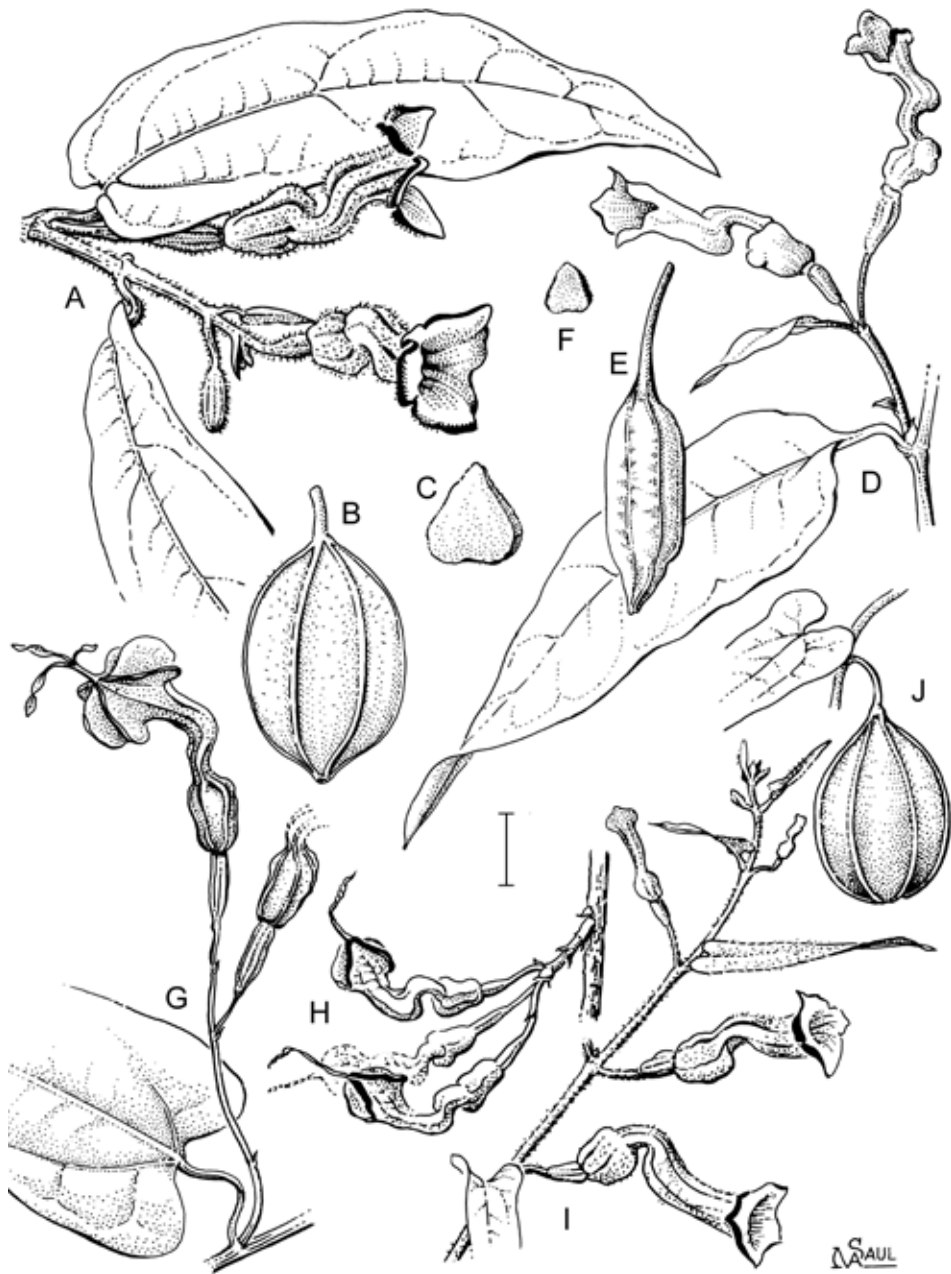


Figure 49. *Pararistolochia*. **A–C**, *P. praevenosa*. **A**, flowering twig (Chapel Hill, D.Sands *s.n.*, BRI); **B**, fruit; **C**, seed (**B–C**, Chapel Hill, E.M.Ross *s.n.*, BRI). **D–F**, *P. laheyana*. **D**, flowering twig (Nightcap Ra., R.Moffatt *s.n.*, BRI); **E**, fruit; **F**, seed (**E–F**, W.J.F.McDonald 1854 & T.D.Stanley, BRI). **G**, *P. sparusifolia*, inflorescence (B.Gray 2876, QRS). **H**, *P. australopithecurus*, inflorescence (B.Gray 784, QRS). **I–J**, *P. linearifolia*. **I**, flowering twig (Iron Ra., G.&N. Sankowsky *s.n.*, BRI); **J**, fruit (Vrylia Pt, A.Morton *s.n.*, QRS). Scale bar: **A**, **B**, **D**, **E**, **G–J** = 10 mm; **C**, **F** = 5 mm. Drawn by M.A.Saul.

Qld: Mt Lewis, *B.Gray 131* (QRS); Pinnacle Rock track, 4.5 km W of Karnak, *P.I.Forster PIF10712 et al.* (BRI); Mt Lewis, Nov. 1982, *G.Sankowsky* (QRS); Mt Misery E of Mt Spurgeon, 15.7 km NE of Mt Carbine, *J.W.Jessup et al. GJM753* (BRI).

This species has affinities with the Malesian species *P. momandul* (K.Schum.) Michael J.Parsons. It has been recorded as a host of the larvae of the Cairns Birdwing Butterfly, *Troides euphorion*.

3. *Pararistolochia peninsulensis* Michael J.Parsons, *Bot. J. Linn. Soc.* 120: 234 (1996)

T: Iron Range, Qld, 20 Nov. 1985, *B.Gray 4239*; holo: QRS.

Aristolochia sp. (Iron Ra. rainforest), D.L.Jones & B.Gray, *Climbing Pl. Australia* 155 (1988), as *Aristolochia* sp.

Aristolochia sp. (Iron Ra., *G.Sankowsky 382 et al.*), R.Henderson (ed.), *Queensland Vasc. Pl.* 26 (1994)

Aristolochia sp. (Lamond Hill *G.Sankowsky+ 382*), R.Henderson (ed.), *Queensland Vasc. Pl.* 22 (1997)

Illustrations: K.A.W.Williams, *Native Pl. Queensland* 3: 29 (1987) as *Aristolochia* sp.; D.L.Jones & B.Gray, *op. cit.* 152, as *Aristolochia* sp. (Iron Range rainforest); W.Cooper, *Fr. Austral. Trop. Rainforest* 77 (2004).

Slender vine; stems to 15 m long; young branches pubescent. Leaves: petiole 1–3 cm long; lamina narrowly ovate-elliptic to narrowly oblong-elliptic, 9–21 cm long, 2–9.5 cm wide, glabrous above, appressed or spreading pubescent mainly on veins below; base cordate; apex acuminate. Flowers axillary, solitary or paired, ±sessile. Calyx maroon with darker longitudinal and reticulate veins, pubescent outside; utricle 8–10 mm long; tube c. 15 mm long; lobes spreading, broadly obtuse, 5–7 mm long, dark maroon inside; apex obtuse. Fruit obloid, 3–6 (–10) cm long, 2–3 cm diam. Seed triangular, 6–8 mm long, 5–7 mm diam., 3–4 mm thick, convex on one side, deeply grooved on the other, smooth. Plate 42.

Restricted to Iron Ra., Cape York Penin., Qld; in notophyll vine forest. Flowers Nov.–Jan.; fruits Apr.–May. Map 282.

Qld: Claudie R., 4 km ENE of Mt Tozer, *D.G.Fell 2556* (BRI); from N of Pascoe R., grown from seedlings collected by B.Gray, *G.Sankowsky 469* & *N.Sankowsky* (BRI); grown from seedlings collected at Iron Ra., *G.Sankowsky 470* & *N.Sankowsky* (BRI).

This species has been recorded as a host for the larvae of the Cape York Birdwing Butterfly, *Troides priamus pronomus*, and the Redbodied Swallowtail, *Atrophaneura polydorus queenslandicus*.

4. *Pararistolochia deltantha* (F.Muell.) Michael J.Parsons, *Bot. J. Linn. Soc.* 120: 206 (1996)

Aristolochia deltantha F.Muell., *Fragm.* 6: 179 (1868). T: Rockingham's Bay, Qld, *J.Dallachy*; lecto: MEL 1553306, *fide* M.J.Parsons, *Bot. J. Linn. Soc.* 120: 206 (1996).

Illustrations: K.A.W.Williams, *Native Pl. Queensland* 3: 29 (1987); D.L.Jones & B.Gray, *Climbing Pl. Australia* 150 (1988), both as *Aristolochia deltantha*; H.Matsuka, *Nat. Hist. Birdwing Butterflies* 279 (2001).

Slender to robust vine; stems to 20 m long; young branches retrorsely pubescent, glabrescent. Leaves: petiole 0.7–2.5 (–4.5) cm long; lamina oblong-ovate or oblong-triangular to slightly lyrate-oblong, 3–18.5 (–25) cm long, 1.3–7.5 (–15) cm wide, glabrous above, puberulent to pubescent with straight and hooked hairs below; base cordate; apex acuminate or sometimes acute. Flowers leaf-opposed, solitary or in long axillary racemes. Calyx pinkish or mauve with purplish veins or streaks, pubescent outside; utricle 9–11 mm long; tube 13–16 mm long; lobes erect, folded, broadly obtuse, 7–10 mm long, dark maroon on revolute margin, with marginal fringe of white hairs; apex obtuse. Fruit obloid, 3–7.5 cm long, 2–3 cm diam. Seed triangular to heart-shaped, 5.5–7 mm long, 5–8 mm diam., 0.5–1 mm thick, flat; surface minutely textured.

Recorded from Iron Ra., Cape York Penin., to Paluma Ra. near Townsville, Qld; in rainforest. Flowers Sept.–Jan.; fruits Sept.–Mar. Map 283.

Qld: Leo Creek Mine area, McIlwraith Ra., *P.I.Forster et al. PIF10182* (BRI); Kuranda, July 1969, *C.W.McCubbin* (MEL); S.F.R. 194 c. 6 km WSW of Atherton, *V.K.Moriarty 2025* (QRS); SFR 194, Compartment 53, *B.Gray 248* (BRI, QRS); Rex Ra., Little Mossman Logging Area, State Forest 141, *P.I.Forster PIF9572* (BRI).

This species has been recorded as a host for the larvae of the Cairns Birdwing Butterfly, *Troides euphorion*, and the Redbodied Swallowtail, *Atrophaneura polydorus queenslandicus*.

5. *Pararistolochia laheyana* (F.M.Bailey) Michael J.Parsons, *Bot. J. Linn. Soc.* 120: 206 (1996)

Aristolochia deltantha var. *laheyana* F.M.Bailey, *Queensland Agric. J.* 28: 199 (1912). T: MacPherson Ra., Qld, Feb. 1912, C.T.White; holo: BRI.

Illustrations: T.D.Stanley & E.M.Ross, *Fl. SE Queensland* 1: 184, fig. 26C (1983); D.L.Jones & B.Gray, *Climbing Pl. Australia* 150 (1988); both as *A. deltantha* var. *laheyana*; H.Matsuka, *Nat. Hist. Birdwing Butterflies* 282 (2001).

Wiry vine; stems to 10 m long; young branches glabrous or puberulent. Leaves: petiole 0.4–2.8 cm long; lamina narrowly oblong-ovate to oblong-triangular, 3.5–16.5 cm long, 0.9–5.5 cm wide, glabrous on both surfaces; base rounded to truncate or occasionally oblique; apex acuminate. Flowers solitary, leaf-opposed or on axillary shoots. Calyx creamy white or greenish white, spotted and veined purplish, puberulent outside; utricle 7–12 mm long; tube 20–30 mm long; lobes spreading, broadly triangular, asymmetrical, one broader than remaining pair, 2.5–6 mm long, yellow with mottled maroon inside; apex mucronate or acute. Fruit obloid, 2–2.5 cm long, 1–1.4 cm diam. Seed triangular, 4–5 mm long, 3–4 mm diam., 1–1.5 mm thick, convex on both sides; surface minutely textured. Fig. 49D–F.

Recorded in Qld and N.S.W. from the McPherson Ra. area and adjacent ranges, at 600–1200 m, in complex notophyll vine forest. Flowers Dec.–Apr.; fruits Feb.–July. Map 284.

Qld: near Orchid Sanctuary, near O'Reilly's Guest House on Lamington Plateau, Mar. 1978, T.D.Stanley s.n. (BRI); Binna Burra, Roberts Plateau, Lamington Natl Park, R.F.Thorne 20350 & S.T.Blake (BRI). N.S.W.: Wiangeri State Forest, May 1977, M.J.Russell W1 (BRI); cultivated at Alstonville from cutting material originally from Mt Nardi, Nightcap Ra., Apr. 1992, R.Moffatt s.n. (BRI).

Summer food plant of the Richmond Birdwing Butterfly, *Troides richmondii*, a butterfly species endemic to south-eastern Qld and north-eastern N.S.W. and listed on the schedule of the Queensland Nature Conservation Act 1992 as 'vulnerable wildlife'.

6. *Pararistolochia praevenosa* (F.Muell.) Michael J.Parsons, *Bot. J. Linn. Soc.* 120: 207 (1996)

Aristolochia praevenosa F.Muell., *Fragm.* 2: 166 (1861). T: Clarence River, N.S.W., Dr H.Beckler; lecto: MEL 1553302, fide M.J.Parsons, *Bot. J. Linn. Soc.* 120: 207 (1996).

Illustrations: T.D.Stanley & E.M.Ross, *Fl. SE Queensland* 1: 184, fig. 26D (1983); G.J.Harden, in G.J.Harden (ed.), *Fl. New South Wales* 1: 125 (1990), both as *Aristolochia praevenosa*; H.Matsuka, *Nat. Hist. Birdwing Butterflies* 282 (2001).

Robust vine; stems to 12 m long; young branches ferruginous puberulent, glabrescent. Leaves: petiole 0.8–3.9 cm long; lamina ovate or oblong-elliptic to elliptic-obovate, (4.5–) 6.5–23 (–27) cm long, (1.4–) 2.5–11.6 cm wide, \pm glabrous above, pubescent mainly on veins below; base subcordate to cordate or slightly oblique; apex bluntly acuminate. Flowers solitary, leaf-opposed. Calyx cream with rich purplish brown stripes and spots, ferruginous puberulent outside; utricle 10–12 mm long; tube 15–20 mm long; lobes spreading, triangular, 5–9 mm long, dark maroon on revolute margin, mustard yellow inside; apex obtuse. Fruit subglobose to obloid, 1.8–4 cm long, 1.8–2 cm diam. Seed heart-shaped to triangular, 6–6.5 mm long, 6–6.5 mm diam., c. 1 mm thick, flat on both surfaces, verrucose. Fig. 49A–C.

Recorded from south-eastern Qld (with 2 specimens recorded from the Atherton Tableland, northern Qld) and north-eastern N.S.W., between the Mary and Clarence Rivers; in notophyll vine forest, now rare due to clearing of lowland riverine and littoral closed forest. Flowers Oct.–Nov.; fruits Mar.–May. Map 285.

Qld: Gillies Crater, P.I.Forster PIF17118 & S.J.Figg (BRI, QRS); Mt Eerwah c. 6 km W of Eumundi, P.R.Sharpe 4744 & P.Thompson (BISH, BRI, NSW); Stanley R. crossing W of Peachester, Apr. 1977, T.Lambkin (BRI); Tamborine Mtn, cultivated, L.Jessup 437 (BRI). N.S.W.: Tumbulgun, Oct. 1897, W.Bauerlen (BRI, MEL, NSW).

This species is a food plant of the Richmond Birdwing Butterfly, *Troides richmondii* (Gray). Richmond Birdwing Butterflies are said to have occurred in the Many Peaks Ra. area west of Miriam Vale, Qld, though there are no specimen records of either the butterfly or the host to support this observation.

7. *Pararistolochia linearifolia* Michael J. Parsons, *Bot. J. Linn. Soc.* 120: 235 (1996)

T: Old Wolfram diggings, 3 km from Kubin Village, Moa Is., Qld, 14 Feb. 1989, *B. Gray 5006*; holo: QRS.

Aristolochia sp. (Iron Ra. open forest), D.L. Jones & B. Gray, *Climbing Pl. Australia* 155 (1988)

Aristolochia sp. (Iron Ra., *G. Sankowsky 383 et al.*), R. Henderson (ed.), *Queensland Vasc. Pl.* 26 (1994)

Illustrations: D.L. Jones & B. Gray, *op. cit.* 151, as *Aristolochia* sp. (Iron Range open forest); H. Matsuka, *Nat. Hist. Birdwing Butterflies* 283 (2001).

Herbaceous vine; stems up to 2 m long; young branches retrorsely pubescent, glabrescent. Leaves: petiole 0.4–1 cm long; lamina of lower leaves broadly triangular-ovate, 4.5–8.5 cm long, 2.5–4 cm wide, upper leaves linear-lanceolate, 7–19.5 cm long, 0.4–2 cm wide; appressed pubescent, glabrescent above, pubescent with straight and hooked hairs below; base cordate; apex acuminate to attenuate. Flowers solitary, leaf-opposed or occasionally in axillary racemes. Calyx creamish with maroon to brownish veins and bright yellow to gold inside, pubescent outside; utricle 7–13 mm long; tube 20–25 mm long; lobes spreading to erect, triangular, 3–5 mm long, dark maroon on revolute margin, bright sulphur-yellow inside; apex obtuse. Fruit globose to obloid, 1.5–2 cm long, 1–1.5 cm diam. Seed triangular, 5–6 mm long, 4–5 mm diam., 1–1.5 mm thick, convex on one side, deeply grooved on the other, smooth. Fig. 49I–J.

Recorded from Moa Is., Torres Strait, S to the Nesbit R. area, Cape York Penin., northern Qld; in woodland with a grassy or heathy understorey. Flowers Dec.–Feb.; fruits June–Aug. Map 286.

Qld: c. 6 km from Bamaga towards Moreton Telegraph Stn, at air crash site, *N. Ollerenshaw 507C* (CANB); Stones Crossing, 73 km from Weipa, *P. I. Forster PIF13508 et al.* (BRI); northern lower slopes of Mt Tozer, *B. Hyland 6185* (QRS); Iron Ra., Feb. 1983, *G. & N. Sankowsky* (BRI); 2.7 km SE of Heathlands, *R. W. Johnson 4994* (BRI).

This species has been recorded as a host for the larvae of the Cape York Birdwing Butterfly, *Troides priamus pronomus*, and the Redbodied Swallowtail, *Atrophaneura polydorus queenslandicus*.

2. ARISTOLOCHIA

Aristolochia L., *Sp. Pl.* 2: 960 (1753); *Gen. Pl.* 5th edn, 410 (1754); from the Greek *aristos* (best) and the Latin *lochia* (childbirth), in reference to the curved form of the flower of *A. clematitis* recalling the human foetus in normal position prior to birth.

Type: *A. rotunda* L.

Erect, twining or scandent herbs, shrubs or vines. Roots fibrous or tuberous. Leaves entire; pseudo-stipules absent or sometimes present. Flowers zygomorphic, axillary, often solitary or clustered. Calyx tube straight to sigmoid, inflated basally forming utricle that encloses sexual organs, then constricted before expanding into limb; limb 1- or 2-lobed, often highly coloured petaloid limb. Petals absent. Anthers 6, sessile, entirely united with dorsal side of stigma (including stigmatic lobes). Ovary inferior, 6-locular; stigmatic lobes 6. Fruit a capsule, usually 6-valved, septicidally dehiscent mostly from base, closed at apex; pedicel splitting concurrently. Seeds dorso-ventrally compressed, flat, occasionally laterally winged; elaiosome usually present.

A genus of c. 300 species in tropical and temperate regions; 10 species in Australia of which 4 are naturalised and 6 are native (5 endemic). Roots of several species are used for medicinal purposes such as curing snake bite and in fertility control.

R.Brown, *Aristolochia*, *Prodr.* 349 (1810); K.Domin, *Aristolochia*, *Biblioth. Bot.* 89(1): 611 (1921); O.C.Schmidt, Beiträge zur Kenntnis der Aristolochiaceen III, *Repert. Spec. Nov. Regni Veg.* 30: 66–75 (1932); H.W.Pfeifer, Revision of the North and Central American hexandrous species of *Aristolochia* (Aristolochiaceae), *Ann. Missouri Bot. Gard.* 53: 1–114 (1966); Ding Hou, *Florae Malesianae Praecursores* LXV. Notes on Aristolochiaceae, *Blumea* 29: 223–249 (1983); M.Jebb, *Aristolochia in New Guinea* 1–51 (1993).

- 1 Flowers more than 3 cm across expanded limb
 - 2 Calyx limb 2-lobed 3. *A. ringens*
 - 2: Calyx limb 1-lobed
 - 3 Leaf lamina glabrous 1. *A. elegans*
 - 3: Leaf lamina puberulent below 2. *A. odoratissima*
- 1: Flowers less than 3 cm across limb
 - 4 Flowers in racemes of 2–10; plants of vineforest or deciduous vine-thicket
 - 5 Leaves broadly cuneate at base 6. *A. indica*
 - 5: Leaves deeply cordate at base
 - 6 Robust climber; calyx reddish brown to maroon; calyx limb apiculate at apex; fruit 2.5–3 cm diam.; seed smooth, laterally winged 5. *A. acuminata*
 - 6: Slender twiner; calyx whitish with reddish limb; calyx limb 3-dentate at apex; fruit 1–1.5 cm diam.; seed verrucose, not winged 4. *A. chalmersii*
 - 4: Flowers solitary; plants slender herbaceous twiners or erect herbs of open forest, occasionally in vine thickets
 - 7 Leaves linear-lanceolate or linear, or if very narrowly triangular, prominently lobed at base
 - 8 Leaf base prominently lobed 7. *A. thozetii*
 - 8: Leaf base cuneate 8. *A. holtzei*
 - 7: Leaves not as above
 - 9 Leaves ovate-sagittate to sagittate or narrowly sagittate 10. *A. meridionalis*
 - 9: Leaves oblong to broadly oblong, obovate or narrowly to broadly lyrate 9. *A. pubera*

1. **Aristolochia elegans* Mast., *Gard. Chron.* 24: 301, fig. 64 (1885)

T: Brazil, Rio de Janeiro, [A.]Glaziov 13163; holo: K n.v.; iso: P n.v., *fide* F.González, *Fl. Ecuador* 58: 22 (1994).

Illustrations: F.C.Hoehne, *Fl. Brasílica* 15: t 10 (1942); A.B.Graf, *Exotica* p.351 (1982); H.Matsuka, *Nat. Hist. Birdwing Butterflies* 270 (2001).

Robust canopy vine, glabrous; stems to 10 m long. Leaves: pseudo-stipules cordate-reniform, deciduous, 7–27 mm long, 9–30 mm wide; petiole 1.2–5.8 cm long; lamina broadly triangular to reniform, 2–10.2 cm long, 2.7–11.9 cm wide; base deeply cordate; apex obtuse to rounded. Flowers solitary; pedicels 4–13 cm long. Calyx sigmoid, whitish to creamy yellow, mottled maroon to purplish, darker purplish inside throat, glabrous outside; utricle obovoid, 2.5–3.3 cm long; tube 10–20 mm long, expanding abruptly into spreading limb; limb 1-lobed, peltiform, broadly cordate-ovate, 7.5–8 cm long, 8–8.4 cm wide, rounded to obtuse. Fruit obloid, 2.3–5.5 cm long, 1.2–1.8 cm diam., beaked; sterile tip 5–10 mm long. Seed cordate-triangular, flat, 4–6 mm long, 4–5.5 mm wide, c. 0.2 mm thick, tuberculate, laterally winged; wing 0.25–1 mm wide. 2 n = 14, M.P.Gregory, *Amer. J. Bot.* 43: 110–122 (1956). Fig. 50J–M.

Native to South America and cultivated as an ornamental, now naturalised E of the Great Dividing Ra. from Cairns to Burleigh Heads, Qld and near Casino, N.S.W.; on the margins of rainforests and on roadsides. Flowers Nov.–May; fruits Dec.–June. Map 287.

Qld: Junction Cherrytree and Teemburra Cks, *N.Byrnes* 3725 & *J.Clarkson* (BRI); Bouldercombe Falls Ck, c. 10 km NE of Mt Morgan, *E.R.Anderson* 3989 (BRI); Smiths Crossing on Kolan R., c. 16 km NE of Gin Gin, *V.K.Moriarty* 1338 (BRI, CANB); Burleigh Heads Natl Park, Apr. 1991, *E.M.Ross s.n.* (BRI). N.S.W.: Summerland Way, 10 km S of Casino, *B.Reinker* (NSW 264309) (NSW).

The vine is poisonous to the larvae of Birdwing butterflies and unless eradicated could have serious implications for their continued survival.

We have chosen to follow B.Verdcourt (*loc. cit.*, 1986) in using the name *A. elegans* for this taxon. *Aristolochia littoralis* Parodi has also been used for this taxon (herb. NSW), and was published earlier (1878), however, the type is not extant and the description does not exactly match the taxon as we know it. *Aristolochia elegans* is still the name used in horticulture, even at the Royal Botanic Gardens Kew. Therefore, in the words of Verdcourt, 'I have preferred to use a totally unambiguous name rather than one to which some doubt is attached'.

2. **Aristolochia odoratissima* L., *Sp. Pl.* 2nd edn, 2: 1362 (1763)

T: illustration in H.Sloane, *Voy. Jamaica* 1: 62, tab. 104, fig. 1 (1707); lecto, *fide* E.A.Kellogg, in R.A.Howard, *Fl. Lesser Antilles* 4: 125 (1988).

Illustration: F.C.Hoehne, *Fl. Brasília* 15: t. 5 (1942).

Robust climber; stems to 5 m long, glabrous. Leaves: pseudo-stipules absent; petiole 3–6 cm long; lamina broadly triangular-ovate, 6–14 cm long, 6–10 cm wide, glabrous above, sparsely puberulent below; base deeply cordate; apex acuminate to rounded. Flowers solitary; pedicels 6–9 cm long. Calyx sigmoid, creamy yellow outside, golden yellow inside throat, dark purple above, heavily spotted, glabrous or sparsely puberulent outside; utricle obovoid, 1.5–1.8 cm long; tube 5–8 mm long, expanding abruptly into spreading limb; limb 1-lobed, peltiform, broadly cordate-ovate, 5–6.5 cm long, 3.5–5.5 cm wide, acute. Fruit obloid, c. 7 cm long, c. 2 cm diam., beaked; sterile tip c. 5 mm long. Seed ovate, flat, 3–3.5 mm long, 2.5–2.8 mm wide, c. 0.5 mm thick, smooth, not winged.

Native of Brazil. Recorded from near Cairns, northern Qld; doubtfully naturalised in forested areas. Flowers Jan.–Feb.; fruits Mar. Map 288.

Qld: N of Cairns, Mar. 1994, *D.Sands s.n.* (BRI).

Toxic to butterfly larvae, and thought to be endangering the survival of the Cairns Birdwing Butterfly, *Troides euphorion*, in the area.

3. **Aristolochia ringens* Vahl, *Symb. Bot.* 3: 99 (1794)

T: [tropical America], *J.P.B. von Rohr*; holo: C n.v. (IDC microfiche 2201.2: II.1,2,3).

Illustrations: F.C.Hoehne, *Fl. Brasília* 15: t. 30 (1942); H.W.Pfeifer, *Ann. Missouri Bot. Gard.* 53(2): 158, f. 32 (1996); K.A.Barringer & F.A.González, in J.A.Steyermark *et al.*, *Fl. Venezuelan Guayana* 3: fig. 96 (1997).

Stout vine, glabrous; stems to 5 m long; young branches glaucous. Leaves: pseudo-stipules cordate-reniform, c. 20 mm long, c. 20 mm wide, deciduous; petiole 3–6 cm long; lamina broadly reniform, 5–9 cm long, 6–9 cm wide; base deeply cordate; apex rounded. Flowers solitary; pedicels 6–10 cm long. Calyx geniculate, mottled maroon and cream, glabrous outside; utricle obovoid, 4–7 cm long; tube 30–40 mm long; limb 2-lobed; upper lobe obovate-spathulate, c. 10 cm long, c. 10 cm wide, emarginate; lower lobe narrowly lanceolate, c. 9 cm long, c. 3 cm wide, acute. Fruit unknown. Seed cordate-ovate, flat, c. 12 mm long, c. 7 mm wide, c. 0.2 mm thick, smooth (?), laterally winged (?). $2n = 36$, M.P.Gregory, *Amer. J. Bot.* 43: 110–122 (1956).

Native of tropical America. Doubtfully naturalised near Cairns, northern Qld; forested area on roadside. Flowers May & June; fruits Nov. Map 289.

Qld: 22 km N of Cairns, May 1997, *D.P.Sands s.n.* (BRI); corner of Cook Hwy and Clifton Rd, Clifton Beach, *B.Waterhouse* BMW4718 & *A.A.Mitchell* (BRI).

Toxic to native butterfly larvae.

4. *Aristolochia chalmersii* O.C.Schmidt, *Repert. Spec. Nov. Regni Veg.* 30: 73 (1932)

T: Thursday Is., Qld, 1878, *Rev. J.Chalmers*; syn: ?MEL n.v.; Jervis Is., Qld, 1878, *Rev. J.Chalmers*; syn: ?MEL n.v.; scrubs on Lizard Is., Qld, Apr. 1861, *coll. unknown*; syn: ?S n.v. (photo MEL).

Aristolochia sp. (Mt White), D.L.Jones & B.Gray, *Climbing Pl. Australia* 154 (1988)

Slender twiner, dying back to perennial rootstock; stems to 2 m long, glabrous. Leaves: pseudo-stipules broadly cordate-ovate, 4.5–11 mm long, 4–10 mm wide, deciduous; petiole 1.5–5 cm long; lamina broadly ovate, 4–8 cm long, 4–8 cm wide, glabrous above or rarely puberulent, sparsely puberulent below or sometimes glabrous; base deeply cordate; apex abruptly acuminate to obtuse. Inflorescence a 2–4-flowered raceme; pedicels 0.2–1.5 cm long. Calyx straight or slightly curved, whitish with reddish limb, glabrous outside; utricle subglobose, 0.5–0.7 cm long; tube 15–17 mm long; limb 1-lobed, linguiform, 1.9–2.6 cm long, 0.5–0.7 cm wide, 3-dentate at apex. Fruit subglobose to shortly obloid, 1–2 cm long, 1–1.5 cm diam., not beaked. Seed cordate-ovate, slightly concave-convex, 4–5 mm long, 3.5–4.5 mm wide, 0.7–1 mm thick, verrucose on both surfaces, not winged. Fig. 50D–E.

Occurs on Cape York Penin. and adjacent mainland islands, Qld; in semi-deciduous vine thicket and rainforest margins. Flowers Feb.–Apr.; fruits May–July. Map 290.

Qld: Chester R., *B.Hyland* 9474 (BRI, QRS); Mt White, Coen, Mar. 1983, G. & N.Sankowsky (BRI); Klondike Mine road, Silver Plains Holding, *B.Hyland* 15338 (QRS); Site 32B, Lizard Is., *G.N.Batianoff* 10188 (BRI, DNA); on northern extension of Jane Table Hill, Lakefield Natl Park, *V.J.Neldner* 3817 & *J.R.Clarkson* (BRI, MBA).

This species has been recorded as a host for the larvae of the Big Greasy, *Cressida cressida cressida*, and possibly also the Cairns Birdwing Butterfly, *Troides euphorion*.

5. *Aristolochia acuminata* Lam., *Encycl.* 1: 254 (1783)

T: India, *P.Commerson*; holotype: P n.v.

Aristolochia tagala Cham., *Linnaea* 7: 207, t. 5, fig. 3 (1832). T: 'Luçonía prope Tierra alta', not designated.

Aristolochia indica var. *magna* F.Muell. ex Benth., *Fl. Austral.* 6: 209 (1873). T: Endeavour River, [Qld], *J.Banks* & *D.Solander* (Herb. R.Brown); syn: ?BM n.v.; Rockingham Bay, Qld, *J.Dallachy*; syn: ?MEL.

Illustrations: B.D.Morley & H.R.Toelken (eds), *Flowering Pl. Australia* 47, fig. 18 (1983), as *A. indica*; K.A.W.Williams, *Native Pl. Queensland* 3: 29 (1987) as *A. tagala*; W.Cooper, *Fr. Austral. Trop. Rainforest* 77 (2004).

Robust climber; stems to 10 m long; young branches ±pubescent, glabrescent. Leaves: pseudo-stipules absent; petiole 2–6 cm long; lamina broadly ovate to triangular-ovate, 9–23 (–28) cm long, 4.5–16.5 (–21.5) cm wide, glabrous on both surfaces; base deeply cordate; apex acuminate. Inflorescence a (3–) 6–10-flowered raceme; pedicels 0.5–0.8 cm long. Calyx straight or slightly curved, reddish brown to maroon, sparsely puberulent outside; utricle globose, 0.5–0.6 cm long; tube 5–15 mm long; limb 1-lobed, oblong, 2–3 cm long, 0.7–0.9 cm wide, apiculate. Fruit obovoid to obloid, 3–4.5 cm long, 2.5–3 cm diam., not beaked. Seed cordate-ovate, flat, c. 4 mm long, c. 5 mm wide, c. 0.2 mm thick, ±smooth, laterally winged; wing 1.5–3 mm wide. Plate 44; Fig. 50C.

Occurs from India through SE Asia, Malaysia to Solomon Is. and Australia. In Australia from north-western Kimberley, W.A., and from Cape York Penin. S to Dryander Ck, Qld; in vine forest in coastal areas to 200 m alt. Flowers Nov.–June; fruits Feb.–Sept. Map 291.

W.A.: Naturalist Is., Prince Frederick Harbour, *K.F.Kenneally* 8960 (PERTH). Qld: Clump Pt, Mission Beach, *R.F.Thorne* 22639 & *J.G.Tracey* (BRI); Quarantine Bay, near Cooktown, *V.Scarth-Johnson* 816A (BRI); Iron Ra., *L.J.Brass* 19184 (BRI); Moa Is., Torres Strait, *S.Budworth* 905 (BRI).

This species has been recorded as a host for the larvae of the Cairns Birdwing Butterfly, *Troides euphorion*, the Redbodied Swallowtail, *Atrophaneura polydorus queenslandicus*, and the Big Greasy, *Cressida cressida cressida*.

6. **Aristolochia indica* L., *Sp. Pl.* 2: 960 (1753)

T: habitat in India, not designated.

Illustrations: H.N.Ridley, *Fl. Malay Penin.* 3: 17, Fig. 136 (1924), as *A. tagala*; K.M.Matthew, *Fl. Tamilnadu Carnatic* 4: 529 (1988); H.Matsuka, *Nat. Hist. Birdwing Butterflies* 261 (2001).

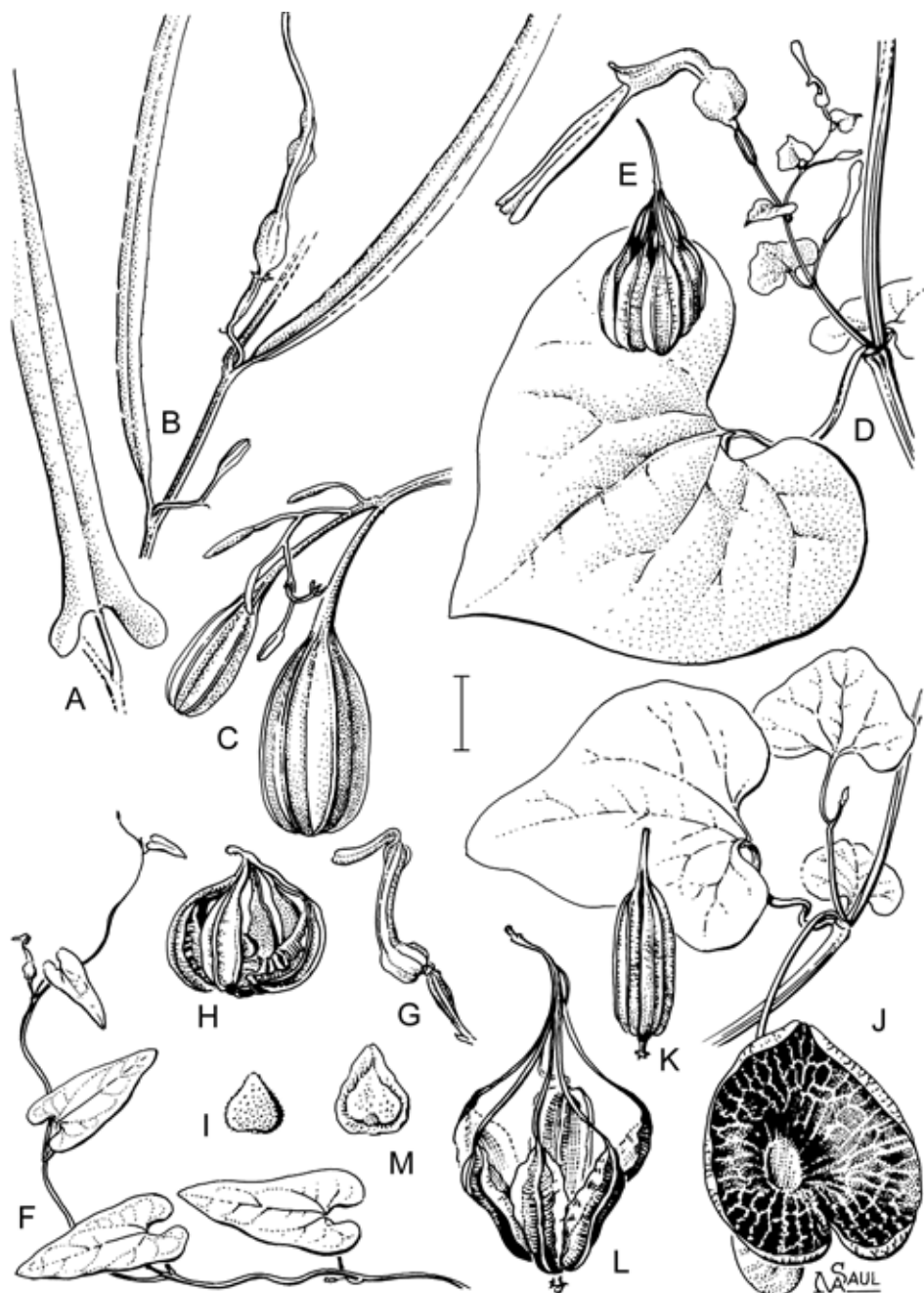


Figure 50. *Aristolochia*. **A**, *A. thozetii*, leaf (16°40'S, 145°34'E, J.Berry & G.Andrews *s.n.*, QRS). **B**, *A. holtzei*, leaf and flower (A.Morton AM1601, BRI). **C**, *A. acuminata*, fruiting inflorescence (K.F.Kenneally 5875/C, PERTH). **D-E**, *A. chalmersii*. **D**, leaf and inflorescence (Mt White, G. & N.Sankowsky *s.n.*, QRS); **E**, dehiscent fruit (G.Batianoff 10188, BRI). **F-I**, *A. meridionalis* subsp. *meridionalis*. **F**, habit (K.A.Williams 83007, BRI); **G**, flower (P.R.Sharpe 4838 & A.R.Bean, BRI); **H**, dehiscent fruit; **I**, seed (**H-I**, Mt Crosby, L.Bird *s.n.*, BRI). **J-M**, *A. elegans*. **J**, flowering twig (N.Byrnes 3725 & J.Clarkson, BRI); **K**, mature fruit; **L**, dehiscent fruit (Burleigh Heads, E.M.Ross *s.n.*, BRI); **M**, seed (**K, M**, P.K.Thompson 147, BRI). Scale bar: **A-E, G, H** = 10 mm; **F, J-L** = 20 mm; **I, M** = 5 mm. Drawn by M.A.Saul.

Vigorous twiner, glabrous; stems to 10 m long. Leaves: pseudo-stipules absent; petiole 1.2–3.5 cm long; lamina oblong to obovate, 3.5–12 cm long, 1.5–6.8 cm wide; base broadly cuneate; apex usually abruptly acuminate. Inflorescence a 3–8-flowered raceme, rarely terminal; pedicels 0.6–1 cm long. Calyx straight, greyish green outside, purplish bronze inside, deeper purple in throat with prominent white hairs, glabrous outside; utricle globose, 0.5–0.6 cm long; tube 10–15 mm long; limb 1-lobed, obovate, 1–1.5 cm long, 0.5–0.7 cm wide, acute. Fruit obovoid, 2–3 cm long, 1.5–1.8 cm diam., not beaked. Seed cordate-ovate, flat, c. 6 mm long, c. 6 mm wide, c. 0.2 mm thick, smooth, laterally winged; wing c. 1 mm wide.

Extends from India to Malaya. In Australia apparently naturalised only on Channel Is., Darwin Harbour, N.T.; in coastal vine thicket. Flowers Nov., Mar.; fruits May. Map 292.

N.T.: Channel Is., Darwin Harbour, *K.F.Kenneally* 9810 (PERTH); Channel Is., *C.Mangion* 125 & *R.Booth* (DNA); Channel Is., *C.Michell* 365 & *S.Calliss* (BRI, DNA).

7. *Aristolochia thozetii* F.Muell., *Fragm.* 2: 167 (1861)

T: Rockhampton, Qld, *s. dat.*, *A.Thozet*; holotype: ?MEL *n.v.*; isotype: G-DC *n.v.* (IDC microfiche 2562.2411: II.7).

Aristolochia baueri Duch. in A.L.P.P. de Candolle, *Prodr.* 15(1): 484 (1864). T: in Novae Hollandiae orâ tropicâ, *s.d.*, *Ferd. Bauer*; holotype: ?W [destroyed].

Aristolochia nauseifolia Michael J.Parsons, *Bot. J. Linn. Soc.* 120: 208 (1996). T: 3 km from Kubin Village, Moa Is., Qld, 14 Feb. 1989, *B.Gray* 5007; holotype: QRS.

Illustrations: D.L.Jones & B.Gray, *Climbing Pl. Australia* 151 (1988); H.Matsuka, *Nat. Hist. Birdwing Butterflies* 260 (2001).

Slender twining vine, dying back to perennial rootstock; stems to 1 m long, sparsely to moderately pubescent or rarely glabrous. Leaves caducous: pseudo-stipules absent; petiole 0.5–1.6 cm long; lamina of lower leaves broadly triangular, 2–4.5 cm long, 1.8–3.2 cm wide, upper leaves linear-lanceolate to linear, 3.2–16.5 cm long, (0.2–) 0.5–1.5 cm wide, sparsely to moderately pubescent on both surfaces; base sagittate-auriculate; apex acute to attenuate. Flowers solitary; pedicels 0.2–0.3 cm long. Calyx straight to geniculate, greenish with reddish purple veins and limb, mostly glabrous outside; utricle subglobose, 0.6–0.8 cm long; tube 10–15 mm long; limb 1-lobed, oblong, 1.5–3 cm long, 0.3–0.4 cm wide, apiculate. Fruit subglobose, 1.5–1.8 cm long, 1–1.2 cm diam., not beaked. Seed cordate-ovate, concave-convex, c. 4 mm long, c. 3 mm wide, c. 0.5 mm thick, verrucose on convex face, not winged. Fig. 50A.

Occurs from near Gove, northern N.T., through Cape York Penin. extending S to Rockhampton, Qld; in vine forest or open forest. Flowers Jan.–Feb.; fruits Feb.–Oct., probably in response to rain. Map 293.

N.T.: Cape Arnhem, Gove, *J.Russell-Smith* 4923 & *D.Lucas* (DNA). Qld: Timber Reserve 9, Lankelly Ck, McIlwraith Ra., *P.I.Forster* PIF10366 & *G.Kenning* (BRI); Mt Scatterbrain c. 4 km SW of Butchers Hill, *J.R.Clarkson* 6725 & *W.J.F.McDonald* (BRI); Blady Grass Ck, 18 km SSE of Cardwell, Oct. 1976, *S.L.Everist s.n.* (BRI); Rockhampton, Mar. 1868, *P.O'Shanesy s.n.* (MEL).

The species has been recorded as a host for the larvae of the Redbodied Swallowtail, *Atrophaneura polydorus queenslandicus*, and the Big Greasy, *Cressida cressida cressida*.

8. *Aristolochia holtzei* F.Muell., *Victorian Naturalist* 9: 160 (1893)

T: near Port Darwin, N.T., *s. dat.*, *N.Holtze s.n.*; holotype: MEL.

Aristolochia thozetii var. *angustissima* Benth., *Fl. Austral.* 6: 209 (1873). T: N Australia, Port Darwin, N.T., Mar. 1870, *F.Schultz n.* 547; holotype: K (photo BRI, DNA).

Aristolochia sp. (Wolfram Camp, N Qld), D.L.Jones & B.Gray, *Climbing Pl. Australia* 155 (1988)

Slender erect herb, dying back to perennial rootstock, glabrous; stems to 0.3 m long. Leaves: pseudo-stipules absent; petiole ±absent; lamina linear, 6–15 cm long, 0.2–0.4 cm wide; base cuneate; apex acute to attenuate. Flowers solitary; pedicels 0.2–0.5 cm long. Calyx straight to geniculate, white to cream with brown to maroon limb, glabrous outside; utricle subglobose, 0.5–0.7 cm long; tube 10–15 mm long; limb 1-lobed, oblong, 1.5–2.5 cm long,

0.2–0.3 cm wide, apiculate. Fruit subglobose, 1.5–1.8 cm long, 1–1.2 cm diam., not beaked. Seed cordate-triangular, concave-convex, c. 4 mm long, c. 4 mm wide, c. 0.5 mm thick, verrucose on convex face, not winged. Fig. 50B.

Extends from near Darwin, N.T., to Cape York Penin. and S to near Irvinebank, north-eastern Qld; in open woodland with a grassy understorey, often in sandy soil. Flowers Sept.–Feb.; fruits Sept.–June, probably in response to rain. Map 294.

N.T.: Nightcliff, Darwin, *C.Dunlop 3659* (DNA); Rookery Point, Kapalga, *I.D.Cowie 605* & *J.Cusack* (DNA). Qld: Weipa; A north, Fauna Survey Site 1.5B, *A.Morton AM1601* (BRI); Wolfram, Feb. 1983, *G. & N.Sankowsky* (BRI); c. 10 km W of Dimbulah, *J.R.Clarkson 6632* (BRI).

9. *Aristolochia pubera* R.Br., *Prodr.* 349 (1810)

T: Arnhem Bay [Caledon Bay], [N.T.], 17 Feb. 1803, *R.Brown*; holo: BM (BM 99966), *n.v.* (photo DNA).

Creeping or sometimes erect herb; stems to 1 m long, pubescent or puberulent. Leaves: pseudo-stipules absent; petiole 0.6–4 cm long; lamina oblong to broadly oblong, obovate or narrowly to broadly lyrate, 1–13 cm long, 0.8–8.6 cm wide (including basal lobes), puberulent above, pubescent or puberulent with multi-celled hairs on veins below; base shallowly cordate, sagittate-auriculate, auriculate or rarely truncate; apex obtuse, rarely emarginate. Flowers solitary; pedicels 0.2–0.4 cm long. Calyx geniculate, creamish or pale green with purplish brown limb, sparsely pubescent outside; utricle globose, 0.5–0.7 cm long; tube 5–12 mm long; limb 1-lobed, linguiform, 1.5–2.5 cm long, 0.2–0.3 cm wide, rounded at apex. Fruit globose or obloid, 1–2.5 cm long, 1–1.3 cm diam., not beaked. Seed triangular, concave-convex, 3–4 mm long, c. 3 mm wide, c. 0.5 mm thick, verrucose on convex face, not winged.

Occurs from north-eastern N.T., through Cape York Penin. and extending S to near Rockhampton, Qld.

The species has been recorded as a host for the larvae of the Big Greasy, *Cressida cressida cressida*. The leaves of this species are very variable with an almost continual intergrade between them. Some specimens have been very difficult to place, but without further collections it is not possible to state categorically whether or not they are new species. There are 2 varieties.

Leaves minutely pubescent above, with multicellular hairs on veins below; not obviously glandular on lower surface

9a. var. *pubera*

Leaves with multicellular hairs above and below, often dense; lower surface with numerous glands

9b. var. *aromatica*

9a. *Aristolochia pubera* R.Br. var. *pubera*

Aristolochia strictiflora Duch. in A.L.P.P. de Candolle, *Prodr.* 15(1): 484 (1864). T: in Novâ Hollandiâ circa oppidum Bockhampton [Rockhampton], Qld, *s. dat.*, *A.Thozet*; holo: G-DC *n.v.* (IDC microfiche 2562.2411: II.6).

Illustration: D.L.Jones & B.Gray, *Climbing Pl. Australia* 151 (1988).

Leaves oblong or lyrate; upper surface pubescent or puberulent with minute hairs, lower surface with multicellular hairs mainly on veins.

Occurs from north-eastern N.T. and from Cape York Penin. to near Rockhampton, Qld, though there is one old record stated to be from 'Elliot R' (between Bundaberg and Maryborough). It generally grows in open forest or woodland, or rocky areas. Flowers Dec.–Mar.; fruits Feb.–June. Map 295.

N.T.: Groote Eylandt, 5 km ESE [of] Emerald R. crossing, *I.Cowie 2651* (DNA). Qld: Melaleuca Ck Scrub, 'Rockwood', *P.I.Forster PIF7955* & *W.J.F.McDonald* (BRI); Trinity Beach, 12 miles [19.2 km] N of Cairns, Jan. 1939, *H.Flecker s.n.* (NSW); Kowanyama, *T.Birchley 50* (BRI); Keswick Is., Connie Bay, *G.N.Batianoff 960942* & *I.G.Champion* (BRI).

9b. *Aristolochia pubera* var. *aromatica* E.M.Ross, *Fl. Australia* 2: 458 (2007)

T: Stannary Hills, Qld, 16 Feb. 1975, *R.Collins* 20108; holo: QRS.

Aristolochia pubera var. (Mt Mulligan *J.R.Clarkson* 5246), *R.J.F.Henderson* (ed.), *Names Distr. Queensland Pl., Algae Lichens* 22 (2002)

Leaves oblong to broadly oblong, very obtuse, pubescent to puberulent with multicellular hairs on both surfaces, densely glandular dotted below.

Occurs in northern Qld in a restricted area around Mt Mulligan, Mt Pinnacle and Stannary Hills, W of Mareeba; in open forest or on rocky areas, scree slopes etc. Flowers Feb.; fruits Feb.–Apr. Map 296.

Qld: Mt Pinnacle, *G.Sankowsky* 493 & *N.Sankowsky* (BRI); Mt Mulligan, *J.R.Clarkson* 5720 (BRI); Baal Gammon Mining Lease, *B.Hyland* 10484 (BRI, QRS).

10. *Aristolochia meridionalis* E.M.Ross, *Fl. Australia* 2: 458 (2007)

T: D'Aguilar Ra., 12 km NE of Mt Crosby, Qld, 22 Dec. 1991, *L.H.Bird* & *J.Collins* s.n.; holo: BRI.

Aristolochia sp. (south-eastern Qld), *D.L.Jones* & *B.Gray*, *Climbing Pl. Australia* 155 (1988)

Aristolochia sp. (Mt Coot-tha, *S.T.Blake* 17388), *R.Henderson* (ed.), *Queensland Vasc. Pl.* 26 (1994)

Aristolochia sp. (D'Aguilar Range *L.H.Bird*+ *AQ520943*), *R.Henderson* (ed.), *Queensland Vasc. Pl.* 22 (1997); *R.J.F.Henderson* (ed.), *Names Distr. Queensland Pl., Algae Lichens* 22 (2002)

[*A. pubera* auct. non *R.Br.*: *T.D.Stanley* & *E.M.Ross*, *Fl. SE Queensland* 1: 185 (1983)]

Slender vine; stems to 1.5 m long, glabrous. Leaves: pseudo-stipules absent; petiole 0.5–5.5 cm long; lamina narrowly sagittate or sagittate to ovate-sagittate, 1.2–11.5 cm long, 0.5–5 cm wide, glabrous above, sparsely puberulent or glabrous below; base sagittate or shallowly to deeply cordate; apex acute to blunt. Flowers solitary; pedicels 0.1–0.5 cm long. Calyx straight or curved, creamish or greyish mottled maroon or purplish brown, glabrous outside; utricle subglobose, 0.3–0.7 cm long; tube 6–14 mm long; limb 1-lobed, linguiform, 0.9–2.2 cm long, 0.2–0.3 cm wide; apex obtuse, mucronate to emarginate. Fruit globose to obloid, 1–2 cm long, 1–1.6 cm diam., not beaked. Seed cordate-triangular, concave-convex, 3–5.5 mm long, 3–5 mm wide, 1–1.5 mm thick, verrucose on both surfaces, not winged.

Occurs in central and south-eastern Qld and in north-eastern N.S.W.

The species has been recorded as a host for the larvae of the Big Greasy, *Cressida cressida cressida*. There are 2 subspecies.

Leaves sagittate or ovate-sagittate, less than 3 times as long as wide

10a. subsp. *meridionalis*

Leaves narrowly sagittate, more than 3 times as long as wide

10b. subsp. *centralis*

10a. *Aristolochia meridionalis* E.M.Ross subsp. *meridionalis*

Leaves sagittate to ovate-sagittate, sometimes triangular but always less than three times as long as wide, 1.2–9 cm long, 0.9–5 cm wide. Fig. 50F–I.

Occurs from near Kalpowar to Beenleigh, south-eastern Qld, and possibly to Port Macquarie, north-eastern N.S.W (pers. comm. *D.Sands*); in open forest or fringing forest situations. Flowers mainly Dec.–Mar.; fruits Mar.–May. Map 297.

Qld: Biggenden, old piggery, 'scrub soil', 1981, *A.H.Beresford* s.n. (BRI); Kingaroy, *L.S.Smith* 3039 (BRI, CANB); Kenilworth Bluff c. 8 km N of Kenilworth, *P.R.Sharpe* 4838 & *A.R.Bean* (BRI); cult. *P.D.Bostock* in Brisbane from plant collected on D'Aguilar Ra., Mar. 1992, *E.M.Ross* s.n. (BRI).

10b. *Aristolochia meridionalis* subsp. *centralis* E.M.Ross, *Fl. Australia* 2: 458 (2007)

T: Rockhampton, Qld, 5 Mar. 1937, *S.T.Blake* 12713; holo: BRI.

Aristolochia sp. (Marlborough), *D.L.Jones* & *B.Gray*, *Climbing Pl. Australia*: 154 (1988)

Aristolochia sp. (D'Aguilar Range *L.H.Bird*+ *AQ520943*) subsp. (Rockhampton *S.T.Blake* 12713), *R.Henderson* (ed.), *Queensland Vasc. Pl.* 22 (1997); *R.J.F.Henderson* (ed.), *Names Distr. Queensland Pl., Algae Lichens* 22 (2002)

Leaves narrowly sagittate, at least three times as long as wide, 4–11.5 cm long, 0.5–2.5 cm wide. Plate 43.

Occurs in central Qld from Marlborough to Fernlees and W to Carnarvon Gorge; in open forest. Flowers Nov.–Mar.; fruits Dec.–Apr. Map 298.

Qld: 20 km S of Marlborough, Feb. 1983, *G. & N. Sankowsky* (BRI); Kooramindangie Plain, Carnarvon Gorge, Jan. 1988, *W. Morley* 2 (BRI); Carnarvon Ra., in gorge, June 1970, *F. D. Hockings* (BRI); Sandhurst Park, Fernlees, Dec. 1934, *J. Garvey* (BRI).

NELUMBONACEAE

*T. D. Stanley*¹

Robust aquatic herbs, with vegetative rhizomes and thickened storage rhizomes. Leaves arising directly from rhizome, floating, raised above water surface and submerged; lamina peltate, orbicular; submerged leaves \pm lanceolate. Flowers bisexual, actinomorphic, solitary, axillary, raised above water surface. Perianth segments c. 14–30, 2–5 outermost ones sepaloid, remainder petaloid. Stamens c. 200–400; filaments elongate; anthers with 4 pollen sacs; connective prolonged, conspicuous. Carpels c. 9–40 borne singly in, but free from, cavities in pithy obconical receptacle, with only styles and stigmas protruding; styles very short; ovule solitary, anatropous, pendulous from top of ovule. Fruits separate, hard-walled nuts loose in cavities in greatly enlarged receptacle; each nut with small respiratory pore at top. Seed solitary.

A family of 1 genus and 2 species, 1 species from eastern North America and central America, the other from southern and eastern Asia, New Guinea and Australia.

G. Bentham, *Nelumbium* in Nymphaeaceae, *Fl. Austral.* 1: 62 (1863); H. I. Aston, *Nelumbo* in Nymphaeaceae, *Aquatic Pl. Australia* 133–135 (1973); P. S. Williamson & E. L. Schneider, Nelumbonaceae, in K. Kubitzki, J. G. Rohwer & V. Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 470–493 (1993).

NELUMBO

Nelumbo Adans., *Fam. Pl.* 2: 76, 582 (1763); from the Sinhalese name for *N. nucifera*.

Nelumbium Juss., *Gen. Pl.* 68 (1789), *orth. var.* T: *N. nucifera* Gaertn.

***Nelumbo nucifera* Gaertn., *Fruct. Sem. Pl.* 1: 73 (1788)**

based on *Nymphaea nelumbo* L., *Sp. Pl.* 1: 311 (1753); *Nelumbo speciosa* Willd., *Sp. Pl.* 4th edn, 2: 1258 (1799), as *Nelumbium speciosum*, *nom. illeg.* T: not designated.

Nelumbo speciosa var. *alba* F. M. Bailey, *Cat. Pl. Brisbane Bot. Gard. Bowen Park* 5 (1885), as *Nelumbium*, *nom. nud.*

Illustrations: H. I. Aston, *op. cit.* 134, fig. 50; J. Brock, *Top End Native Pl.* 264 (1988).

Leaves: petiole to 1.5 m long; lamina 20–70 cm across, with shallow sinus on one side, veins radiating from centre. Flowers 15–25 cm diam., mostly pink or reddish pink, rarely white, fragrant. Perianth: outermost segments 1.5–5 cm long, 1–4 cm wide; other segments gradually increasing in size inwards, to 6–13 cm long, 3–6 cm wide. Stamens: filaments 1.5–2.5 cm long; anthers linear, 1–1.5 cm long; connective appendage 4–8 mm long. Carpels 1–2 cm long; style c. 1 mm long; stigma c. 1 mm wide. Fruits slightly larger than carpels.

¹ c/- Queensland Herbarium, Brisbane Botanic Gardens Mt Coot-tha, Mt Coot-tha Road, Toowong, Queensland 4066.

Fruiting receptacle to 2–6 cm long, 2–12 cm wide, becoming hard and turning downwards, the openings widening to allow fruits to fall out. *Pink Waterlily*, *Pink Lotus-lily*. Plate 45.

Occurs in northern N.T. and in northern and eastern Qld, in several widely separate areas extending as far S as Chinchilla. It is found growing in mud in sheltered freshwater lagoons and waterbodies, in water to c. 2 m deep. Map 299.

N.T.: Melaleuca Swamp, *M.O.Rankin* 2357 (CANB, DNA, K, NE, NSW); Oenpelli, in freshwater lagoon near East Alligator R., *R.Specht* 1164 (AD, BRI, CANB, MEL, PERTH). Qld: Red Lily Lagoon c. 13 km from Kowanyama on road to South Mitchell, Kowanyama Aboriginal Reserve, *J.R.Clarkson* 3418 (BRI, MEL); 'Lakefield', 14 km NNW of 'Breeza Plains' outstation, *A.Kanis* 1958 (BRI, CANB, L, MO).

Sometimes cultivated in large ornamental ponds.

NYMPHAEACEAE

*S.W.L.Jacobs*¹ & *C.L.Porter*¹

Annual or perennial aquatic herbs with vertical rhizomes or tubers, or horizontal rhizomes, with or without stolons. Leaves alternate or spirally arranged, submerged or floating; petiole sheathing at base or simple; lamina orbicular to elliptic, or sagittate to hastate. Flowers actinomorphic, bisexual, solitary, emergent, standing clear of water or floating, often fragrant; perianth spirally arranged. Sepals 4–6, usually green, yellow or pink. Petals 0 to indefinite (sometimes then interpreted as staminodes), usually showy, variously coloured, sometimes fused at base, either grading into stamens or a gap between petals (or sepals) and stamens. Stamens from c. 8 to indefinite, inserted at top of ovary or adnate to corolla tube; anthers bilocular, dehiscent introrsely or latrorsely; connective sometimes extending as a sterile appendage. Ovary superior, half-inferior or inferior, lobed, multilocular; ovules many per carpel, anatropous, attached all over carpel walls with no definite placenta; stigma 1, sometimes with sterile appendages or lobes. Fruit a berry. Seeds numerous, often arillate.

A cosmopolitan family of 6 genera and c. 80 species; widely distributed, with most species in the tropics, and with the highest concentration of species in tropical South America. Two genera and 15 species in Australia with 2 species naturalised and a third doubtfully naturalised. Many cultivars of introduced species are cultivated in temperate areas; these are mostly of hybrid origin and are apparently not naturalised. Species of *Nymphaea* were widely used by Aborigines as food plants: most parts of the plants are recorded as being eaten. Nymphaeaceae treatments often have included genera now usually referred to the families Cabombaceae and Nelumbonaceae.

G.Bentham, Nymphaeaceae, *Fl. Austral.* 1: 60–62 (1863); F.M.Bailey, Nymphaeaceae, *Queensland Fl.* 1: 88–89 (1899); H.S.Conard, *Waterlilies* (1905); P. van Royen, Sertulum Papuanum 5: Nymphaeaceae, *Nova Guinea* 8: 103–126 (1962); C.D.K.Cook *et al.*, *Water Pl. World* 334–342 (1974); G.R.Sainty & S.W.L.Jacobs, *Waterpl. New South Wales* 322–333 (1981); B.J.Conn, Nymphaeaceae, in G.J.Leach & P.L.Osborne, *Freshwater Pl. Papua New Guinea* 191–201 (1985); B.Verdcourt, *Fl. Trop. E. Africa*, Nymphaeaceae 1–11 (1989); S.W.L.Jacobs, Nymphaeaceae, in G.J.Harden (ed.), *Fl. New South Wales* 1: 150–151 (1990); E.L.Schneider & P.S.Williamson, Nymphaeaceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 486–493 (1993); I.D.Cowie, P.S.Short & M.Ostercamp Madsen, Nymphaeaceae, *Floodplain Fl.* 54–59 (2000).

¹ National Herbarium of New South Wales, Royal Botanic Gardens, Mrs Macquaries Road, Sydney, New South Wales 2000.

NYMPHAEACEAE

KEY TO GENERA

- 1 Petals absent or 1–5 and light to dark purple; submerged leaves with crispate margins, more abundant than floating leaves at maturity 2. **ONDINEA**
- 1: Petals more than 5, variously coloured; submerged leaves \pm entire, not crispate, less abundant than floating leaves at maturity
- 2 Sepals usually 4; ovary half inferior; petals obvious; seeds arillate 1. **NYMPHAEA**
- 2: Sepals 5 or 6; ovary superior; petals not obvious, scale- or stamen-like; seeds not arillate †**NUPHAR**

†*Nuphar lutea* (L.) Sibth. & Sm. is sometimes cultivated in temperate areas, and although it may be well established in parks etc, is not normally regarded as naturalised.

1. NYMPHAEA

Nymphaea L., *Sp. Pl.* 1: 510 (1753); *Gen. Pl.* 5th edn, 227 (1754), *nom. cons.*; associated with the Nymphs, a class of semi-divine mythological beings, imagined as beautiful maidens often associated with water and other natural features.

Type: *N. alba* L.

Castalia Salisb., *Ann. Bot. (König & Sims)* 2: 71 (1806). T: not designated.

Leuconymphaea Kuntze, *Revis. Gen. Pl.* 1: 11 (1891). T: not designated.

Annual or perennial; rhizomes vertical or horizontal, cylindrical or tuberous; with or without stolons. Leaves spirally arranged, floating when mature; petiole entire or winged; lamina orbicular to elliptic with a radial slit, entire, sinuate, dentate or toothed, hastate as seedling. Flowers floating or standing clear of water. Sepals usually 4, usually green outside, sometimes flecked with purple or pink; margins membranous, coloured as petals. Petals numerous, lanceolate to spatulate, variously coloured; gap between petals and stamens present or absent. Stamens numerous; filaments either \pm cylindrical and membranous, or flattened and either tough or membranous; anthers dehiscing introrsely or latrorsely; apical appendage present or absent. Ovary half inferior. Fruit globose, drawn beneath water by coiled peduncle. Seeds arillate, glabrous or hairy; testa comprised of numerous interlocking cells.

A cosmopolitan genus of c. 60 species, mostly tropical; frequently cultivated, especially in temperate areas. Fourteen species in Australia: 2 naturalised, 7 endemic, 3 shared only with New Guinea, and 2 shared with New Guinea, India and SE Asia. All native Australian species have flowers standing clear of the water (sometimes *N. nouchali* flowers barely so) and tuberous vertical rhizomes.

Conard (1905) has been the accepted authority on the subgeneric classification in *Nymphaea*. Conard was unaware of any of the species treated here in subg. *Confluentes* as he misinterpreted the name *N. violacea*, treating it as a subspecies of *N. gigantea*, within subg. *Anecphyia*. However *N. violacea* is now recognised as a distinct species and, with *N. elleniae*, *N. hastifolia* and *N. alexii* (all described since Conard's publication), is placed in subg. *Confluentes*.

H.S.Conard, *Waterlilies* (1905); J.Wiersema, A monograph of *Nymphaea* subgenus *Hydrocallis* (Nymphaeaceae), *Syst. Bot. Monogr.* 16: 1–112 (1987); S.W.L.Jacobs, New species, lectotypes and synonyms of Australasian *Nymphaea*, *Telopea* 4: 635–641 (1992); S.W.L.Jacobs, Further notes on *Nymphaea* (Nymphaeaceae) in Australasia, *Telopea* 5: 703–706 (1994); S.W.L.Jacobs, Three new species of *Nymphaea* (Nymphaeaceae) in Australia, *Telopea* 11: 155–160 (2006).

KEY TO SUBGENERA

- 1 Plants with horizontal rhizomes or vertical rhizomes and horizontal stolons; flowers at or near water surface; flowers white, pink, cream or yellow **subg. 1. Nymphaea**
- 1: Plants with comparatively vertical tuberous rhizomes and no stolons; flowers usually standing well clear of water surface; flowers blue, pink, white or some mixture of those colours
- 2 Filaments flattened and robust **subg. 2. Lotos**
- 2: Filaments flattened or almost cylindrical, membranous
- 3 Stamens with a sterile terminal appendage, usually > 2 mm long, especially on outer stamens **subg. 3. Brachyceras**
- 3: Sterile appendage absent or minute (< 1 mm) on stamens
- 4 Flowers with petals passing gradually into stamens; leaf margins sinuate; seeds small (< 2.5 mm) **subg. 4. Confluentes**
- 4: Flowers with a distinct gap between petals and stamens; leaf margins with distinct teeth; seeds large (> 2.5 mm) **subg. 5. Anecphyia**

KEY TO SPECIES

- 1 Petals yellow, grading into stamens; leaf blade margin slightly sinuate; horizontal stolons and vertical rhizomes both present **1. N. mexicana**
- 1: Petals white, blue or pink; grading into stamens or a distinct gap present; leaf blade margins various; stolons absent; rhizomes either horizontal, or vertical and ±tuberous
- 2 Rhizomes horizontal or suberect, elongated and vigorous; flowers ±floating on water surface **†N. alba, N. odorata and hybrids**
- 2: Rhizomes tuberous, erect; flowers usually standing clear of water surface
- 3 Petals grading into stamens; leaf with entire, sinuate or dentate margins
- 4 Filaments flattened, thickened, tough; leaf margin dentate; lamina undersurface usually pubescent **2. N. pubescens**
- 4: Filaments membranous and either cylindrical, or all flattened, or only some outer filaments flattened; leaf lamina undersurface always glabrous; blade margin sinuate to entire **4. N. caerulea**
- 5 Anthers to 25 mm long; apical appendage to 10 mm long
- 5: Anthers 13 mm long or less; apical appendage minute or absent
- 6 Anthers cream; top of ovary frequently red; seeds with longitudinal ridges and these often with proliferations **8. N. alexii**
- 6: Anthers yellow; top of ovary rarely red; seeds without longitudinal ridges or proliferations
- 7 Filaments to 25 mm long; sepals to 11.5 cm long; petals blue to mauve, white, or pink **5. N. violacea**
- 7: Filaments to 18 mm long; sepals to 7 cm long; petals white
- 8 Sepals usually with purple flecks, to 7 cm long; anthers to 8.5 mm long, sometimes slightly apiculate; carpels 11–22; fruit to 2.5 cm diam.; seeds glabrous, 1.75–2.5 mm long, 1–1.5 mm wide; growing in more or less permanent water [Cape York Penin.] **6. N. elleniae**
- 8: Sepals without purple flecks, to 6 cm long; anthers to 5.5 mm long; appendage obsolete; carpels 8–16; fruit c. 4.5 cm diam.; seeds glabrous, spherical, c. 1 mm diam.; growing in ephemeral water on floodplains [N.T., W.A.] **7. N. hastifolia**

- 3:** Distinct gap present between petals and stamens; leaf with sinuate or dentate margin
- 9** Filaments flattened and tough; petals usually < 10; stamens usually < 25; leaf blade margin slightly sinuate; mature seed < 1.5 mm long **3. *N. nouchali***
- 9:** Filaments membranous, slightly flattened to cylindrical; petals usually more than 10; stamens usually > 50; leaf blade margin toothed; mature seeds more than 2.5 mm long
- 10** Sepal margins pink; petals becoming dark pink with age; blade margin with sparse teeth to 2 mm long **9. *N. atrans***
- 10:** Sepal margins white or blue, rarely pink; petals not darkening with age; blade margin with teeth usually > 2 mm long
- 11** Anthers to 6 mm long; sepals to 6.5 cm long; petals to 26 on fully developed flowers, white, deep blue, rarely pink; blade margin with teeth to 4 mm long
- 12** Flowers mostly blue, rarely pink or white, comparatively small with sepals to c. 4.5 cm; petals to 5 cm long and all the same colour; leaves with teeth on mature leaves cylindrical from a shallow triangular base; seeds globose to subglobose, 3–4.5 mm diam. **10. *N. macrosperma***
- 12:** Flowers mostly white with some blue, rarely pink, larger with sepals to 6.5 cm; petals to 7 cm long and all the same colour; leaves with teeth on mature leaves triangular to narrow-triangular; seeds globose to elongate-spherical, 2–4 mm diam.
- 13** Seeds spherical to elongate-spherical, 2–3.5 mm long, c. 2 mm wide, with \pm continuous rows of short hairs; flowers mostly white, rarely blue, no obvious fading with age **13. *N. carpentariae***
- 13:** Seeds globose to subglobose, mostly 2.5–4 mm diam., with often interrupted rows of short hairs; flowers mostly white but blue flowers still common, the blue flowers fading with age **14. *N. georginae***
- 11:** Anthers > 6 mm long; sepals to 12 cm long; petals to 34 on fully developed flowers, blue, white, or rarely pink; blade margin with teeth to 5 mm long
- 14** Anthers to 11 mm long, rarely apiculate; when coloured, petals fading with age; carpels 12–18; seeds ovate, pubescent, the hairs arranged in \pm continuous rows of short hairs **11. *N. gigantea***
- 14:** Anthers to 15 mm long, often apiculate; when coloured, petals usually not fading with age; carpels 9–20; seeds oblong, pubescent or rarely glabrous, with sparse to dense hairs in discontinuous or disorganised rows, sometimes almost appearing scattered **12. *N. immutabilis***

†*Nymphaea alba* L., *N. odorata* Aiton, and various hybrids with these as the main parents, are commonly planted in temperate areas. They rarely seem to form viable seed and, although they may persist for some time, they do not seem to be naturalised.

Subg. 1. *Nymphaea*

Nymphaea L. subg. *Nymphaea*

Type: *N. alba* L.

Plants with horizontal or vertical rhizomes, with or without horizontal stolons. Leaf margins entire, sinuate or crenate, never distinctly dentate. Flowers diurnal, usually at or near water surface, usually floating. Petals grading into stamens. Stamens without an apical appendage. Innermost stamens with narrow membranous filaments. Seeds large, smooth.

Northern Hemisphere; one introduced species naturalised in Australia, other species commonly cultivated.

1. **Nymphaea mexicana* Zucc., *Abh. Math.-Phys. Cl. Königl. Bayer Akad. Wiss.* 1: 365 (1832)

T: aus dem See bei Mexico, Sept. 1827, *Karwinski s.n.*; holo: M n.v., *fide* H.S.Conard, *Waterlilies* 163 (1905). *Nymphaea flava* Leitn. in A.W.Chapman, *Fl. South. U.S. 2nd edn, Suppl.* 604 (1883). T: not designated.

Illustrations: H.S.Conard, *Waterlilies* pl. 13 (1905); G.R.Sainty & S.W.L.Jacobs, *Waterpl. New South Wales* 330 (1981).

Perennial; rhizomes vertical; stolons horizontal. Leaf lamina orbicular, to 26 cm wide, slightly sinuate, often with brown blotches; undersurface glabrous. Flowers standing just above the water. Sepals 4, to 9 cm long, obtuse, green outside streaked with pink. Petals to c. 30, lanceolate to oblanceolate, usually acute, yellow, outer petals often streaked pink. Stamens to c. 60; filaments membranous, flattened, to 38 mm long; anthers to 10 mm long, apiculate. Carpels 8–10; sterile stigmatic lobes 5–7 mm long. Fruit globose, to 3 cm diam. Seeds uncommon, apparently c. 5–6 mm long, \pm globose, glabrous or finely hairy.

Naturalised around Brisbane, Qld, Sydney, N.S.W., and the Goulburn R., Vic. Originally from tropical America. Growing in water to 4 m deep. Flowers during warmer months; flowers open during the day. Map 300.

Qld: between Sandgate and Brighton, Mar. 1978, *M.Olsen* (BRI); Enoggera Reservoir, Brisbane, Jan. 1891, *J.H.Simmonds* (BRI). N.S.W.: Lane Cove, *S.W.L.Jacobs 2000* (NSW); Botany, *S.W.L.Jacobs 3219* (NSW). Vic.: 'Islayvale' on a branch of Goulburn R., S of Nagambie, 9 Jan. 1985, *T.Miles* (MEL).

This species is noted for the occasional production of vegetative 'brood-bodies' consisting of an axis c. 2.5 cm long with a row of buds on the upper surface and a cluster of fleshy roots 2–4 cm long hanging below; these brood bodies are produced at the ends of the stolons but seem to be uncommon in Australia. Planted around the capital cities and many larger towns by Acclimatisation Societies popular around the end of the 19th century.

Subg. 2 *Lotos*

Nymphaea subg. *Lotos* DC., *Regni Vegetabilis Systema Naturale* 2: 49 (1821)

Type: *N. lotus* L.

Plants with short vertical tuberous rhizomes, stolons absent. Leaf margins distinctly dentate or sinuate. Flowers nocturnal or diurnal, usually \pm standing clear of the water. Petals and stamens distinct, sometimes petals \pm grading into stamens sometimes with a small space between them. No terminal appendage at apex of stamen. Filaments flattened, robust. Seeds glabrous or hairy.

Old World Tropics, two species in Australia.

2. *Nymphaea pubescens* Willd., *Sp. Pl.* 2: 1154 (1800)

T: 'India orientalis'; holo: W (10100).

Illustration: I.D.Cowie, P.S.Short & M.Ostercamp Madsen, *Nymphaeaceae, Floodplain Fl.* 58 (2000).

Annual or perennial; rhizome erect, tuberous, to c. 8 cm long. Leaf lamina elliptic to orbicular, to 43 cm wide, dentate; undersurface usually hairy. Flowers to 10 cm above water. Sepals 4 or 5, to 9 cm long, obtuse. Petals to 19, oblanceolate, obtuse, grading into stamens, white, usually tinged pink. Stamens to c. 60; filaments flattened, thickened, tough, to 32 mm long; anthers to 20 mm long. Carpels 11–20; sterile stigmatic lobes to 5 mm long, curling over at maturity. Fruit c. 5 cm diam. Seeds 1.5 mm long, c. 1 mm wide, glabrous, with rows of small bumps. Fig. 52E.

Usually from coastal floodplain areas of the N.T., with occasional records from Qld; also from New Guinea, India and SE Asia. Growing in water to 2 m deep. Flowers Jan.–July; flowers open during the morning (and night?), closing at c. midday. Map 301.

N.T.: Arafura Swamp near Old Arafura HS, *I.Cowie* 1229 & *M.Clark* (NSW); Mistake Ck, *C.R.Dunlop* 7055 & *G.Wightman* (DNA, NSW); Port Darwin, *Holtze* 1066 (MEL); 4-Mile Hole, Wildman R., *S.W.L.Jacobs* 5210 & *K.L.Wilson* (NSW). Qld: Broadwater Ck c. 6 km from its junction with Elphinstone Ck, c. 40 km NW of Ingham, Aug. 1970, *H.S.McKee* (BRI).

Some specimens from Kakadu Natl Park differ in being glabrous or only sparsely hairy on the undersurface of the leaf. This species has sometimes been referred to as *N. nouchali*, a confusion presumably arising from the forms with glabrous leaves. Despite the relationship apparent from the names (both species belonging to subg. *Lotos*) this is not *N. lotus* var. *australis*, which is a synonym of *N. immutabilis* subsp. *immutabilis*.

3. *Nymphaea nouchali* Burm.f., *Fl. Indica* 120 (1768)

T: Coramandel, India, *Outgaerden*; holo: G n.v. (photo NSW).

Nymphaea stellata Willd., *Sp. Pl.* 2: 1153 (1800). T: plate 27 in H.A. van Rheede, *Hort. Malab.* 11: 53 (1692).; lecto: *fide* B.Verdcourt, *Fl. Trop. E. Africa*, Nymphaeaceae 10 (1989).

Nymphaea minima F.M.Bailey, *Syn. Queensland Fl.* 10 (1883), *nom. illeg. non* Rchb. T: Still waters off Barron River, Qld, *F.M.Bailey*; holo: BRI 278799.

[*Nymphaea tetragona* auct. non Georgi: F. von Mueller, *Second Syst. Census Austral. Pl.* 4 (1889)]

Illustration: P. van Royen, *Nova Guinea* 8: 112 (1962).

Annual or perennial; rhizome erect, globose, tuberous, to c. 3 cm diam. Leaf lamina c. 10–23 cm wide, slightly sinuate. Flowers barely emergent. Sepals 4, usually to 3 cm long, rarely to 7 cm long, acute, with purple streaks usually near margins. Petals to c. 10, lanceolate, acute, blue, pink or white; gap between petals and stamens present. Stamens to c. 20; filaments flattened, tough, to 11 mm long; anthers to 8 mm long; sterile appendage to 7 mm long. Carpels 7 or 8; sterile stigmatic lobes to 4 mm long. Fruit c. 1.5–4 cm diam. Seeds c. 0.75 mm diam., with continuous rows of long hairs. Fig. 52D.

Grows in the northern part of the N.T. and on Cape York (Qld) N of Cardwell; also in New Guinea and SE Asia to India. Usually close to the coast in temporary water bodies, swamps and pools. Flowers during the warmer months; flowers open during the day. Map 302.

N.T.: Bulls Run Ck, Tipperary Stn, *G.Leach* 2855 & *I.Cowie* (DNA, NSW). Qld: Camping Reserve R12, Bloomfield, *B.Hyland* 7315 (BRI); Cairns, *S.W.L.Jacobs* 4825 & *G.R.Sainty* (BRI, NSW); Wonga Beach N of Mossman, *S.W.L.Jacobs* 4887 & *G.R.Sainty* (NSW); Edmund Kennedy Natl Park, c. 6 km N of Cardwell *Thorsborne* 517 & *Travers* (BRI).

This species has been known under a number of names in Australia and Papua New Guinea. It has been misidentified as *N. pygmaea* Dryand. and *N. tetragona* Georgi.

Subg. 3 *Brachyceras*

Nymphaea subg. *Brachyceras* Casp. in F.A.W.Miquel, *Ann. Mus. Lugd.-Bat.* 2: 241–253 (1865)

Type: *N. stellata* Willd.

Plants with short vertical tuberous rhizomes; stolons absent. Leaf margins sinuate, never distinctly dentate. Flowers diurnal, standing clear of water. Petals grading into stamens. Stamens usually with obvious sterile appendage at apex. Filaments membranous, often flattened. Seeds small, hairy.

Africa and Asia, one species naturalised in Australia.

4.**Nymphaea caerulea* Savigny, *La Decade Egypt* 7: 74 (1798)

T: plate 25, *Ann. Mus. Natl. Hist. Nat.* 1 (1802); lecto, *fide* B.Verdcourt, *Fl. Trop. E. Africa*, Nymphaeaceae 10 (1989).

Nymphaea capensis Thunb., *Prodr. Pl. Cap.* 92, (1800). T: South Africa, Cape, *Thunberg*; holo: UPS n.v.

Illustrations: G.R.Sainty & S.W.L.Jacobs, *Waterpl. New South Wales* 326, 327 (1981); G.R.Sainty & S.W.L.Jacobs, *Waterpl. Australia* 35 (1988); both as *N. capensis*.

Annual or perennial; rhizome tuberous, short, erect. Leaf lamina to 45 cm wide, irregularly sinuate; undersurface glabrous. Flowers to 30 cm above water. Sepals 4, to 10 cm long, obtuse, green outside. Petals to c. 35, lanceolate to oblanceolate, usually acute, grading into stamens, blue, white or pink. Stamens to c. 200; filaments flattened, to 16 mm long; anthers to 25 mm long; sterile appendage to 10 mm long. Carpels 22–38; sterile stigmatic lobes 3–5 mm long. Fruit c. 5 cm diam. Seeds c. 1.5 mm long, c. 1 mm wide, with continuous rows of usually long hairs (very short in Fig. 51C). Fig. 51C.

Naturalised along the E coast from about Fraser Is., Qld, to S of Sydney, N.S.W.; originally from southern Africa. Growing in water to 4 m deep. Flowers during warmer months; flowers open at day, closing at night. Map 303.

Qld: Bribie Is., *G.N.Batianoff 1408* & *J.A.Elsol* (BRI); near Beenleigh, *S.T.Blake 20100* (BRI, MEL). N.S.W.: Telegraph Point, *S.W.L.Jacobs 2947* & *J.Pickard* (NSW); c. 3 km NW of Collombatti Rail, *S.W.L.Jacobs 3000* (NSW); Lismore, Dec. 1959, *s. coll.* (NSW).

This species is frequently mistaken for the native *N. gigantea* which has a much less prominent or obsolete sterile appendage on the anther. In the southern part of the range many plants behave as annuals, not surviving winter, especially in shallow water. This is the species that has been known as *N. capensis* Thunb. in Australia; it is still not clear what the correct name for this species should be (J.Wiersema pers. comm.).

Subg. 4. Confluentes

Nymphaea subg. *Confluentes* S.W.L.Jacobs, *Fl. Australia* 2: 458 (2007)

Type: *N. violacea* Lehm.

Plants with vertical tuberous rhizomes; stolons absent. Leaf margins entire to sinuate. Flowers diurnal, standing clear of the water. Petals grading into stamens. Terminal staminal appendage absent or minute. Filaments membranous, flattened to cylindrical. Seeds small, hairy or glabrous.

Confined to tropical Australasia, four species in Australia.

5. *Nymphaea violacea* Lehm., *Hamburger Garten- Blumenzeitung* 9: 218 (1853)

Nymphaea gigantea var. *violacea* (Lehm.) Conard, *Waterlilies* 130–131 (1905); *N. gigantea* var. *violacea* (Lehm.) Domin, *Biblioth. Bot.* 89: 104 (1925), *nom. illeg. non Conard*. T: Cape York, [Qld], 10 Oct. 1848, *J.MacGillivray, Voyage of the Rattlesnake, Bot. 410*; lecto: K, *fide* S.W.L.Jacobs, *Telopea* 4: 639 (1992).

Nymphaea violacea var. *caerulea* Lehm., as ‘*coerulea*’, *Hamburger Garten- Blumenzeitung* 9: 218 (1853). T: Cape York, [Qld], 27 Oct. 1849, *J.MacGillivray, Voyage of the Rattlesnake, Bot. 410β*; lecto: K; isolecto: B, *fide* S.W.L.Jacobs, *Telopea* 4: 639 (1992).

Nymphaea brownii F.M.Bailey, *Queensland Fl.* 1: 39 (1899). T: Barron River, Qld, *F.M.Bailey s.n.*; holo: BRI.

Nymphaea casparyi Rehnelt & F.Henkel ex F.Henkel, Rehnelt & Dittman, *Das Buch der Nymphaeaceen oder Seerosengewächse* 66 (1907), *nom. illeg. non Carrière* (1879). T: ‘*N. repanda*’, Head of Sturts Creek, *F.Mueller*; lecto: K, *fide* S.W.L.Jacobs, *Telopea* 4: 640 (1992).

Nymphaea holtzei Rehnelt & F.Henkel ex F.Henkel, Rehnelt & Dittman, *Das Buch der Nymphaeaceen oder Seerosengewächse* 67 (1907). T: left hand figure accompanying the type description, page 67; lecto: *fide* S.W.L.Jacobs, *Telopea* 4: 639 (1992).

Nymphaea holtzei var. *albiflora* Rehnelt & F.Henkel ex F.Henkel, Rehnelt & Dittman, *Das Buch der Nymphaeaceen oder Seerosengewächse* 67 (1907). T: not designated.

Nymphaea rehneltiana F.Henkel, *Gartenflora* 59: 154 (1910). T: figure 11 on p. 155 of type description; lecto: *fide* S.W.L.Jacobs, *Telopea* 4: 640 (1992).

Annual or perennial; rhizome globular. Leaf lamina to 40 cm long, 30 cm wide, entire to sinuate; undersurface glabrous. Flowers to 60 cm above water. Sepals 4, to 11.5 cm long, acute to obtuse. Petals to 45, oblanceolate, acute to obtuse, blue to mauve, white or pink.

Stamens to c. 300; filaments cylindrical, to 25 mm long, with outer filaments occasionally flattened; anthers yellow, to 13 mm long, often with minute appendage. Carpels 9–23; sterile stigmatic lobes vestigial or obsolete. Fruit c. 5 cm diam. Seeds without longitudinal ridges or proliferations, ovoid to ellipsoid, 1–2 mm long, 0.5–1 mm wide, glabrous, or occasionally with short hairs. Plate 46; Fig. 52F–H.

Grows in tropical Australia from the Kimberley (W.A.) to S of Cape York (Qld); also in New Guinea. Growing in water to 2 m deep in billabongs, creeks and rivers. Flowers Feb.–Aug.; flowers open during the day, closing at night, not appreciably fading with age. Map 304.

W.A.: on the track to Karriwell bore, Lennard R. floodplain, c. 23 km from Kimberley Downs HS, *E.Goble-Garratt* 577 (PERTH). N.T.: Nankeen Billabong, *I.Cowie* 257 (BRI); Flying Fox Ck, Beswick–Mainoru road, *S.W.L.Jacobs* 1721 (NSW). Qld: 5.5 km ESE of Arukun, *J.R.Clarkson* 4509 (BRI, NSW); Hasties Swamp S of Atherton, *S.W.L.Jacobs* 4786 & *G.R.Sainty* (NSW).

There is considerable variation in this species. Populations frequently have consistent petal-colour patterns but the variation between populations seems continuous and we have been unable to detect any logical groupings. There is some pattern in seed characteristics: specimens from the Kimberley usually have short scattered hairs; specimens from the Top End (N.T.) are glabrous and the testa cells often have slightly raised arm endings; specimens from Cape York are glabrous and the testa cells sometimes have large lumens with comparatively short and broad arms. These variants are not correlated with any of the other variables. Specimens from New Guinea match both those from Cape York and the Top End.

6. *Nymphaea elleniae* S.W.L.Jacobs, *Telopea* 4: 635 (1992)

T: Jardine River, Qld, 6 Aug. 1987, *S.W.L.Jacobs* 5450 & *J.R.Clarkson*; holotype: NSW; isotype: BRI.

Perennial; rhizome erect, elongated-tuberos. Leaves: juvenile lamina often retained for several years, sagittate, usually red; mature lamina broadly ovate, to 22 cm long, 18 cm wide, entire to slightly sinuate, often reddish below, especially toward margins, glabrous on undersurface. Flowers to 20 cm above water. Sepals 4, to 7 cm long, acute, occasionally obtuse, usually with purple flecks. Petals to 25, lanceolate, acute to obtuse, white. Stamens yellow, to c. 100; filaments cylindrical, to 18 mm long; anthers to 8.5 mm long, sometimes slightly apiculate. Carpels 11–22; sterile stigmatic lobes vestigial or obsolete. Fruit c. 2.5 cm diam. Seeds without longitudinal ridges or proliferations, elliptic, c. 1.75–2.5 mm long, c. 1–1.5 mm wide, glabrous. Fig. 51E.

On Cape York N from Lakefield Natl Park, but mostly in and N of the Jardine R., Qld; also in New Guinea. Growing in more or less permanent water to 5 m deep. Flowers ?Apr.–Dec.; flowers open all day, closing at night. Map 305.

Qld: Burster Ck, *J.R.Clarkson* 6185 (BRI, NSW); c. 20 km W of Karwah Lagoon, *J.R.Clarkson* 4568 (BRI); Skull Ck, *S.W.L.Jacobs* 5458 & *J.R.Clarkson* (NSW).

This species is very similar to *N. hastifolia* but, unlike that species, *N. elleniae* grows in more permanent water and does not usually start flowering until *N. hastifolia* has finished; there is also a difference in the seeds with the testa cells appearing to have a 'double wall or margin' in *N. hastifolia*.

7. *Nymphaea hastifolia* Domin, *Biblioth. Bot.* 89: 105 (1925)

T: Port Darwin N.T., s. *det.*, *F.Schultz* 831; holotype: K.

Annual or perennial; rhizome globose, erect. Leaf lamina broadly elliptic, to 20 cm long, to 15 cm wide, slightly sinuate, glabrous on undersurface; juvenile lamina sagittate. Flowers to 30 cm above water. Sepals 4 or 5, to 6 cm long, acute. Petals to 30, lanceolate, acute, white. Stamens yellow, to c. 100; filaments cylindrical, to 17 mm long; anthers to 5.5 mm long, sometimes with a gland at base; appendage obsolete. Carpels 8–16; sterile stigmatic lobes vestigial or obsolete. Fruit c. 4.5 cm diam. Seeds without longitudinal ridges or proliferations, spherical, c. 1 mm diam., glabrous. Fig. 52A.

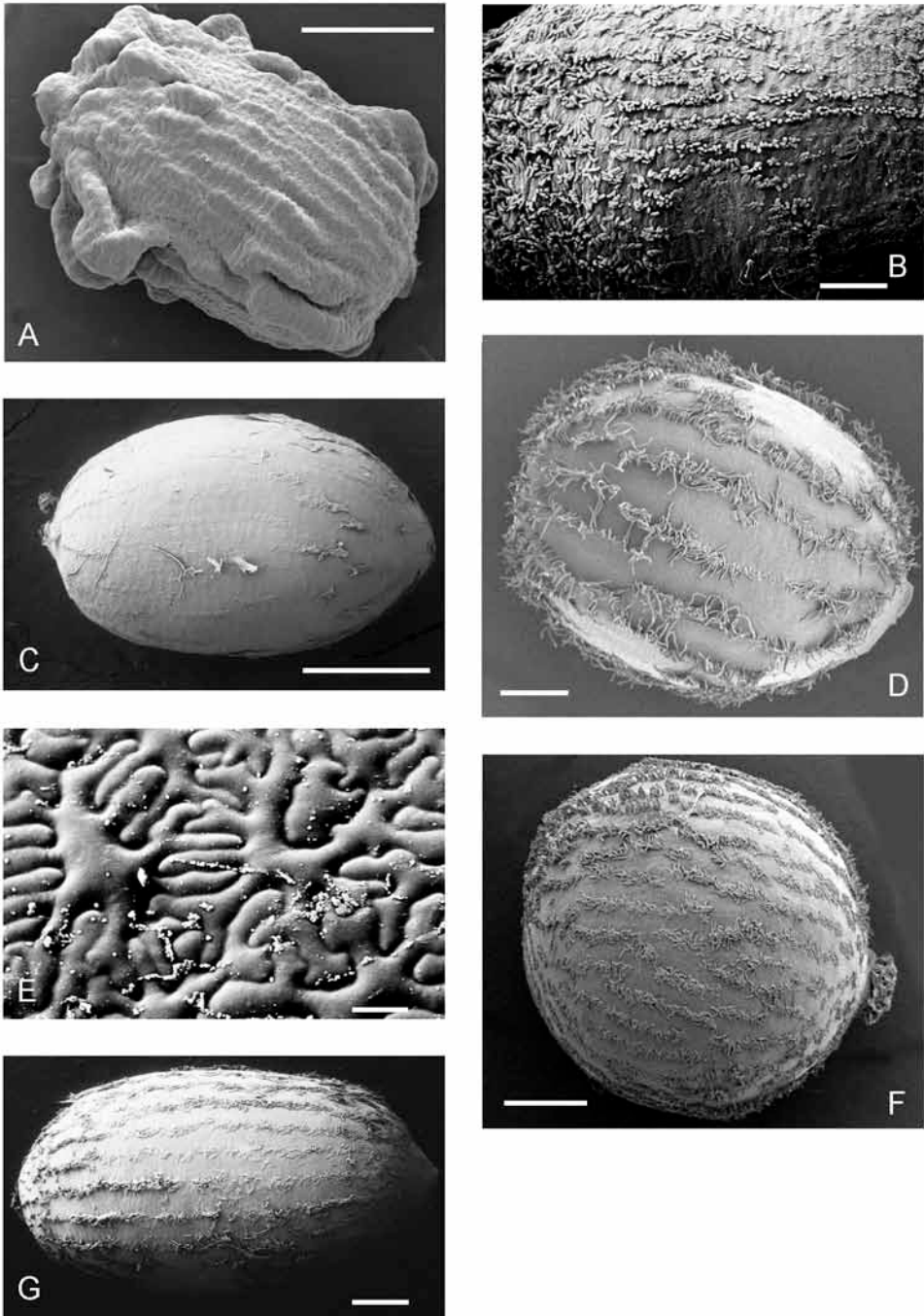


Figure 51. *Nymphaea* seeds. **A**, *N. alexii* (S.Jacobs 9326, NSW); **B**, *N. atrans* (S.Jacobs 5398, NSW); **C**, *N. caerulea*, (E.Burgess 25 May 1970, NSW); **D**, *N. carpentariae* (S.Jacobs 9329, NSW); **E**, *N. elleniae* (S.Jacobs 5449, NSW); **F**, *N. georginae* (S.Jacobs 9335, NSW); **G**, *N. gigantea* (S.Jacobs 2986, NSW). Scale bars: **A**, **C**, **D**, **G** = 0.5 mm; **B** = 0.3 mm; **E** = 10 µm; **F** = 1 mm. Photographs: **A**, **D**, **F** by E.Norris; **B**, **C**, **E**, **G** by S.W.L.Jacobs.

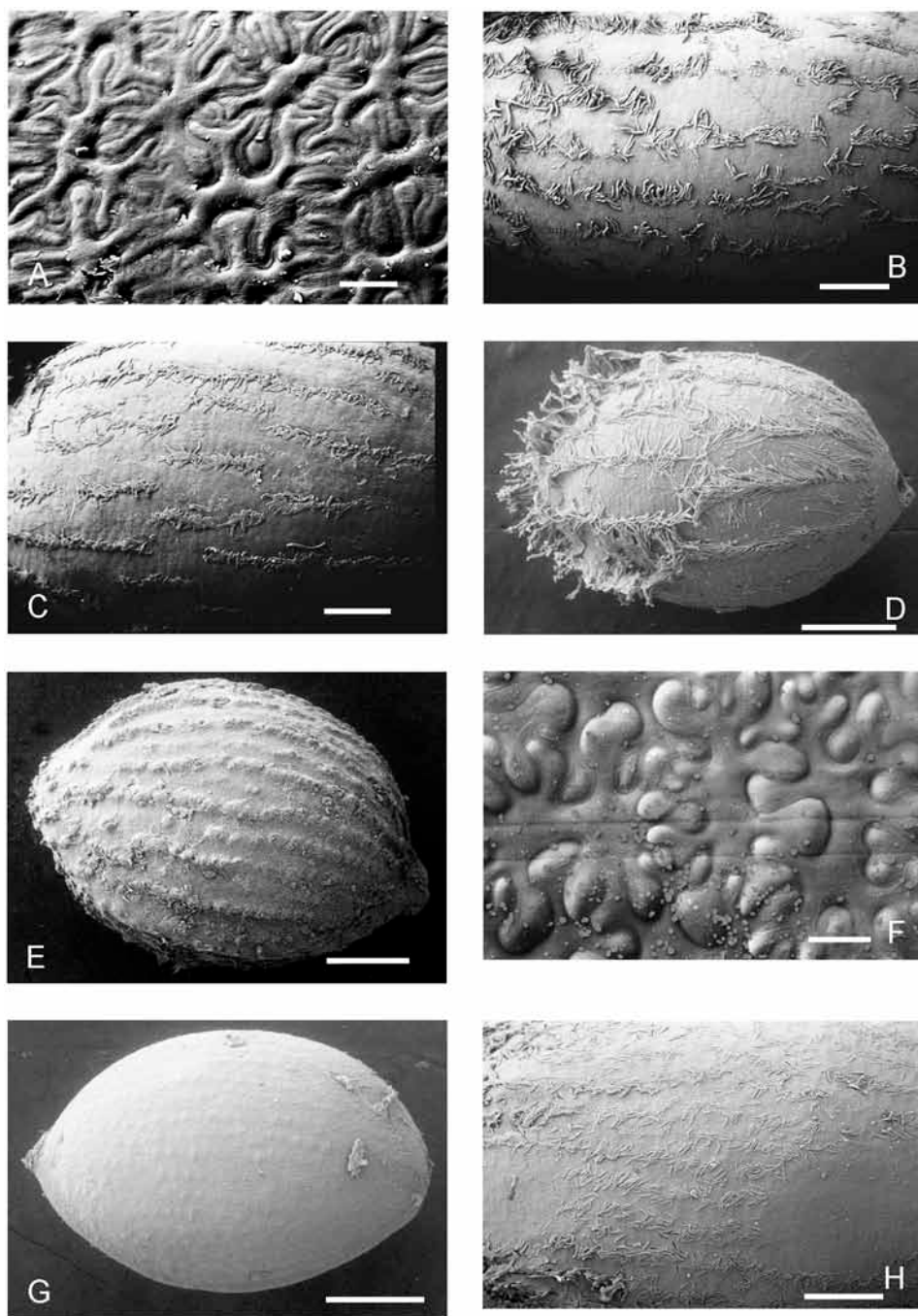


Figure 52. *Nymphaea* seeds. **A**, *N. hastifolia* (I.Cowie 9 Mar. 1986, NSW); **B**, *N. immutabilis* subsp. *immutabili* (S.Jacobs 4055, NSW); **C**, *N. macrosperma* (S.Jacobs 5225, NSW); **D**, *N. nouchali* (S.Jacobs 4887, NSW); **E**, *N. pubescens* (S.Jacobs 5126a, NSW); **F–H**, *N. violacea* (**F**, S.Jacobs 5007, NSW; **G**, S.Jacobs 4908, NSW; **H**, S.Jacobs 5592, NSW). Scale bars: **A**, **F** = 10 μ m; **B**, **C** = 0.4 mm; **D**, **E** = 0.3 mm; **G** = 0.5 mm; **H** = 0.1 mm. Photographs by S.W.L.Jacobs.

From the northern near-coastal areas of W.A. and the N.T. Growing on floodplains in ephemeral pools or in water to 1 m deep. Flowers Jan.–Mar.; flowers open during the day, closing at night. Map 306.

W.A.: Kalumburu, *K.F.Kenneally* 9819 (NSW, PERTH). N.T.: below Nankeen Billabong, Magela Ck floodplain, *I.Cowie* 306 (NSW); Angalarri R., *C.R.Dunlop* 8179 & *G.Leach* (DNA, NSW).

Often flowers while juvenile sagittate leaves are present. *Nymphaea hastifolia* was characterised by Domin as having a gland at the base of the anther, but the glands have so far only been found on the type. The specimen from W.A. has a different seed testa pattern to the N.T. specimens and this warrants further collecting and study. See also the notes under *N. elleniae*.

8. *Nymphaea alexii* S.W.L.Jacobs & Hellq., *Telopea* 11: 155–156 (2006)

T: Qld: c. 23 km N of Normanton, Karumba road, 17° 31.741'S 141° 09.625'E, 17 Apr. 2005, *S.Jacobs* 9325 & *C.B.Hellquist*; holo: NSW; iso: NASC, BRI.

Annual or perennial with a globose rhizome c. 2 cm diam. Leaf lamina elliptic, to 15 cm long, to 10 cm wide, slightly sinuate, glabrous on undersurface. Flowers to 30 cm above water, pleasantly-scented. Sepals 4 or 5, to 6 cm long, acute, green outside. Petals (18–) 20–25 (–40), lanceolate, to 5.5 cm long, 1.5 cm wide, acute, white. Stamens to c. 150, cream; filaments ±cylindrical, to 17 mm long; anthers to 10 mm long; appendage white, much reduced and only visible on outer stamens. Carpels 8–16; sterile stigmatic lobes vestigial or obsolete. Fruit globose, c. 4.5 cm diam. Seeds elongated, c. 1–2 mm long, glabrous, with longitudinal ridges, parts of the ridges sometimes proliferating irregularly into linear outgrowths when mature. Fig. 51A.

Grows in Qld; grows in ephemeral billabongs and the shallow margins of more perennial lagoons during the end of the Wet and shortly after, and has often disappeared by May. Flowers during the Wet; flowers open during the day. Map 307.

Qld: c. 23 km N of Normanton, Karumba road, *S.Jacobs* 9325a & *C.B.Hellquist* (NSW, NASC, BRI); c. 25 km S of Normanton, Croydon road, *S.Jacobs* 9326 & *C.B.Hellquist* (NSW, NASC, BRI).

Nymphaea alexii can be readily distinguished from *N. hastifolia*, or indeed from any other native *Nymphaea* sp., by its distinctive cream stamens and its small, ridged seeds.

Subg. 5. *Anecphyra*

Nymphaea subg. *Anecphyra* (Casp.) Conard, *Waterlilies* 127 (1905)

Nymphaea subsect. *Anecphyra* Casp. in F.A.W.Miquel, *Ann. Mus. Lugd.-Bat.* 2: 247 (1866). T: *N. gigantea* Hook.

Plants with vertical tuberous rhizomes; stolons absent. Leaf margins distinctly dentate or toothed. Flowers diurnal, standing clear of the water. A distinct space between petals and stamens. Terminal staminal appendage absent or minute; filaments membranous, flattened to almost cylindrical and filamentous. Seeds large, hairy (*N. immutabilis* rarely glabrous).

Confined to tropical and subtropical Australasia. Six species in Australia.

9. *Nymphaea atrans* S.W.L.Jacobs, *Telopea* 4: 636 (1992)

T: c. 10 km N of Wakooka, Bathurst Bay road, Qld, 31 July 1987, *S.W.L.Jacobs* 5398 & *J.R.Clarkson*; holo: NSW; iso: BRI.

Perennial; rhizome short, vertical, swollen. Leaf lamina ±orbicular, to c. 40 cm wide, with sparse teeth to 2 mm long; undersurface glabrous. Flowers to 40 cm above water. Sepals 4, to 8 cm long, obtuse, with purple streaks; margins light pink, becoming deep pink. Petals to 33, oblanceolate, obtuse, white with pink tinge, becoming darker with age. Stamens to c. 300; filaments cylindrical, to 14 mm long; anthers to 10 mm long, usually with a small hooked appendage. Carpels 10–15; sterile stigmatic lobes vestigial or obsolete. Fruit c. 4 cm diam.

Seeds c. 4 mm long, c. 2.5 mm wide, with discontinuous or disorganised rows of very short hairs. Fig. 51B.

Restricted, as far as is known, to Cape York (Qld) in Lakefield Natl Park and its vicinity. In water to 2.5 m deep. Flowers ?July–Nov.; flowers open during the morning. Map 308.

Qld: Romeo Lagoon, Lakefield Natl Park, *S.W.L.Jacobs 5414* & *J.R.Clarkson* (BRI, NSW); Low L., Lakefield Natl Park, *S.W.L.Jacobs 5442* & *J.R.Clarkson* (BRI, NSW); ‘Bizant’, Lakefield Natl Park, *K.A.Williams 85259* (BRI).

Similar to other species in the ‘*gigantea*’ group (subsect. *Anecphyra* Casp.) but differing in the apparent night-flowering, and in the petals and sepals darkening with age — the sepals become almost deep maroon as the fruit is drawn beneath the water surface. The hairs on the seed are shorter than those of other species in this group. It hybridises with *N. immutabilis*, and the hybrids are obvious from the pink older flowers that are, however, not as dark as those of *N. atrans*. The hybrids do not have a good seed set, while both parents do.

10. *Nymphaea macrosperma* Merr. & L.M.Perry, *J. Arnold Arbor.* 23: 389 (1942)

T: Lake Daviumbu, Middle Fly R., Papua New Guinea, Aug. 1936, *L.Brass 7608*; holo: A; iso: BM, BRI.

Nymphaea gigantea var. *serrata* Domin, *Biblioth. Bot.* 89: 104 (1925). T: Arnhem Land [N.T.], 15 July 1858, *F.Mueller*; holo: K.

Nymphaea dictyophlebia Merr. & L.M.Perry, *J. Arnold Arbor.* 23: 390 (1942). T: Penzara, between Morehead and Wassi Kussa Rivers, Papua New Guinea, Dec. 1936, *L.Brass 8437*; holo: A; iso: BM, BRI.

Perennial; rhizome globular. stolons absent. Leaf lamina orbicular to elliptic, to 55 cm wide, with regularly spaced teeth to 3 mm long; undersurface glabrous. Flowers to 30 cm above water. Sepals 4, to 4.5 cm long, obtuse, with purple streaks. Petals to 22, oblanceolate to spatulate, obtuse, deep blue or rarely pink or white; space between petals and stamens present. Stamens to c. 300; filaments cylindrical, to 15 mm long; anthers to 5 mm long; appendages vestigial or obsolete. Carpels 7–19; sterile stigmatic lobes vestigial or obsolete. Fruit c. 4 cm diam. Seeds 3–4.5 mm long, 2–3 mm wide, globose to subglobose, with ±continuous rows of short hairs. Fig. 52C.

Far north of the N.T. and Qld in more or less permanent water on the floodplains near the coast; also in New Guinea. Growing in water to 3 m deep. Flowers Mar.–Aug.; flowers open during the day, closing at night. Map 309.

N.T.: Arafura Swamp near Old Arafura HS, *I.Cowie 1228* & *M.Clark* (NSW); Little Calvert R., Calvert Hills Stn, *S.W.L.Jacobs 1598* (NSW); Island Billabong, Magela Ck, *S.W.L.Jacobs 5127* & *I.Cowie* (NSW); Dry Lake, Wagait Reserve, *S.W.L.Jacobs 5289* & *K.L.Wilson* (NSW). Qld: Edward River Aboriginal Reserve, 9.5 km N of Bull Crossing of Mitchell R., *J.R.Clarkson 3542* (BRI).

Similar to the other species in subg. *Anecphyra* but generally with smaller flowers and the seed differences as given. Sometimes the flowers fade slightly at maturity but they are still obviously deep blue.

Mueller named specimens *N. serrata*, but does not seem to have published the name; unfortunately it does appear in the literature as a *nom. nud.* and at least one specimen was subsequently used as the basis for a validly published name (*N. gigantea* var. *serrata* Domin). The specimens are not really adequate but appear to belong with *N. macrosperma*.

11. *Nymphaea gigantea* Hook., *Bot. Mag.* 78: t. 4647 (1852)

Leuconymphaea gigantea (Hook.) Kuntze, *Revis. Gen. Pl.* 1: 11 (1891); *N. gigantea* var. *normalis* Domin, *Biblioth. Bot.* 89: 104 (1926), *nom. inval.*, type var. T: Wide Bay, [Qld], *J.Bidwill 39*; holo: K (5 sheets).

Nymphaea gigantea var. *neorosea* K.C.Landon, *Phytologia* 40: 441–446 (1978). T: Grown from stock supplied from Undulla Ck, Qld, by Mr E.H.Williams of Alstonville, N.S.W., 23 Nov. 1976, *K.C.Landon s.n.*; holo: TEX, *n.v.*, *fide* K.C.Landon, *loc. cit.*

Perennial; rhizome globular. Leaf lamina orbicular, to c. 80 cm wide, with regularly-spaced teeth to 5 mm long; undersurface glabrous. Flowers to 50 cm above water. Sepals 4, to 11 cm long, obtuse, small purple streaks may be present. Petals to 32, oblanceolate to spatulate, obtuse, blue, white or rarely pink, fading with age. Stamens to c. 400; filaments cylindrical,

to 30 mm long; anthers to 11 mm long, rarely apiculate. Carpels 12–18; sterile stigmatic lobes vestigial or obsolete. Fruit c. 5 cm diam. Seeds ovate, c. 4 mm long, c. 2.5 mm wide, with \pm continuous rows of short hairs. Fig. 51G.

Usually in more or less permanent water near the east coast, from the Tropic of Capricorn (Qld) to north-eastern N.S.W., but appearing sporadically in temporary waterbodies of drier areas. Flowers most of the year but less commonly in cooler months; flowers open during the day and closing at night. Map 310.

Qld: Station Ck, Caboolture, *S.T.Blake 20514* (BRI, MEL); Lonesome Ck, 5 km S of Willawa, *S.W.L.Jacobs 2575* & *A.Rodd* (NSW); Undulla Ck, Condamine–Meandarra road, *K.A.Williams 75003* (BRI). N.S.W.: Shark Ck, c. 2 km S of junction with Clarence R., *S.W.L.Jacobs 2986* (NSW).

The petals of the most common blue-flowered form fade to almost white as the flower matures. This name has been generally misapplied to include all of the Australian species at some stage or other. Many tri- or polynomials of *N. gigantea* have been used that essentially refer to cultivars; most of these names have not been validly published and many probably refer to species other than *N. gigantea*, which is used here in a restricted sense. Many of the plants in cultivation under this name elsewhere in the world are not this species.

12. *Nymphaea immutabilis* S.W.L.Jacobs, *Telopea* 4: 637 (1992)

T: c. 1 km SW of Emerald Ck, near Mareeba, Qld, 26 July 1987, *S.W.L.Jacobs 5338* & *J.R.Clarkson*; holo: NSW; iso: BRI.

Annual or perennial; rhizome globular. Leaf lamina to c. 70 cm wide, with regularly-spaced teeth to 4.5 mm long; undersurface glabrous. Flowers to 50 cm above water. Sepals 4, to 12 cm long, obtuse. Petals to 34, oblanceolate to spatulate, obtuse, white, with blue tinge, or blue, usually not fading with age. Stamens to c. 400; filaments cylindrical, to 32 mm long; anthers to 15 mm long, often apiculate. Carpels 9–20; sterile stigmatic lobes vestigial or obsolete. Fruit c. 5 cm diam. Seeds oblong, c. 4 mm long, c. 2.5 mm wide, with short, sparse to dense hairs in discontinuous or disorganised rows, sometimes almost appearing scattered, rarely glabrous.

Widespread in the monsoonal parts of the Australian tropics from the Kimberley, W.A., to c. the Tropic of Capricorn on the E coast in coastal Qld, in permanent or ephemeral waterholes. Flowers Mar.–Nov.; flowers open during the day and closing at night.

This species has either been included in *N. gigantea* or incorrectly known as *N. dictyophlebia* (a synonym of *N. macrosperma*). There are 2 subspecies.

Petals mostly white, outer whorls often tinged blue, or the petals all white or all blue, not fading with age; sepals to 10.5 cm long; stamens to c. 400; anthers without purple gland at base; leaf lamina margins with teeth to 4.5 mm long; seeds pubescent

11a. subsp. *immutabilis*

Petals blue with white at base, fading slightly with age; sepals to 12.5 cm long; stamens to c. 200; anthers with purple gland at base; leaf lamina margins with teeth to 3 mm long; seeds apparently glabrous

11b. subsp. *kimberleyensis*

12a. *Nymphaea immutabilis* S.W.L.Jacobs subsp. *immutabilis*

Nymphaea lotus var. *australis* F.M.Bailey, *Queensland Fl.* 1: 88 (1899). T: Kamerunga, Barron R., Aug. 1891, *E.Cowley* 7; lecto: BRI, *fide* S.W.L.Jacobs, *Telopea* 4: 638 (1992).

Rhizome swollen and upright, usually less than 8 cm long. Leaf lamina margins with teeth to 4.5 mm long. Sepals to 10.5 cm long. Petals white, with outer whorls often tinged blue, less commonly all white or all blue. Stamens to c. 400; filaments to 28 mm long; anthers to 15 mm long, without a purple gland at base. Carpels 9–19. Fruit globose, c. 5 cm diam. Seeds with short hairs in discontinuous or disorganised rows, sometimes almost appearing scattered. Fig. 52B.

Widespread in the monsoonal parts of the Australian tropics from the Kimberley, W.A., to c. the Tropic of Capricorn in coastal Qld, in permanent or ephemeral waterholes. Flowers Mar.–Nov.; flowers open during the day and closing at night. Map 311.

W.A.: Mount House Stn, E of Derby, *S.W.L.Jacobs* 4334 (NSW). N.T.: Singleton Stn, *T.Henshall* 1047 (MEL). Qld: Lakefield Natl Park, *S.W.L.Jacobs* 5427 & *J.R.Clarkson* (NSW, BRI); Nardellos Lagoon, *J.R.Clarkson* 6279 (BRI, NSW); Upper Burdekin, *S.W.L.Jacobs* 4770 & *G.Sainty* (NSW).

12b. *Nymphaea immutabilis* subsp. *kimberleyensis* S.W.L.Jacobs, *Telopea* 4: 638 (1992)

T: Kimberley region, 23 May 1988, *S.W.L.Jacobs* 5706 & *P.G.Wilson*; holo: NSW; iso: PERTH.

Rhizome swollen and upright, to 12 cm long. Leaf lamina margins with teeth to 3 mm long. Sepals to 12.5 cm long. Petals blue with white at base. Stamens to c. 200; filaments to 32 mm long; anthers to 13 mm long, with purple gland at base. Carpels 15–20. Only immature seeds seen and these are apparently glabrous.

Known from only one population in the Kimberley region, W.A., from a lagoon that dries out each year. Flowers from ?Mar.–June; flowers open during the day. Map 312.

W.A.: Kimberley region, *S.W.L.Jacobs* 5707 & *P.G.Wilson* (NSW).

13. *Nymphaea carpentariae* S.W.L.Jacobs & Hellq., *Telopea* 11: 156–158 (2006)

T: Qld: Burketown, bore drain of town bore, 18 Apr. 2005, 17° 44.879'S 139° 32.899'E, *S.Jacobs* 9329 & *C.B.Hellquist*; holo: NSW; iso: NASC, BRI.

Nymphaea gigantea Hook. var. *gigantea* 'Albert De Lestang', R.J.F.Henderson (ed.), *Names Distr. Queensland Pl., Algae Lichens* 132 (2002)

Perennial with a globular to elongate rhizome to c. 4 cm long. Leaf lamina orbicular to elliptic, to 45 cm diam., dentate with regularly-spaced triangular teeth to 1.5 mm long; undersurface glabrous. Flowers to 40 cm above water, lightly scented. Sepals 4, to 6.5 cm long, obtuse, green outside with purple streaks, streaks occasionally obscuring the green. Petals mostly 12–22, oblanceolate to spatulate, 4–6 cm long, 1.5–2.5 cm wide, obtuse, mostly white, rarely with some blue, when blue, most of the petals coloured, not just the outer petals, and fading only slightly with maturity. Stamens mostly 150–300, yellow; filaments cylindrical, to 25 mm long; anthers 2.5–5 mm long; appendages vestigial or obsolete. Carpels 7–19; sterile stigmatic lobes vestigial or obsolete. Fruit globose, c. 4 cm diam. Seeds spherical to elongate-spherical, 2–3.5 mm long, c. 2 mm wide, with \pm continuous rows of short hairs usually c. 0.1–0.15 mm long. Plate 47; Fig. 51D.

Occurs in Qld in perennial or near-perennial billabongs and lagoons around the Gulf of Carpentaria; probably also in N.T. but no specimens seen. Flowers during the later part of the Wet and early part of the Dry; flowers open during the day. Map 313.

Qld: between Normanton and Maggieville, *J.Clarkson* 2697 (NSW); c. 4 km N of Normanton, Karumba road, *S.Jacobs* 9324 & *C.B.Hellquist* (NSW); Boogan Lagoon, *S.Jacobs* 1280 (NSW); Forked Lagoon 'Wernadinga' *S.Jacobs* 1368 (NSW); E of Croydon, Georgetown road, *S.Jacobs* 8588 & *D.Les* (NSW); Cumberland Chimney, c. 22 km W of Croydon, Georgetown road *S.Jacobs* 9320 & *C.B.Hellquist* (NSW).

Can be distinguished from *N. macrosperma* by the usually larger white flowers, and from *N. georginae* by the smaller seeds and by the blue-flowered forms of the latter fading with age. Although the differences in shape and dimensions of the seeds in *N. carpentariae* and *N. georginae* do not seem very great, when compared side by side the differences are quite striking. Specimens of this species have, in the past, usually been included in *N. immutabilis*.

14 *Nymphaea georginae* S.W.L.Jacobs & Hellq., *Telopea* 11: 158–159 (2006)

T: Qld: Georgina River, Camooweal, 19° 55.576'S 138° 06.903'E, 19 Apr. 2005, *S.Jacobs* 9332 & *C.B.Hellquist*; holo: NSW; iso: NASC, BRI (blue-flowered specimen).

[*Nymphaea gigantea* auct. non Hook.: G.Bentham, *Fl. Austral.* 1: 61 (1863), p.p. (N.T. specimens)]

Perennial with a globular rhizome c. 4 cm diam. Leaf lamina orbicular to elliptic, to 60 cm diam., dentate with regularly-spaced narrow-triangular to triangular teeth to 2–4 mm long; undersurface hairy. Flowers to 30 cm above the water, fragrant. Sepals 4, to 6.5 cm long, obtuse, green outside with purple streaks, streaks occasionally obscuring the green. Petals mostly 12–26, oblanceolate to spatulate, 4–7 cm long, 2–3.5 cm wide, white or, less commonly, blue, rarely pink, and fading with age, when blue, most of the petals coloured,

not just the outer petals. Stamens mostly 150–250; filaments cylindrical, to 25 mm long; anthers to 6 mm long, appendages vestigial or obsolete. Carpels 7–19; sterile stigmatic lobes vestigial or obsolete. Fruit globose, c. 4 cm diam. Seeds globose to subglobose, (1.5–) 2.5–4 mm diam., with often interrupted rows of short hairs c. 0.1–0.15 mm long. Fig. 51F.

Occurs in N.T. and Qld; grows in the billabongs and flood channels of the upper parts of northern rivers flowing into the L. Eyre system. These waterbodies may hold water for over 1 year but also are frequently dry for more than 1 year. Flowers at the end of the Wet or after flooding; day-flowering. Map 314.

N.T.: James R., near 'Avon Downs', 20 Jun 1960, *G.Chippendale s.n.* (NSW); *loc. id.*, *S.Jacobs 9331 & C.B.Hellquist* (NSW). Qld: Georgina R., Cammoweal, *S.Jacobs 5531 & P.Wilson* (NSW280651); flood channel of Thomson R., Longreach, *S.Jacobs 9335 & C.B.Hellquist* (NSW).

Can be distinguished from *N. carpentariae* by the larger seeds and from *N. macrosperma* by the larger flowers of blue-flowered plants fading with age. This species has the strongest scent of any subg. '*Anecphyra*', but it is still considerably less than the scent of the species of subg. '*Violacea*'. Specimens of this species have usually been included in either *N. gigantea* or *N. immutabilis*.

Excluded names

Nymphaea gigantea var. *alba* (Benth. & F.Muell.) K.C.Landon, *Phytologia* 40: 440 (1978)

Landon writes that his variety is based on *N. gigantea* f. *alba* Benth. & F.Muell., *Fl. Austral.* 1: 61 (1863), but no mention of it is found in that publication. In the absence of a Latin diagnosis and indication of a type in Landon's publication, the name is not validly published.

Nymphaea gigantea f. *candida* Domin, *Biblioth. Bot.* 89: 104 (1926) *in obs.*

T: Emu Park, Rockhampton, Mar. 1910, *K.Domin*; *holo: PR n.v.*

Published as *Nymphaea gigantea* var. *serrata* f. *candida*. See note under *N. macrosperma*. *Nymphaea serrata*, the basis for *N. gigantea* var. *serrata*, is a *nomen nudum* and there are no specimens cited. There is a specimen of f. *candida* but I have not seen it and it has not been possible to place this name.

Nymphaea gigantea f. *hudsonii* (Anon.) K.C.Landon, *Phytologia* 40: 439 (1978)

Landon writes that his form is based on *N. gigantea* var. *hudsonii* Anon., *Gardening World.* 20: 756 (1903). That publication has not been examined, so it is not clear whether this name refers to an Australian plant.

Nymphaea lotus L., *Sp. Pl.* 1: 511 (1753)

T: 'Habitat in calidis Indiae, Africae, Americae'; lecto: illustration in P.Alpino, *Pl. Exot.*, p. 213 (1627), *fide* B.Verdcourt, *Kew Bull.* 44: 179 (1989).

J.D.Hooker, in his introductory essay to *Fl. Tasman.* (1855), refers to this species in a 'List of Indian Plants in Australia', with the comment that the Australian plants may probably prove to be distinct from their Indian relatives on closer examination. Indeed, *N. lotus* does not occur in Australia though the related *N. pubescens* does.

NYMPHAEACEAE

2. ONDINEA

Ondinea Hartog, *Blumea* 18: 413–417 (1970); named after Ondine, a long forgotten water-spirit that has been brought to life again in Frederick Ashton's ballet of the same name.

Type: *O. purpurea* Hartog

Perennial, with vertical tubers. Leaves alternate, submerged, sometimes floating; petiole sheathing at base; submerged lamina sagittate to hastate, with lobes usually free, entire and crispate; floating lamina elliptic, entire, slightly undulate. Flowers solitary, standing clear of water. Sepals 4, obtuse; abaxial surface pink. Petals present or absent, oblong-elliptic, obtuse, light to dark purple, with a gap between petals (sepals) and stamens. Stamens numerous; filaments membranous, flattened; anthers lateral, dehiscing latrorsely; apical appendage absent. Ovary half-inferior. Fruit an ovoid berry. Seeds arillate, glabrous, with fine longitudinal striations.

A genus of one species, endemic to the northern Kimberley of W.A.; closely related to *Barclaya* Wall.

K.F.Kenneally & E.L.Schneider, The genus *Ondinea* (Nymphaeaceae) including a new sub-species from the Kimberley region, Western Australia, *Nuytsia* 4: 359–365 (1983); E.L.Schneider, Gross morphology and floral biology of *Ondinea purpurea* Hartog, *Austral. J. Bot.* 31: 371–382 (1983); P.S.Williamson, E.L.Schneider & L.A.Malins, Tuber and leaf structure of *Ondinea purpurea* Hartog (Nymphaeaceae), *W. Australian Naturalist* 18: 52–61 (1989).

***Ondinea purpurea* Hartog, *Blumea* 18: 413–417 (1970)**

T: 3 miles [5 km] NE of Kalumburu, Kurunundalo or Kurunundalu, Kimberley district, W.A., 15 Apr. 1968, *W.Leutert* 108; holotype: CANB *n.v. fide* C. den Hartog, *loc. cit.*

Tuber 1.5–3.5 cm long, 1–2 cm wide. Leaves: submerged lamina 6–24 cm long, lobes obtuse or emarginate and with a small mucro, bearing sparsely distributed small papillae on both surfaces; floating lamina c. 7 cm long, 2 cm wide, with lobes almost to completely overlapping. Flowers c. 10–20 cm above water; peduncle 3–6 mm wide at base and tapering slightly to flower. Sepals 9–33 mm long, papillose, with a green stripe on adaxial surface, reflexed during anthesis, spreading to erect when in fruit. Petals 0–4 (infrequently 5), alternating with sepals. Stamens 15–34, 1–16 mm long. Carpels 3–10. Fruit 10–20 mm long, 8–15 mm wide. Seeds c. 1 mm long, with fine longitudinal striations.

Known only from a few non-perennial creek systems extending from Kalumburu to the Prince Regent R. in northern W.A. There are 2 subspecies.

Populations with floating leaves are apparently restricted to the Kalumburu (type) area and have not been observed elsewhere. The two described subspecies are apparently sympatric and differ in several characters. The present taxonomic treatment does not satisfactorily cope with the observed facts. It is probable that there are either two species or the subspecies represent extreme growth forms of one species. Further work is required to produce a more satisfactory classification.

Petals absent; stamens c. 15; floral axis 2.5–3 mm long

a. subsp. *purpurea*

Petals present; stamens 27–34; floral axis 5–8 mm long

b. subsp. *petaloidea*

a. *Ondinea purpurea* Hartog subsp. *purpurea*

Sepals 9–17 mm long. Petals absent. Stamens c. 15, inserted on upper part of ovary, often spirally arranged, 1–6 mm long. Ovary 5–9 mm long. Floral axis 2.5–3 mm long. Fruit 14–17 mm long, 8–11 mm wide.

Known only from a few non-perennial creek systems extending from Kalumburu to the Prince Regent R. in northern W.A. Map 315.

W.A.: Mitchell R., *C.R.Dunlop* 5317 (CANB, DNA, K, MEL, PERTH); creeks near Prince Regent R., *C.A.Gardner* 1353 (NSW, PERTH); 9 km NW Mitchell R. Falls, *K.F.Kenneally* 7734 (PERTH); 2.5 km N Kalumburu Mission, *G.Taylor* 58 (AD, BRI, CANB, DNA, MEL, NSW, PERTH).

b. *Ondinea purpurea* subsp. *petaloidea* Kenneally & E.L.Schneid., *Nuytsia* 4: 362 (1983)

T: Mitchell Plateau, N Kimberley, W.A., 21 Jan. 1982, *E.L.Schneider s.n.*; holo: PERTH 01003429; iso: CANB, K, NY, TEX.

Sepals 15–33 mm long. Petals 1–4 (–5). Stamens 27–34, inserted in close whorls at top of ovary, 2–16 mm long. Ovary 8 mm long, 5 mm wide. Floral axis 5–8 mm long. Fruit 10–20 mm long, 10–15 mm wide.

Known only from the type collection. Map 316.

CABOMBACEAE

T.D.Stanley¹ & A.E.Orchard²

Perennial freshwater aquatic herbs with creeping stolons. Stems mucilaginous, at least when young. Leaves opposite, whorled or alternate; submerged leaves much dissected; floating leaves peltate. Flowers actinomorphic, bisexual, axillary or displaced from leaf axils, solitary, long pedunculate from upper nodes. Sepals 3, rarely 2 or 4, petaloid, free and distinct or nearly so. Petals 3, rarely 2 or 4. Stamens 3 or 6 (*Cabomba*) or usually 12–36 (*Brasenia*), free; anthers opening lengthwise; staminodes absent. Carpels 2–18, rarely 1, free, 1-locular; ovary superior; style short; ovules 2 or 3, rarely 1–5, anatropous. Fruits indehiscent, achene-like or follicle-like, 1–3-seeded. Seeds with fleshy endosperm.

A family of 2 genera and 6 species from tropical and warm temperate parts of the world. Two genera and 2 species in Australia, 1 species native and 1 species naturalised.

G.Bentham, *Nymphaeaceae p.p., Fl. Austral.* 1: 60–61 (1863); C.D.K.Cook, *Waterpl. World* 168–170 (1974); S.W.L.Jacobs, *Cabombaceae*, in B.D.Morley & H.R.Toelken, *Fl. Pl. Australia* 49–51 (1983); S.W.L.Jacobs, *Cabombaceae*, in G.J.Harden (ed.), *Fl. New South Wales* 1: 148–149 (1990); P.S.Williamson & E.L.Schneider, *Cabombaceae*, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 157–161 (1993).

KEY TO GENERA

Submerged leaves present, opposite or whorled, finely dissected; floating leaves few or absent; stamens 3 or 6; flowers white or cream in Australia

1. CABOMBA

Submerged leaves absent; floating leaves always present; stamens 12–36 or more; flowers purplish red or brownish red

2. BRASENIA

1. CABOMBA

Cabomba Aubl., *Hist. Pl. Guiane* 1: 321, t. 124 (1775); Latinised form of the native name for these aquatics in Guyana.

Type: *C. aquatica* Aubl.

Herbs, rooting at stolon nodes and lower nodes of stems. Submerged leaves opposite, or less commonly in whorls of 3, petiolate; lamina circular to kidney-shaped, palmately divided 3–7 times into long narrow primary segments, which may themselves be divided. Floating leaves

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few or absent, alternate on long petioles; lamina linear-elliptic to broadly ovate or sagittate, not divided into narrow segments. Flowers white, yellow, pink or violet. Sepals 3, petaloid. Petals 3, clawed; base of expanded lamina auriculate, with nectaries in 2 yellow lobes. Stamens 3 or 6; filament slightly flattened. Carpels mostly 2–4, rarely 1–7, free, each with 1–5 pendulous ovules. Seeds covered with elongated processes.

A genus of 5 species from tropical and warm temperate areas of North, Central and South America and the West Indies; 1 species naturalised in eastern Australia.

N.C.Fassett, A monograph of *Cabomba*, *Castanea* 18: 116–128 (1953); M.Ørgaard, The genus *Cabomba* (Cabombaceae) - a taxonomic study, *Nordic J. Bot.* 11: 179–203 (1991).

****Cabomba caroliniana*** A.Gray, *Ann. Lyceum Nat. Hist. New York* 4: 47 (1848)

var. ***caroliniana***

T: 'S. Carolina, Georgia & Louisiana'; lecto: Louisiana, U.S.A., *J.Torrey & S.F.Gray s.n.*; GH *n.v.*, fide M.Ørgaard, *Nordic J. Bot.* 11: 199 (1991).

Illustrations: W.J.Hooker, *Hooker's Icon. Pl.* 7: t. 642 (1844); G.R.Sainty & S.W.L.Jacobs, *Waterpl. New South Wales* 80 (1981); S.W.L.Jacobs, *Fl. New South Wales* 1: opp. 164, pl. 11 (1990).

Submerged leaves: petiole to 3 cm long; lamina to 6 cm wide, divided 3–7 times, the divisions dichotomous or trichotomous; lamina segments linear, not toothed, less than 1 mm wide. Floating leaves few, narrowly elliptic, to 20 mm long and to 3 mm wide; base entire and ±acute or somewhat sagittate; apex ±acute. Flowers floating at first, then held 2–4 cm above water surface. Sepals and petals similar, 0.5–1 cm long, white or cream with yellow bases. Anthers c. 1.5 mm long. Carpels 2–4. Fruits not seen. *Fanwort.* Plate 48; Fig. 53B–C.

Naturalised in scattered locations in northern and eastern Australia: near Darwin, N.T.; in Qld on the Atherton Tableland and near Brisbane; in N.S.W. near Murwillumbah and in the central coast region; and in Vic. in L. Nagambie and near Foster. Native of eastern U.S.A., southern Brazil, Paraguay, Uruguay and north-eastern Argentina. Naturalised in Malaysia, India, Japan and New Guinea as well as Australia, from discarded aquarium plants. An obligate aquatic plant found in still freshwater up to 3 m deep, rooting at base or persisting for considerable periods when detached. Map 317.

N.T.: Palmerston, Marlow's Lagoon, *R.Booth 1510 & B.Harwood* (BRI, CANB, DNA, MEL, NSW). Qld: Quinkan Springs Ck, adjoining Leslie Ck, Atherton Tableland, Jan. 1989, *C.Julian* (BRI); Caboolture R. at Caboolture [near Brisbane], *T.D.Stanley 85101* (BRI). N.S.W.: Burringbar Ck, Mooball, Oct. 1982, *J.G.Lush* (NSW). Vic.: L. Nagambie, Picnic Point Reserve, *A.C.Cochrane 1098* (MEL).

Cultivated as an ornamental in fish ponds and aquaria. The senior author has observed the populations near Brisbane for about 5 years and during that time has not seen any mature fruit. No mature fruits were seen on any of the herbarium specimens examined. Ørgaard, *op. cit.* observed that seed set in this species is much reduced in its native range as well, and ascribed this to reduced pollen fertility and possibly reduced stigma receptivity, consequent on its high polyploid chromosome number. Ørgaard recorded various chromosome counts on *C. caroliniana* var. *caroliniana*, ranging from $2n = 24$ through c. 78 and c. 96 to 104. No counts are known for Australian populations. Australian populations apparently reproduce vegetatively only, by fragmentation of the brittle stems and rhizomes.

2. BRASENIA

Brasenia Schreb., *Gen. Pl.* 372 (1789); the origin of the name is unknown.

Type: *B. schreberi* J.F.Gmel.

Hydropeltis Michx., *Fl. Bor.-Amer.* 1: 323, t. 29 (1803). T: *H. purpurea* Michx.

Herbs, rooting from nodes of stolons and lower stems, with floating leaves. Submerged leaves absent. Floating leaves alternate, long-petiolate; lamina peltate, orbicular to elliptic, entire. Flowers purplish red or brownish red. Sepals 3, rarely 2 or 4, petaloid. Petals 3, rarely

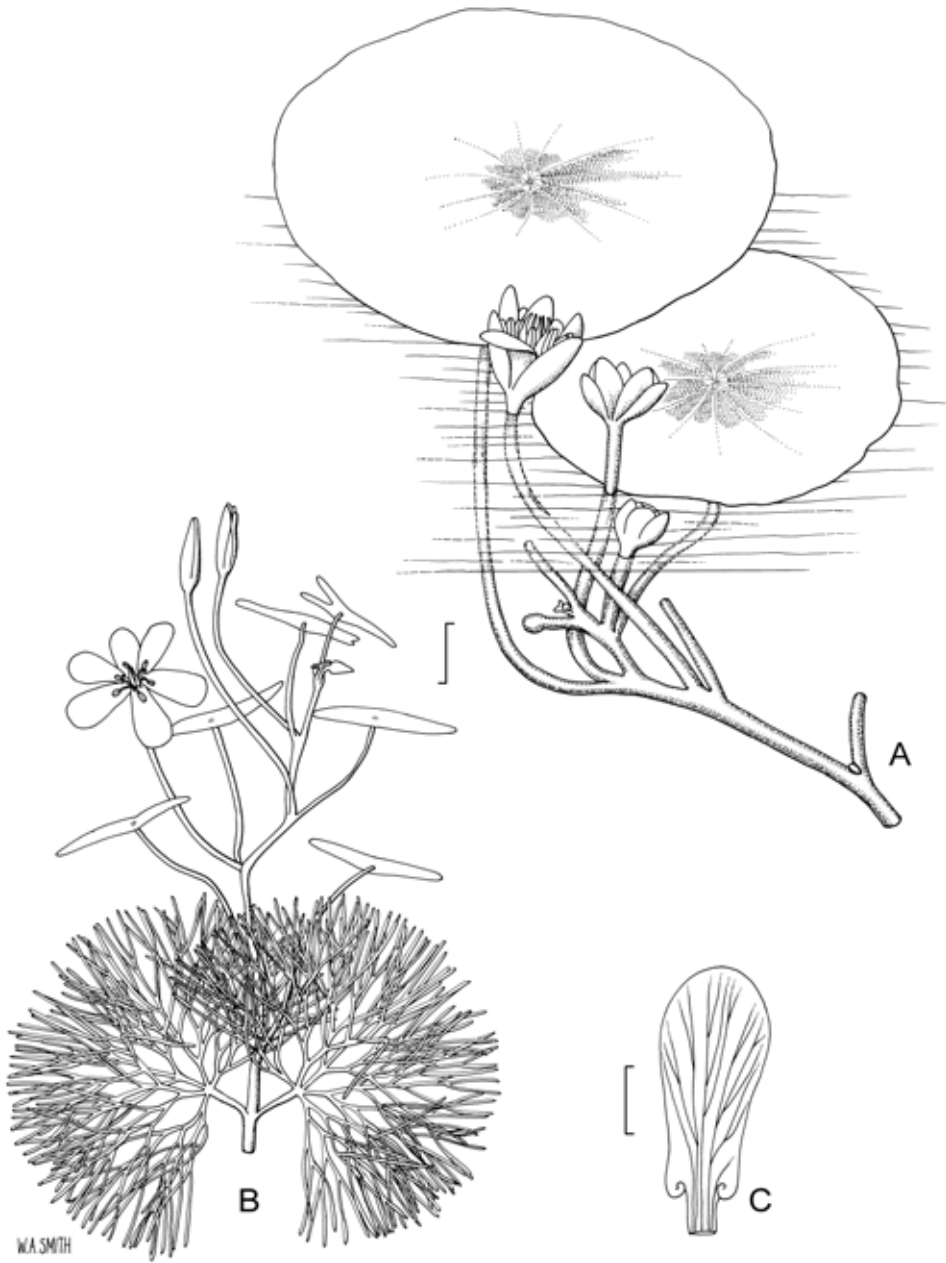


Figure 53. **A**, *Brasenia schreberi*, habit (H.Aston 1080, BRI). **B–C**, *Cabomba caroliniana* var. *caroliniana*, **B**, habit; **C**, petal (**B–C**, T.Stanley 9002, BRI). Scale bars: **A**, **B** = 10 mm; **C** = 3 mm. Drawn by W.A.Smith.

2 or 4, linear, sessile. Stamens 12–36 or more; filament filiform. Carpels 4–18, free, each with 2 pendulous ovules. Seeds smooth or papillate.

A genus with only 1 species, widespread in North America, Africa, southern and eastern Asia and eastern Australia.

M.Raymond & P.Domsereau, The geographical distribution of the bipolar Nymphaeaceae, *Nymphaea tetragona* and *Brasenia schreberi*, *Proc. Pacific Sci. Congr.* 7: 122–131 (1953); P.Kanna, Morphological and embryological studies in Nymphaeaceae. II *Brasenia schreberi* Gmel. and *Nelumbo nucifera* Gaertn., *Austral. J. Bot.* 13: 379–387 (1965); F.C.Richardson, Morphological studies of the Nymphaeaceae. IV Structure and development of the flower of *Brasenia schreberi* Gmel., *Univ. Calif. Publ. Bot.* 47: 1–45 (1969); H.I.Aston, *Aquatic Pl. Australia* 46–48 (1973); G.R.Sainty & S.W.L.Jacobs, *Waterpl. New South Wales* 78–79 (1981).

***Brasenia schreberi* J.F.Gmel., *Syst. Nat.* 1: 853 (1791)**

T: New Jersey, U.S.A., *Hope*; holo: M n.v.

Hydropeltis purpurea Michx., *Fl. Bor.-Amer.* 1: 324, t. 29 (1803); *Brasenia peltata* Pursh, *Fl. Amer. Sept.* 2: 389 (1814); *B. purpurea* (Michx.) Casp., *J. Sci. Math. Phys. Nat.* 4: 312 (1873); *Cabomba peltata* (Pursh) F.Muell., *Fragm.* 10: 77 (1876). T: S. Carolina, U.S.A., *A.Michaux*; syn: P; Tennessee, U.S.A., *A.Michaux*; syn: P.

Illustrations: H.L.Mason, *Fl. Marshes California* 490, fig. 229 (1957); H.I.Aston, *op. cit.* 47, fig. 15; G.R.Sainty & S.W.L.Jacobs, *op. cit.* 78–79; S.W.L.Jacobs, in B.D.Morley & H.R.Toelken, *Fl. Pl. Australia* 50 (1983).

All submerged parts with jelly-like mucilage. Leaves: petiole to 2 m long; lamina orbicular to elliptic, 2.5–11.5 cm long, 2–7.5 cm wide, green above, reddish brown or purplish beneath. Flowers held at or slightly above water surface. Sepals 9–14 mm long, 3–6 mm wide, purplish red or brownish red. Petals 12–18 mm long, 3–4 mm wide, purplish red or brownish red. Filaments to 10 mm long; anthers reddish, c. 3.5 mm long. Fruiting carpels to c. 10 mm long. Seeds 2.5–3 mm long. *Water Shield*. Fig. 53A.

Known from a few scattered localities in coastal and subcoastal areas of eastern Australia from near Atherton in Qld, southwards. Also known from a few scattered localities along the Murray R. in N.S.W. and Vic., and in central Vic. Grows in still freshwater to 2 m deep on sandy or muddy substrates. G.R.Sainty and S.W.L.Jacobs (*loc. cit.*) report that it prefers acidic water, and that the fruits are a food source for waterfowl. Map 318.

Qld: Emerald Ck Storage, Mareeba, *S.W.L.Jacobs* 5342 & *J.R.Clarkson* (B, BRI, MEL, NSW, Z). N.S.W.: Port Jackson, *R.Brown* 4927 (BM, MEL); Thirlmere Lakes, *S.W.L.Jacobs* 3214 (MEL, NSW). Vic.: c. 3.2 km SW of Nagambie, Goulburn R. at 'Maranoa', just S of Chinaman's Bridge, *H.I.Aston* 953 (BRI, MEL).

H.Aston *loc. cit.* described the elaborate emergence and submergence behaviour of the flower during and after pollination.

J.Briggs and J.Leigh (*Rare or Threatened Australian Plants* 38 (1988)) consider this species to be vulnerable, i.e. at risk of disappearing from the wild over a period of 20–50 years. Last century the species was collected at a few localities in southern Qld. However, probably due to changes in land use, the species is now apparently extinct in this area. In Qld, the species is now known from only a few water storage areas in the Atherton–Mareeba area of northern Qld, where it is locally common. The species is not common in N.S.W. and Vic., except in a few localised areas, for example in lagoons along the lower Hawkesbury R.



Plate 33. *Endiandra hypotephra*.
Photographer — B.Jago.



Plate 34. *Endiandra pubens*.
Photographer — G.Leiper.



Plate 35. *Litsea breviumbellata*.
Photographer — B.Gray (© CSIRO).



Plate 36. *Litsea leefeana*.
Photographer — M.Fagg.



Plate 37. *Neolitsea dealbata*.
Photographer — M.Fagg.



Plate 38. *Piper caninum*.
Photographer — B.Gray (© CSIRO).



Plate 39. *Peperomia tetraphylla*.
Photographer — M.Fagg.



Plate 40. *Hernandia nymphaeifolia*.
Photographer — M.Fagg.



Plate 41. *Pararistolochia australopithicus*.
Photographer — G.Sankowsky.



Plate 42. *Pararistolochia peninsulensis*.
Photographer — G.Sankowsky.



Plate 43. *Aristolochia meridionalis* subsp. *centralis*.
Photographer — G.Sankowsky.



Plate 44. *Aristolochia acuminata*.
Photographer — B.Gray (© CSIRO).



Plate 45. *Nelumbo nucifera*.
Photographer — M.Fagg.



Plate 46. *Nymphaea violacea*.
Photographer — S.Jacobs.



Plate 47. *Nymphaea carpentariae*.
Photographer — S.Jacobs.



Plate 48. *Cabomba caroliniana* var. *caroliniana*.
Photographer — S.Jacobs.



Plate 49. *Ceratophyllum demersum*.
Photographer — S.Jacobs.



Plate 50. *Anemone crassifolia*.
Photographer — M.Fagg.



Plate 51. *Clematis aristata*.
Photographer — T.Low.



Plate 52. *Psychrophila introloba*.
Photographer — N.Walsh.



Plate 53. *Clematis microphylla*.
Photographer — M.Fagg.



Plate 54. *Clematis delicata*.
Photographer — A.S.George.



Plate 55. *Ranunculus gunnianus*.
Photographer — C.Totterdell (© ANBG).



Plate 56. *Ranunculus muelleri*.
Photographer — C.Totterdell. (© ANBG).



Plate 57. *Ranunculus anemoneus*.
Photographer — A.S.George.



Plate 58. *Ranunculus niphophilus*.
Photographer — A.S.George.



Plate 59. *Hypserpa polyandra* var. *polyandra*.
Photographer — B.Gray (© CSIRO).



Plate 60. *Parapachygone longifolia*.
Photographer — B.Jago.



Plate 61. *Argemone mexicana*.
Photographer — T.Low.



Plate 62. *Papaver somniferum*.
Photographer — M.Fagg.



Plate 63. *Pycnarrhena ozantha*.
Photographer — B.Gray (© CSIRO).



Plate 64. *Fumaria muralis* subsp. *muralis*.
Photographer — G.Norton.

CERATOPHYLLACEAE

T.D.Stanley¹

Submerged aquatic herbs, usually free floating, monoecious; roots absent. Leaves in whorls; lamina 1 or more times dichotomously branched, with linear segments. Flowers 1 or more per node, male and female at separate nodes. Perianth of 8–13 herbaceous lobes, united at base; each margin often with a single spine; lobe apex truncate, with 2 lateral spines and a central projection. Male flowers: subsessile; stamens numerous in several whorls on domed torus around sterile pistil; anthers \pm sessile, bilocular, dehiscent longitudinally, with connective produced apically into 2 spines, margins often with 1–3 spines, immature anthers resemble perianth lobes, at maturity the tissues become gas filled and anthers detach and rise to water surface where they dehisce and pollen sinks into female flowers below. Female flowers: sessile or shortly pedunculate; staminodes absent; ovary superior, sessile, tapering into long style, 1-locular; ovule 1, pendulous. Fruit a hard nut, often winged on margin, often with basal pair of prominent spines; style persistent and spinose. Seed pendulous, endocarp absent.

A family of 1 genus and 6 species, cosmopolitan; 2 species in Australia, both native.

Opinions vary as to the number of species in *Ceratophyllum*. Wilmot-Dear (1985) recognised 2 species, distinguished by the degree of branching in the leaves, with numerous subspecific taxa based on fruit characters, while Les (1989) recognised 6 species in 3 sections, separated primarily by variations of the spines on the fruit. Cowie *et al.* (2000) recognised only a single variable species. The present treatment follows that of Les (1989), with the 2 Australian species in 2 sections: *C. demersum* in sect. *Ceratophyllum* and *C. muricatum* in sect. *Muricatum*. The third section, sect. *Submersum*, is not represented in Australia.

G.Bentham, *Ceratophyllum* in Halorageae, *Fl. Austral.* 2: 491 (1864); H.I.Aston, *Ceratophyllaceae*, *Aquat. Pl. Australia* 60–62 (1973); G.R.Sainty & S.W.L.Jacobs, *Waterpl. New South Wales* 88–91 (1981); M.Wilmot-Dear, *Ceratophyllum* revised - a study in fruit and leaf variation, *Kew Bull.* 40: 243–271 (1985); D.Les, The evolution of achene morphology in *Ceratophyllum* (Ceratophyllaceae), IV. Summary of proposed relationships and evolutionary trends, *Syst. Bot.* 14: 254–262 (1989); D.Les, *Ceratophyllaceae*, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 246–250 (1993); I.D.Cowie, P.S.Short & M.Ostercamp Madsen, *Ceratophyllaceae*, *Floodplain Fl.* 61–62 (2000).

CERATOPHYLLUM

Ceratophyllum L., *Sp. Pl.* 2: 992 (1753); from the Greek *keras* (a horn), and *phyllon* (a leaf), in reference to the antler-like leaves.

Type: *C. demersum* L.

Leaves dichotomously branched 1 or 2 times, occasionally 3 times; fruit not winged; surface of fruit smooth though usually with dark glandular dots

1. *C. demersum*

Leaves dichotomously branched 3, occasionally 4 times; fruit winged; surface of fruit often with raised tubercles

2. *C. muricatum*

1. *Ceratophyllum demersum* L., *Sp. Pl.* 2: 992 (1753)

T: *Hort. Cliff.* 446, *Ceratophyllum* 1; lecto: BM n.v., *fide* K.Aziz, in E.Nasir & S.I.Ali, *Fl. W. Pakistan* 70: 4 (1974).

Illustrations: H.I.Aston, *Ceratophyllaceae*, *Aquat. Pl. Australia* 61 (1973); I.D.Cowie *et al.*, *Ceratophyllaceae*, *Floodplain Fl.* 60 (2000).

¹ c/- Queensland Herbarium, Brisbane Botanic Gardens Mt Coot-tha, Mt Coot-tha Road, Toowong, Queensland 4066.

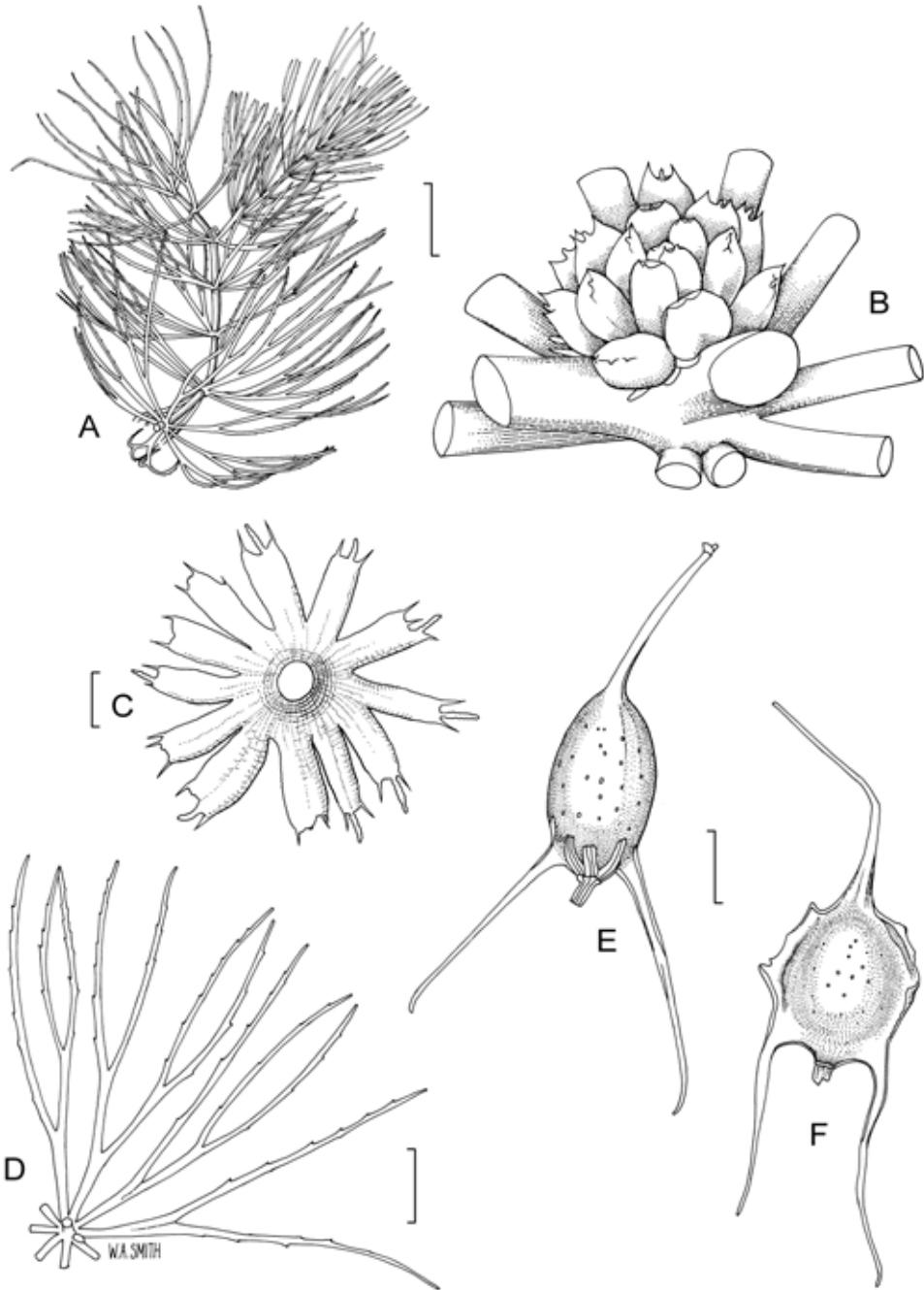


Figure 54. *Ceratophyllum*. A–E, *C. demersum*. A, habit; B, male flower; C, perianth; D, leaves; E, fruit (A–E, T.Stanley 9001, BRI). F, *C. muricatum* subsp. *muricatum*, fruit (G.Goodrick, CANB 327574). Scale bars: A = 10 mm; B = 1 mm; C = 0.5 mm; D = 5 mm; E, F = 2 mm. Drawn by W.A.Smith.

Main stem to 2 m long. Leaves dichotomously branched 1 or 2 times, occasionally 3 times, to 4 cm long; segments usually coarse, with conspicuous spine-tipped teeth at least on apical segments; teeth with broad base of tissue. Male flowers often numerous, 1–3 per leaf whorl, to 3 mm diam.; perianth lobes to 1.3 mm long, with apical projection ± 0.2 mm long; anthers 0.5–1.5 mm long. Female flowers not as numerous as male flowers, 1 per leaf whorl; perianth lobes to 1.3 mm long, closely surrounding ovary, with apical projection 0.4–0.7 mm long; ovary to 1 mm long; style 1.5–5 mm long. Nut ovoid or ellipsoidal, slightly flattened but not winged (in Australian specimens), 4–6 mm long, 3–3.5 mm wide; surface smooth with sparse or numerous shiny gland dots; style 1.5–11 mm long; basal spines 1–7 mm long, slightly unequal in length. *Hornwort*. Plate 49; Fig. 54A–E.

Known from near Broome and the Calder River area, northern W.A., from coastal and subcoastal areas N of about 12°30'S in the N.T., and from coastal and subcoastal areas S of about Cape Melville in northern Qld to the Hunter R. in N.S.W. Also occurs along the Murray R. in Vic. and S.A., and in a few scattered areas in southern Vic. A cosmopolitan species, found on all continents except Antarctica; naturalised in New Zealand. It is found in still or slow-moving fresh water. Flowering and fruits in late summer in southern areas, possibly throughout the year in northern areas. Map 319.

W.A.: Nimalaica Claypan, 2 km W of Beagle Bay Rd on edge of Willie Ck, 20 km N of Broome, Dampierland Penin., *K.F.Kenneally 9417* (CANB, K, PERTH). N.T.: near Caledon Bay, Oct. 1876, *B.Gull* (MEL). S.A.: Goolwa on R. Murray, *D.Hunt 2781* (AD). Qld: Lolworth, *S.T.Blake 19361* (BRI, CANB, K, MEL, MO, Z). N.S.W.: near Casino, Richmond R., Nov. 1976, *D.G.Gosper* (NSW). Vic.: L. Wellington No. 1 drain, Sale district, Feb. 1963, *C.G.Dethridge* (MEL).

C. Wilmot-Dear (*op. cit.* 261) notes a collection from St John, Qld (*Thorne & Tracy 22450*, K), which she considers to be intermediate between *C. demersum* f. *demersum* and *C. demersum* f. *missionis* (Wight & Arn.) Wilmot-Dear. These varieties are not distinguished in this treatment.

2. *Ceratophyllum muricatum* Cham., *Linnaea* 4: 504 (1829)

subsp. *muricatum*

Ceratophyllum demersum var. *muricatum* (Cham.) Hook.f. ex K.Schum., *Fl. Bras.* 3(3): 750 (1894); *C. submersum* subsp. *muricatum* (Cham.) Wilmot-Dear, *Kew Bull.* 40: 266 (1985). T: Damiette, Egypt, 1818, *F.W.Sieber s.n.*; lecto: HAL; isolecto: B, G, K, MO, all *n.v.*, *fide* D.H.Les, *Syst. Bot.* 13: 85 (1988).

Main stem to 2 m long. Leaves dichotomously branched 3 or 4 times, usually 3 in Australia, to 4 cm long; segments fine and often thread-like, with usually inconspicuous spine-tipped teeth at base on apical segments; teeth without broad base of tissue. Male flowers not seen on Australian specimens but exotic specimens to 2 mm diam.; perianth lobes to 1.3 mm long; anthers 0.6–0.8 mm long. Female flowers: 1 per leaf node; perianth lobes to 1.3 mm long, with apical projection less than 1 mm long; ovary to 1 mm long. Nut ovoid or ellipsoidal, \pm flattened, 3.5–4 mm long, 2–3 mm wide, with membranous marginal wing, sometimes wing restricted to upper part of fruit; surface often with warts; style to 5 mm long; basal spines absent or to 5 mm long. Fig. 54F.

Known in Australia from only three widely separated records: one from northern N.T., one from northern Qld and one from northern N.S.W.; also found in tropical and subtropical Asia and Africa. It is found in still or slow-moving fresh water. Flowers probably throughout the year. Map 320.

N.T.: Baralil Ck, *T.S.Henshall 2036* (DNA, MEL). Qld: Bowen, *S.Jacobs 4048* (NSW). N.S.W.: Deep Ck, Upper Coldstream via Ulmarra, *G.Goodrick 3545* (CANB).

RANUNCULACEAE

*Hj.Eichler*¹, *J.A.Jeanes*² & *N.G.Walsh*²

Herbs, usually terrestrial perennials, some aquatics and some annuals, woody climbers, or rarely small shrubs. Leaves spiral, in a basal rosette, or opposite (rarely whorled), compound or simple, often palmately lobed or dissected; petioles usually with sheathing base and without stipules. Flowers solitary and terminal or in cymes, racemes or panicles, actinomorphic or zygomorphic, bisexual, rarely unisexual and dioecious (some *Clematis* spp.), nectar-secreting and insect-pollinated, rarely wind-pollinated. Perianth hypogynous, whorled or spiral, undifferentiated, sepaloid or petaloid or consisting of calyx and corolla, the latter formed usually of petaloid nectaries (honey-leaves, here treated as petals), rarely true petals (*Adonis*), usually 5 or more, rarely reduced to 2, 1 or absent. Stamens mostly numerous, rarely 2 or 1, spiral; filaments free; anthers extrorse, opening in longitudinal slits; rarely with connective appendages. Carpels 1–many, free and spiral or in 1 whorl and \pm fused; style usually well developed; ovules 1–many, ventral or basal, anatropous; integuments 1 or 2. Fruit of 1–many follicles or a head of achenes, or rarely a berry or capsule; seeds 1–many, usually with a small embryo and oily endosperm; germination usually epigeal.

About 70 genera, more than 3,000 species, cosmopolitan, predominantly Northern Hemisphere; many are alpine. In Australia 10 genera, of which 5 are introduced, and 74 species. Mostly poisonous (glycosides and alkaloids), some medicinal and several horticultural.

Some species and cultivars of the genera *Aconitum* L., *Delphinium* L., *Helleborus* L., *Nigella* L. and *Thalictrum* L. are grown in gardens and escape occasionally but appear not to have naturalised. They are included in the key to genera below and marked with a dagger (†), indicating that they are not dealt with further here. However, species of *Adonis* L., *Aquilegia* L., *Clematis* L., *Consolida* (DC.) Gray and *Ficaria* Guett., which have similarly been grown in gardens and escaped, have become naturalised in some places.

A.L.P.P. de Candolle, *Ranunculaceae*, *Syst. Nat.* 1: 125, 127–394 (1817); G.Bentham, *Ranunculaceae*, *Fl. Austral.* 1: 4–15 (1863); K.Prantl, *Beiträge zur Morphologie und Systematik der Ranunculaceae*, *Bot. Jahrb. Syst.* 9: 225–273 (1887); E.Janzen, *Die Systematische Gliederung der Ranunculaceen und Berberidaceen*, *Österr. Akad. Wiss., Math.-Naturwiss. Kl.* 108/4: 1–82 (1949); M.Tamura, *Morphology, ecology and phylogeny of the Ranunculaceae*, VI–VIII, *Sci. Rep. S. Coll. Osaka Univ.* 15(1): 13–35 (1966); 16(2): 21–43 (1967); 17(1): 41–56 (1968); U.Jensen, *Serologische Beiträge zur Systematik der Ranunculaceae*, *Bot. Jahrb. Syst.* 88: 204–310 (1968); J.Damboldt & W.Zimmermann, *Ranunculaceae*, in G.Hegi, *Ill. Fl. Mitt.-Eur.* 2nd edn 3/3: 53–80 (1965); 81–356 (1974); M.Tamura, *Ranunculaceae*, in K.Kubitzki, J.G.Rohrer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 563–583 (1993).

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RANUNCULACEAE

KEY TO GENERA

- 1 Leaves opposite; climbers or shrubs; achenes with elongated, often plumose, styles **5. CLEMATIS**
- 1: Leaves basal and/or cauline and alternate or spirally arranged; annual or perennial herbs; styles not plumose
 - 2 Flowers zygomorphic
 - 3 Upper sepal hooded, without a spur **†ACONITUM**
 - 3: Upper sepal with a basal spur
 - 4 Petals 2, united into a single spurred nectary, the spur placed into the sepal spur; fruit a follicle; annual **2. CONSOLIDA**
 - 4: Petals 2, with 1 basal nectary-spur each; the 2 spurs placed into the single spur of the upper sepal; fruit usually of 3 follicles; annual or perennial **†DELPHINIUM**
 - 2: Flowers actinomorphic
 - 5 Sepals or petals with a basal spur
 - 6 Small annual with basal rosette of linear-filiform or very narrowly spatulate leaves; flowers very small; sepals with a basal spur each of which is appressed to the flowering stem; fruit of numerous achenes on an elongated subulate spike **9. MYOSURUS**
 - 6: Larger perennial with ternately compound leaves; flowers conspicuous; petals with basal spurs not appressed to flowering stems; fruit a whorl of several follicles **3. AQUILEGIA**
 - 5: Perianth segments without a spur
 - 7 Flowering stem with a whorl of involucre bracts below flower
 - 8 Involucre bracts in a whorl of 3 (rarely 2 or 4), lobed or entire, inserted some distance below the perianth; tepals white, without nectaries, not clawed; fruit a cluster of achenes; perennial **4. ANEMONE**
 - 8: Involucre bracts in a whorl of 5, pinnately dissected with narrow, acute segments, inserted immediately below the perianth; sepals light blue to white, clawed; petals with nectaries; fruit an inflated 5–9 (rarely 12)-celled capsule of connate follicles; annual **†NIGELLA**
 - 7: Flowering stem without a whorl of involucre bracts
 - 9 Perianth of ±equal segments, not clearly separated into sepals and petals
 - 10 Stamens longer than the 4 or 5 caducous petaloid perianth segments; fruit a cluster of a few achenes **†THALICTRUM**
 - 10: Stamens shorter than the 5 or more ±persistent perianth segments; fruit composed of several to many follicles
 - 11 Leaves divided or deeply lobed **†HELLEBORUS**
 - 11: Leaves simple and entire, usually with 2 wing-like appendages or lobes lying almost against the upper surface of the blade **1. PSYCHOPHILA**
 - 9: Perianth divided into sepals and petals (honey-leaves)
 - 12 Petals yellow, sometimes scarlet when fresh, rarely bright red with a black basal spot
 - 13 Petals without a nectary pit; annual **10. ADONIS**
 - 13: Petals with a nectary pit, annual or perennial
 - 14 Sepals 3; petals (5–) 7–12; most roots tuberous, obtuse; leaves entire, cordate or slightly undulate or very shallowly dentate **7. FICARIA**
 - 14: Sepals usually 5 (6) or, if 3, then petals usually 0–2 (5–8 in *R. acaulis*); all roots fibrous or, if swollen, narrowed into a thin filiform apex; leaves often divided **8. RANUNCULUS**

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12: Petals white

- 15 Perennials, terrestrial or sometimes briefly submerged in seasonal pools; leaves lobed or dissected into a few narrowly linear segments; achenes smooth with a persistent beak when ripe

8. RANUNCULUS

- 15: Aquatic annuals or perennials; leaves repeatedly trichotomously divided into filiform segments; achenes ridged, with a caducous or vestigial beak when ripe

6. BATRACHIUM

†Some species and cultivars of these genera are occasional garden escapes but appear not to have naturalised. They are not dealt with further in this treatment.

1. PSYCHROPHILA

Hj.Eichler & J.A.Jeanes

Psychrophila (DC.) Bercht. & J.Presl, *Prir. Rostlin* 79 (1823); from the Greek *psychros* (cold), and *philes* (loving), in reference to the preferred habitat of the species.

Caltha L. sect. *Psychrophila* DC., *Syst. Nat.* 1: 307 (1817) [*Psychrophila* (DC.) Raf., *Atlantic J.* 144 (1832), orth. var., *nom. inval.*]. T: *P. appendiculata* (Pers.) Bercht. & J.Presl [= *Caltha appendiculata* Pers.]; lecto, *fide* Hj.Eichler, *Fl. Australia* 2: 459 (2007).

Glabrous perennial herbs with stout, usually branching rhizomes often forming dense mats in cold swamps (snowbeds). Leaves spirally arranged, forming basal rosettes, simple, \pm cordate to hastate at base, usually with 2 wing-like appendages or lobes lying almost against upper surface of blade. Flowers actinomorphic, bisexual, scapose. Perianth of 5 or more petaloid tepals, narrow in most species, not spurred, white, magenta-pink or pale yellow. Nectaries absent. Stamens usually not more than 25. Carpels usually 2–18. Ovules numerous. Fruiting follicles several to many, radiating in a head, free, shortly beaked; seeds several.

A genus of c. 12 species from the Andes of Ecuador, Peru, Bolivia, Argentina and Chile to the Magellanic Region and the Falkland Islands, New Zealand and Australia. Two endemic species in Australia. Restricted to high elevations, except in subantarctic regions where also at low altitudes.

In the past the Australian species were usually treated under *Caltha* L. sect. *Psychrophila* DC., but there appears sufficient reason to recognise the section as a distinct genus. *Psychrophila* is characterised by the peculiar leaf appendages; solitary, often white or pale yellow, scapose flowers; mostly narrow, \pm acute tepals that are said to be rather long-persistent; and its almost exclusive restriction to the Southern Hemisphere. *Psychrophila leptosepala* (DC.) W.A.Weber, of the Rocky Mountains of western N America, appears to provide a link with *Caltha*, which is restricted to the Northern Hemisphere.

De Candolle, *loc. cit.*, described the tepals as persistent, in contrast to *Caltha* s. str. with caducous tepals. This needs further observation in the Australian species.

G.Bentham, *Fl. Austral.* 1: 15 (1863), as *Caltha*; E.Huth, *Monographie der Gattung Caltha, Abh. Vorträge Gesamtgeb. Naturwiss.* 4(1): 1–31, [32], t. 1 (1891); E.Huth, *Nachtrag zur Monographie der Gattung Caltha, Helios* 9: 99–103 (1892); A.W.Hill, *The genus Caltha in the Southern Hemisphere, Ann. Bot. (London)* 32: 421–435 (1918); P.G.Smit, *A revision of Caltha (Ranunculaceae), Blumea* 21: 119–150 (1973).

Leaf appendages 2 elongated lobes, attached on either side of petiole at base of lamina and folded inwards, entire; tepals usually white, sometimes magenta-tinged [Aust. mainland]

1. *P. introloba*

Leaf appendages 2 erect wings, attached on either side of midrib on upper side of lamina parallel to midrib, often incised in lower part into 2 unequal lobes; tepals creamy yellow to pale straw-coloured [Tas.]

2. *P. phylloptera*

1. *Psychrophila introloba* (F.Muell.) W.A.Weber, *Phytologia* 51(6): 375 (1982)

Caltha introloba F.Muell., *Defin. Austral. Pl.* 22 (1855); *Caltha novae-zelandiae* var. *introloba* (F.Muell.) Huth, *Helios* 9: 67 (1892). T: on gravelly places in the Australian Alps, irrigated during summer months by melting snow. Mount Hotham, Mount Latrobe, and Munyang Mountains, *F.Mueller*; lecto: MEL 1004167, *fide* P.G.Smit, *Blumea* 21: 148 (1973); remaining syms: MEL.

Illustrations: B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 157, pl. 10 (1990); N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 40, fig. 4a, b (1996); A.B.Costin *et al.*, *Kosciuszko Alpine Fl.* 2nd edn 126–128 (2000).

Tufted herb, 3–12 cm high. Rhizomes \pm fleshy. Leaves in rosettes; petiole 2–12 cm long, lower half membranous; lamina narrow-ovate to ovate-lanceolate, 1–4 cm long, 5–20 mm wide, \pm entire, acute to emarginate; basal appendages linear to lanceolate, 5–25 mm long, inflexed, attached at junction of petiole and lamina. Flowering stems short, thick, elongating to 10 (–20) cm long in fruit. Flowers at anthesis virtually sessile, sweet-scented. Tepals 5 (–8), spreading, narrowly lanceolate to ovate-lanceolate, 1–3.5 cm long, short-acuminate, white, sometimes tinged or streaked magenta. Stamens 12–25; filaments 3–10 mm long, flattened; anthers ovoid, c. 1 mm long. Carpels mostly 5–15; styles persistent. Fruiting follicles in a head 10–20 mm diam., sessile, beaked; seeds 1–5, ovoid, smooth, pale brown. *Alpine Marsh-marigold*. Plate 52; Fig. 55F–G.

Occurs in the Snowy Mountains of N.S.W., extending through the eastern highlands of Vic., but apparently absent from the Mt Cobberas area; grows in moss-beds, often flowering under snow and at the edges of receding snow-drifts. Flowers Nov.–Jan. Map 321.

N.S.W.: near source of Trapyard Ck, Ramshead Ra., Snowy Mtns, *Hj.Eichler 13510* (CANB); L. Albina, Kosciuszko Natl Park, *J.Pickard & R.Coveny 2745* (MEL, NSW). Vic.: Bogong High Plains, Pretty Valley, *L.A.Craven 1869* (CANB); Mt Baw Baw, 27 Nov. 1968, *H.A.Morrison* (MEL).

2. *Psychrophila phylloptera* (A.W.Hill) H.Eichler, *Fl. Australia* 2: 459 (2007)

Caltha phylloptera A.W.Hill, *Ann. Bot. (London)* 32: 433, fig. 7 (1918). T: Western Mtns, Tas., *Archer*; holo: K.

[*Caltha introloba* auct. non F.Muell.: J.D.Hooker, *Fl. Tasman.* 2: 355 (1860); G.Bentham, *Fl. Austral.* 1: 15 (1863), *p.p.* as to the Tasmanian specimens]

[*Caltha novae-zelandiae* auct. non Hook.f.: L.Rodway, *Tasman. Fl.* 3 (1903)]

Illustrations: M.Stones & W.M.Curtis, *Endemic Fl. Tasmania* 4: t. 80 (B) (1973); W.M.Curtis & D.I.Morris, *Stud. Fl. Tasmania* 1: 20, fig. 6 (1975); both as *Caltha phylloptera*.

Tufted herb, 2–8 cm high. Rhizomes fleshy. Leaves in rosettes; petiole 1–6 cm long, lower-half membranous; lamina cordate-ovate to ovate-lanceolate, 10–25 mm long, 5–10 mm wide, \pm entire, \pm emarginate; basal appendages elliptic, 5–12 mm long, erect, attached for part of their length along either side of the midrib, often unequally 2-lobed near base. Fruiting stems to c. 15 mm long, thickish. Flowers subsessile at anthesis. Tepals 5–7, spreading, linear-lanceolate, 8–10 mm long, short-acuminate, creamy yellow to pale straw-coloured. Stamens c. 10; filaments c. 5 mm long, flattened; anthers ovoid, c. 0.5 mm long. Carpels 5–8 (–10); styles persistent. Fruiting follicles in a head 10–15 mm diam., sessile, beaked; seeds 1–6, ovoid, smooth, brown. Fig. 55H.

Confined to the central plateau of Tas.; on mountains in wet screes in the shelter of boulders or tall plants, or sometimes between cushion plants. Flowers Dec.–Mar. Map 322.

Tas.: Mt Field West, 12 Dec. 1952, *W.M.Curtis* (HO); Cradle Mtn, gully near Cradle Peak, *Hj.Eichler 16517* (AD); Devils Den, *A.Moscal 7002* (HO); Marlborough Hwy at Ouse River Bridge, 19 Feb. 2002, *H.Wapstra* (MEL).

P.G.Smit, *Blumea* 21: 148 (1973), includes the name of this species, which appears well segregated, in the synonymy under *Caltha introloba* F.Muell., its undoubted closest ally. The species can be distinguished from *P. introloba* by its dull yellowish flowers and the different shape and placement of the leaf appendages.

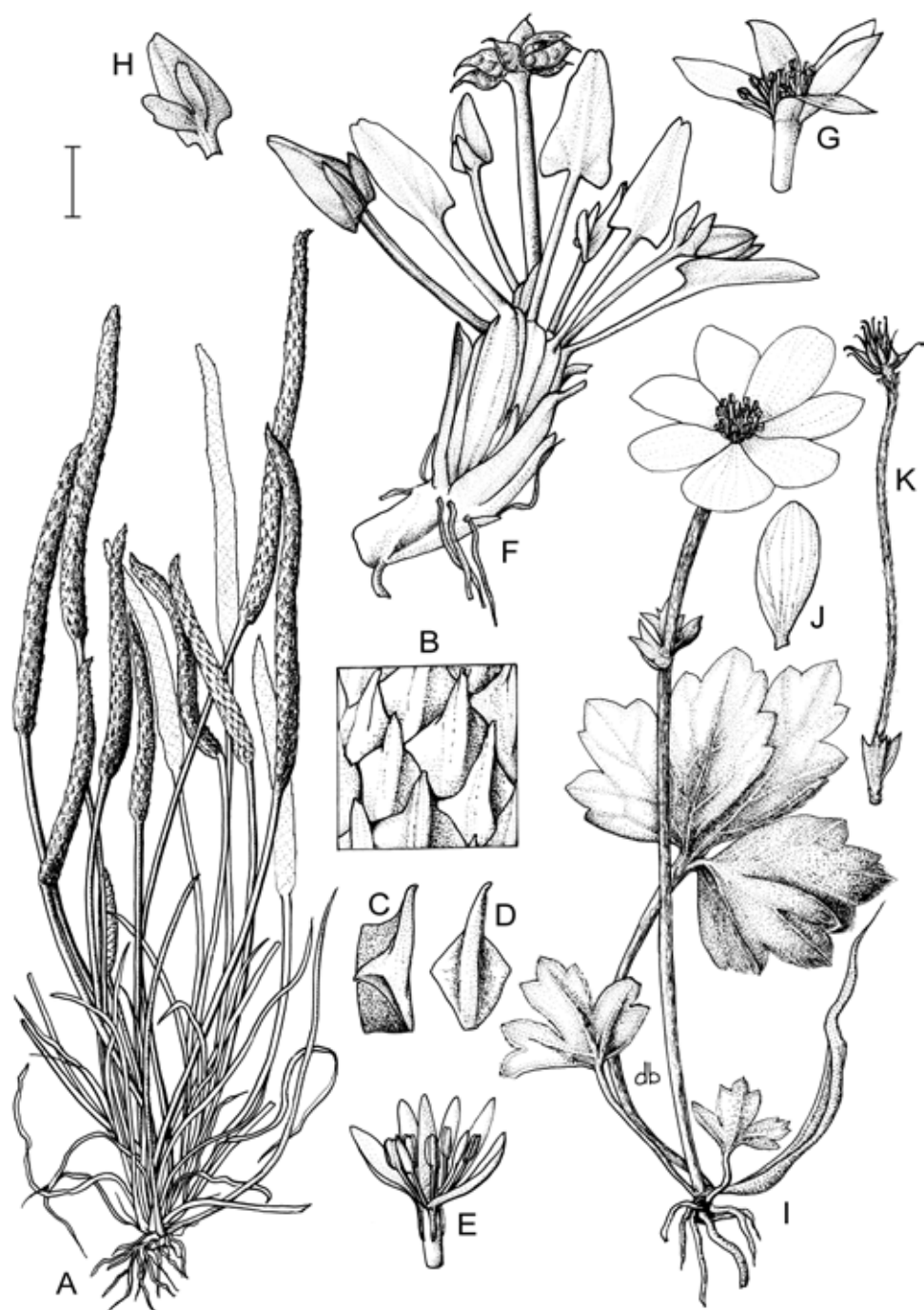


Figure 55. A–E, *Myosurus australis*. A, habit; B, portion of fruiting spike; C, nutlet (lateral view); D, nutlet (abaxial view) (A–D, C.Moore 8240, CANB); E, flower (M.Crisp 625, CANB). F–G, *Psychrophila introloba*. F, habit (fruiting) (H.Eichler 14810, CANB); G, flower (H.Eichler 13510, CANB). H, *Psychrophila phylloptera*, leaf lamina (W.Curtis, 12 Dec. 1952, HO). I–K, *Anemone crassifolia*. I, habit; J, tepal (abaxial view); K, fruiting spike with bracts and young fruit (I–K, L.Rodway, Oct. 1893, HO). Scale bar: A, F–K = 10 mm; B–D = 1.25 mm; E = 2.5 mm. Drawn by D.Boyer.

RANUNCULACEAE

2. CONSOLIDA

Hj.Eichler & J.A.Jeanes

Consolida (DC.) Gray, *Nat. Arr. Brit. Pl.* 2: 709, 711 (1821); name of an unknown plant in Roman literature (Apuleius, c. 150 A.D.) from the Latin *consolidare* (to make firm).

Type: *C. regalis* Gray

Delphinium L. sect. *Consolida* DC., *Syst. Nat.* 1: 340, 341 (1817). T: *Delphinium consolida* L.

Consolida (DC.) J.B.Ehrh., *Oecon. Pflanzenhist.* 8: 97 (1760), *nom. inval.*

Annuals with slender taproots. Leaves alternate, basal and cauline; lamina palmately lobed or divided. Flowers zygomorphic, bisexual, in racemes or panicles. Sepals 5, petaloid, the upper one with a prolonged, conical, basal spur. Petals 2, united into a single spurred nectary, its basal spur extending into the sepal spur. Stamens numerous, in 5 spirally arranged series. Carpel 1. Ovules numerous. Fruit a many-seeded follicle.

A genus of c. 60 species from central Asia to the Mediterranean area. One species occasionally escaping cultivation and becoming weakly naturalised in Australia.

Consolida has been included by many in *Delphinium* L. as a section or subgenus.

E.Huth, *Monographie der Gattung Delphinium*, *Bot. Jahrb. Syst.* 20: 322–499 (1895); R. von Soó, Über die mitteleuropäischen Arten und Formen der Gattung *Consolida* (DC.) S.F.Gray, *Oesterr. Bot. Z.* 71: 233–246 (1922); P.A.Munz, A synopsis of African species of *Delphinium* and *Consolida*, *J. Arnold Arbor.* 48: 30–55 (1967); P.A.Munz, A synopsis of the Asian species of *Consolida* (Ranunculaceae), *J. Arnold Arbor.* 48: 159–202 (1967).

****Consolida ajacis* (L.) Schur, *Verh. Mitth. Siebenbürg. Vereins Naturwiss. Hermannstadt* 4(3): 47 (1853)**

Delphinium ajacis L., *Sp. Pl.* 1: 531 (1753). T: not designated.

[*Consolida ambigua* auct. non (L.) P.W.Ball & Heywood: J.H.Willis, *Handb. Pl. Victoria* 2: 156 (1973); Hj.Eichler, in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 1: 345 (1986); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 157 (1990)]

Illustration: J.Damboldt & W.Zimmermann, in G.Hegi, *Ill. Fl. Mitt.-Eur.*, 2nd edn, 3/3: 151, fig. 102 (1974), as *C. ambigua*.

Stem to 1 m high, simple or branched. Basal leaves with oblong segments. Cauline leaves with linear segments. Inflorescence usually racemose, occasionally paniculate. Lower bracts dissected. Bracteoles small, remote, usually not reaching base of flower. Lower pedicels mostly more than 12 mm long in fruit, but less than twice as long as ripe follicle. Sepals 10–14 (–20) mm long, usually deep-blue; spur 13–18 mm long; petals 3-lobed, with a bifid upper lobe. Follicle 15–20 mm long, c. 5 mm thick, gradually narrowed at apex, pubescent. Seeds black. *Eastern Larkspur*.

Native in the Mediterranean region. Introduced to Australia as an ornamental garden plant, occasionally escaping cultivation. Recorded in W.A., S.A. and N.S.W. Flowers Dec.–Jan. Map 323.

W.A.: Narrogin, *G.J.Keighery 6916* (PERTH); Jerramungup, 3 Dec. 1979, *A.A.Marsh* (CANB, PERTH). S.A.: Port Lincoln, Kirton Point, 5 Dec. 1935, *J.M.Black & A.D.Black* (AD). N.S.W.: Pejar Ck, c. 16 miles [c. 26 km] NW of Goulburn, 19 Jan. 1956, *I.C.R.Holford* (NSW).

The name *C. ambigua* was widely misapplied, e.g. in *Fl. Europaea* 1: 217 (1964), and in modern Australian State floras and check-lists. The basionym, *Delphinium ambiguum* L., *Sp. Pl.* 2nd edn, 1: 749 (1762) (T: ‘Mauritania’ n.v.), as typified by De Candolle, *Syst. Nat.* 1: 347 (1817), is allied to *Delphinium peregrinum* L. and does not belong to *Consolida*; cf. W.Greuter, *Willdenowia* 19: 43 (1989), and W.Greuter, H.M.Burdet & G.Long, *Med-Checklist* 4: 399 (1989), under *Consolida ajacis*.

RANUNCULACEAE

3. AQUILEGIA

J.A.Jeanes

Aquilegia L., *Sp. Pl.* 1: 533 (1753); *Gen. Pl.* 5th edn, 237 (1754); from the Latin *aquila* (an eagle) alluding to the shape of the petals or possibly the claw-like nectaries.

Type: *A. vulgaris* L.

Perennial herbs with erect woody stock, sometimes subtuberous. Leaves 1–3-ternately compound, spirally arranged. Inflorescence terminal, cymose or flowers solitary. Flowers bisexual, actinomorphic, terminal. Sepals 5, petaloid, free. Petals 5, free, \pm tubular with a flat, erect limb and a backwardly directed nectar-secreting spur. Stamens numerous, the innermost usually sterile with broadened scarious filaments. Carpels usually 5, free, many-ovulate. Fruit a whorl of many-seeded follicles, each opening along the inner face.

About 70 species in temperate regions of the Northern Hemisphere. In Australia only 1 species is recorded, as an occasional garden escape.

J.G.Baker, A synopsis of the known forms of *Aquilegia*, *Gard. Chron. n. s.* 10: 19–20, 76, 111, 203 (1878); A.Becherer, Bemerkungen zur Gattung *Aquilegia*, *Ber. Schweiz. Bot. Ges.* 68: 289–94 (1958); P.A.Munz, *Aquilegia*, the cultivated and wild columbines, *Gentes Herb.* 7: 1–150 (1946); E.P.Payson, The North American species of *Aquilegia*, *Contr. U.S. Natl. Herb.* 20: 133–57 (1918); R.Rapaics, Die genere *Aquilegia*, *Bot. Közlem.* 8: 117–36 (1909); A.Zimmer, Verwandtschafts-Verhältnisse und geographische Verbreitung der in Europa einheimischen Arten der Gattung *Aquilegia*, *Jahresber. Staats-ober-Realschule Steyr*, 5: 1–66 (1875).

**Aquilegia vulgaris* L., *Sp. Pl.* 1: 533 (1753)

T: Herb. Clifford: 215, *Aquilegia* 1, fol. A; lecto: BM, *fide* B.E.Jonsell & C.Jarvis, in C.Jarvis *et al.* (eds), *Regnum Veg.* 127: 20 (1993)

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 1: pl. 41 (1948); W.Keble Martin, *Concise Brit. Fl. Colour*, pl. 4 (1965); N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 63, fig. 13e–h (1996).

Plants 40–100 cm high, glabrous or softly hairy. Basal leaves biternate to triternate, long-petiolate; leaflets cuneate to broadly ovate, 2.5–5 cm long, lobed or crenate, glabrous above, pilose and glaucous below; cauline leaves smaller, less divided, with shorter petioles. Flowers 3–5 cm diam., nodding, usually blue to violet, sometimes white or reddish. Sepals ovate, 15–30 mm long, acute. Petals 20–38 mm long including the 15–22 mm spur; spur sharply curved with apical knob. Stamens c. 50, sub-equal to or exceeding limb of petals; staminodes c. 10, white, membranous, slightly shorter than stamens. Follicles 15–30 mm long, beaked, glandular-pubescent, dehiscing while green. Seeds 2–2.5 mm long, black, shiny. *Columbine*.

Native to Europe. In Australia it occurs as a garden escape in cool, moist, shaded sites. A few records for N.S.W., Vic. and Tas. Flowers Nov.–Jan. Map 324.

N.S.W.: Maragle, near Tooma, *E.J.McBarron* 7289 (NSW). Vic.: snowfield, About 3 km NW of Falls Creek Village – Howmans Gap, *I.C.Clarke* 3031 (MEL, CANB); E Gippsland, Boundary Ck, 11 Nov. 1961, *K.C.Rogers* (MEL). Tas.: Little Swanport, *A.Moscal* 8517 (HO); North West Bay R., *A.Rozefelds* 1895 (HO).

4. ANEMONE

Hj.Eichler & J.A.Jeanes

Anemone L., *Sp. Pl.* 1: 538 (1753); *Gen. Pl.* 5th edn, 241 (1754); the deciduous tepals of some species are easily dispersed by wind (Greek *anemos*), hence, allegedly, the name.

Type: *A. coronaria* L.

Perennial herbs, rarely small shrubs, with a creeping or tuberous rhizome or woody descending rootstock. Leaves basal (except for involucre), spirally arranged; lamina usually

palmately lobed or divided. Flowering stem erect with usually 3 (rarely 2 or 4) involucre bracts in a whorl, mostly \pm remote from perianth. Flowers actinomorphic, bisexual, solitary or in few-many-flowered cymose umbel, variously coloured, without a calyx. Perianth of 4–20 petaloid tepals, without spurs, not clawed. Nectaries absent. Stamens many, shorter than tepals. Carpels many, each with 1 pendulous ovule; integument 1. Fruit a globular or oblong cluster of achenes; achenes glabrous or hairy, each with a persistent style beak.

A genus of c. 100–120 species in the temperate and cold zones of both Hemispheres. One endemic species in Tasmania.

Anemone hortensis L. is reported as naturalised in S.A. and *A. hupehensis* Lemoine and *A. hupehensis* var. *japonica* (Thunb.) Bowles & Stearn as sparingly naturalised in N.S.W., but specimens were not seen for this treatment.

E.Ulbrich, Über die systematische Gliederung und geographische Verbreitung der Gattung *Anemone*, *Bot. Jahrb. Syst.* 37: 172–256, 257–334 (1905, 1906); J.Damboldt & W.Zimmermann, *Anemone*, in G.Hegi, *Ill. Fl. Mitt.-Eur.* 2nd edn, 3/3(2/3): 190–206 (1974).

***Anemone crassifolia* Hook., *Icon. Pl.* 3(6): t. 257 (1840)**

T: near summit of Black Bluff mountain, on ascent approaching from Vale of Belvoir, Van Diemen's Land [Tas.], Feb. 1837, *R.Gunn 775 & Dr Milligan*; holo: K (photo CANB).

Illustrations: L.Rodway, *Tasman. Fl.* t. opp. p. 4 (1903); M.Stones & W.M.Curtis, *Endemic Fl. Tasmania* 3: t. 52B (1971).

Herb, 8–35 cm high, with short, perennial rootstock and sometimes slender, underground stems. Basal leaves with long petioles; lamina \pm orbicular, 1.5–5 cm wide, palmately lobed or divided into 3–5 segments; segments cuneate, blunt, coarsely toothed, thick and almost succulent, with appressed hairs mainly on veins and margins, often purplish beneath. Flowering stem with dense appressed hairs in upper part, sparser lower down. Involucre bracts usually 3, sometimes 2, at c. middle of scape, sessile, irregularly lobed or entire. Flowers solitary. Tepals 6–8, oblong to ovate-obovate, 12–18 mm long, white. Achenes glabrous; style-beak 3–4 mm long, hooked or coiled at apex. Plate 50; Fig. 551–K.

Occurs locally on mountains towards the W coast of Tas.; in dark peaty soil in open alpine vegetation, c. 1300 m alt. Flowers Oct.–Jan. Map 325.

Tas.: Frenchmans Cap, *A.M.Buchanan 453* (HO); Mt Read, 3 Jan. 1968, *W.M.Curtis* (HO); Jubilee Ra., *A.Moscal 9320* (HO); Lake Pedder Natl Park, Memorial Hut on W shoulder of Mt Eliza (Mt Anne Ra.), 4 Jan. 1977, *J.H.Willis* (MEL).

Anemone crassifolia was placed by E.Ulbrich, *Bot. Jahrb. Syst.* 37: 188, 237, 318 (1905, 1906), in *Anemone* sect. *Rivularidium* Jancz. Its closest ally appears to be the New Zealand *A. tenuicaulis* (Cheeseman) Parkin & Sledge, which is the only other Australasian *Anemone*. Its affinities are closer to South American species of *Anemone* sect. *Rivularidium* than to Asian species.

5. CLEMATIS

Hj.Eichler & J.A.Jeanes

Clematis L., *Sp. Pl.* 1: 543 (1753); *Gen. Pl.* 5th edn, 242 (1754); derived from *klematis*, a Greek name of various climbing plants, from Greek *klema* (a shoot or tendril).

Type: *C. vitalba* L.

Woody climbers, perennial herbs (not in Australia), or rarely shrubs. Leaves opposite, usually compound, once or twice ternate, 1–4 times pinnate, rarely simple, in some species ending in tendrils; petioles and petiolules often twining and acting as tendrils. Flowers in dichasial panicles or solitary, actinomorphic, bisexual or plants dioecious. Tepals usually valvate, mostly 4 (rarely to 8), petaloid. Stamens many; anthers often with a terminal

connective-appendage. Male flowers sometimes with \pm petaloid staminodes. Female flowers usually with 1 whorl of staminodes. Carpels numerous. Ovule solitary. Fruit a globular head of 1-seeded achenes, each with a persistent, long, often plumose style (awn).

A cosmopolitan genus of at least 300 species found especially in temperate regions of the Northern Hemisphere. In Australia 14 species, of which 11 are endemic, 1 occurs also in south-eastern Malesia, New Caledonia to Fiji, and 2 are introduced. There is also an endemic species on Norfolk Is., *Clematis dubia* (Endl.) P.S.Green, which is treated in *Fl. Australia* 49: 51 (1994).

A satisfactory taxonomic presentation of *Clematis* in Australia seems premature. Many herbarium specimens are inadequate and the dioecious species overlap in the extremes of the variation of most of their characters. The treatment here is very tentative and should encourage further study.

Collectors are encouraged to adopt the following practice. Herbarium specimens should include the leaf variation within one plant and within populations, also of vegetative shoots, be representative of plants of both sexes, and well annotated in recording the colour of the various flower-organs while fresh. As flowers and ripe fruits are rarely found at the same time, it is desirable to have flowers and ripe fruits (just before they fall off) collected from marked individuals so that their characters can be correlated safely. Field observations and experiments in cultivation under controlled conditions are desirable.

The term 'flammuliform' is used in the key and descriptions below to describe the complicated division of leaves of some species where the leaf is cleft into 5 primary divisions, which are then ternately divided. This leads to a typical condition of 15 leaflets, but by further or incomplete division, there may be as few as 12 or as many as 36 leaflets. The term is derived from *Clematis flammula* whose leaves demonstrate this type of division.

O.Kuntze, Monographie der Gattung *Clematis*, *Verh. Bot. Vereins Prov. Brandenburg* 26: 83–202 (1885); O.Kuntze, Nachträge zur Clematis-Monographie, *Verh. K.K. Zool.-Bot. Ges. Wien* 37: 47–50 (1887); A.Finet & F.Gagnepain, *Clematis*, in Contributions à la flore de l'Asie orientale d'après l'herbier du muséum de Paris, *Bull. Soc. Bot. France* 50: 518–557 (1903); K.Domin, *Clematis*, in *Biblioth. Bot.* 89(2): 105–112 (1926); H. von Handel-Mazzetti, *Plantae sinenses a Dre. H. Smith annis 1921–1922, 1924 et 1934 lectae*, XXXIII, *Acta Horti Gothob.* 13: 183–219 (1939); B.Haccius, Untersuchungen über die Blattstellung der Gattung *Clematis*, *Bot. Arch.* 43: 469–486 (1942); A.Rehder, *Manual Cult. Trees Shrubs* 2nd edn, 202–220 (1951); T.G.Tutin, *Clematis*, in T.G.Tutin *et al.* (eds), *Fl. Europaea* 1: 221–222 (1964); M.Tamura, Morphology, ecology and phylogeny of the Ranunculaceae VII. (Ranunculaceae of Eastern Asia: General part VII.), *Sci. Rep. S. Coll. N. Coll. Osaka Univ.* 16/2: 21–43 (1967); J.Damboldt & W.Zimmermann, *Clematis*, in G.Hegi, *Ill. Fl. Mitt.-Eur.* 2nd edn, 3/3(2/3): 177–189 (1974); M.Johnson, *Släktet Klematis* (1996).

- 1 Leaves simple to ternate or imparipinnate, with 5 (–7) or fewer leaflets; anthers with or without an apically protruding connective appendage
- 2 Plants deciduous, with bisexual flowers
 - 3 Leaves pinnate 1. *C. vitalba*
 - 3: Leaves trifoliate †*C. montana*
- 2: Plants evergreen, dioecious (female flowers with 1 whorl of staminodes)
 - 4 Low, erect shrub; leaves simple, rarely some deeply lobed to 3-partite 3. *C. gentianoides*
 - 4: Climbers (petiolules acting as tendrils); most leaves ternate or imparipinnate
 - 5 At least some leaves imparipinnate, with 5 leaflets; tepals glabrous below in the centre and lanuginose on the margin, even in bud 6. *C. clitorioides*
 - 5: Leaves ternate; tepals pubescent below
 - 6 Connective appendages to 0.5 mm long; tepals 0.7–2.5 cm long; leaf margins usually entire

- 7 Achenes often with distinct longitudinal ridges on each lateral face, often \pm falcate; tepals 0.7–1.6 cm long; anthers mostly 1–1.5 mm long; connective appendage 0–0.3 mm long **4. *C. pickeringii***
- 7: Achenes neither ridged nor falcate; tepals 1.1–2.5 cm long; anthers mostly 1.5–2 mm long; connective appendage 0.2–0.5 mm long **5. *C. glycinoides***
- 6: Connective appendages 0.4–3 mm long; tepals 1.3–4.0 cm long; leaf margins serrate or entire
- 8 Leaf margins usually serrate; connective appendages 1–3 mm long [eastern Australia] **8. *C. aristata***
- 8: Leaf margins usually entire; connective appendages 0.4–1.3 mm long [W.A.] **7. *C. pubescens***
- 1: Leaves biternate, triternate or flammuliform, with more than 5 leaflets; anthers without an apically protruding connective appendage
- 9 Plants deciduous with bisexual flowers **2. *C. flammula***
- 9: Plants evergreen, dioecious
- 10 Achenes fusiform, c. 1 mm diam.; leaflets usually serrate-dentate **14. *C. fawcettii***
- 10: Achenes distinctly compressed, broader than 1 mm; leaflets usually entire or sometimes deeply lobed
- 11 Filaments of stamens and staminodes purplish violet **13. *C. delicata***
- 11: Filaments of stamens and staminodes white or cream
- 12 Leaves usually biternate with up to 9 (–12) leaflets, sometimes with leaflets lobed
- 13 Awns of achenes 6.9–12.6 cm long; achenes narrowly ovate-falcate in outline, with margin not conspicuous [W.A.] **12. *C. linearifolia***
- 13: Awns of achenes 3–5.2 cm long; achenes ovate to broadly elliptic in outline with a conspicuous corky wrinkled margin [SE Australia] **9. *C. microphylla***
- 12: Leaves flammuliform to triternate, with more than 12 leaflets (rarely fewer in some immature leaves)
- 14 Leaflets usually 12–15 per leaf, broadest below middle; terminal leaflet 12–45 mm long **10. *C. decipiens***
- 14: Leaflets usually 18–36 per leaf, broadest beyond middle; terminal leaflet 5–15 (–25) mm long **11. *C. leptophylla***

† *C. montana* DC., a deciduous vine native to China, is sometimes cultivated and was noted in 2002 as adventive from a neighbouring garden at Leura, N.S.W.

1. **Clematis vitalba* L., *Sp. Pl.* 1: 544 (1753)

var. *vitalba*

T: Herb. Burser XVII: 35; lecto: UPS, *fide* V.P.Serov, *Bot. Zhurn. (Moscow & Leningrad)* 73(12): 1738 (1988).

Illustrations: B.Fretwell, *Clematis* 145 (1989); S.Ross-Craig, *Drawings Brit. Pl.* 1: t. 1 (1948).

Strong, deciduous woody climber. Leaves imparipinnate, mostly with 5 (occasionally 7) leaflets; leaflets ovate, 3–10 cm long, entire, lobed or remotely serrate, acute or acuminate, glabrous or slightly pubescent, more densely so on veins. Flowers in terminal and axillary dichasial panicles, bisexual, c. 2 cm in diam., fragrant. Tepals oblong, c. 1 cm long, with silky hairs above and below, tomentose at margin, greenish white. Stamens 5–8 mm long; filaments linear, glabrous; anthers oblong, 1–2 mm long, obtuse, without appendage; staminodes absent. Achenes strongly compressed, ovoid, 3–5 mm long, 1.5–2.5 mm wide, dark-brown, pubescent; awn to 4 cm long. *Travellers Joy, Old Man's Beard*.

Native in southern, western and central Europe. Grown as an ornamental in gardens; escaped and naturalised locally near Adelaide, S.A., near Melbourne, Vic. and near Hobart, Tas. Flowers Jan.–Mar. Map 326.

S.A.: Stirling West, 24 Feb. & 6 May 1957, *E.H.Ising* (CANB). Vic.: Melbourne suburb of Northcote, Merri Ck near Rushall railway station, *D.E.Albrecht 5371* (MEL); Belgrave–Monbulk Rd, 4 Mar. 1991, *D.Duggan* (MEL). Tas.: Bathurst St., Hobart, 9 Jan. 1970, *W.M.Curtis* (HO).

2. **Clematis flammula* L., *Sp. Pl.* 1: 544 (1753)

T: Herb. Linn. No. 712.12; lecto: LINN, *vide* M.Qaiser, in Y.J.Nasir & S.I.Ali (ed.), *Fl. Pakistan* 166: 5 (1984).

Illustration: B.Fretwell, *Clematis* 106 (1989).

Strong, deciduous climber with woody base, 3–5 m high. Leaves biternate or flammuliform; leaflets 9–15 (rarely more), broadly ovate to narrowly oblong, 1.5–4 cm long, entire or sometimes 2- or 3-lobed, acute to obtuse, ±coriaceous, glabrescent. Flowers many, in large axillary and terminal dichasial panicles, bisexual, 2–3 cm diam., fragrant. Tepals oblong, 8–14 mm long, glabrous above, glabrescent below, with narrow, white-tomentose margin, white. Stamens 5–10 mm long; filaments linear, glabrous; anthers linear, 3–4 mm long, obtuse, without appendage; staminodes absent. Achenes strongly compressed, ovoid, 5–6 mm long, 4–5 mm wide, dark brown with paler margins, appressed-pubescent to glabrous; awn 2–5 cm long.

Native in southern Europe, the Mediterranean region and south-western Asia. Grown as an ornamental, it has escaped and established in a few places in the southern Mt Lofty Ranges, S.A. and weakly naturalised near Geelong, suburban Melbourne and possibly Mitta Mitta in Vic. Flowers Dec.–Mar. Map 327.

S.A.: roadside near Cherry Gardens, *R.Bates 2050* (AD); Nangkita, near Mt Compass, *R.Bates 6567* (AD); Eden Hills, S of Adelaide, *B.J.Blaylock 1666* (AD, CANB). Vic.: c. 4 km W of Geelong P.O., 5 Jan. 1993, *M.Trengrove* (MEL); Mitta Mitta, Jan. 1923, *H.B.Williamson* (MEL).

3. *Clematis gentianoides* DC., *Syst. Nat.* 1: 159 (1817)

Valvaria gentianoides (DC.) Ser., *Fl. Jard.* 3: 95 (1849); *C. aristata* var. *gentianoides* (DC.) F.Muell., *Fragm.* 10(81): 2 (1876); *C. aristata* subsp. *gentianoides* (DC.) Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 157 (1885); *C. gentianoides* var. *normalis* Domin, *Biblioth. Bot.* 89(2): 109 (1926), *nom. inval.* T: in *Novae-Hollandiae insulâ Mariâ, Riedley* [?A.Riedlê]; et terrâ Van Diemen [Tas.], *Caley* (v.s.sp. ♂ in h. Mus. Par.♀ in h. Lamb.); *syns: n.v.*

Clematis aristata subsp. *procumbens* Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 157 (1885); *C. gentianoides* var. *procumbens* (Kuntze) Domin, *Biblioth. Bot.* 89(2): 109 (1926). T: Tasmania ('!sub nom. *C. gentianoides* var. *scandens* Gunn (ms. nom.)'); *holo: K.*

Clematis aristata subsp. *tasmanica* Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 157 (1885); *C. gentianoides* var. *tasmanica* (Kuntze) Domin, *Biblioth. Bot.* 89(2): 109 (1926). T: Tasmania ('!varii locis Gunn, Kew sub nom. *C. gentianoides*'); *syns: n.v.*

Illustrations: J.P.B.Delessert, *Icon. Sel. Pl.* 1: t. 5 (1821); W.M.Curtis & D.I.Morris, *Stud. Fl. Tasmania* 2nd edn, 1: 10, fig. 5 (1975); M.Stones & W.M.Curtis, *Endemic Fl. Tasmania* 1: t. 6 (1967).

Low dioecious shrub with creeping underground stem. Aerial branches 10–50 cm long, in semi-erect tufts. Leaves usually simple (rarely deeply 3-lobed to ternate); lamina broadly ovate to narrowly lanceolate, 2–10 cm long, 0.7–3 cm wide, entire or coarsely toothed, acute to obtuse, rather thick, glabrous. Flowers usually solitary, terminal, sometimes in 3-flowered dichasia, long-pedunculate. Tepals narrow-ovate to oblong, 2–4 cm long, ±glabrous, white. Stamens 3–13 mm long; filaments glabrous; anthers narrowly ovate, 2–2.5 mm long, with subulate appendage, 0.3–0.8 mm long; staminodes present. Achenes compressed, obovoid, 4–5 mm long, 1.8–2.5 mm wide brown, villous; awn 2–3 cm long.

Widespread in eastern Tas., including Flinders Is. (where known from a single collection). Locally abundant in poor soil and on well-drained slopes. Flowers Oct.–Mar. Map 328.

Tas.: c. 10 km W of Orford on the Tasman Hwy, *W.R.Barker 882A* (AD); N ridge of Knocklofty, Hobart, *A.M.Buchanan 3573* (AD, BRI, CANB, HO); 6.4 km along Lake Leake turnoff from Tasman Hwy, *R.Melville 2519* (AD); Waterworks track to Fern Tree, 8 Feb. 1937, *J.Somerville* (HO).

4. *Clematis pickeringii* A.Gray in C.Wilkes, *U.S. Expl. Exped.* 1: 1 (1854)

Clematis aristata subsp. *pickeringii* (A.Gray) Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 156 (1885). T: Ovolau, Feejee Islands, Dr. Pickering & Mr. Brackenridge; holotype: GH.

Clematis aristata var. *glycinoides* F.Muell. ex Kuntze, *Verh. K.K. Zool.-Bot. Ges. Wien* 37: 50 (1887). T: Timor, Dr. Naumann; holotype: B?, n.v.

Clematis glycinoides var. *submutica* Benth., *Fl. Austral.* 1: 7 (1863). T: Clarence river and Brisbane river, coll.(s) unknown, Herb. F.Mueller; syns: n.v.

Clematis aristata var. *gillivrayana* Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 156 (1885). T: Pine Isle, Nova Caledonia, Gillivray; holotype: n.v.

Clematis rhodocarpoides W.T.Wang, *Acta Phyto. Sin.* 42(1): 65 (2004). T: Robert's Plateau, Lamington Natl Park, Qld, 20 Mar. 1943, C.T.White 12048; holotype: K; isotype: BRI.

Clematis queenslandica W.T.Wang, *Acta Phyto. Sin.* 42(1): 67 (2004). T: Australia, Brunett [sic], F.Mueller; holotype: K; isotype: MEL.

[*Clematis glycinoides* auct. non DC.: F.M.Bailey, *Queensland Fl.* 1: 5 (1899), p.p.]

Illustration: B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 159 (1990), as *C. glycinoides* var. *submutica*.

Strong, dioecious, woody climber, to 5 m high. Leaves ternate; leaflets broad-ovate to ovate-elliptic, mostly 6–9 cm long, 2–6.5 cm wide, entire, acute to obtuse, thin, glabrescent. Flowers in axillary and terminal dichasial panicles. Tepals caducous, oblong-lanceolate, 7–16 mm long, pubescent below, glabrous above with densely white-tomentose margins, creamy white. Stamens 5–10 mm long; filaments glabrous; anthers ±ellipsoidal, mostly 1–1.5 mm long, with ±globular appendage, 0–0.3 mm long; staminodes present. Achenes compressed, narrow-ovoid, subulate, 5–7 mm long, 1.2–1.5 mm wide, reddish brown, ±falcate, pubescent to glabrous, often with longitudinal ridges on faces, margins corky; awn 3–5 cm long. Fig. 56I–K.

Occurs from eastern Java through Malesia, northern Australia, New Caledonia to Fiji. In Australia known from few collections (mostly vegetative only) from the Kimberley, W.A., northern N.T., more frequently from coastal districts of Qld, from eastern Cape York Penin., and S to southern coastal N.S.W.; mainly at the edges of rainforest stands. Flowers Apr.–Feb. Map 329.

W.A.: 'Hidden Valley', NW of Amax basecamp on edge of Mitchell Plateau, W Kimberley, K.F.Kenneally 6658 (PERTH). N.T.: Deaf Adder Gorge, R.E.Fox 2512 (CANB, MEL, NSW). Qld: Cook district, on Bamaga road, 4.4 km from Muttee Head, P.I.Forster 6446 (CANB); Mt Koolmoon Forest Reserve, c. 11.3 km S of Ravenshoe, Atherton Tableland, R.Schodde 3291 (AD, CANB). N.S.W.: Acacia Plateau, 9 Mar. 1960, W.T.Jones (CANB).

5. *Clematis glycinoides* DC., *Syst. Nat.* 1: 145 (1817)

Clematis aristata subsp. *glycinoides* (DC.) Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 155 (1885); *C. glycinoides* var. *normalis* Domin, *Biblioth. Bot.* 89(2): 109 (1926). *nom. inval.*, type variety. T: near Port-Jackson [Sydney], N.S.W., coll. unknown, 'v. s. sp. ♂ in herb. Banks'; holotype: BM.

Clematis glycinoides var. *dentata* Domin, *loc. cit.* T: Port Jackson [Sydney], N.S.W., 1802–1805, R.Brown [iter Austral. 4857]; holotype: K.

Clematis glycinoides var. *floribunda* Domin, *loc. cit.* T: Süd-Queensland: banks of the Brisbane River, A.Cunningham; holotype: K.

Illustrations: G.R.Cochrane *et al.*, *Fl. & Pl. Victoria* 154, fig. 484 (1968); A.Fairley & P.Moore, *Native Pl. Sydney District* 58, t. 108 (1989).

Dioecious woody climber to 3 m high. Leaves ternate (simple when juvenile or first pair on branches); leaflets ovate to elliptic-lanceolate, 2.5–8 cm long, 1–4.5 cm wide, entire or rarely with few teeth or triangular lobe near base, acute, glabrous. Flowers in axillary and terminal dichasial panicles. Tepals narrow-oblong, 11–25 mm long, pubescent below, glabrous above, white. Stamens 5–10 mm long; filaments glabrous; anthers linear to narrowly elliptic, mostly 1.5–2 mm long, with obtuse appendage, 0.2–0.5 mm long; staminodes present. Achenes compressed, ellipsoidal, 4–8 mm long, 2–3 mm wide, reddish brown, sparsely pubescent to glabrous, smooth; margin only slightly thickened; awn 3.7–4.7 cm long. Fig. 56A–C.



Figure 56. *Clematis*. **A–C**, *C. glycinoides*. **A**, branch with inflorescence; **B**, male flower; **C**, anther (**A–C**, H.Eichler 20903, CANB). **D–F**, *C. clitorioides*. **D**, branch with inflorescence; **E**, anther (**D–E**, N.Burbidge 2944, CANB); **F**, leaf with dentate leaflets (H.Eichler 16797, CANB). **G–H**, *C. pubescens*. **G**, leaf; **H**, anther (**G–H**, K.Paijmans 3646, CANB). **I–K**, *C. pickeringii*. **I**, male flower; **J**, anther (**I–J**, W.Jones s.n., CANB); **K**, nutlet (without awn) (R.Fox 2512, CANB). Scale bar: **A**, **D**, **F** = 20 mm; **B**, **G**, **I** = 10 mm; **C**, **E**, **H**, **J** = 1 mm; **K** = 4 mm. Drawn by D.Boyer.

Extends from south-eastern Qld, through tableland and coastal areas of N.S.W. to eastern Vic., as far W as Colac; in woodland, eucalypt forest and rainforest, sometimes in heathland. Flowers Aug.–Nov. Map 330.

Qld: Queen Mary Falls Natl Park, E of Killarney, *Hj.Eichler 24062* (CANB); Mt Tully, 9.7 km SE of Stanthorpe, *L.Pedley 1450* (BRI). N.S.W.: Conjola, *Hj.Eichler 20902* (AD, B, CANB); Bungonia Gorge, between Adams Lookout and Bungonia Lookdown, *M.Evans 2530* (BRI). Vic.: Eagle Point Lookout, 10 km SE of Bairnsdale, *H. van Rees 023* (CANB, MEL).

6. *Clematis clitorioides* DC., *Syst. Nat.* 1: 158 (1817)

T: near Port-Jackson [Sydney], N.S.W., *coll. unknown*, 'v. s. sp. in herb. Banks'; holo: BM (photo CANB). [Note: no *Clematis* in the Sydney region agrees with either the description or the type specimen, suggesting mislabelling of a specimen of Tasmanian origin.]

Clematis blanda Hook., *J. Bot. (Hooker)* 1(3): 241 (1834); *C. aristata* var. *blanda* (Hook.) Benth., *Fl. Austral.* 1: 6 (1863). T: Van Diemen's Land [Tas.], 1832, *R.Gunn 54*: lecto; K (photo CANB), *fide* *Hj.Eichler, Fl. Australia* 2: 459 (2007); remaining syn: *Dr. Scott, Mr. Lawrence, (n. 106, 1831.–n. 147.)*; syns: *n.v.*

Clematis aristata var. *minor* Hook.f., *J. Bot. (Hooker)* 2(16): 400 (1840). T: foot of Mount Wellington, Tas., *R.Gunn 631*; holo: *n.v.*

Clematis hexapetala subsp. *brachystemon* Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 108 (1885); *C. brachystemon* Gunn ex W.T.Wang, *Acta Phytotax. Sin.* 42: 68 (2004). T: Georgetown, Tasmania, *R.Gunn 1933*; holo: K.

Clematis aristata subsp. *gunniana* Kuntze, *op. cit.* 156, p.p.; *C. aristata* var. *gunniana* (Kuntze) Domin, *Biblioth. Bot.* 89(2): 108 (1926). T: Tasmania, *R.Gunn s.n.*; syn: K (photo seen), B *n.v.* (destroyed?); Tasmania, *Schayer s.n.*; syn: B *n.v.* (destroyed?); Swan River, *J.Drummond*; syn: P *n.v.* [the latter specimen belongs to *C. pubescens*, see note under that species]

Clematis clitorioides var. *decipiens* Domin, *loc. cit.* T: 'Tasmanien, auf mehreren Standorten' [Tasmania, in several locations]; syn: K (annotated by K.Domin as 'var. *fallax* Domin v.n.', the name probably not published).

[*Clematis linearifolia* auct. non Steud.: J.D.Hooker, *Fl. Tasman.* 1: 4, t. 1 (1855), p.p., as to *R.Gunn 1933*]

Illustration: J.D.Hooker, *loc. cit.*, as *C. linearifolia*.

Dioecious woody climber. Leaves ternate or often imparipinnate with 5 leaflets; leaflets ovate, 1.2–4.5 cm long, 0.5–2.2 cm wide, entire or more rarely dentate, acute, usually glabrous. Flowers in axillary and terminal dichasial panicles. Tepals caducous, narrow-elliptic to narrow-ovate, 1.3–2.7 cm long, white, ±glabrous below except for lanuginose margin, glabrous above. Stamens 4–12 mm long; filaments glabrous; anthers narrowly ovate to broadly elliptic, 1.5–3 mm long, with linear appendage, 0.5–1 mm long; staminodes present. Achenes compressed, ovate, 4–5 mm long, 1.5–2 mm wide, usually glabrous, smooth; margin slightly pronounced; awn 2.0–4.5 cm long. Fig. 56D–F.

Widespread and probably endemic in Tas.; often in lowland and highland forests and woodlands. Flowers Aug.–Jan. Map 331.

Tas.: c. 15 km E of Launceston, *N.T.Burbidge 2944* (CANB); Prosser R., Nov. 1971, *W.M.Curtis* (AD); Mt Field Natl Park, c. 10 km E of L. Dobson, *Hj.Eichler 16797* (CANB); between Hospital Ck and Pine Divide, *A.Moscal 3853* (CANB); Flinders Is., North Pats R., *J.S.Whinray 1754* (CANB).

7. *Clematis pubescens* Hügel ex Endl., *Enum. Pl.* 1 (1837)

Clematis aristata subsp. *pubescens* (Hügel ex Endl.) Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 156 (1885); *C. aristata* var. *pubescens* (Hügel ex Endl.) Domin, *Biblioth. Bot.* 89(2): 107 (1926). T: Swan River, W.A., Hügel; holo: W *n.v.*, probably lost.

Clematis elliptica Endl., *Enum. Pl.* 1 (1837); *C. aristata* f. *elliptica* (Endl.) Domin, *Biblioth. Bot.* 89(2): 108 (1926). T: King Georges Sound, W.A., Hügel; holo: W *n.v.*, probably lost.

Clematis cognata Steud. in J.G.C.Lehmann, *Pl. Preiss.* 1: 263 (1845). T: in littore arenoso sinus Middletowshay, ditionis Plantagenet, W.A., 30 Sept. 1830, *Herb. Preiss. 1346*; holo: *n.v.*; iso: G.

Clematis discolor Steud. in J.G.C.Lehmann, *Pl. Preiss.* 1: 262 (1845). T: in limoso calculosis sylvae Halfwayhouse, W.A., 12 Sept. 1839, *Herb. Preiss. 1344*; holo: P.

Clematis gilbertiana Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 2(4): 273 (1854). T: Nova Hollandia occidentatis, W.A., Gilbert 62; holo: *n.v.*

Clematis aristata var. *occidentalis* Benth., *Fl. Austral.* 1: 6 (1863). T: West Australia; lecto: holotype of *C. discolor* Steud., *fide* Hj.Eichler, *Fl. Australia* 2: 459 (2007).

Clematis aristata subsp. *pubescens* var. *breviappendiculata* Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 156 (1885), *nom. inval.*

Clematis aristata f. *oblongisepala* Domin, *Biblioth. Bot.* 89(2): 107 (1926). T: wurde von G.H.Thielsen-Dyer im Jahre 1903 zwischen Perth und Coolgardie (No. 2 Pumping Station, Mundaring) gefunden, W.A.; holo: *n.v.*

[*Clematis indivisa* auct. non Willd.: E.G.Steudel, in J.G.C.Lehmann, *Pl. Preiss.* 1: 262 (1845)]

Illustrations: J.S.Beard, *Pl. Life Australia* 73, fig. 3.28 (1990); J.R.Wheeler, in N.G.Marchant *et al.*, *Fl. Perth Region* 1: 65, fig. 9 (1987); M.G.Corrick & B.A.Fuhrer, *Wildfl. SW Australia* fig. 629 (1996).

Strong dioecious, woody climber, to 5 m high. Leaves ternate; leaflets ovate, 2.5–8 cm long, 1–4 cm wide, entire or sparsely toothed, acute to obtuse, ±coriaceous, ±glabrous. Flowers in axillary and terminal, few-flowered dichasial panicles. Tepals caducous, oblong-lanceolate, 15–40 mm long, pubescent below with narrow, tomentose margin, glabrous above, white or creamy white. Stamens 5–15 (–20) mm long; filaments glabrous, creamy white; anthers narrowly elliptic, 1.5–2.5 mm long, with subulate appendage, 0.4–1.3 mm long; staminodes present. Achenes compressed, ovate, 4.5–7 mm long, 1.5–2.5 mm wide, brown, shortly pubescent; margin not prominent; awn 2.3–6.4 cm long. Fig. 56G–H.

Occurs from just N of Perth to Eyre, with an isolated northern occurrence near Geraldton, W.A.; mostly in open forest and woodland. Flowers May–Nov. Map 332.

W.A.: near Manjimup, A.M.Ashby 3071 (AD); Nettleton Rd, c. 5 km NE of Jarrahdale, N.N.Donner 1468A & 1468B (AD); c. 13 km N of coast at Stokes Inlet, Hj.Eichler 19965 (AD); Karragullen State Forest, c. 40 km from Perth along Brookton Hwy, Hj.Eichler 20925 (AD, CANB); c. 10 km SE of Busselton, K.Pajmans 3646 (CANB).

Kuntze described *Clematis aristata* subsp. *gunniana* and gave as syntypes two collections from Tasmania (*Gunn s.n.*, *Schayer s.n.*) and another from Western Australia (*Drummond s.n.*). *Clematis aristata* subsp. *gunniana* is treated here as a synonym of *C. clitorioides*, which is endemic in Tasmania. The Drummond material has been identified as *C. pubescens*.

8. *Clematis aristata* R.Br. ex Ker Gawl., *Bot. Reg.* 3: t. 238 (1817)

T: the drawing was taken at the nursery of Messrs. Whitley, Brames, and Milne, at Fulham, where it was cultivated in the greenhouse; lecto: the illustration cited above, *fide* Hj.Eichler, *Fl. Australia* 2: 459 (2007).

Clematis aristata R.Br. ex DC., *Syst. Nat.* 1: 147 (1817), *nom. illeg.*; *C. aristata* var. *browniana* Domin, *Biblioth. Bot.* 89(2): 106 (1926). T: in Novâ-Hollandiâ, *coll. unknown*; holo: G-DC (photo CANB); iso: BM (photo CANB), K, P.

Clematis aristata subsp. *aristata* var. *breviappendiculata* Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 156 (1885). T: ‘var. I rarius [?]: Botany Bay, Blue Mountains (! mus. bot. berol.)’; holo: *n.v.*

Clematis coriacea DC., *Syst. Nat.* 1: 146 (1817); *C. aristata* var. *coriacea* (DC.) Benth., *Fl. Austral.* 1: 6 (1863). T: near Port Jackson [Sydney], N.S.W., *coll. unknown*; lecto: specimen labelled ‘var. acuta’, ‘♀ in h. Lamb’, G-DC, *fide* Hj.Eichler, *Fl. Australia* 2: 459 (2007)

Clematis coriacea var. *obtusa* DC., *Syst. Nat.* 1: 146 (1817). T: near Port-Jackson [Sydney] N.S.W., *coll. unknown*, ‘♂ in h. Mus. Par’; ?holo: P.

Clematis coriacea var. *acuta* DC., *loc. cit.*, *nom. inval.*, type variety.

Clematis stenosepala DC., *op. cit.* 147. T: near Port-Jackson [Sydney], N.S.W., R.Brown; ?holo: BM.

Clematis aristata subsp. *confertissima* Kuntze, *loc. cit.* T: Tasmania, R.Gunn 262; holo: B *n.v.*, destroyed?

Clematis aristata var. *leichhardtiana* Kuntze, *loc. cit.*, *p.p.* T: Australia, 1842, Leichhardt; ?syn: B; Norfolk Island; Lord Howe’s Island; Nova Caledonia, Gillivray; *syms*: all *n.v.* [This name is also, in part, referable probably to *C. dubia*, *C. glycinoides*, and *C. pickeringii*.]

Clematis aristata subsp. *normalis* Kuntze, *loc. cit.*, *nom. inval.*

Clematis aristata subsp. *normalis* Kuntze var. *longiappendiculata* Kuntze, *loc. cit.*, *nom. inval.*

Clematis aristata var. *normalis* Domin, *Biblioth. Bot.* 89(2): 106 (1926), *nom. inval.*

Clematis aristata subsp. *pubescens* (Hügel ex Endl.) Kuntze var. *longiappendiculata* Kuntze, *loc. cit.* T: Tasmania, Gunn 773; holo: B *n.v.* destroyed?

Clematis aristata f. *serratifolia* Lodd. ex Kuntze, *loc. cit.* T: illustration in G.Loddiges, *Bot. Cab.* t. 620 (1822).

Clematis aristata var. *longiseta* F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 7: 59 (1893). T: Upper Nerang, Qld, H.Schneider; holo: BRI; iso: K.

Clematis aristata var. *dennisae* Guilf., *Victorian Naturalist* 15(8): 97 (1898). T: near Healesville, Vic., Mrs J.Dennis; holo: MEL.

Clematis sanderi W.Watson, *Gard. Chron.* 41: 310 (1907); *C. aristata* var. *sanderi* (W.Watson) Domin, *Biblioth. Bot.* 89(2): 107 (1926) *nom. illeg.* T: Australia, Messrs Sander & Sons; holo: K.

Clematis aristata var. *integrifolia* Domin, *Biblioth. Bot.* 89(2): 106 (1926). T: N.S.W., Illawarra, Backhouse; holo: n.v.

Clematis aristata f. *stenosepala* Domin, *Biblioth. Bot.* 89(2): 107 (1926). T: not designated.

Illustrations: G.R.Cochrane *et al.*, *Fl. & Pl. Victoria* 137, fig. 424 (1968); A.Fairley & P.Moore, *Native Pl. Sydney Distr.* 58, t. 107 (1989); M.G.Corrick & B.A.Fuhrer, *Wildfl. Victoria* fig. 677 (2000).

Strong dioecious woody climber, to 15 m high or more. Leaves ternate; petiole 4–7 cm long; leaflets ovate to deltate, 2.5–9 cm long, 1–5 cm wide, serrate (occasionally entire), \pm acute, usually glabrous. Flowers in numerous axillary panicles. Tepals caducous, oblong to narrowly ovate, 13–35 mm long, pubescent below, densely white-tomentose at margin, glabrous above, creamy white. Stamens 4–15 mm long; filaments glabrous; anther linear-oblong, 1.5–4 mm long, with subulate appendage, 1–3 mm long; staminodes present. Achenes compressed, ovate, 5–7 mm long, 2–3.5 mm wide, brown, shortly pubescent (rarely glabrous), smooth; margin slightly thickened; awn 2.8–4.8 cm long. Plate 51; Fig. 57H–I.

Occurs from SE Qld through eastern N.S.W., Vic., the extreme SE corner of S.A. and Tas.; mostly in wetter montane forests, but extending to drier open forests. Flowers Sept.–Jan. Map 333.

S.A.: 25 km SE of Mt Gambier, 25 Sept. 1976, A.C.Beauglehole (CSIRO Mt Gambier). Qld: Binna Burra, Daves Ck Country, R.Jones J296 (BRI). N.S.W.: Kiola State Forest, c. 15 km N of Batemans Bay, R.Schodde 5100 (CANB). A.C.T.: Gibraltar Falls area, M.Gray 5292 (CANB). Vic.: Grampians, Sawmill Track, c. 50 km W of Ararat, K.Czornij 524 (CANB). Tas.: Whites Mill Rd, Lillydale, A.M.Buchanan 933 (HO).

9. *Clematis microphylla* DC., *Syst. Nat.* 1: 147 (1817)

Clematis hexapetala subsp. *microphylla* (DC.) Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 108 (1885); *C. microphylla* var. *normalis* Domin, *Biblioth. Bot.* 89(2): 110 (1926), *nom. inval.* T: circà Novam-Hollandiam, Leschenault, Riedley [?A.Riédé]; holo: P.

Illustrations: G.R.Cochrane *et al.*, *Fl. & Pl. Victoria* 77, fig. 210 (1968); G.M.Cunningham, *et al.*, *Pl. W New South Wales* 308 (1982); M.G.Corrick & B.A.Fuhrer, *Wildfl. Victoria* fig. 678 (2000).

Dioecious, woody climber, to 5 m high. Leaves mostly biternate with 9 leaflets; leaflets lanceolate-oblong to broad-ovate, 0.8–6 cm long, 0.3–1.2 cm wide, entire or appearing toothed or lobed by incomplete division, usually obtuse, glabrous. Flowers in axillary and terminal dichasial panicles. Tepals linear-lanceolate, 1.3–2.5 cm long, creamy white, pubescent below, almost glabrous above. Stamens 2–5.5 mm long; filaments glabrous, white; anthers ellipsoidal-obloid, 0.4–1 mm long, without appendage; staminodes present. Achenes compressed-ovoid to compressed broadly ellipsoid, 4–5 mm long, 2–3 mm wide, light brown, glabrous or with short sparse hairs, margin corky; awn 3–5 cm long. *Small-leaved Clematis*, *Small Leaf Clematis*, *Old Man's Beard*. Plate 53; Fig. 57E–G.

Widespread in eastern Australia including S.A., Qld, N.S.W., Vic. and Tas. Found in a wide variety of habitats including open forests, heathy woodlands and mallee scrublands. Flowers July–Oct. Map 334.

S.A.: Charlotte Waterhole, Eyre Penin., H.J.Eichler 19096 (AD, CANB). Qld: Leichhardt District. 25.6 km NNW of Taroona township, M.Lazarides 6933 (CANB, MEL, NSW). N.S.W.: Flagstaff Hill, Tamworth, P.I.Forster PIF17457 & P.J.Machin (AD, BRI, CANB, MEL, NSW). Vic.: railway crossing on Ironbark Road, 5.9 km from Dog Trap Road, near Werribee Gorge State Park, P.G.Abell 358 & C.Herscovitch (MEL, NSW). Tas.: Picnic Rocks, Picnic Corner, A.Moscal 2720 (HO, MEL).

10. *Clematis decipiens* H.Eichler ex Jeanes, *Fl. Australia* 2: 461 (2007)

T: c. 15 km W of Inverell on northern roadside of Gwydir Hwy, N.S.W., 17 Oct. 1989, H.J.Eichler 24047; holo: CANB; iso: CHR, G, LAE, MEL, NSW.

Clematis stenophylla C.Fraser ex Hook. in T.L.Mitchell, *J. Exped. Trop. Australia* 368 (1848), *nom. nud.*

Clematis occidentalis A.Cunn. ex Hook. in T.L.Mitchell, *J. Exped. Trop. Australia* 368 (1848), *nom. nud.*

Clematis sp. West MacDonnells (B.G.Thompson 3568), I.D.Cowie & D.A.Albrecht (eds), *Checklist N. Terr. Vasc. Pl. Sp.* 45 (2005)

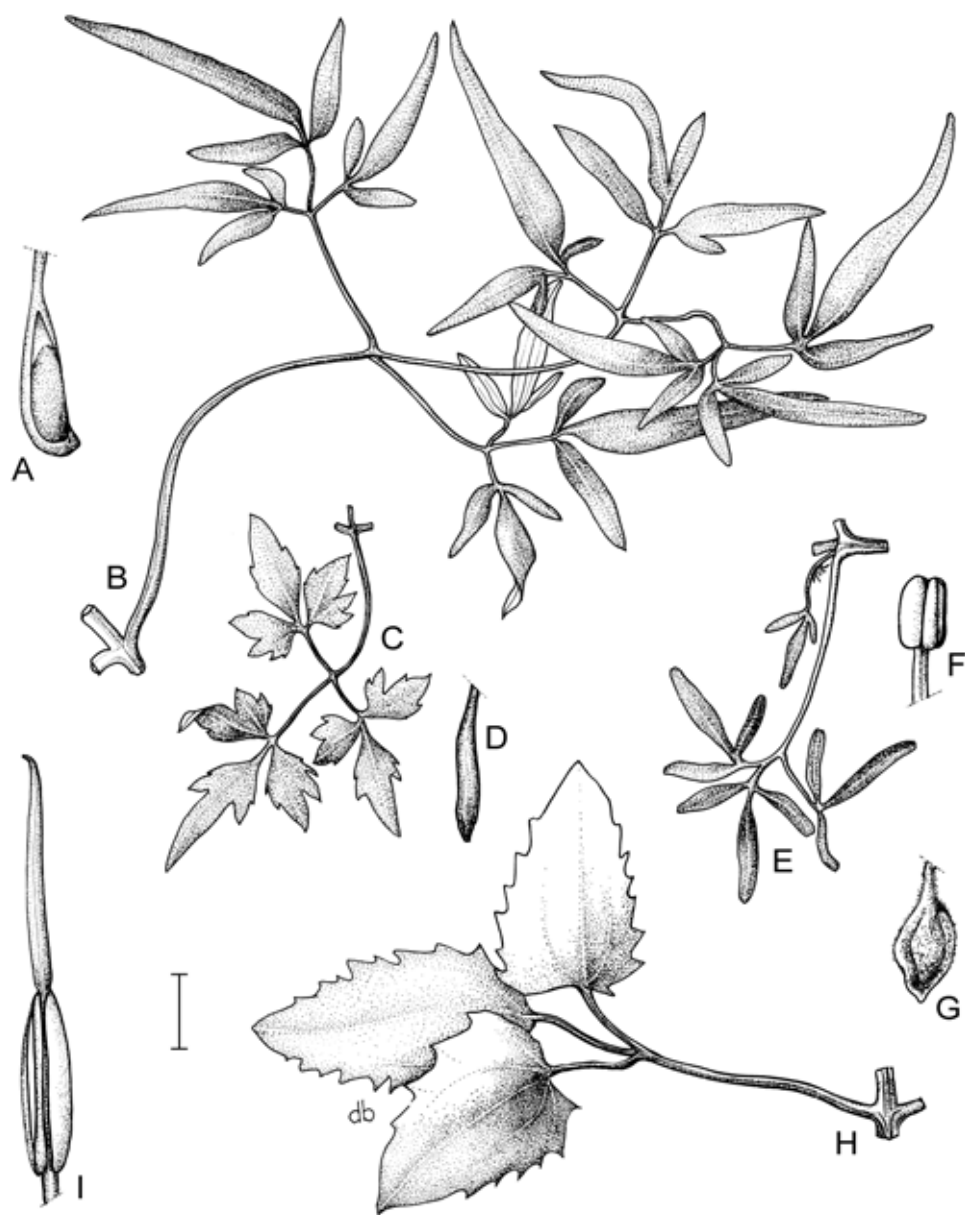


Figure 57. *Clematis*. **A**, *C. linearifolia*, nutlet (without awn) (R.Helms Oct. 1898, CANB). **B**, *C. decipiens*, leaf stem (H.Eichler 24043, CANB). **C–D**, *C. fawcettii*. **C**, leaf (G.Harden 81282, CANB); **D**, nutlet (without awn) (E.Bick, Dec. 1913, BRI). **E–G**, *C. microphylla*. **E**, leaf (P.G.Wilson 9, CANB); **F**, anther (H.Eichler 19096, CANB); **G**, nutlet (R.Coveny 12037, CANB). **H–I**, *C. aristata*. **H**, leaf; **I**, anther (**H–I**, R.Schodde 5100, CANB). Scale bar: **A**, **D**, **G** = 4 mm; **B**, **C**, **E**, **H** = 10 mm; **F**, **I** = 1.25 mm. Drawn by D.Boyer.

Dioecious, woody climber, to 5 m high. Leaves flammuliform, usually with 12–15 leaflets; leaflets narrow-ovate to lanceolate, entire or deeply 3-sect, terminal leaflet 12–45 mm long, 1.5–5 (–11) mm wide, mucronate to emarginate, glabrescent. Flowers in axillary and terminal dichasial panicles. Tepals linear-lanceolate, 2–3 cm long, pale green to creamy white, pubescent below with tomentose margins, glabrous above. Stamens 1.5–5 mm long; filaments glabrous, white; anthers elliptic to ovate, 0.5–1 mm long, without appendage; staminodes present. Achenes compressed-ovoid, 4–5 mm long, c. 2.5 mm wide, light brown, glabrous or with short, sparse hairs, margin corky; awn 1.5–3.5 cm long. Fig. 57B.

Occurs in the Macdonnell Ra., N.T., from the northern Flinders Ra. to the south-eastern corner of S.A., in south-eastern Qld, eastern N.S.W., southern and north-western Vic., and also on the Bass Strait Is., Tas. Often grows in drier inland forests and woodlands, but also in wetter near-coastal forests. Flowers July–Oct. Map 335.

N.T.: Mt Sonder, eastern face, *B.G.Thomson* 3568 (AD, BRI, CANB, DNA, NSW, NT). S.A.: Braendlers Scrub, *B.J.Conn* 753 (MEL, NSW). Qld: State Forest 176, near Texas, *P.I.Forster* PIF11588, *P.Machin* & *R.Crane* (BRI, MEL, NSW). N.S.W.: Gwydir Hwy, 17 km SE of Delungra P.O., *R.Coveny* 12353 & *J.Dalby* (NSW, MEL). Vic.: Raymond Is., 14 km SE of Bairnsdale, *I.Crawford* 1878 (CANB, MEL, NSW). Tas.: Big Green Is., north-eastern point, *J.S.Whinray* 884 (MEL).

11. *Clematis leptophylla* (F.Muell.) H.Eichler, *Fl. Australia* 2: 460 (2007)

Clematis microphylla var. *leptophylla* F.Muell., *Pl. Victoria* 1: 4 (1862); *C. hexapetala* subsp. *leptophylla* (F.Muell.) Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 108 (1885). T: Snowy River and Mitta Mitta, *F.Mueller*; lecto: K, *fide* Hj.Eichler, *Fl. Australia* 2: 460 (2007); syn: MEL.

Clematis hexapetala subsp. *muelleri* Kuntze, *loc. cit.*; *C. microphylla* var. *muelleri* (Kuntze) Domin, *Biblioth. Bot.* 89(2): 111 (1926). T: Australia 'Ferd. v. Müller cum v ! herb. kew., mus brit.'; syns: *n.v.*

Illustrations: N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 40, fig. 4o (1996); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 158 (1990); both as *C. microphylla* var. *leptophylla*.

Strong dioecious, woody climber, to 5 m high. Leaves flammuliform, triternate or incompletely quadraternate, with 18–36 or more leaflets or leaflet-segments; leaflets oblanceolate to obovate, often deeply 3-lobed, entire, often recurved at margin, acute to obtuse, mucronate to emarginate, glabrescent; terminal leaflet 5–15 (–25) mm long, 1–3 mm wide. Flowers in few-many-flowered dichasial panicles. Tepals narrow-ovate to oblong, 1.2–2 cm long, creamy white, short-pubescent below, glabrous above. Stamens 2–6 mm long; filaments glabrous, white; anthers broadly elliptic, 0.4–1 mm long, without appendage; staminodes present. Achenes compressed-ovoid, 3.5–5 mm long, 2–3 mm wide, glabrous; margin prominent, corky; awn 1.8–3 cm long. Fig. 58E–F.

Recorded for S.A., mostly in the southern Flinders Ra., near Wallangarra in SE Qld, in the Walcha area and throughout the southern tablelands of N.S.W., and eastern highlands of Vic. Often in dry open forests and woodlands of rainshadow areas. Flowers July–Oct. Map 336.

S.A.: Port Augusta, 1885, *A.Richards* (MEL). Qld: 0.5 km N of tick gate on N.S.W./Qld border near Acacia Ck, on road to Killarney, *R.G.Coveny* 12823 *et al.* (MEL, NSW). N.S.W.: Tinderry R., c. 9.7 km ESE of Michelago, *L.G.Adams* 643 (AD, BRI, CANB, G, K). A.C.T.: Tennant district, c. 3.2 km S of Tharwa, *R.D.Hoogland* 6431 (AD, BRI, CANB, K). Vic.: c. 4 km ESE of Mt Simson and 4 km E of Bindi homestead, *D.E.Albrecht* 3556 & *N.G.Walsh* (CANB).

A specimen from Gippsland (Bridle Ck, foot of Ballantyne Hills, Suggan Buggan, *A.E.Orchard* 2479 (CANB)) has exceptionally narrow and long leaflets.

12. *Clematis linearifolia* Steud. in J.G.C.Lehmann, *Pl. Preiss.* 1: 262 (1845)

Clematis microphylla var. *occidentalis* Benth., *Fl. Austral.* 1: 8 (1863); *C. hexapetala* subsp. *linearifolia* (Steud.) Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 108 (1885); *C. microphylla* var. *linearifolia* (Steud.) Ostenf., *Biol. Meddel. Kongel. Danske Vidensk. Selsk.* 3(2): 63 (1921); *C. microphylla* var. *linearifolia* Domin, *Biblioth. Bot.* 89(2): 110 (1926), *nom. superfl.* T: 'In arenosis sylvae Pointwater et insulae Rotenest, 18 July 1839. ... Herb. Preiss. No. 1343'; holo: P; iso: G, MEL, P.

Strong dioecious, woody climber, to 5 m high. Leaves usually biternate with c. 9 (rarely fewer) leaflets, sometimes incompletely triternate; leaflets narrowly oblong to narrowly

lanceolate, 15–75 mm long, 4–11 mm wide, entire, acute to obtuse, glabrescent. Flowers in few-many-flowered, short, axillary and terminal dichasial panicles. Tepals narrow-oblong, 1.5–3.5 cm long, white, pubescent below in bud, glabrescent later, glabrous above, with narrow, tomentose margin. Stamens 2–8 mm long; filaments glabrous, white; anthers broadly ellipsoidal to \pm globular, 0.5–1 mm long, without appendage; staminodes present. Achenes compressed-ovoid-falcate, 4–6 mm long, 1.5–2 mm wide, glabrous; margin not prominent; awn 6.9–12.6 cm long. Fig. 57A.

Occurs in near coastal and hinterland W.A. from Shark Bay to Israelite Bay, mostly in open forests and woodlands. Flowers Aug.–Oct. Map 337.

W.A.: Geraldton, Oct. 1898, *R.Helms* (PERTH); Darling Ra., Aug. 1899, *R.Helms* (AD, BRI); 37 km S of Dongara on coast track just S of Cliff Head, *A.E.Orchard* 4217 (AD); Swan District, *E.Pritzel* 538 (AD, G).

13. *Clematis delicata* H.Eichler ex W.T.Wang, *Acta Phytotax. Sin.* 38: 509, fig. 2: 9, 10 (2000)

T: Western Australia, Swan River, 1843, *J.Drummond* 1; holo K n.v.; iso: G n.v., *fide* W.T.Wang, *loc. cit.*

Dioecious creeper or weak climber, to 2 m high. Leaves biternate or flammuliform; second pair of pinnae often with only 2 leaflets; leaflets 9–12 (–15), linear to linear-lanceolate, 25–60 mm long, 1.5–3.5 mm wide, sometimes deeply divided, or with 1 or 2 long lobes, entire, glabrous. Flowers in few-flowered dichasial panicles. Tepals linear to linear-lanceolate, 2–5.5 cm long, white, glabrescent below, tomentose at margin. Stamens 2–9 mm long; filaments glabrous, purplish violet; anthers broadly ellipsoidal to \pm globular 0.5–1 mm long, without appendage; staminodes present, filaments purplish violet. Achenes compressed-ellipsoidal, 5.5–6.0 mm long, 1.5–1.7 mm wide, glabrous, margin slightly thickened; awn 10–12 cm long. Plate 54.

Extends through the W.A. wheatbelt from near Wongan Hills SE to near Ravensthorpe and inland as far as Coolgardie. Grows in dry open forests, woodlands and mallee scrubs. Flowers July–Sept. Map 338.

W.A.: c. 10 km E of Ravensthorpe near the Eyre Hwy, *Hj.Eichler* 21163 (AD, B, CANB, PERTH); 7 km E of Toolibin Lake, *A.S.George* 16184 (PERTH); Mortlock Ck, W edge of Mortlock Flora Res., near Wongan Hills, *K.F.Kenneally* 5361 (CANB, PERTH); Bullaring, S of Corrigin, *R.D.Royce* 7889 (PERTH); 3.2 km S of Nambling, *B.H.Smith* 6739 (CANB, MEL, PERTH).

This species is distinguished from *C. linearifolia* by its narrower leaflets, purplish violet filaments of stamens and staminodes and \pm straight achenes.

14. *Clematis fawcettii* F.Muell., *Fragm.* 10: 1 (1876)

Clematis hexapetala var. *fawcettii* (F.Muell.) Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 108 (1885); *C. microphylla* var. *fawcettii* (F.Muell.) F.M.Bailey, *Queensland Fl.* 1: 6 (1899). T: prope oppidum Lismore ad flumen Richmond-River, *Fawcett et Carron*; lecto: Richmond R., *Fawcett*; MEL 626784; *fide* Hj.Eichler, *Fl. Australia* 2: 460 (2007); isolecto: MEL, NSW; remaining syns: MEL, NSW, ?AD n.v.

Clematis microphylla var. *colorata* F.M.Bailey, *Queensland Fl.* 1: 6 (1899); *C. fawcettii* var. *colorata* (F.M.Bailey) Maiden & Betche, *Census New South Wales Pl.* 7 (1916); *C. fawcettii* f. *colorata* (F.M.Bailey) Domin, *Biblioth. Bot.* 89(2): 110 (1926). T: Killarney, Qld, *coll. unknown*; holo: K.

Illustrations: J.Leigh, R.Boden & J.Briggs, *Extinct & Endangered Pl. Australia* 307 (1984); B.G.Briggs & R.O.Makinson in G.J.Harden (ed.), *Fl. New South Wales* 1: 158 (1990).

Weak dioecious climber, with stems 1–2 m long. Leaves biternate or flammuliform; first pinnae ternate (sometimes incompletely); leaflets 9–15, ovate, 0.5–4 cm long, 0.5–3 cm wide, deeply lobed, acute, usually serrate-dentate, glabrous or sparsely pubescent. Flowers solitary in axils or in axillary and terminal dichasial panicles. Tepals narrow-oblong, 0.8–2.5 cm long, white or pink, pubescent below with narrow tomentose margins, glabrous above. Stamens 2–10 mm long; filaments glabrous, often purplish maroon; anthers ellipsoidal, 0.7–1.5 mm long, without appendage; staminodes present, filaments often purplish maroon. Achenes scarcely compressed, straight, slender fusiform, c. 4 mm long, c. 1 mm wide, light brown, longitudinally ridged; awn 2–2.5 cm long. Fig. 57C–D.



Figure 58. A–D, *Ranunculus anemoneus*. A, habit (H.Eichler 13519, CANB); B, basal leaf; C, young fruit; D, nutlet (B–D, H.Eichler 13511, CANB). E–F, *Clematis leptophylla*. E, leaf & fruit; F, nutlet (E–F, B.Lepschi 240, CANB). Scale bar: A, B = 20 mm; C, E = 10 mm; D = 2.5 mm; F = 4 mm. Drawn by D.Boyer.

Restricted to extreme south-eastern Qld, and southwards to Lismore, N.S.W., often growing on the edges of rainforest. Flowers Sept.–Nov. Map 339.

Qld: Warwick, Dec. 1913, *E.W.Bick* (BRI); Melrose Rd, 4 km SW of Killarney, 29 Dec. 1986, *L.H.Bird* (BRI); Gladfield, 2.5 km SSW of Warwick, *P.I.Forster* 2472 (BRI). N.S.W.: Wilson Park, Lismore, *G.J.Harden* 81282 & *J.B.Williams* (BRI, CANB, MEL); Tooloom, *L.J.Webb* 2183 (BRI).

It is uncertain whether the filaments of the stamens and staminodes of *C. fawcettii* are ever light cream or white as, e.g. in *C. microphylla*, or always purplish maroon. Field observations and notes of the colour of tepals, stamens and staminodes while fresh are needed to accompany herbarium specimens of this apparently rare species.

Doubtful Name

Clematis microphylla f. *stenosepela* Domin, *Biblioth. Bot.* 89(2): 111 (1926)

T: none cited.

The description of this form is insufficient, in the absence of any type material, to allow its identification.

6. BATRACHIUM

Hj.Eichler & J.A.Jeanes

Batrachium (DC.) Gray, *Nat. Arr. Brit. Pl.* 2: 270 (1821); from Greek *batrachos* (a frog) in allusion to the aquatic habitat; *batrachium* was used as a plant name by Hippocrates and Pliny.

Ranunculus sect. *Batrachium* DC., *Syst. Nat.* 1: 232, 233 (1817); *Ranunculus* subgen. *Batrachium* (DC.) A.Gray, *Proc. Amer. Acad. Arts & Sci.* 21: 363 (1886). T: *B. hederaceum* (L.) Gray

Aquatic annuals or perennials, ±glabrous. Stems branching, herbaceous. Leaves mostly cauline, alternate, submerged and finely dissected into capillary segments and/or floating and with a lobed or partite lamina; leaf bases membranous, laterally partly adnate to petiole. Peduncle without bracts. Flowers bisexual, actinomorphic, solitary, terminal, seemingly leaf-opposed along stems. Perianth segments not spurred. Sepals 5, caducous, shorter than petals, light green. Petals usually 5, usually white, matt above, usually with a yellow claw; nectary-pit near petal-base, small, bordered by a lunate, circular or pyriform scale. Receptacle globular to pyriform, in some species enlarged in fruit. Achenes 4–90, ±globose to broadly obovoid; pericarp on lateral walls with regular transverse ridges 0.05–0.1 mm apart, glabrous or hairy; beak usually caducous.

About 20 species, almost cosmopolitan but predominantly in Eurasia, northern and southern Africa, northern New Zealand and 1 species in south-eastern Australia (possibly introduced).

H.Glück, *Biologische und morphologische Untersuchungen über Wasser- und Sumpfgewächse. IV. Teil: Untergetauchte und Schwimmblattflora* [*Ranunculus* (incl. *Batrachium*) 136–258, 650–669, 696–702, t. 1–6, fig. 1 (1924)]; P.Graebner (fil.), *Ranunculus* subgen. *Batrachium*, in P.Ascherson & P.Graebner, *Syn. Mitteleurop. Fl.* 5/3: 74–98 (1935); C.D.K.Cook, A monographic study of *Ranunculus* subgenus *Batrachium* (DC.) A.Gray, *Mitt. Bot. Staatssamml. München* 6: 47–237 (1966); G.Wiegleb & W.Herr, Taxonomie und Verbreitung von *Ranunculus* subgenus *Batrachium* in niedersächsischen Fließgewässern unter besonderer Berücksichtigung des *Ranunculus penicillatus* Komplexes, *Göttinger Florist. Rundbr.* 17(3/4): 101–150 (1983); B.Zander & G.Wiegleb, Biosystematische Untersuchungen an Populationen von *Ranunculus* subgen. *Batrachium* in Nordwest-Deutschland, *Bot. Jahrb. Syst.* 109: 81–130 (1987); G.Wiegleb, Notes on Japanese *Ranunculus* subgenus *Batrachium*, *Acta Phytotax. Geobot.* 39(4–6): 117–132 (1988).

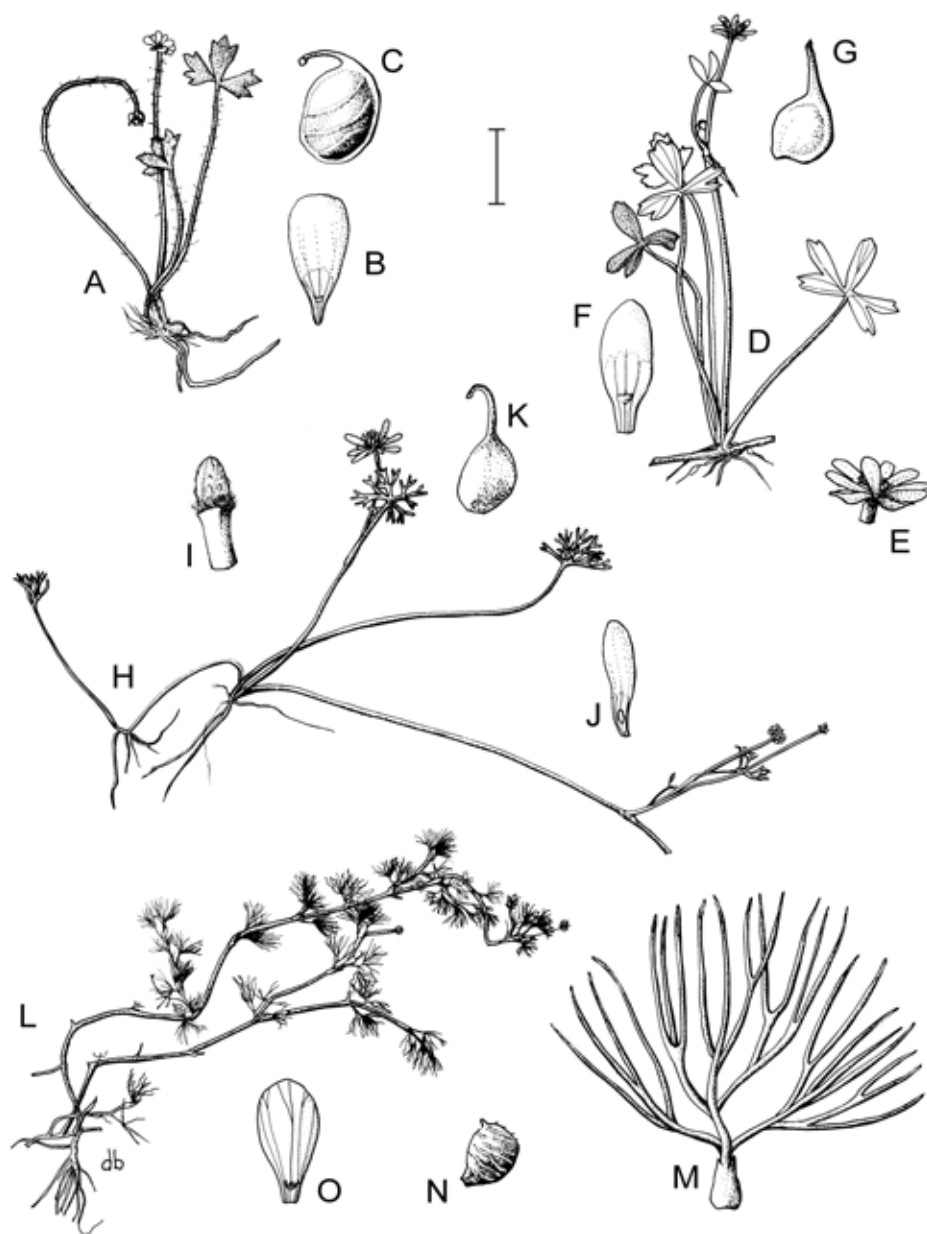


Figure 59. A–C, *Ranunculus collinus*. A, habit; B, petal; C, nutlet (A–C, H.Eichler 18936, CANB). D–G, *Ranunculus amphitrichus*. D, habit; E, flower; F, petal; G, nutlet (D–G, H.Eichler 18086, CANB). H–K, *Ranunculus inundatus*. H, habit; I, receptacle; J, petal; K, nutlet (H–K, I.Wilson 687, CANB). L–O, *Batrachium trichophyllum*. L, habit; M, leaf; N, nutlet (L–N, H.Eichler 16411, CANB); O, petal (D.Hunt 1728, CANB). Scale bar: A, D, H, L = 20 mm; B, F, J, O = 4 mm; C, G, I, K, N, M = 2.5 mm; E = 2 mm. Drawn by D.Boyer.

***Batrachium trichophyllum* (Chaix) Bosch, *Prodr. Fl. Bat.* 1: 5 (1850)**

Ranunculus trichophyllus Chaix in D.Villars, *Hist. Pl. Dauphiné* 1: 335 (1786). T: herb. Haller f. 1162; neo: G (photo A.Lourteig, *Darwiniana* 9: t. 1 (1951)), fide C.D.K.Cook, *Mitt. Bot. Staatssamml. München* 6: 131–133 (1966).

[*Ranunculus aquatilis* auct. non L.: J.D.Hooker, *Fl. Tasman.* 1: 5 (1855); F.Mueller, *Pl. Victoria* 1: 5 (1862); G.Bentham, *Fl. Austral.* 1: 10 (1863); J.M.Black, *Fl. S. Australia* 2nd edn, 363 (1948)]

Illustrations: H.I.Aston, *Aquat. Pl. Australia* fig. 62 (1973), as *Ranunculus trichophyllus*; B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 159 (1990); N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 60, fig. 12 (1996).

Stems hollow, rooting at lower nodes. Leaves: petiole 0.25–4 cm long; lamina globose to obconical, 1.5–4.5 cm long, repeatedly tri- or di-chotomously divided into rigid or flaccid capillary segments, which spread in 3 dimensions; basal sheath oblong to ovate, adnate for about $\frac{2}{3}$ length. Peduncles 1–5 cm long, placing the flowers above the water surface, usually recurved in fruit. Sepals narrow-ovate, 2.5–3.5 mm long, spreading, caducous, greenish, blue-tipped. Petals ovate to obovate, 3.5–5.5 mm long, white with a yellow claw; nectary-scale lunate. Receptacle globular, hairy. Stamens 9–15. Carpels 16–33, hairy when immature, sometimes glabrous when mature. Achenes ovoid to obovoid, 1.5–2 mm long, usually sparsely hairy; beak subterminal, very short. $2n = 32$, B.G.Briggs, *Telopea* 9(4): 834 (2002). *Water Buttercup*. Fig. 59L–O.

Native in Europe, Asia and central North America. In Australia it is possibly naturalised and occurs in south-eastern S.A., eastern N.S.W., throughout much of Vic., and in Tas.; in fresh-water ponds and slow streams. Flowers Oct.–Feb. Map 340.

S.A.: c. 8 km SSW of Mt Barker, *Hj.Eichler 16411* (AD, CANB, MEL). N.S.W.: Central Tablelands: Oberon, 11 Nov. 1952, *J. Garden* (MEL, NSW). A.C.T.: Naas Ck, c. 3.2 km N of the A.C.T. border on Boboyan Rd, *P.Darbyshire 136* (CANB). Vic.: Cockpit Swamp, in vicinity of L. Learmonth, 30 Sept. 1959, *H.I.Aston* (MEL). Tas.: Bicton, Campbell Town, *D.I.Morris 80113* (AD, BRI, HO).

The Australian specimens seem to match European material more closely than specimens from New Zealand which have glabrous achenes. There is, however, considerable variation within Australia which appears to be both genotypical and caused by different habitat conditions. The presence of many 19th century Australian collections, as well as collections from remote, relatively pristine habitats, suggests that the species is probably native.

7. FICARIA

Hj.Eichler & J.A.Jeanes

Ficaria Guett., *Hist. Acad. Roy. Sci. Mém. Math. Phys. (Paris)* 1750: 355 (1754); from the Latin *ficus* (a fig), in reference to the shape of the root-tubers.

Ranunculus sect. *Ficaria* (Guett.) Boiss., *Fl. Orient.* 1: 20 (1867); *Ranunculus* subg. *Ficaria* (Guett.) L.D.Benson, *Amer. J. Bot.* 27: 807 (1940). T: *F. verna* Huds.

Glabrous perennial herbs, regenerating from tuberous roots. Stems branching and leafy in the lower parts. Leaves basal and cauline, alternate; lamina broad-ovate, cordate, entire, slightly undulate or very shallowly dentate; leaf bases membranous, adnate to petiole. Peduncle without bracts. Flowers bisexual, actinomorphic, solitary, terminal. Perianth segments not spurred. Sepals 3, somewhat petaloid, shorter than petals, caducous, greenish yellow. Petals 7–12 or more, yellow, glossy; nectary-pit shallow, with an obtuse or truncate scale. Achenes 10–15 in a cluster, \pm ovoid, turgid, scarcely compressed, beakless; pericarp hard, thick, strong, close-fitting, smooth. Fruiting receptacle pyriform or globose, not noticeably enlarged.

A genus with c. 10 species in Europe and western to central Asia; one species naturalised in Australia.

J.Damboldt, in G.Hegi, *Ill. Fl. Mitt.-Eur.* 2nd edn, 3/3(4/5): 243–244 (1974).

****Ficaria verna* Huds., *Fl. Angl.* 214 (1762)**

Ranunculus ficaria L., *Sp. Pl.* 1: 550 (1753). T: Herb. Linn. No. 715.12; lecto: LINN, *fide* L.D.Benson, *Amer. Midl. Naturalist* 52: 539 (1954).

Illustrations: G.Hegi, *Ill. Fl. Mitt.-Eur.* 3: t. 118 (1912); S.Ross-Craig, *Drawings Brit. Pl.* 1: t. 35 (1948), as *Ranunculus ficaria*; N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 63, fig. 13a–d (1996).

Perennial, 5–30 cm high. Most roots tuberous, obtuse, some fibrous. Stems often rooting at lower nodes. Basal leaves: petiole 3–15 cm long; lamina broadly ovate, 1–5 cm long, 1–4.5 cm wide, cordate at base, entire or shallowly crenate, rarely dentate, obtuse at apex; basal sheath 8–20 mm long. Peduncles 1–8 cm long, glabrous. Flowers 1.5–5 cm diam. Sepals elliptic, 5–10 mm long, 3–4 mm wide, spreading. Petals (5–) 7–12, narrowly obovate, 8–15 mm long, 4–8 mm wide; nectary-scale truncate, glabrous. Receptacle subglobose, hairy. Stamens 20–40. Carpels 10–15. Achenes clustered, narrowly obovoid, 2.5 mm long, 1.8–2 mm diam., glabrous or pubescent, scarcely keeled. Fruiting receptacle 1–2 mm long, glabrous.

Native of Europe; weakly naturalised in Ballarat and the Dandenong Ranges, Vic. Flowers Aug.–Nov. Map 341.

Vic.: opposite the Botanical Garden, L. Wendouree, Ballarat, *C. Le Breton* 126 (MEL); Dandenong Ra., Sherbrooke, opposite eastern end of Jacka St, *J.C.Reid* 2221 (MEL); *loc. id.*, *J.C.Reid* 2238 (MEL).

Ficaria verna (s. lat.) shows a considerable amount of morphological, ecological and cytological variation, and its infraspecific taxa are not always clear-cut. Judging by its rather narrow petals and the bulbils developed in the leaf axils after flowering, the plants naturalised in Victoria appear to belong to *Ficaria verna* subsp.['agsp.'] *bulbifera* (Marsden-Jones) Á.Löve & D.Löve. This subspecies is characterised by the development of bulbils as vegetative reproductive organs.

8. RANUNCULUS

Hj.Eichler & N.G.Walsh

Ranunculus L., *Sp. Pl.* 1: 548 (1753); *Gen. Pl.* 5th edn, 243 (1754); from the diminutive of the Latin *rana* (a frog), name of a plant in the writings of Pliny.

Type: *R. auricomus* L.

Annual or perennial herbs, some aquatics. Roots fibrous to fleshy-tuberiform. Stems erect, creeping or stoloniferous. Leaves spiral, cauline and/or in a basal rosette, without stipules; petioles with gradually tapering leaf sheath; blades simple, entire, or more often palmately lobed or pinnately dissected, or compound, trifoliolate or imparipinnate. Flowers solitary and terminal, or sometimes in cymes, bisexual, actinomorphic, all parts spiral. Sepals usually 5, rarely fewer, sometimes reflexed. Petals 5–15, rarely fewer, yellow or white, often glossy, lacking spurs, but each with a nectar-secreting pit on the adaxial surface mostly in the lower half and often covered by a sometimes laterally adnate lobe which then forms a nectary-pocket. Stamens numerous, rarely only 5 or fewer. Carpels free, usually numerous, with 1 basal ovule. Fruit a head of achenes each with a usually persistent, glabrous style-beak.

More than 500 species, cosmopolitan but chiefly in the extratropical Northern Hemisphere. 51 species known in Australia: 38 endemic, 10 introduced. *R. crassipes* Hook.f. (included by many in *R. bitermatus* Sm.), an endemic of the subantarctic islands, has been dealt with in *Fl. Australia* 50: 79 (1993). Many species are poisonous to cattle when fresh.

The occurrence of hybrids between related species of *Ranunculus* is not uncommon, indicated by the existence of morphological intermediates. Putative hybrid swarms occur naturally where the parental species meet, especially when the ground has been disturbed or local ecological processes disrupted. The following hybrids have been recorded in Australia (cf. B.G.Briggs, *loc. cit.* 1962 and 1986): *R. anemoneus* × *R. gunnianus*, *R. clivicola* × *R. muelleri*, *R. clivicola* × *R. niphophilus*, *R. clivicola* × *R. pimpinellifolius*, *R. dissectifolius* × *R. graniticola*, *R. dissectifolius* × *R. millanii*, *R. dissectifolius* × *R. muelleri*, *R. dissectifolius*

× *R. pimpinellifolius*, *R. eichlerianus* × *R. muelleri* (?= *R. victoriensis*), *R. eichlerianus* × *R. victoriensis*, *R. graniticola* × *R. lappaceus*, *R. graniticola* × *R. millanii* (= *R. ligulatus*), *R. graniticola* × *R. muelleri*, *R. graniticola* × *R. pimpinellifolius*, *R. lappaceus* × *R. victoriensis*, *R. millanii* × *R. muelleri*, *R. millanii* × *R. pimpinellifolius*, *R. millanii* × *R. victoriensis*, *R. muelleri* × *R. acrophilus*, *R. muelleri* × *R. niphophilus*, *R. muelleri* × *R. victoriensis*, *R. pimpinellifolius* × *R. productus*, *R. pimpinellifolius* × *R. victoriensis*. *R. sessiliflorus* var. *pilulifer* may be a ±stabilised hybrid of *R. pumilio* var. *pumilio* × *R. sessiliflorus* var. *sessiliflorus*.

L.Benson, The North American subdivisions of *Ranunculus*, *Amer. J. Bot.* 27(9): 799–807 (1940); L.Benson, A treatise on the North American Ranunculi, *Amer. Midl. Naturalist* 40(1): 1–264 (1948); L.Benson, Supplement to a treatise on the North American Ranunculi, *Amer. Midl. Naturalist* 52: 328–369 (1954); R.Melville, Contributions to the Flora of Australia: II. Some Ranunculi of Tasmania and south eastern Australia, *Kew Bull.* 10: 193–220 (1955); R.Melville, Contributions to the Flora of Australia: III. The *Ranunculus sessiliflorus* complex in Australia, *Kew Bull.* 11: 277–286 (1957); Hj.Eichler, The *Ranunculus sessiliflorus* group in South Australia, *Trans. Roy. Soc. S. Australia* 81: 175–183, fig. 1, t. 1, 2 (1958); B.G.Briggs, *Ranunculus lappaceus* and allied species of the Australian mainland, *Proc. Linn. Soc. New South Wales* 84: 295–324, t. 15 (1960); B.G.Briggs, Interspecific hybridization in the *Ranunculus lappaceus* group, *Evolution* 16(3): 372–390 (1962); M.Tamura, Morphology, ecology and phylogeny of the Ranunculaceae, VII, *Sci. Rep. S. Coll. Osaka Univ.* 16(2): 39–41 (1967); D.Goepfert, Karyotypes and DNA content in species of *Ranunculus* L. and related genera, *Bot. Not.* 127: 464–489 (1974); Y.Menadue & R.K.Crowden [Chromosome numbers of several Australian *Ranunculus* species], in Á.Löve (ed.), Chromosome number report LXXXVIII, *Taxon* 34: 550–551 (1985); B.G.Briggs, Alpine Ranunculi of the Kosciusko Plateau: Habitat change and hybridization, in B.A.Barlow (ed.), *Fl. & Fauna Alpine Australia* 401–412 (1986); Y.Menadue & R.K.Crowden, Three new species of *Ranunculus* (Ranunculaceae) from Tasmania, *Brunonia* 8: 373–380 (1986); Y.Menadue, Taxonomy of *Ranunculus* in Tasmania, unpubl. PhD thesis, Univ. Tasmania (1986); Y.Menadue & R.K.Crowden, Tasmanian species of *Ranunculus* – a new key, *Pap. & Proc. Roy. Soc. Tasmania* 123: 87–96 (1989); B.G.Briggs, Chromosome numbers of some native and naturalised species in Australia, *Telopea* 9(4): 833–835 (2002).

- 1 Petals white or cream, conspicuous
- 2 Robust erect perennial; flowering stems 15–35 cm or more high; leaves simple, palmately broadly lobed; flowers 30–60 mm diam. **36. *R. anemoneus***
- 2: Dwarf, ±procumbent perennial; flowering stems 1–8 cm high, rooting at lower nodes; leaves pinnately divided into narrowly linear segments; flowers 6–12 mm diam. **34. *R. millanii***
- 1: Petals golden or pale yellow, or greenish, rarely lacking or diminutive (then sometimes whitish)
- 3 Leaves simple and entire or toothed
- 4 Leaves narrowly linear, ±terete **35. *R. setaceus***
- 4: Leaves wider and distinctly flat, broadly oblong, lanceolate, ovate to ±obovate
- 5 Plants with leafy stems, 10–50 (–80) cm high; flowers few (leaf-opposed) to many, in cymes
- 6 Achenes granular to tuberculate; flowers 6–9 mm diam.; annual **50. *R. ophioglossifolius***
- 6: Achenes smooth (minutely reticulate under magnification); flowers 7–20 mm diam.; perennial **49. *R. flammula***
- 5: Plants with basal leaf rosette, to 16 cm high; flowers solitary on scapes with 0 or 1 reduced leaf
- 7 Flowers 4–11 mm diam.; pistils 6–16; leaves glabrous or ±hirsute below [Tas. only] **13. *R. triplodontus***
- 7: Flowers 15–35 mm diam.; pistils 30–120; leaves with dense, short, appressed hairs below [mainland only]

- 8 Petioles generally longer than 10 cm; nectary-lobe distinct, 0.7–1.5 mm long; hairs on upper leaf surface to c. 1 mm long [Vic. alps and subalps only] **31. *R. victoriensis***
- 8: Petioles generally less than 10 cm long; nectary-lobe absent or indistinct (to 0.5 mm long); hairs on upper leaf surface longer than 1.5 mm
- 9 Flowering stems 2–16 cm long; leaf margins with appressed hairs, upper surface with rigid, appressed or sub-erect hairs 2–3 mm long; petiole 1–9 cm long [NSW and Vic. alps] **32. *R. muelleri***
- 9: Flowering stems 2–4 cm long; leaf margins and upper surface covered with rigid, spreading hairs 3–4 mm long; petiole 0.5–2.5 cm long [NSW alps only] **33. *R. acrophilus***
- 3: Leaves simple or compound, if simple then most leaves palmately or ternately lobed or dissected
- 10 Leaves pinnately dissected into narrowly linear (rarely narrowly lanceolate), almost terete segments; nectaries 3 or more per petal **37. *R. gunnianus***
- 10: Leaves simple, or palmately or ternately lobed or dissected, if pinnate then leaflets flat and relatively broad; nectary 1 per petal
- 11 Sepals, at least finally, reflexed
- 12 Achenes smooth
- 13 Achenes less than 1 mm long, very numerous, in elongated heads; beak minute; plants annual or overwintering biennial **51. *R. sceleratus***
- 13: Achenes longer than 1 mm, few to many in globose heads; beak distinct; plants perennial (if annual, see *R. sardous*)
- 14 Petals broadly obovate, (6–) 10–20 mm long; achenes 3–5 mm long; stamens 40–60 [W.A.] **23. *R. colonorum***
- 14: Petals elliptic to obovate, 5–10 mm long; achenes 1.3–3 mm long; stamens usually fewer than 30 [E Australia]
- 15 Style-beak 0.7–1 mm long, strongly recurved; leaves mostly trifoliate with ternately lobed segments; flowering stems branched with 2–16 flowers **22. *R. plebeius***
- 15: Style-beak 1.2–2 mm long, straight with recoiled tip; leaves often simple and ternately lobed, rarely trifoliate; flowering stems often single-flowered, if branched with 2–4 flowers **21. *R. scapiger***
- 12: Achenes with few to many tubercles or spines on the lateral faces; plants annual
- 16 Flowers 3–6 mm diam.; receptacle glabrous; plants decumbent or ascending **44. *R. parviflorus***
- 16: Flowers 8–25 mm diam.; receptacle pubescent; plants \pm erect or spreading
- 17 Leaves (except sometimes, those immediately subtending flowers) simple, 3-lobed to 3-fid; fruiting heads not elongated; achenes 5–8 mm long with stout acute tubercles on lateral faces; style-beak 2–3 mm long **43. *R. muricatus***
- 17: Leaves (except sometimes the lowest) trifoliate; fruiting heads usually slightly elongated; achenes 2–4 mm long, tubercles not spiny; style beak \pm 0.5 mm long
- 18 Petals oblong, up to 1.5 times as long as sepals; achenes with numerous small tubercles, flat-ovate-orbicular; beak recurved; plants usually subglabrous **41. *R. trilobus***
- 18: Petals obovate, 2–3 times as long as sepals; achenes usually with few small tubercles mainly towards the margin (rarely faces evenly tuberculate), flat-orbicular; beak upcurved or straight; plants usually distinctly pilose **40. *R. sardous***

- 11: Sepals spreading or appressed to petals, finally not distinctly reflexed (except sometimes reflexed in *R. inundatus* and *R. amphitrichus*)
- 19 Plants perennial; achenes smooth or obscurely and irregularly rugose or ridged on lateral faces, somewhat to strongly biconvex
- 20 Plants stoloniferous, sometimes aquatic or semi-aquatic
- 21 Stolons robust, mostly above ground; flowers 20–30 mm diam., petals 5–10 mm wide; leaves usually trifoliate with petiolulate terminal leaflet **38. *R. repens***
- 21: Stolons slender, below ground (except sometimes if plants aquatic); flowers mostly < 20 mm diam., petals mostly < 5 mm wide; terminal leaflet (if apparent) not or rarely petiolulate
- 22 Leaves palmatisect, *i.e.* the incision of the lateral segments almost to the base and almost as deep as that between the lateral and terminal segments
- 23 Nectary a tumid semilunar bracket without a petaloid lobe; leaf segments \pm linear in submerged leaves, often cuneate or obovate-cuneate in aerial leaves **10. *R. amphitrichus***
- 23: Nectary with a distinct petaloid lobe, often \pm attached at the lateral margins and forming a pocket
- 24 Ultimate segments of leaves wider than 2 mm; dorsal margin of achenes conspicuously thickened **4. *R. undosus***
- 24: Ultimate segments of leaves narrowly linear, c. 1 (–2) mm wide; dorsal margin of achenes not conspicuously thickened
- 25 Sepals hairy beneath; achenes strongly rippled on lateral faces **3. *R. meristus***
- 25: Sepals glabrous (or rarely, shortly ciliate on proximal margin); achenes smooth to indistinctly rippled
- 26 Leaves 1–5 cm diam.; petioles to 15 cm long; achenes 1.5–1.8 mm long **1. *R. inundatus***
- 26: Leaves 5.5–13 cm diam.; petioles to 45 cm long; achenes 2–4 mm long **2. *R. amplus***
- 22: Leaves trifoliate or 3-sect, the incision of the lateral segments less deep than that between the terminal and lateral segments
- 27 Sepals with dense, appressed hairs or, if glabrescent or glabrous then petals with a distinct nectary-pocket surmounted by short but distinct free lobe
- 28 Achenes with 2–5 prominent, broad, oblique or nearly longitudinal ridges, or sometimes boldly reticulate on lateral faces
- 29 Leaves matt, leathery, segments with acute teeth, usually dissected to midway or below; fruiting pedicels not recurved [mostly lowland to montane sites] **11. *R. glabrifolius***
- 29: Leaves glossy, \pm fleshy, segments with blunt teeth, usually shallowly 3-toothed; narrow-fruited pedicels often recurved [mostly alps and subalps] **12. *R. collinus***
- 28: Achenes irregularly wrinkled, or obscurely ridged, or pitted, or smooth
- 30 Petals 7–12 mm long, 2–4 mm wide; achenes 1.7–3.6 mm long **9. *R. papulentus***
- 30: Petals 3.5–6.5 mm long, 0.6–1.5 mm wide; achenes 1–1.8 mm long **8. *R. diminutus***
- 27: Sepals glabrous or with a few soft spreading hairs; nectary without a free lobe; achenes 1.7–3.6 mm long
- 31 Leaves pilose to sparsely villous, mainly around margin **7. *R. prasinus***
- 31: Leaves glabrous, or sometimes sparsely pilose, especially when young

- 32 Lateral leaflets usually entire; petals golden yellow **6. *R. collicola***
- 32: Lateral leaflets usually dentate or lobed; petals pale greenish yellow
- 33 Receptacle glabrous in stamen zone; leaflets fleshy; terrestrial, of seepage areas near sandy coasts [Tas. only] **5. *R. acaulis***
- 33: Receptacle with a ring of stiff short hairs in the stamen zone; leaflets thin to rarely sub-fleshy; plants usually aquatic or semi-aquatic [all States except N.T., Qld] **10. *R. amphitrichus***
- 20: Plants non-stoloniferous, tufted or with short \pm creeping, sometimes branching, rhizomes; plants mostly terrestrial
- 34 Flowers usually 2–several on branching stems longer than leaves (rarely stems single-flowered in subalpine forms of *R. lappaceus*)
- 35 Basal leaves palmatipartite, with (3–) 5–7 ovate-cuneate, serrate to laciniate segments; receptacle glabrous **39. *R. acris***
- 35: Basal leaves 3-lobed, 3-partite to biternately dissected; receptacle hairy between achenes
- 36 Stem and petioles with short appressed hairs; roots \pm tuberous, abruptly narrowed; basal leaves usually dissected into narrow, almost linear segments **26. *R. robertsonii***
- 36: Stem and petioles in lower part with spreading hairs (sometimes appressed in *R. lappaceus*) or glabrescent; roots fibrous, sometimes fleshy, \pm tuberous but usually more gradually narrowed (in *R. pachycarpus* and less commonly *R. lappaceus*); basal leaves lobed or divided with broadly lanceolate to obovate segments
- 37 Basal leaves pinnate with 3–5 segments; achenes strongly flattened, 3–4.5 mm long [Kosciuszko area only] **20. *R. clivicola***
- 37: Basal leaves ternately lobed, trifoliolate or biternate; achenes globular or compressed laterally and lenticular [E Australia]
- 38 Achenes inflated, \pm globular with thick pericarp; basal leaves often simple, 3-lobed to 3-partite, broadly ovate or as wide as long; roots fleshy, \pm tuberous **25. *R. pachycarpus***
- 38: Achenes lenticular with thin pericarp; basal leaves (at least some of the later ones) usually trifoliolate and often biternately lobed, if simple, ovate in outline, longer than wide; roots fibrous, sometimes thick and fleshy and gradually narrowed **24. *R. lappaceus***
- 34: Flowers solitary on usually leafless scapes and/or flowering stems shorter than leaves
- 39 Leaves pinnate or bipinnate
- 40 Nectary a tumid semilunar pocket, lacking a distinct lobe
- 41 Flowering stem as long or longer than leaves at anthesis **15. *R. nanus***
- 41: Flowering stem shorter than leaves at anthesis **16. *R. decurvus***
- 40: Nectary with a distinct lobe
- 42 Petals golden yellow, 4–9 mm long; fruiting pedicels usually not markedly elongating, or elongating to c. 1.5 (–2) times leaf + petiole length **17. *R. pimpinellifolius***
- 42: Petals pale yellow, 1.5–2.5 mm long; fruiting pedicels markedly elongating, at least 2 times leaf + petiole length. **18. *R. productus***
- 39: Leaves simple or once or several times ternately divided
- 43: Flowering stems shorter than leaves at anthesis (in *R. decurvus* elongating when fruiting); petals pale yellow

- 44 Leaves hirsute; nectary a crescentic bracket lacking a lobe
- 44: Leaves glabrous or hairy; nectary covered by a small fleshy lobe
- 45 Leaves trifoliolate; terminal leaflet with long petiolule, usually trifid; lateral leaflets almost sessile; petals 5 or 6
- 45: Leaves entire, 3-dentate or ternately lobed; petals 0–6
- 43: Flowering stems longer than leaves at anthesis; petals golden yellow
- 46 Leaves ternately divided into narrowly lanceolate to linear segments mostly under 3 mm wide
- 47 Petioles with appressed hairs; petals 5
- 47: Petioles with long, spreading hairs; petals 6–14
- 46: Leaves simple or divided into wider elliptic or lanceolate lobes or segments
- 48 Petioles with closely appressed hairs
- 49 Leaves entire or with incisions near the apex or symmetrically ternately or biternately dissected or lobed; lobes lanceolate to broadly lanceolate [Vic. alps only]
- 49: Leaves entire to deeply incised or asymmetrically ±pinnately dissected, with the lateral lobes or leaflets elliptic and entire or toothed [Tas. only]
- 48: Petioles glabrous or with spreading hairs
- 50 Nectary with an oblong-triangular lobe; petioles covered with spreading hairs; leaves trifoliolate to biternate with ternately lobed leaflets or sometimes simple and boldly dentate
- 50: Nectary without a distinct lobe; petioles glabrescent
- 51 Flowers 15–25 mm diam.; terminal leaflet about as wide as long; leaflets deeply divided into lanceolate lobes; pistils 30–80 [Kosciuszko area only]
- 51: Flowers c. 8–12 mm diam.; terminal leaflet distinctly longer than wide; leaflets entire to trilobed; pistils 10–20 [Tas. only]
- 19: Plants annual; achenes mostly tuberculate *or* strongly flattened (smooth and biconvex in *R. pumilio* var. *politus*)
- 52 Flowers 4–12 mm diam., all distinctly pedicellate; petals 5, with many veins, longer than sepals; achenes 6–8 mm long, conspicuously bordered, with slender spine-like tubercles, the longest on the border; receptacle hairy
- 52: Flowers 2–4 mm diam., inconspicuous and often sessile; petals 0–4, with 1–3 veins, scarcely longer than sepals; achenes 1.5–4 mm long, if tuberculate, longest tubercles not on the border; receptacle glabrous
- 53 Plants almost glabrous; achenes strongly flattened, thin, papery with a thickened margin, often somewhat twisted when ripe, 2–4 mm long
- 53: Plants hairy; achenes flattened but neither papery-thin nor twisted, their margins not distinctly thickened
- 54 Achenes 3–5 mm long, with long subulate tubercles (bristles) on the lateral faces, ±stipitate at base
- 54: Achenes 1.5–2 mm long, without long bristles on the lateral faces, usually rounded at base
16. *R. decurvus*
14. *R. jugosus*
13. *R. triplodontus*
30. *R. eichlerianus*
29. *R. dissectifolius*
31. *R. victoriensis*
28. *R. pascuinus*
27. *R. graniticola*
19. *R. niphophilus*
15. *R. nanus*
42. *R. arvensis*
48. *R. pentandrus*
45. *R. hamatosetosus*

- 55 Achenes with prominent bristle-tipped conical tubercles scattered over lateral faces, the bristles hooked and not or barely longer than the subtending tubercle; body of achene often nearly flat; leaf segments of mature leaves \pm cuneate, flabelliform or linear

46. *R. sessiliflorus*

- 55: Achenes with hairs on very short tubercles, or smooth and glabrous, the hairs \pm straight or gently curved, distinctly longer than subtending tubercle; body of achene distinctly biconvex; leaf segments of mature leaves \pm oblong to linear

47. *R. pumilio*

1. *Ranunculus inundatus* R.Br. ex DC., *Syst. Nat.* 1: 269 (1817)

Ranunculus rivularis var. *inundatus* (R.Br. ex DC.) Rodway, *Fl. Tas.* 2 (1903). T: ad Guillielmi rivum [Williams-River, N.S.W.], *R. Brown*; holo: G-DC (photo CANB); iso: BM (photo CANB), K (photo CANB), MEL (photo CANB).

Ranunculus rivularis var. *major* Benth., *Fl. Austral.* 1: 14 (1863), *p.p.* (*R. inundatus*, *R. glabrifolius* Hook. and the N.Z. species *R. incisus* Hook.f. are quoted in synonymy); type excluded (see under *R. glabrifolius*).

Ranunculus rivularis var. *subfluitans* Benth., *Fl. Austral.* 1: 14 (1863), *nom. inval.*, *p.p.* (*R. inundatus* is quoted in synonymy); type excluded (see under *R. amphitrichus*).

Illustrations: R. Melville, *Kew Bull.* 10: 209, fig. 13, 213, fig. 16.3 (1955); H.I. Aston, *Aquat. Pl. Australia* 159, fig. 60 (d), 161, fig. 61a–d (1973); N.G. Walsh, in N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 3: 59, fig. 11b, plate 3a–c (1996).

Stoloniferous perennial. Basal leaves with petioles 1–15 cm long, \pm glabrous; lamina palmatisect, 1–5 cm diam., glabrous or with few hairs beneath; ultimate segments 0.5–2 mm wide. Flowering stems 5–30 cm high, 1–3-flowered, glabrous, \pm pubescent at base. Sepals 5, spreading to reflexed, 2–3.5 mm long, glabrous. Petals 5–12, narrowly obovate to oblanceolate, 4–10 mm long, yellow, obtuse; nectary near petal-base, c. 1 mm long, with lobe obtuse, often oblique, free for $1/2$ – $2/3$ its length. Stamens 20–30. Pistils 20–45. Receptacle shortly hirsute in stamen zone, subglabrous between achenes. Achenes \pm lenticular, 1.5–1.8 mm long; lateral faces almost smooth or irregularly warty; beak reflexed, about $1/2$ – $2/3$ as long as achene-body. $2n = 48$, Y. Menadue & R.K. Crowden, in A. Löve (ed.), *Taxon* 34: 551 (1985); B.G. Briggs, *Telopea* 9(4): 835 (2002). *River Buttercup*. Fig. 59H–K.

Occurs on Kangaroo Is. and in south-eastern S.A., south-eastern Qld (N to Calliope area), widespread in eastern N.S.W., A.C.T. and most parts of Vic. except the drier north-west; grows in shallow water, in mud, along creeks or in ponds, sometimes with the leaves floating or temporarily submerged. Records from Tas. are based on misapplication of the name for *R. amphitrichus*. Flowers Sept.–Feb. Map 342.

S.A.: Wandilo, c. 10 km NNW of Mt Gambier, *I.B. Wilson* 687 (AD, CANB). Qld: Mt Eerwah, about 4 km SW of Eumundi, on Kenilworth Rd, *P.R. Sharpe* 4767 (BRI, MEL). N.S.W.: Wingecarribee Swamp, c. 8 km W of Robertson, *L.G. Adams* 3247 (CANB, NSW). A.C.T.: Naas Ck Valley, *E. Mullins* 479 (CANB). Vic.: 22 miles [35 km] WSW of Ballarat, *H.I. Aston* 1392 (MEL, NSW).

2. *Ranunculus amplus* N.G. Walsh & B.G. Briggs, *Muelleria* 17: 15 (2003)

T: Victoria: Surry River at Gorae, *A.C. Beaglehole* 6610; holo: MEL; iso: AD, NSW.

Ranunculus sp. aff. *inundatus* (Western Victoria), J.H. Ross & N.G. Walsh, *Census Pl. Victoria* 109 (2003), *pro syn.*

Illustration: N.G. Walsh & B.G. Briggs, *loc. cit.*

Stoloniferous perennial. Basal leaves with petioles 5–45 cm long, glabrous; lamina palmatisect, 5–13 cm diam., glabrous; ultimate segments 0.5–2 mm wide. Flowering stems 10–30 cm high, 1–3-flowered, glabrous or pilose just below flowers. Sepals 5, spreading, 3–6.5 mm long, glabrous or shortly ciliate near basal margin. Petals 8–16, narrowly obovate to obovate, 5–13 mm long, yellow, obtuse or emarginate; nectary near petal-base, c. 1 mm long, with lobe rounded to truncate, free for up to $1/4$ its length. Stamens 20–45. Pistils 25–45. Receptacle shortly hirsute in stamen zone, hairs scattered between achenes. Achenes \pm lenticular, 2–4 mm long; lateral faces smooth or somewhat warty, sometimes indistinctly rippled; beak reflexed, c. $1/4$ – $1/3$ as long as achene-body.

Largely confined to south-western Victoria, from the southern Grampians to near Portland, with an outlying occurrence c. 40 km NE of Melbourne; usually partially submerged, but leaves and flowering stems usually emergent. Flowers Oct.–Nov. Map 343.

Vic.: Grampians, Wannon R., *A.C.Beaglehole 30601* (MEL, NSW); c. 23 km SW of Casterton, *A.H.Corrick 612* (MEL); Yarra Glen, 2 miles [3.2 km] south of the town, 2 Dec. 1959, *H.I.Aston* (MEL).

3. *Ranunculus meristus* B.G.Briggs & Makinson, *Telopea* 9(4): 809, fig. 1 (2002)

T: N.S.W., 12 km WSW of Merriwa on road to Mudgee, 17 Mar. 1984, *B.G.Briggs 7430*; holo: NSW; iso: AD, BRI, CANB, CHR, HO, K, MEL, MO.

Ranunculus sp. A, B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 164 (1990)

Illustrations: T.D.Stanley & E.M.Ross, *Fl. SE Queensland* 1: 173, fig. 23 (D) (1984), as *R. undosus*; B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 164 (1990), as *Ranunculus* sp. A; B.G.Briggs & R.O.Makinson, *Telopea* 9(4): 809, fig. 1 (2002).

Stoloniferous perennial, glabrous or sparsely pilose. Leaves with petioles 5–20 cm long; lamina palmatisect, 2.5–9 cm diam. (but juveniles trifoliolate with cuneate, crenate to somewhat dissected leaflets); ultimate segments mostly numerous, \pm linear, 0.5–1.5 (–3) mm wide. Flowering stems erect, 1–4-flowered, mostly 15–50 cm high. Sepals 5, spreading, broadly ovate or obovate, 3.5–5.5 mm long, sparsely or densely pilose abaxially. Petals 7–11, obovate or narrow obovate, 7.5–12.5 mm long, yellow; nectary near petal-base, with lobe 0.7–1 mm long, free for up to c. $\frac{1}{4}$ its length, rounded to truncate at apex. Stamens 30–50. Pistils 30–95. Receptacle moderately hispid throughout. Achenes lenticular, mostly 1.0–1.6 mm long; lateral faces with narrow transverse or diagonal ridges; margins not or slightly thickened; beak slender, recurved, 0.7–1 mm long. $2n = 48$, B.G.Briggs, *op. cit.* 835. Fig. 67G–L.

Occurs on the Great Dividing Ra., from near Dalby, Qld, to near Cootamundra, N.S.W.; in swamps or seasonally inundated areas, mostly in clayey or silty soils. A specimen at NSW ('Batemans Bay, June 1906, *J.L.Boorman*') is well beyond the known distribution and is likely mislabelled. Flowers Aug.–Jan. Map 344.

Qld: Merrits Creek road, W of Hampton, *A.R.Bean 8197* (BRI, NSW); 7 miles [11 km] W of Dalby, *N.T.Burbidge 5458* (CANB, NSW). N.S.W.: about 20 km by road from Yetman to Goondiwindi, *CSIRO Armidale SWQS 1319* (CANB); 4.6 miles (c. 7.3 km) SW from the Merriwa-Cassilis road, *R.Coveny 2426* (NSW); 14 km N of Rylstone, *W.Semple OR 169* (NSW).

Broader leaf segments (bracketed measurements above) are mostly in non-flowering plants and appear to represent juvenile or intermediate leaf forms.

4. *Ranunculus undosus* Melville, *Kew Bull.* 10: 211, fig. 15, fig. 16 (1) (1955)

T: Balranald, N.S.W., Jan. 1939, per Glenfield Veterinary Research Station; holo: K (photo CANB); iso: NSW.

Illustrations: R.Melville, *loc. cit.*; H.I.Aston, *Aquat. Pl. Australia* fig. 63 (1973); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 165 (1990).

Rhizomatous or stoloniferous perennial, glabrous or sparsely pilose. Leaves with petioles 8–42 cm long; lamina deeply palmatisect, 3–7 cm wide; ultimate segments 2–9 mm wide, with broad \pm tridentate blunt apex. Flowering stems 12–45 cm high, 2–5-flowered. Sepals 5, spreading, obovate, 5–8 mm long, \pm pilose below. Petals 5–14, oblong to obovate-cuneate, 8–18 mm long, golden-yellow; nectary near petal-base, pocket-like, with lobe 0.5–1 mm long, slightly rounded to shallowly emarginate. Stamens c. 30–40. Pistils c. 40–100. Receptacle moderately hispid throughout. Achenes \pm semiorbicular, 1.8–3.0 mm long; faces transversely rippled with c. 6 ridges; dorsal margin distinctly keeled; beak slender, erect or recurved, c. 1–2 mm long. Fig. 61D–E.

Occurs in far eastern S.A. near the Murray R., mid-western N.S.W. from Quambone district S to the border and in north-central to mid-western Vic. (records for Qld are doubtful; most specimens so named from Qld are referable to *R. meristus*); in riverine areas subject to regular shallow flooding, in black soil or mud. Flowers Aug.–Apr. Map 345.

S.A.: Paringa, *R.J.Bates 26948* (AD, MEL). N.S.W.: Macdonald Ck, 10 miles [16 km] W of Willow Tree, *B.G.Briggs 2227* & *A.N.Rodd* (G, NSW); Macquarie Marshes area, SW of Old Buckingham homestead,

K.Paijmans 3170 (CANB). Vic.: Reedy Lake Wildlife Reserve, ± 7.5 km NNW of Kerang P.O., *A.C.Beaglehole 55704* (CANB, MEL, NSW).

The characteristically lobed leaves, large flowers and rippled achenes make this one of the more distinctive species of *Ranunculus* in Australia.

5. *Ranunculus acaulis* Banks & Sol. ex DC., *Syst. Nat.* 1: 270 (1817)

T: New Zealand: Hab. in fossis limosis et locis udis Novae-Zelandiae prope Oporagi, *J.Banks*; holo: G-DC (photo CANB); iso: AK *n.v.*, BM *n.v.*, WELT *n.v.*

Illustrations: J.D.Hooker, *Fl. Antarctica* 1: t. 2 (1844); Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 88, fig. 1 O, 92, fig. 3 O, 94, fig. 5B (1989).

Stoloniferous perennial, often mat-forming, glabrous or sparsely pilose. Leaves with petioles 12–45 mm long; lamina trifoliate or deeply 3-lobed, 5–15 mm wide, somewhat fleshy; lobes blunt, median lobe entire or 3-toothed, lateral lobes entire or unequally divided. Flowering stems subequal to leaves, 1- or 2-flowered. Sepals 3–5, spreading, broad-obovate, 1.5–2.5 mm long, glabrous. Petals 5–8, narrowly oblong or spatulate, 2.5–5 mm long, pale greenish yellow; nectary almost in middle of petal, c. 0.5 mm long, with lobe shallowly emarginate to rounded, free for $\frac{1}{4}$ – $\frac{1}{2}$ its length. Stamens c. 10–15. Pistils c. 6–12. Receptacle glabrous. Achenes \pm semiorbicular to somewhat reniform, 1.5–2 mm long, virtually smooth; beak to 1 mm long, straight or \pm recurved. $2n = 48$, Y.Menadue & R.K.Crowden, in Á.Löve (ed.), *Taxon* 34: 550 (1985).

Occurs along coasts from the north-western to the southern extremities of Tas.; also in New Zealand, Auckland and Chatham Is., in southern Chile and the Falkland Is. In Tas. usually in coastal areas of seepage on the seaward side of dunes. Flowers Aug.–Feb. Map 346.

Tas.: Ocean Beach, Strahan, *A.M.Buchanan 2430* (AD, HO, MEL); western end of Spero Bay, *A.Moscal 5521* (AD, HO); Sundown Point, 10 km S of Arthur R., W coast, *G.S.Hope ANU21557* & *ANU21564* (CANB); Wilson Bight, *A.Moscal 13976* (HO).

The record from L. Pedder before its flooding in 1973 (W.M.Curtis & D.I.Morris, *Stud. Fl. Tasmania*, 2nd edn, 1: 18, 1975), of which no voucher specimen seems to exist, refers probably to *R. collicola*.

6. *Ranunculus collicola* Menadue in Y.Menadue & R.K.Crowden, *Brunonia* 8: 373, figs 1, 5 (1986), as *collicolus*

T: Second Lagoon, Central Plateau, Tas., 11 Feb. 1982, Y.Menadue & R.K.Crowden *s.n.*; holo: HO 77950 (photo CANB).

Illustrations: Y.Menadue & R.K.Crowden, *loc. cit.*; Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 88, fig. 1D, 92, fig. 3Q, 94, fig. 5 O (1989).

Stoloniferous perennial, glabrous, or young leaves sparsely pilose. Leaves with petioles 10–35 mm long; lamina 3-foliate, glabrous, somewhat fleshy; leaflets \pm elliptic, usually entire, the terminal one 5–6 mm long, 1–1.5 mm wide and laterals 2.5–3 mm long, 0.4–1 mm wide. Flowering stems 18–24 mm long, 1–3-flowered. Sepals 5, spreading, broad-elliptic or -ovate, 1.2–2.7 mm long, glabrous or rarely sparsely hispid. Petals 6–9, \pm narrow-elliptic, 3–4 mm long, golden-yellow; nectary at or just below middle of petal, a shallow pocket c. 0.5 mm long; apex \pm truncate or broadly emarginate. Stamens c. 10–14. Pistils 5–10. Receptacle glabrous. Achenes flattened ellipsoid, c. 2 mm long, smooth; beak to c. 0.3 mm long, erect, with recurved tip. $2n = 48$, Y.Menadue & R.K.Crowden, in Á.Löve (ed.), *Taxon* 34: 551 (1985).

Restricted to central Tas.; growing in fine silt at the shores of First and Second Lagoon and L. Sorell at c. 1130 m altitude. It probably occurred also at L. Pedder from where it was recorded (without voucher) as *R. acaulis* before the lake's flooding in 1973. Flowers Jan.–Apr. Map 347.

Tas.: Interlaken, L. Sorell, *Hj.Eichler 16919* (CANB); Second Lagoon, L. Augusta, 22 Jan. 1981, Y.Menadue (HO); First Lagoon, 2 Mar. 1982, Y.Menadue & R.K.Crowden (HO).

7. *Ranunculus prasinus* Menadue in Y.Menadue & R.K.Crowden, *Brunonia* 8: 375, fig. 2, fig. 6 (1986)

T: Whites Lagoon, 4 km N of Tunbridge, Midlands, Tas., 4 Nov. 1983, Y.Menadue & R.K.Crowden s.n.; holo: HO 77948 (photo CANB); iso: CANB.

Illustrations: Y.Menadue & R.K.Crowden, *loc. cit.*; Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 88, fig. 1N; 92, fig. 3; 94, fig. 5N (1989).

Stoloniferous perennial. Leaves with petioles 15–35 (–160) mm long; lamina deeply trifoliolate, 6–10 (–20) mm long, 7–12 (–20) mm wide; leaflets simple and entire to tridentate or 3-lobed, \pm elliptic to oblanceolate in outline, pilose to sparsely villous mainly about margin. Flowering stems 2.5–5 (–9) cm long. Sepals 5, erect, elliptic to ovate, 3.5–4 mm long, glabrous. Petals 5–8, elliptic to obovate, 7–8 mm long, golden-yellow; nectary $\pm 1/4$ petal-length above base, pocket-like, 0.1–0.3 mm long, with lobe fleshy, rounded, free for up to $1/2$ its length. Stamens 20–32. Pistils 10–14. Receptacle glabrous in stamen zone, a few hairs in achene zone. Achenes semiorbicular, 1.8–2 mm long, smooth with 2 or 3 lateral ridges; beak 0.6–0.8 mm long, recurved. $2n = 48$, Y.Menadue & R.K.Crowden, in Á.Löve (ed.), *Taxon* 34: 551 (1985). Fig. 60C.

Apparently confined to grassy edges of small lagoons near Tunbridge, Tas., at c. 200 m altitude. Flowers Oct.–Feb. Map 348.

Tas.: White Lagoon, A.Moscal 8691 (HO, MEL); Whites Lagoon near Tunbridge, 11 Dec. 1984, Y.Menadue & R.K.Crowden (HO).

Bracketed measurements in the above description refer to etiolated, partially submerged plants.

8. *Ranunculus diminutus* B.G.Briggs, *Telopea* 5(4): 583, fig. 1 (1994)

T: 4 km E of Tarago, 15 Feb. 1985, B.G.Briggs 7951; holo: NSW; iso: B, CANB, CHR, K, MEL, MO, NSW.

Ranunculus sp. B, B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 165 (1990)

Illustrations: B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *loc. cit.*, as *Ranunculus* sp. B; B.G.Briggs, *loc. cit.*; N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 59, fig. 11c (1996).

Stoloniferous perennial. Leaves with petioles 2–10 (–12) cm long; lamina trifoliolate, 0.5–2 cm long and wide; segments oblong to narrowly elliptic, entire or with 2 or 3 lobes or teeth. Flowering stems 1–10 cm long, 1 (–3)-flowered. Sepals 5–8, spreading, ovate to broadly elliptic, 3–5 mm long, glabrous or sparsely pilose. Petals oblong to obovate, 3–6.5 mm long, 0.6–1.5 mm long, bright yellow; nectary near petal-base, pocket-like, with lobe c. 0.5 mm long, with apex shallowly emarginate, truncate, or shortly rounded. Stamens 15–30. Pistils 6–30. Receptacle sparsely hispid. Achenes flattened-obovoid, 1–1.8 mm long; lateral faces smooth or finely wrinkled or obscurely ridged; beak slender, erect, c. 1 mm long. $2n = 48$, B.G.Briggs, *op. cit.* 585.

Occurs in far south-eastern S.A., the Southern Tablelands, N.S.W. (apparently absent from A.C.T.), north-eastern and south-western Vic. and Badger Is., Bass Strait, Tas.; on seasonally inundated clay soils or muds, often subsaline, often derived from basalt. Flowers Sept.–Feb. Map 349.

S.A.: Penola, c. 50 km N of Mt Gambier, R.Bates 4003 (AD). N.S.W.: L. Bathurst, N.T.Burbidge 5637 (CANB, NSW); L. George, M.Gray 3512 & 5643 (CANB, NSW). Vic.: L. Goldsmith, N.G.Walsh 5245 (MEL); L. Omeo, Benambra, R.J.Adair 1635 (MEL). Tas.: North Lagoon, Badger Is., Furneaux Group, J.S.Whinray 1187 (AD, MEL).

Very close to *R. papulentus*, from which it is most readily distinguishable by the smaller petals and achenes. The two species are occasionally sympatric without apparent introgression (the different chromosome numbers suggest hybridism is unlikely) with *R. papulentus* occupying wetter microhabitats. Nonetheless some herbarium specimens are difficult to place in the absence of complete flowering or fruiting material.



Figure 60. *Ranunculus*. **A**, *R. muelleri*, habit (H.Eichler 13512, CANB). **B**, *R. acrophilus*, habit (H.Eichler 13516, CANB). **C**, *R. prasinus*, habit (Y.Menadue & R.Crowden, Nov. 1983, CANB). **D–E**, *R. setaceus*. **D**, habit (H.Eichler 16980, CANB); **E**, leaf (J.Somerville s.n., 7 Jan. 1960, CANB). **F–G**, *R. millanii*. **F**, habit; **G**, leaf (**F–G**, H.Eichler 13446, CANB). **H–J**, *R. papulentus*. **H**, habit; **I**, petal; **J**, nutlet (**H–J**, H.Eichler 18988, CANB). Scale bar: **A–D**, **F**, **H** = 20 mm; **E**, **G** = 10 mm; **I** = 2.5 mm; **J** = 4 mm. Drawn by D.Boyer.

9. *Ranunculus papulentus* Melville, *Kew Bull.* 10: 210, fig. 14, fig. 16 (2) (1955)

T: Canberra–Yass road, 1 mile [1.6 km] from Federal Hwy, A.C.T., 17 Jan. 1955, *C.W.E. Moore 3054*; holotype: K (photo CANB); isotype: AD (photo CANB), BRI (photo CANB), CANB, HO, MEL (photo CANB), NSW.

Illustrations: R. Melville, *loc. cit.*; H.I. Aston, *Aquat. Pl. Australia* 159, fig. 60c, h, 161, fig. 61h, i (1973); B.G. Briggs & R.O. Makinson, in G.J. Harden (ed.), *Fl. New South Wales* 1: 165 (1990); N.G. Walsh, in N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 3: 59, fig. 11e (1996).

Stoloniferous perennial. Leaves with petioles 4–25 cm long; lamina trifoliate, sometimes appearing digitate due to deep division of lateral segments, 1.5–5 cm long and wide; segments cuneate to narrow elliptic, 2–6 (–12) mm wide, each with 3–5 lobes or teeth, rarely entire, glabrous or with a few scattered hairs above, sparingly pilose below. Flowering stems 10–30 cm long, erect, 2–4-flowered, \pm pilose under flowers and glabrescent below. Sepals 5 (6), spreading, ovate to oblong, \pm 5 mm long, \pm shortly hispid below, rarely glabrous. Petals 5–15, elliptic to oblanceolate, 7–12 mm long, 2–4 mm wide, yellow; nectary near petal-base, \pm 0.5 mm long, pocket-like, with apex emarginate or truncate, or a short rounded lobe developed. Stamens 15–40. Pistils 20–50. Receptacle sparsely hispid in achene zone. Achenes obliquely obovoid to broadly cuneoid, 1.7–3.6 mm long; lateral faces smooth, irregularly warty or undulate; beak slender, erect to reflexed, 0.8–2.4 mm long. $2n = 96$, B.G. Briggs, *Telopea* 5(4): 585 (1994). *Large River Buttercup*. Fig. 60H–J.

Occurs in south-eastern S.A., south-eastern N.S.W. (S from the Blue Mtns and inland to near Griffith) and southern Vic.; in pools, along rivers and lakes, and in other low-lying areas prone to inundation, on a range of soils from silts to clays. Flowers Nov.–Mar. Map 350.

S.A.: Penola Forest, *R. Bates 21382* (AD, MEL). N.S.W.: 14.5 km W of Gundaroo, *B.J. Lepschi 690* (CANB, NSW). A.C.T.: near R.A.A.F. Wireless Stn on Barton Hwy, Canberra, *P.J. Darbyshire 1246* (CANB, NSW). Vic.: Braeside, south-eastern suburb of Melbourne, *H.I. Aston 2531* (CANB, MEL).

Close to *R. diminutus*. See notes under that species.

10. *Ranunculus amphitrichus* Colenso, *Trans. & Proc. New Zealand Inst.* 17: 237 (1885), as *amphitricha*

T: near Norsewood, County of Waipa, New Zealand, 1880–1884: *W.C[olenso]*; lectotype: WELT (24383) *n.v.*; isotype: K (photo CANB), WELT *n.v.*, *fide* P.J. Garnock-Jones, *New Zealand J. Bot.* 28: 116 (1990).

Ranunculus rivularis Banks & Sol. ex DC., *Syst. Nat.* 1: 270 (1817), *nom. illeg.*, non Spreng. (1807). T: in rivulis Novae-Zelandiae prope Totaranui, *J. Banks & D. Solander*; holotype: G-DC (photo CANB); isotype: AK, BM, WELT, all *n.v.*

Ranunculus rivularis var. *subfluitans* Benth., *Fl. Austral.* 1: 14 (1863), *nom. inval.* (*R. rivularis* DC. in synonymy)

[*Ranunculus inundatus* auct. non R.Br. ex DC.: J.H. Willis, *Handb. Pl. Victoria*, 2: 152 (1973); W.M. Curtis & D.I. Morris, *Stud. Fl. Tasmania* 2nd edn, 1: 17 (1975)]

Illustrations: R. Melville, *Kew Bull.* 10: 214, fig. 17 (1955); H.I. Aston, *Aquat. Pl. Australia* 159, fig. 60a, g, 161, fig. 61d, f (1973); both as *R. rivularis*; N.G. Walsh, in N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 3: 59, fig. 11d (1996).

Variable, usually partially or entirely submerged stoloniferous perennial. Leaves with petioles 1–15 cm long; lamina trifoliate to palmatisect, 1–5 (–7) cm diam., \pm circular in outline, glabrous; segments linear-oblong when deeply submerged, cuneate to obovate when aerial, 3-toothed or 3–many-lobed. Flowering stems 1–10 cm long, erect to spreading, 1–4-flowered. Sepals 4 or 5, spreading (sometimes later \pm reflexed), broadly ovate, 2–3 mm long, glabrous. Petals 4–9, oblong to narrowly obovate, 2–4 mm long, yellow to pale yellow-green; nectary a tumid semilunar pocket or bracket, c. $\frac{1}{3}$ petal-length from base. Stamens c. 10–18. Pistils c. 6–15. Receptacle hispid in stamen zone, glabrous or with few hairs in achene zone. Achenes sublenticular, 1.5–2 mm long, somewhat swollen, smooth or slightly wrinkled or warted; beak slender, straight or slightly curved, almost as long as achene-body. $2n = 64$, Y. Menadue & R.K. Crowden, in Á. Löve (ed.), *Taxon* 34: 551 (1985); $2n = 48$, 64, and 96, Y. Menadue & R.K. Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 91 (1989); $2n = 72$, B.G. Briggs, *Telopea* 9(4): 835 (2002). *Small River Buttercup*. Fig. 59D–G.

Extends from south-western W.A., Kangaroo Is. and the Flinders Ra., S.A., Barrington Tops, N.S.W. south through cooler parts of Vic. and widespread in Tas.; also in New Zealand. In swamps, ponds, dams, along rivulets etc., sometimes permanently submerged, mostly in

shallow water, but recorded from clear water up to 8 m deep (*R. Filson 15821c*, MEL). Flowers all months, mainly Oct.–Mar. Map 351.

W.A.: 8 km S of Muir Hwy on Thomson Rd, just W of L. Muir, *A.E. Orchard 4377* (AD). S.A.: Wilpena Pound, Flinders Ra., *Hj. Eichler 18086* (BRI, CANB, NSW). N.S.W.: Barrington Tops, *C. Bell 574* (BRI). A.C.T.: Fitzs Hill, *M. Gray 6262* (BRI, CANB, NSW). Vic.: Mt Richmond, *A.C. Beaglehole 6193* (AD, CANB, MEL, NSW). Tas.: Florentine Valley, c. 10 km from Maydena, *R. Melville 2348* (BRI).

In addition to the various ploidy levels there is an extraordinary degree of morphological variation in *R. amphitrichus* which calls for experimental study under controlled conditions.

11. *Ranunculus glabrifolius* Hook., *J. Bot. (Hooker)* 1: 243 (1834)

T: Tasmania, *Mr Gunn 157*; holo: K (photo CANB, NSW).

Ranunculus glabrifolius var. *gracilior* Hook., *Companion Bot. Mag.* 1: 273 (1836). T: Tasmania: locality not indicated, *Gunn s.n.*, (mounted with *Gunn 157*, cf. *R. Melville*, *Kew Bull.* 10: 215, 1955); holo: K (photo CANB, NSW).

Ranunculus incisus Hook.f., *Fl. Nov.-Zel.* 1: 10, t. 4 (1852). T: New Zealand: 'Hab. Northern and Middle Islands. East coast, *Colenso*; Banks Peninsula, *Raoul*; Canterbury and Otago, *Lyall*'; syns: K *n.v.*, fide *R. Melville*, *Kew Bull.* 10: 216 (1955).

Ranunculus rivularis var. *major* Benth., *Fl. Austral.* 1: 14 (1863). T: not cited (*R. inundatus* R.Br. ex DC., *R. glabrifolius* Hook. and *R. incisus* Hook.f. quoted by Benthham as synonyms); lecto: *R. glabrifolius* Hook., fide *Hj. Eichler*, *Fl. Australia* 2: 460 (2007).

Illustrations: *R. Melville*, *Kew Bull.* 10: 213, fig. 16 (4–5), 217, fig. 18 (1955); H.I. Aston, *Aquat. Pl. Australia* 159, fig. 60b, f (1973); N.G. Walsh, in N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 3: 59, fig. 11f (1996).

Stoloniferous perennial. Leaves with petioles 1.5–16 cm long; lamina trifoliate or deeply palmatisect, ±orbicular in outline, 1–7 cm diam., matt, leathery; leaflets narrowly elliptic (rarely linear) to obovate-cuneate, usually deeply lobed, ultimate segments mostly 1–3 mm wide, acutely toothed, glabrous or with few scattered hairs. Flowering stems erect, to c. 30 cm long, 1–3-flowered, usually appressed-hirsute. Sepals 5, spreading, ovate, 4–8 mm long, appressed-hairy below. Petals 5–15, oblanceolate to obovate, 5–11 mm long, golden-yellow; nectary near petal-base, pocket-like, ±0.5–1 mm long, with apex of lobe shallowly emarginate or sinuate, often asymmetric, and margins excurrent. Stamens 12–50. Pistils 9–15. Receptacle glabrous. Achenes inflated, subglobular or broadly obovate, 2.7–4 mm long; lateral faces with 3–4 broad, oblique ridges; beak erect or reflexed, c. 1.5 mm long. $2n = 48$, Y. Menadue & R.K. Crowden, in Á. Löve (ed.), *Taxon* 34: 551 (1985); $2n = 64$, Y. Menadue & R.K. Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 91 (1989).

South-eastern S.A., southern Vic., Tas.; also in New Zealand. Usually in shallow water, wet grassland, or moist clearings in forest and woodland from near sea level to montane areas. Flowers Sept.–Jan. Map 352.

S.A.: Mt Burr, *R. Bates 2365 & 4028* (AD); Glenelg River Reserve, Hundred of Caroline, 30 Sept. 1976, *A.C. Beaglehole* (AD). Vic.: Churchill Natl Park, *D.E. Albrecht 3284* (MEL); ±18 km SW of Colac P.O., *A.C. Beaglehole 49450* (MEL, NSW). Tas.: Ouse R. behind Liawane, 28 Nov. 1982, *Y. Menadue & R.K. Crowden* (HO).

12. *Ranunculus collinus* R.Br. ex DC., *Syst. Nat.* 1: 271 (1817)

T: Tasmania: 'Hab. in collibus terrae Van-Diemen' [Tas.], *R. Brown*; holo: G-DC (photo CANB); iso: BM (photo CANB), K (photo CANB).

Ranunculus inconspicuus Hook.f., *Fl. Tasman.* 1: 9, t. 2B (1855); *R. rivularis* var. *inconspicuus* (Hook.f.) Benth., *Fl. Austral.* 1: 14 (1863). T: Hampshire Hills, Western Mountains, and Mount Wellington, *Gunn 1018, 1019*; syn: K (photo CANB).

[*Ranunculus parviflorus* var. *australis* auct. non Benth.: G. Benth., *Fl. Austral.* 1: 14 (1863), *p.p.* (*R. collinus* quoted as a synonym; lectotype excluded, see under *R. sessiliflorus*)]

Illustrations: H.I. Aston, *Aquat. Pl. Australia* 159, fig. 60e (1973); B.G. Briggs & R.O. Makinson, in G.J. Harden (ed.), *Fl. New South Wales* 1: 165 (1990); N.G. Walsh, in N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 3: 59, fig. 11g (1996).

Stoloniferous perennial. Leaves with petioles 1.5–15 cm long, with appressed or spreading hairs; lamina trifoliate, 5–40 (–65) mm long and wide; segments cuneate to broadly

oblanceolate, usually 3-toothed with slightly thickened apices, sometimes more deeply cleft and more abundantly toothed, dark-green, \pm shining above, paler beneath, both surfaces glabrous to moderately appressed-hairy. Flowering stems usually shortly exceeding leaves, 1 (or 2)-flowered, erect (recurving in fruit), spreading- to appressed-hirsute. Sepals broadly elliptic to obovate, \pm 3 mm long, spreading, (sometimes very sparsely) pilose below. Petals 5–11, oblong to obovate, 5–10 mm long, golden-yellow; nectary near petal-base, shallowly pocket-like, 0.2–0.5 mm long, with lobe-apex shallowly emarginate or slightly rounded. Stamens 25–40. Pistils 8–20. Receptacle (sub)glabrous in stamen zone, hispid above, or glabrous throughout. Achenes broadly ellipsoid, 2–2.5 mm long; lateral faces with 2–4 coarse oblique ridges or boldly reticulate; beak recurved, 0.5–1 mm long. $2n = 48$, Y.Menadue & R.K.Crowden, in *Ä.Löve* (ed.), *Taxon* 34: 551 (1985); $2n = c. 48$, B.G.Briggs, *Telopea* 9(4): 835 (2002). Fig. 59A–C.

From isolated occurrences on the Barrington Tops, scattered through the N.S.W. tablelands to the Kosciuszko area where locally common, also in alps and subalps of Vic., widespread in Tas. uplands; in bogs, wet grasslands, soaks and seepage areas above c. 500 m, sometimes mat-forming. Flowers Oct.–Jan. Map 353.

N.S.W.: Polblue Swamp, Barrington Tops, *T.A.James* 1413 & *S.McCune* (NSW); S end of Bago Ra., 24 km E of Tumberumba on Tumberumba–Cabramurra road, *B.G.Briggs* 4384 & *L.A.S.Johnson* (MEL, NSW). Vic.: Mt Baw Baw, *Hj.Eichler* 18936 (CANB); Masons Ck near head of Timbarra R., Gippsland, *R.Melville* 3096 (AD, BRI, CANB, MEL, NSW). Tas.: near summit of Mt Wellington, *R.Melville* 2271 (AD, BRI, MEL, NSW).

As noted by B.G.Briggs & R.O.Makinson (*loc. cit.*), specimens from the northern part of the range of the species (e.g. Mt Coricudgy, Jenolan Caves, N.S.W.) are mostly more robust and pilose than those from more southerly localities. However these forms are linked by an apparent complete range of intermediates, and even within the northerly areas, smaller, glabrescent plants occur.

13. *Ranunculus triplodontus* Melville, *Kew Bull.* 10: 204, fig. 5 (8–10), fig. 10 (1955)

Based on *R. cuneatus* Hook., *J. Bot. (Hooker)* 1: 242 (1834), *nom. illeg., non* Sommerf. (1833). T: swamps, Tas., *Mr Gunn* 228; holo: K (photo CANB).

[*Ranunculus lappaceus* var. *nanus* auct. non (Hook.) Benth.: G.Bentham, *Fl. Austral.* 1: 13 (1863), *p.p.* as to syn.]

[*Ranunculus lappaceus* var. *subsericeus* auct. non Benth.: L.Rodway, *Tasman. Fl.* 3 (1903), *p.p.* as to syn.]

Illustrations: R.Melville, *loc. cit.*; M.Stones & W.M.Curtis, *Endemic Fl. Tasmania* 6: t. 135A (1978); Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 88, fig. 1M; 92, fig. 3H; 94, fig. 5Q (1989).

Tufted perennial (rarely developing \pm erect stolons); roots fibrous. Leaves with petioles 1–10 cm long, hirsute near base; lamina 8–25 mm wide and long overall, the lower usually simple and oblong-cuneate or broadly elliptic with 3–7 teeth, the upper broadly ovate and entire, 3-dentate or ternately lobed, or occasionally pinnate with 3 (–5) \pm elliptic, coarsely toothed leaflets, glabrous or nearly so above, glabrous to hirsute below. Flowering stems stout, 1–9 cm long, \pm hirsute, 1–3-flowered; pedicels elongating and recurving in fruit. Sepals 5, spreading, broadly elliptic, c. 1 mm long, \pm glabrous. Petals 0–6, oblanceolate to obovate, 2.5–5.5 mm long, pale-yellow, often golden at apex; nectary c. $\frac{1}{3}$ petal-length above base, crescentic or a short (c. 0.3 mm), fleshy, obtuse lobe developed. Stamens 8–20. Pistils 6–16. Receptacle \pm hirsute. Achenes sublenticular, shortly stipitate, \pm compressed, 1.5–2 mm long, minutely dimpled, margins not prominent; beak recurved or recoiled at apex, 0.4–0.8 mm long. $2n = 48$, Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 93 (1989).

Restricted to Tas. where it is widespread on the Central Plateau and Middlesex Plain near Cradle Mtn to Mt Anne in the SW; in montane and subalpine grasslands, creeks, swamps and bogs, c. 550–1200 m alt. Flowers Nov.–Feb. Map 354.

Tas.: Ouse R. behind Liawenee, Y.Menadue & R.K.Crowden *E85* (HO); Lake St Clair Natl Park, between Mt Rufus and Hugel Lake, *Hj.Eichler* 16614 (CANB); between L. Sorell and Lagoon of Islands, *Hj.Eichler* 16929 (CANB).

This is a very variable species but patterns of variation seem to defy recognition of infra-specific entities.

14. *Ranunculus jugosus* Menadue in Y.Menadue & R.K.Crowden, *Brunonia* 8: 377, fig. 3, fig. 7 (1986)

T: near L. Augusta on Wild Dog Plain, Central Plateau, Tas., 28 Nov. 1982, *Y.Menadue & R.K.Crowden s.n.*; holo: HO 77949 (photo CANB).

Illustrations: Y.Menadue & R.K.Crowden, *loc. cit.*; Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 88, fig. 1P; 92, fig. 3G; 94, fig. 5P (1989).

Tufted perennial (rarely developing \pm erect stolons); roots fibrous. Leaves with petioles 15–50 mm long, \pm glabrous; lamina trifoliate, glabrous or with long, sparse \pm appressed hairs; lateral leaflets remote, narrowly elliptic, 4–9 mm long, entire to tridentate, sessile or shortly petiolulate; terminal leaflet obovate, 5–12 mm long, trifid, rarely entire (then narrowly ovate or elliptic), petiolule 2–7 mm long. Flowering stems c. 3–12 mm long, sparsely hirsute, 1-flowered. Sepals 5, spreading, \pm ovate, 2.5–4 mm long, glabrous or with a few long scattered hairs below. Petals usually 6, oblong to obovate, 4–5 mm long, pale yellow; nectary near petal-base, bracket-like with a minute, fleshy, triangular lobe. Stamens 11–16. Pistils 8–14. Receptacle sparsely hirsute throughout. Achenes \pm ovate, sublenticular, 2.3–2.6 mm long, minutely punctate; beak c. 0.4 mm long, recurved. $2n = 48$, Y.Menadue & R.K.Crowden, in Á.Löve (ed.), *Taxon* 34: 551 (1985).

Restricted to the L. Augusta – Walls of Jerusalem region, Central Plateau, Tas.; in river silt and soak areas; c. 1100–1150 m alt. Flowers Oct.–Feb. Map 355.

Tas.: Wild Dog Plains, 27 Nov. 1955, *W.M.Curtis* (HO); Arthurs Lakes, at the outlet, *Hj.Eichler* 1644 (CANB); below Lake Augusta Dam, 10 Nov. 1983, *Y.Menadue & R.K.Crowden* (HO); L. Salome, Walls of Jerusalem, *M.J.Brown* 168 (HO).

15. *Ranunculus nanus* Hook., *J. Bot. (Hooker)* 1(3): 242 (1834)

Ranunculus lappaceus var. *nanus* (Hook.) Benth., *Fl. Austral.* 1: 13 (1863); *R. rivularis* var. *nanus* (Hook.) Rodway, *Tasman. Fl.* 2 (1903). T: Tas., *Mr Lawrence* 324; holo: K (photo CANB).

Illustrations: R.Melville, *Kew Bull.* 10: 204, fig. 9 (1955); M.Stones & W.M.Curtis, *Endemic Fl. Tasmania* 4: t. 80A (1973); Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 88, fig. 1L; 92, fig. 3D; 94, fig. 5D (1989).

Tufted or shortly rhizomatous perennial; roots fibrous-fleshy. Leaves with lamina ovate to deltate, 6–25 mm long, pinnately 3–5-pinnatisect, or with 5–7 leaflets, lobes or leaflets narrowly elliptic to lanceolate, entire, or \pm obovate and 3-dentate to 3-lobed, \pm glabrous to hirsute. Flowering stems 1-flowered, about as long as leaves or slightly longer at anthesis, \pm glabrous to hirsute. Sepals 5, spreading, oblong-elliptic, c. 3–4 mm long, glabrous or sparsely hirsute below. Petals 5 (–7), elliptic to broadly obovate, 3–9 mm long, golden-yellow; nectary c. $\frac{1}{5}$ petal-length above base, a shallow semilunar pit, rarely with a triangular fleshy lobe. Stamens 24–30. Pistils 10–20. Receptacle glabrous in stamen zone, hispid above. Achenes, \pm flattened, elliptic-ovate, 2.7–3.5 mm long; beak tapered, 0.7–1.2 mm long, tip recurved. $2n = 16$, Y.Menadue & R.K.Crowden, in Á.Löve (ed.), *Taxon* 34: 551 (1985).

Widespread on the Central and Ben Lomond plateaus, Tas., in bogs and swamps, often in periodically flooded places, but also in alpine heaths at 750–1400 m alt. Flowers late Oct.–Mar. Map 356.

Tas.: southern edge of L. Augusta, *W.R.Barker* 1027 (AD); Central highlands, St Patricks Plains, *A.Moscal* 8980 (AD, CANB, HO); Second Lagoon, Central Plateau, 19 Mar. 1984, *Y.Menadue* (HO).

The wide variation in leaf morphology and indumentum density has been shown to be largely under environmental control, discussed in Y.Menadue & R.K.Crowden, Leaf polymorphism in *Ranunculus nanus* Hook. (Ranunculaceae), *New Phytol.* 114(2): 265–274 (1990).

16. *Ranunculus decurvus* (Hook.f.) Melville, *Kew Bull.* 10: 202, fig. 8 (1955)

Ranunculus scapiger var. *decurvus* Hook.f., *Fl. Tasman.* 1: 7, t. 2A (1855). T: St Patricks River, NE of Launceston, Tas., 16 Nov. 1844, *R.Gunn* 1937; holo: K (photos CANB, NSW).

Ranunculus scapiger var. *concinus* Hook.f., *Fl. Tasman.* 1: 7 (1855); *R. concinns* (Hook.f.) Melville, *Kew Bull.* 10: 201 (1955). T: Summit of Western Mountains N of Arthurs Lakes, Tas., 17 Jan. 1845, *Gunn* 1934; holo: K (photo CANB); iso: NSW.

Illustrations: R.Melville, *loc. cit.*; R.Melville, *op. cit.* 202, fig. 7, as *R. concinnus*; M.Stones & W.M.Curtis, *Endemic Fl. Tasmania* 4: 80C (1973); Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 88, fig 1G; 92, fig. 3F; 94, fig. 5 (J) (1989).

Tufted perennial; roots fibrous-fleshy; stems and leaves with fine hairs, usually spreading near base, (sub-)appressed above. Leaves with petioles 1–15 cm long; lamina ovate in outline, c. 4–27 mm long and wide, trifoliate to pinnate with 5 leaflets; leaflets suborbicular to ovate, coarsely toothed, c. 3–10 mm long; petiolule 0.5–6 mm long. Flowering stems 1 (rarely 2)-flowered, shorter than leaves at anthesis, exceeding leaves in fruit. Sepals 5, spreading, oblong or ovate, c. 2–4 mm long, sparsely hirsute below. Petals 0–5, narrowly elliptic, 1.7–5 mm long, pale yellow; nectary a shallow crescentic bracket, 0.5–1.5 mm above petal-base. Stamens 8–22. Pistils 8–28. Receptacle hispid in stamen zone, glabrous or sparsely hispid above. Achenes flattened, ovate, 1.3–3.8 mm long, smooth, without marginal ridges; beak 0.4–1 mm long, recurved. $2n = 16$, Y.Menadue & R.K.Crowden, in Å.Löve (ed.), *Taxon* 34: 551 (1985).

Widespread in alpine and subalpine grassland and heath above 400 m, and in bogs on the mountains of the Central Plateau, Tas. Flowers Oct.–Feb. Map 357.

Tas.: N of Cradle Mtn, Black Bog Ck between Moina and Waldheim, *Hj.Eichler 16446* (CANB); St Patricks Plain, 7 Dec. 1971, *M.Talbot de Malahide* (HO); Herods Gate, Walls of Jerusalem, 18 Jan. 1983, *A.Moscal 1387* (HO); Lake St Clair Natl Park, N slopes of Mt Rufus, 6 Jan. 1977, *J.H.Willis* (MEL).

Reasons for the inclusion of *R. concinnus* within this species are described in detail in Y.Menadue & R.K.Crowden, Multivariate analysis of variation in *Ranunculus decurvus* (Hook.fil.) Melville and *Ranunculus concinnus* (Hook.fil.) Melville, *J. Linn. Soc., Bot.* 98: 71–83 (1988).

17. *Ranunculus pimpinellifolius* Hook., *J. Bot. (Hooker)* 1: 243 (1834)

Ranunculus pimpinellifolius var. *glabrius* Hook., *J. Bot. (Hooker)* 2: 401 (1840), *nom. inval.*; *R. lappaceus* var. *pimpinellifolius* (Hook.) Benth., *Fl. Austral.* 1: 12 (1863). T: Tasmania, *Mr. Gunn*, mixed with n. 90 [*R. lappaceus*]; holo: K (photo CANB).

Ranunculus pimpinellifolius var. *vestitus* Hook., *Icon. Pl.* 3(6): t. 260 (1840). T: edge of Blackmans river, near Hobart Town, Tas., *R.Gunn*; holo: K (photo CANB).

Ranunculus hirtus var. *vestitus* Hook.f., *Fl. Tasman.* 1: 6 (1855). T: alpine marshes, Tas., *R.Gunn 635*; holo: K (photo CANB).

[*Ranunculus hirtus* auct. non Banks & Sol. ex DC. : J.D.Hooker, *Fl. Tasman.* 1: 6 (1855)]

[*Ranunculus lappaceus* var. *scapigerus* auct. non (Hook.) Benth.: L.Rodway, *Tasman. Fl.* 3 (1903), *p.p.*]

Illustrations: R.Melville, *Kew Bull.* 10: 197, fig. 3, 200, fig. 5 (3–4) (1955); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 162 (1990); M.G.Corrick & B.A.Fuhrer, *Wildfl. Victoria*, 194, fig. 682 (2000).

Tufted perennial; roots fibrous; stems and leaves with long spreading hairs, rarely almost glabrous. Leaves with petioles 1–17 cm long; lamina narrowly ovate in outline, 5–35 mm long, pinnate, with 3–5 cuneate, ovate or obovate, usually coarsely toothed, sessile or subsessile leaflets. Flowering stem 1 (rarely 2)-flowered, 1.7–10 (–25) cm long, not or not greatly elongating in fruit. Sepals 5, spreading, elliptic to ovate, 2.5–6 mm long, pubescent below. Petals 5–8, elliptic to obovate-cuneate, 4–9 mm long, golden-yellow; nectary near petal-base, shallowly pocket-like, to c. 0.5 mm long, with lobe triangular, usually asymmetric. Stamens 20–60. Pistils 12–40. Receptacle hirsute or glabrous in both zones. Achenes flattened, ovate to broadly elliptic, 2.5–3.5 mm long, smooth; upper margin forming a ±prominent shoulder; beak 0.5–1 mm long, recurved. $2n = 16$, B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 310 (1960); Y.Menadue & R.K.Crowden, in Å.Löve (ed.), *Taxon* 34: 551 (1985). Fig. 61A–C.

Occurs on the tablelands in eastern N.S.W. (S from c. Ebor Falls), the A.C.T., the eastern highlands of Vic., and the south-eastern portion of the Central Plateau in Tas.; in bogs on mud, in mossy swamps and wet grassland of montane and subalpine regions; on the mainland predominantly above 800–2000 m, in Tas. 200–1200 m alt. Flowers Oct.–Feb. Map 358.



Figure 61. *Ranunculus*. A–C, *R. pimpinellifolius*. A, habit; B, petal; C, nutlet (A–C, H.Eichler 13653, CANB). D–E, *R. undosus*. D, habit; E, petal (D–E, K.Paijmans 3170, CANB). F–H, *R. productus*. F, habit; G, receptacle; H, nutlet (F–H, B.Briggs, Mar. 1956, CANB). Scale bar: A, D, F = 20 mm; B, E = 4 mm; C, G, H = 2.5 mm. Drawn by D.Boyer.

N.S.W.: Ebor Falls, 68 km ENE of Armidale, *R. Coveny* 5290 (BRI, NSW); between Charlotte Pass and Snowy R., c. 5.5 km ENE of Mt Kosciuszko, *Hj. Eichler* 13653 (AD, CANB, NSW). A.C.T.: S side of the Orroral Valley, *R. Pullen* 2318 (AD, BRI, CANB, NSW). Vic.: Buckety Plain, Bogong High Plains, *L.G. Adams* 2642 (CANB, MEL). Tas.: L. Sorell, eastern shore, 3 Feb. 1978, *P. Minchin* (CANB, HO).

Exceedingly close to *R. productus* which usually has leaves more broadly ovate in outline. Leaves of *R. pimpinellifolius* typically have the leaflets of the first pair not conspicuously larger than those of the second pair. The pedicels of *R. productus* elongate more when the fruits mature than those of *R. pimpinellifolius*. Some small specimens from the Snowy Mountains, N.S.W., and the Brindabella Ra., A.C.T., appear to be intermediate between *R. pimpinellifolius* and *R. productus*. Further observation on distinctive characters between these two closely related species and their variability, e.g., by growing samples of various populations under the same conditions, is desirable.

18. *Ranunculus productus* B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 321, figs 83–86 (1960)

T: Daners Gap, Mt Kosciuszko area, N.S.W., *B.G. Briggs*, 5 Jan. 1959; holo: NSW (photo CANB); iso: AD (photo CANB), B, BM *n.v.*, CANB, G, K (photo CANB), MEL (photo CANB), NSW (photo CANB), NY *n.v.*, P *n.v.*, SYD.

Illustrations: B.G.Briggs, *loc. cit.*; B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 163 (1990).

Tufted perennial; roots fibrous; stems and leaves with short appressed hairs. Leaves with petioles 5–8.5 cm long; lamina ovate in outline, 7–35 mm long, pinnate with 3–7 ovate, ternately lobed leaflets; terminal lobe entire or tridentate and lateral lobes often bifid. Flowering stem 1-flowered, mostly 1–5 cm long at anthesis, elongating to 12–45 cm in fruit. Sepals 5, spreading, rarely slightly reflexed, ovate to elliptic, 2–2.5 mm long, pubescent below. Petals 5, elliptic to broadly lanceolate, 1.5–2.5 mm long, pale yellow; nectary near petal-base, shallowly pocket-like, c. 0.5 mm long, with lobe free for most of nectary-length, almost as wide as petal. Stamens 15–20. Pistils 25–45. Receptacle \pm glabrous in stamen zone, hirsute above. Achenes lenticular, elliptic to semiorbicular, 1.5–2 mm long; lateral faces smooth; beak slender, 0.3–0.8 mm long, strongly recurved. $2n = 16$, B.G.Briggs, *op. cit.* 322. Fig. 61F–H.

Locally common between Cabramurra and Guthega, Mt Kosciuszko area, N.S.W.; in wet montane and subalpine grasslands, on sloping ground, c. 1500–1800 m alt. Flowers Dec.–Mar. Map 359.

N.S.W.: Friday Flat, upper Thredbo R., 7 Jan. 1959, *B.G. Briggs s.n.* (CANB, NSW); 0.7 km NNE of Smiggin Holes, Kosciuszko Natl Park, *B.G. Briggs* 7206 & *D. Fortescue* (CANB, K, MEL, NSW); 1 mile [1.6 km] W of Kiandra, *B.G. Briggs* 2562 (MEL, NSW)..

Ranunculus productus is closely allied to *R. pimpinellifolius*. For differences and possible intermediates see the note under that species.

19. *Ranunculus niphophilus* B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 321, figs 78–82 (1960)

T: Club L., Mt Kosciuszko area, N.S.W., 17 Jan. 1956, *B.G. Briggs*; holo: NSW; iso: AD (photo CANB), B, BM *n.v.*, CANB 109935, G, K (photo CANB), MEL (photo CANB), NSW (photo CANB), NY *n.v.*, P *n.v.*

Illustrations: B.G.Briggs, *loc. cit.*; A.B.Costin *et al.*, *Kosciuszko Alpine Fl.* fig. 187 (1979); A.B.Costin *et al.*, *op. cit.* 2nd edn 136 (2000).

Tufted, often clump-forming perennial, glabrous or with sparse spreading hairs; roots fibrous. Leaves with petiole 1–15 cm long; lamina orbicular or deltate in outline, 6–45 mm long, trifoliate or biternate, segments acute, usually lobed and dentate. Flowering stems 5–15 cm long, 1-flowered. Sepals 5 (–7), spreading, elliptic to ovate, 2–4 mm long, glabrous or with sparse long spreading hairs below. Petals 5 (–7), obovate-cuneate, 7–14 mm long, truncate, golden-yellow; nectary near petal-base in a small pit without distinct lobe. Stamens 30–55. Pistils 30–80. Receptacle \pm glabrous in stamen zone, hirsute above. Achenes lenticular, ovate to elliptic, 2.4–3 mm long; margins narrowly ridged; lateral faces smooth or

slightly dimpled; beak slender, 1–1.7 mm long, straight or recurved-arching. $2n = 16$, B.G.Briggs, *op. cit.* 321; Y.Menadue & R.K.Crowden, in Á.Löve (ed.), *Taxon*, 34: 551 (1985). *Snow Buttercup*. Plate 58; Fig. 62D–F.

Restricted to the Mt Kosciuszko plateau, N.S.W.; in wet alpine herbfields and springs, common below semi-permanent snow patches; above 1760 m, rarely down to 1550 m (Thredbo Gorge). Flowers late Dec.–Feb. Map 360.

N.S.W.: L. Albina, Mt Kosciuszko area, *Hj.Eichler 13581* (AD, CANB, NSW); slope above Blue L., *M.Gray & C.Totterdell 6115* (CANB, MEL); c. 2 km ESE of North Ramshead, Kosciuszko Natl Park, *B.G.Briggs 7954* (NSW); above Guthega, *J.M.Powell 1520* (MEL, NSW).

20. *Ranunculus clivicola* B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 319, figs 73–77 (1960)

T: Spencers Ck, downstream from road bridge, Mt Kosciuszko area, N.S.W., 3 Feb. 1958, *B.G.Briggs*; holo: NSW (photo CANB); iso: AD (photo CANB), B, BM *n.v.*, CANB, G, K (photo CANB), MEL, NY *n.v.*, P *n.v.*, SYD *n.v.*

Illustrations: B.G.Briggs, *loc. cit.*; B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 163 (1990).

Tufted perennial; roots fibrous. Basal leaves with petioles 2.5–25 cm long; lamina orbicular to deltate in outline, 1–6.5 cm long, pinnate with 3–5 ternately or biternately lobed, often dentate leaflets, sparsely to densely pilose; stem-leaves less divided, grading into the uppermost sessile, linear or lanceolate bracts. Flowering stems 12–50 cm high, 2–4-flowered, pilose below, appressed-hairy above. Sepals 5, spreading, elliptic or ovate, 4–7 mm long, sparsely hirsute (rarely glabrous) below. Petals 5–8, obovate-cuneate, 8–14 mm long, obtuse or truncate, golden-yellow; nectary near petal-base, pocket-like, 1–2 mm long, with lobe oblong, free for c. half its length. Stamens 30–45. Pistils 40–70. Receptacle glabrous or sparsely hirsute in stamen zone, hirsute above. Achenes ovate to ovate-cuneate, 3–4.5 mm long, compressed; marginal ridges prominent; beak (1.8–) 2.5 (–3) mm long, straight or arching with recurved tip. $2n = 16$, B.G.Briggs, *op. cit.* 319. Fig. 62A–C.

Restricted to the Mt Kosciuszko plateau in the Snowy Mtns, N.S.W.; in subalpine woodland in wet places below semipermanent snow patches on steep slopes. Flowers Jan.–early Mar. Map 361.

N.S.W.: Merritts Spur, Mt Kosciuszko, Mar. 1956, *B.G.Briggs s.n.* (MEL, NSW, SYD); Crackenback R. at Thredbo, *Hj.Eichler 17824* (AD); saddle from Betts Ck to Thredbo R. valley, Kosciuszko area, 6 Feb. 1957, *B.G.Briggs s.n.* (AD, B, SYD); E slopes of the Paralyser, Kosciuszko area, 10 Jan. 1956, *J.Garden s.n.* (CANB, NSW).

21. *Ranunculus scapiger* Hook., *J. Bot. (Hooker)* 1: 244 (1834) as *R. scapigerus*

Ranunculus lappaceus var. *scapigerus* (Hook.) Benth., *Fl. Austral.* 1: 12 (1863). T: Tas., *Mr Gunn 229*; holo: K (photo CANB).

Ranunculus scapiger var. *foliosus* Melville, *Kew Bull.* 10: 197, (1955). T: N of Wilfreds Hill, Mount Buffalo Plateau, Vic., 1 Jan. 1953, *R.Melville 2684*; holo: K (photo CANB); iso: AD (photo CANB), BRI (photo CANB), CANB, MEL (photo CANB), NSW.

[*Ranunculus hirtus* auct. non Banks & Sol. ex DC.: A.J.Ewart, *Fl. Victoria* 513 (1931), *p.p.*]

Illustrations: R.Melville, *Kew Bull.* 10: 196, fig. 2, fig. 5 (1, 2) (1955); B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 309, figs 32–37 (1960); both as *R. scapigerus*; N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 55, fig. 10c (1996).

Tufted perennial; roots fibrous. Most leaves basal; petiole 1–15 cm long; lamina broadly ovate, 0.7–6 cm long, often broader than long, ternately or palmately lobed with 7 subequal teeth, rarely trifoliate; leaflets cuneate to suborbicular, coarsely toothed, pilose on both surfaces, hairs spreading or appressed. Cauline leaves when present simple, 3-lobed to linear-lanceolate. Flowering stems 1–4-flowered, 5–25 cm long, hairs spreading in lower part, appressed above. Sepals 5, reflexed, elliptic, 4–7 mm long. Petals 5, narrowly to broadly elliptic, 6–9 mm long, golden-yellow, often tinged purple below; nectary near petal-base, with lobe rounded or truncate, 0.7–1.2 mm long, free for most its length. Stamens 15–35.



Figure 62. *Ranunculus*. A–C, *R. clivicola*. A, habit; B, petal; C, nutlet (A–C, H.Eichler 13621, CANB). D–F, *R. niphophilus*. D, habit; E, petal; F, nutlet (D, F, H.Eichler 13586, CANB; E, H.Eichler 13581, CANB). G–J, *R. graniticola*. G, habit; H, petal; I, nutlet; J, less dissected leaf (G, H, J, H.Eichler 18970, CANB; I, H.Eichler 13463, CANB). Scale bar: A, D, G, J = 20 mm; B, E, H = 4 mm; C, F, I = 2.5 mm. Drawn by D.Boyer.

Pistils 20–50. Receptacle stamen zone glabrous, hispid above. Achenes 1.7–3 mm long, smooth; marginal rib narrow, sometimes with a line of subappressed hairs; beak slender, 1.2–2 mm long, straight with a recoiled tip. $2n = 16$, B.G.Briggs, *op. cit.* 307; Y.Menadue & R.K.Crowden, in Å.Löve (ed.), *Taxon* 34: 551 (1985). Fig 63J.

Extends from the Brindabella Ra., A.C.T. through the Snowy Mtns, N.S.W., to upland areas of eastern Vic. (rare in the west), and widespread in Tas.; in forest, woodland, and moist grassland, on the mainland mainly 700–1500 m, in Tas. 200–1020 m alt. Flowers Nov.–Mar. Map 362.

N.S.W.: Happy Jacks Gorge, *M.Mueller* 2587A (NSW). A.C.T.: c. 4.8 km N of Mt Franklin, eastern slopes of Brindabella Ra., *R.D.Hoogland* 8437 (CANB). Vic.: Annie R., *A.C.Beauglehole* 43703 (MEL, NSW). Tas.: foothills of Mt Barrow, *N.T.Burbidge* 2972 (CANB, HO).

22. *Ranunculus plebeius* R.Br. ex DC., *Syst. Nat.* 1: 288 (1817)

T: Hunters River, N.S.W., *R.Brown s.n.*; lecto: G-DC (photo CANB), *fide* Hj.Eichler, *Fl. Australia* 2: 460 (2007); remaining syntype: Kingstown [Newcastle, N.S.W.]; syns: BM (photo CANB), K (photo CANB).

Ranunculus lappaceus var. *pseudoplebejus* Domin, *Biblioth. Bot.* 89(2): 112 (1926). T: Süd-Queensland: auf den Tambourine Mts. häufig, *K.Domin*, Mar. 1910; holo: PR (photo NSW); iso: PR *n.v.*

[*Ranunculus hirtus* auct. non Banks & Sol. ex DC.: A.J.Ewart, *Fl. Victoria* 513 (1931), *p.p.*]

[*Ranunculus hirtus* var. *elongatus* auct. non Cheeseman: A.J.Ewart, *Fl. Victoria* 514 (1931)]

[*Ranunculus hirtus* var. *gracilis* auct. non Cheeseman: A.J.Ewart, *Fl. Victoria* 514 (1931)]

[*Ranunculus hirtus* var. *stoloniferus* auct. non Kirk: A.J.Ewart, *Fl. Victoria* 514 (1931)]

Illustrations: B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 305, figs 27–31 (1960); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 162 (1990); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 55, fig. 10b (1996).

Tufted perennial; roots fibrous. Most leaves basal; petioles 3–28 cm long, with long spreading hairs; lamina ovate to deltate, 1–7 cm long, usually trifoliate, with short usually appressed hairs; leaflets ovate, ternately lobed, with acute teeth; upper stem-leaves grading to the sessile, entire or dentate bracts. Flowering stems 2–16-flowered, 8–80 cm high, pilose below, appressed-hairy above. Sepals 5, reflexed, ovate to elliptic, 2.5–5 mm long, hirsute below. Petals 5, ±obovate, 5–10 mm long, golden-yellow; nectary near petal-base, with lobe 0.6–1.3 mm long, rounded, free for most of its length. Stamens 9–25. Pistils 25–60. Receptacle glabrous in stamen zone, sparingly hirsute above. Achenes lenticular, obovate to obovate-cuneate, 1.8–2.8 mm long, smooth; marginal rib sometimes with a line of subappressed hairs; beak slender, 0.7–1 mm long, strongly recurved. $2n = 16$, B.G.Briggs, *op. cit.* 306. Fig. 63A–C.

Restricted to eastern mainland Australia from south-eastern Qld, central and southern tablelands and coastal N.S.W., A.C.T., to the Otway Ra. in southern Vic.; damp and shady places in forests, often along creeks, mostly below 100 m alt. Flowers Nov.–Mar. Map 363.

Qld: Queen Mary Falls Natl Park E of Killarney, *Hj.Eichler* 24064 (CANB). N.S.W.: Shane Park, *R.Coveny* 11441 (CANB, NSW); Brown Mtn, E of Nimmitabel, *R.Pullen* 3942 (AD, CANB). A.C.T.: Brindabella Ra., *R.G.Lane* 76 (CANB). Vic.: 7 km WNW of Mallacoota, *I.C.Clarke* 1923 (MEL).

23. *Ranunculus colonorum* Endl., *Enum. Pl.* 1 (1837)

T: Swan River, W.A., *Hügel*; holo: W *n.v.*, probably destroyed.

Ranunculus coloneus Hügel ex J.Drumm., *London J. Bot.* 2: 182 (1843), orth. var., *nom. nud.*

Ranunculus discolor Steud. in J.G.C.Lehmann, *Pl. Preiss.* 1: 263 (1845). T: in arenosis umbrosis sylvaticis haud procul ab ore maritima, in districtu Perth [sandy shaded forests not far from the coast near Perth, W.A.], 23 Sept. 1839, *Herb. Preiss.* 1347; holo: P (photo CANB); iso: G (photo CANB), MEL.

Ranunculus lappaceus var. *macrocarpellus* Domin, *Věstn. Král. České Společn. Nauk, Tř. Mat.-Přír.* II: 23 (1923). T: Claremont near Perth, W.A., 5 Sept. 1902, *Cec. Andrews 1st Coll. No. 3*; holo: K (photo CANB).

Ranunculus lappaceus var. *normalis* Domin, *Věstn. Král. České Společn. Nauk, Tř. Mat.-Přír.* II: 23 (1923), *nom. inval.* T: Bridgetown to Kojonup and Slab Hut Gully, Yallingup and Cape Naturaliste, W.A., *A.A.Dorrien-Smith*; syn: K (photo CANB), PR *n.v.*

[*Ranunculus plebeius* auct. non R.Br. ex DC.: E.G.Steudel, in J.G.C.Lehmann, *Pl. Preiss.* 1: 263 (1845), as *plebejus*].

[*Ranunculus lappaceus* auct. non Sm.: G.Bentham, *Fl. Austral.* 1: 12 (1863), *p.p.* (W.A. specimens)]

Illustration: B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 305, figs 22–26 (1960).

Tufted perennial; roots fibrous to somewhat tuberous. Stems and petioles with long spreading hairs at least toward base. Basal leaves with petioles 8–20 cm long; lamina trifoliolate; broadly ovate in outline, 35–80 mm long, hirsute; leaflets ternately lobed and coarsely dentate; stem-leaves similar, less divided, grading to the linear-lanceolate sessile bracts. Flowering stems 2–8-flowered, 20–60 cm high. Sepals 5, becoming reflexed, ovate, 3–6 mm long, hairy below. Petals 5, obovate-cuneate, (6–) 10–20 mm long, golden-yellow; nectary near petal-base, with lobe cuneate or oblong, 0.7–1.5 mm long, and margins adnate to petal for $\frac{1}{4}$ – $\frac{4}{5}$ lobe length. Stamens 40–60. Pistils 20–45. Receptacle glabrous in stamen zone, shortly hispid above. Achenes obovate, 3–5 mm long, compressed; marginal ridges prominent, occasionally sparsely ciliate; beak slender, 1.5–3 mm long, recurved.

Occurs in south-western W.A. on the coastal plain and Darling Ra. from Yanchep to the extreme SW, along the S coast to Albany and the Porongurup Ra.; usually in winter-wet and shady places. Flowers Aug.–Dec. Map 364.

W.A.: Warren Natl Park, c. 2.7 km from turnoff Northcliffe–Pemberton road, *E.M.Canning CBG036071* (AD, CBG); Porongurup Ra., *T.E.H.Aplin 2149* (PERTH); 4 miles [6.4 km] SW of Walpole, *R. & R.Belcher 327* (AD, MEL, PERTH).

24. *Ranunculus lappaceus* Sm. in A.Rees, *Cycl.* 29(2): *Ranunculus* no. 61 (1815)

T: Port Jackson, N.S.W.; communicated by Dr White; holo: LINN n.v. (microfiche seen).

Ranunculus lappaceus var. *obtusatus* DC., *Syst. Nat.* 1: 287 (1817). T: not indicated; ?holo: N.S.W., Lambert, G-DC (photo CANB).

Ranunculus lappaceus var. *pubescens* DC., *loc. cit.* T: not indicated; ?holo: locality and collector not indicated, G-DC (photo CANB).

Ranunculus lappaceus var. *latilobus* Hook.f., *Fl. Tasman.* 1: 6 (1855). T: Woolnorth, *R.Gunn 633*: lecto: K (photo CANB), fide R.Melville, *Kew Bull.* 10: 198 (1955).

Ranunculus lappaceus var. *pimpinellifolius* f. *multiplex* F.M.Bailey, *Queensland Fl.* 1: 7 (1899). T: Qld, Ormiston, Cameron; syn: BRI n.v.; Nerang, Schneider; syn: BRI n.v.

Illustrations: B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 302, figs 5–10 (1960); G.M.Cunningham *et al.*, *Pl. W New South Wales* 309 (1982), as *Common Buttercup*; M.G.Corrick & B.A.Fuhrer, *Wildfl. Victoria*, 194, fig. 681 (2000).

Tufted perennial; roots fibrous to (rarely) fleshy-subtuberous. Leaves mostly basal; petioles 2–30 cm long with spreading and/or appressed hairs; lamina ovate to deltate in outline, 1.5–8 (–11) cm long and wide, deeply trifid to (usually) trifoliolate, leaflets deeply dissected or lobed, sometimes \pm biterminate, appressed-hirsute, sometimes with well developed petiolules. Flowering stems (1–) 2–10-flowered, 4–70 (–170) cm high, with spreading and/or appressed hairs. Sepals 5, spreading, elliptic, 4–7 (–10) mm long, hairy below. Petals 5, obovate-cuneate, 7–17 (–22) mm long, obtuse, bright yellow; nectary near petal-base, with lobe cuneate, c. 1–2.8 mm long, free for most of length. Stamens 40–110. Pistils 20–50. Receptacle glabrous in stamen zone, hirsute above. Achenes lenticular, obovate-cuneate, 1.7–3.5 mm long; margin narrowly ridged; lateral faces smooth or dimpled; beak slender, 0.8–1.8 mm long, arched, tip recoiled. $2n = 16$, B.G.Briggs, *op. cit.* 297; Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 95 (1989). *Australian Buttercup*, *Common Buttercup*. Fig. 63D–E.

Extends from Flinders and Mt Lofty Ranges through south-eastern S.A., eastern Qld S from about Proserpine, eastern N.S.W., mesic areas nearly throughout Vic. and, except the far S and W, most of Tas.; absent from W.A. and N.T. (records from New Zealand have resulted from misapplication of the name); moist grassland, woodland and forest, occasionally in drier places amongst rocks. Flowers July–Dec. Map 365.

S.A.: Belair, Mt Lofty Ra., *Hj.Eichler 13380* (AD, CANB, H). Qld: Bunya Mtns on Big Falls track, *L.S.Smith 6226* (BRI). N.S.W.: Glen Innes, *L.Murray 50* (CANB, NSW). A.C.T.: between Bulls Head

and Bendora Dam, *R. Pullen* 3863 (BRI, CANB). Vic.: Bonang Hwy 8 km S of Brown Mtn Ck, *E.A. Chesterfield* 504 (CANB, MEL). Tas.: Forestier Penin., Blackman Bay, N of Murdunna, *R. Melville* 2447 (BRI, MEL).

The species is rather variable between populations in dimensions of most organs, leaf-dissection, indumentum and degree of branching in the inflorescence. Plants from alpine and subalpine sites frequently have single-flowered inflorescences. A noteworthy, particularly robust form (indicated by bracketed measurements in the description above) occurs on the mid-Murray River floodplain (Vic. and N.S.W.) downstream from about Albury.

25. *Ranunculus pachycarpus* B.G. Briggs, *Proc. Linn. Soc. New South Wales* 84: 301, figs 11–16 (1960)

T: northern slopes of Mt Brown, c. 22 km E of Port Augusta, S.A., 20 Oct. 1958, *P.G. Wilson* 622; holo: AD 95912009 (photo CANB); iso: AD (photo CANB), K (photo CANB), NSW (photo CANB), P, US.

Illustrations: B.G. Briggs, *loc. cit.*; G.M. Cunningham *et al.*, *Pl. W New South Wales* 310 (1982), as *Thick-fruited Buttercup*; N.G. Walsh, in N.G. Walsh & T.J. Entwisle (eds), *Fl. Victoria* 3: 55, fig. 10a (1996).

Tufted perennial; roots often subtuberosus and fleshy, but gradually tapered. Leaves mostly basal; petiole 1–12 cm long, with spreading or subappressed hairs; lamina ovate to elliptic in outline, 0.8–4.5 cm long and wide, simple, 3-lobed to deeply ternately dissected, the segments acutely toothed or further lobed, with soft subappressed hairs. Flowering stems 1–5-flowered, 5–20 (–40) cm high, hairs spreading near base, usually appressed above. Sepals 5, spreading, ovate to obovate, 3–7 mm long, with spreading hairs below. Petals 5, obovate-cuneate, 6–15 mm long, golden-yellow; nectary near petal-base, with lobe oblong to cuneate, 1–2 mm long, free for c. half its length. Stamens 25–45. Pistils 15–30. Receptacle glabrous in stamen zone, pubescent above. Achenes globular or plumply obovoid-cuneate with thick pericarp, 2.5–5 mm long; lateral faces smooth, often with shallow dorsal groove; beak 1.5–2 mm long, recurved or straight with recurved tip. $2n = 16$, B.G. Briggs, *Telopea* 9(4): 835 (2002). *Thick-fruited Buttercup*. Fig. 63F–G.

Occurs in south-eastern S.A. (including the southern Flinders Ra.), south-western to central-western N.S.W., and central-western to north-eastern Vic. Usually on heavyish, winter-wet soils or on shallow soils or moss mats overlying rock, in forest, woodland, and herbfield. Flowers July–Nov. Map 366.

S.A.: Upper Waterfall, Belair, Mt Lofty Ra., *Hj. Eichler* 17967 (AD, BRI, CANB). N.S.W.: 5 km S of Jindera on Albury road, *B.G. Briggs* 4397 & *L.A.S. Johnson* (NSW). Vic.: Nathalia, *A.C. Beauglehole* 7014 (MEL, NSW).

Nearly sympatric with *R. robertsonii* in areas of eastern S.A. and western Vic. where plants of intermediate character may occur.

26. *Ranunculus robertsonii* Benth., *Fl. Austral.* 1: 10 (1863)

T: east bank of the Glenelg R., Nangela Vale, Vic., *Robertson*; lecto: K (photo CANB); isolecto: MEL (photo CANB), *fide* B.G. Briggs, *Proc. Linn. Soc. New South Wales* 84: 304 (1960); remaining syn: forest land near Glenelg R., Vic., *Robertson*; syn: K (photo CANB), MEL.

Illustrations: B.G. Briggs, *op. cit.* 305, figs 17–21; M.G. Corrick & B.A. Fuhrer, *Wildfl. Victoria* 194, fig. 682 (2000); N.G. Walsh, in N.G. Walsh & T.J. Entwisle (eds), *Fl. Victoria* 3: 53, fig. 9d (1996).

Tufted perennial; roots tuberous, abruptly tapered. Leaves mostly basal; petioles 1–9 cm long with short appressed hairs; lamina ovate to deltate in outline, 12–25 mm long, deeply trifid to ternately or biternately dissected, or commonly trifoliate with narrowly trifid or further divided leaflets; lobes lanceolate to narrowly linear, acute. Flowering stem 1–3-flowered, 5–25 cm high, hairs appressed. Sepals 5, spreading, \pm ovate, 3–5.5 mm long, hirsute below, rarely glabrous. Petals 5, obovate-cuneate, 8–14 mm long, bright yellow; nectary near petal-base, with lobe cuneate, 1.5–2 mm long, truncate or emarginate, free for $\pm 1/2$ its length. Stamens 30–35. Pistils 15–35. Receptacle glabrous in stamen zone, hirsute above. Achenes lenticular to obcuneate, 1.1–1.5 mm long; margins usually thickened, often with short irregular intersecting ribs; beak slender, 0.9–1.2 mm long, straight, tip recurved. $2n = 16$, B.G. Briggs, *op. cit.* 303. *Slender Buttercup*. Fig. 63H–I.

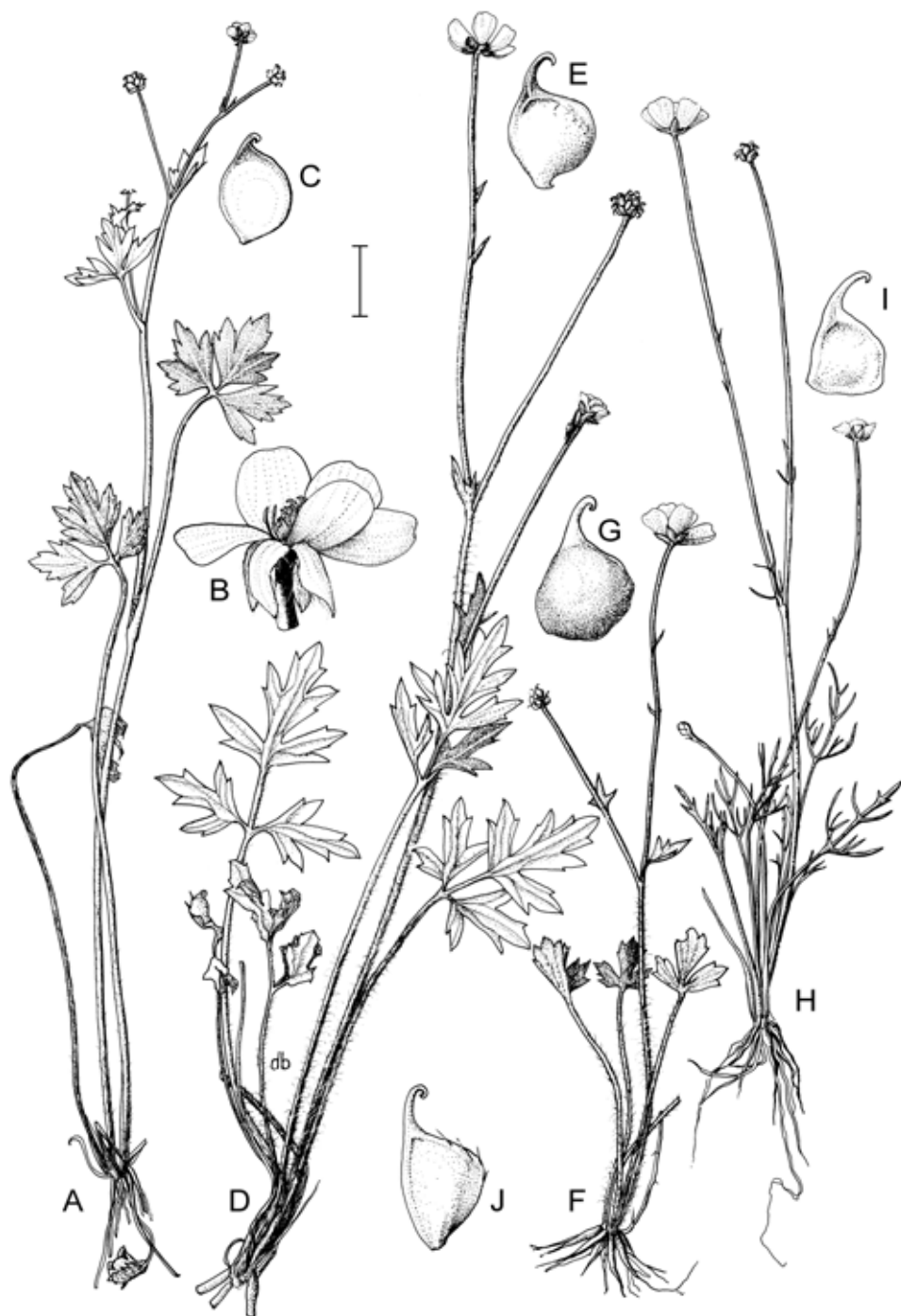


Figure 63. *Ranunculus*. A–C, *R. plebeius*. A, habit; B, flower; C, nutlet (A, C, R.Coveny 11441, CANB; B, H.Eichler 24064, CANB). D–E, *R. lappaceus*. D, habit; E, nutlet (D–E, H.Eichler 13380, CANB). F–G, *R. pachycarpus*. F, habit; G, nutlet (F–G, H.Eichler 17967, CANB). H–I, *R. robertsonii*. H, habit; I, nutlet (H–I, R.Hill 1093, CANB). J, *R. scapiger*, nutlet (B.Briggs, 11 Jan. 1959, CANB). Scale bar: A, D, F, H = 20 mm; B = 4 mm; C, E, G, I, J = 2.5 mm. Drawn by D.Boyer.

Extends from south-eastern S.A., eastwards to near Maryborough, Vic.; usually on moist or seasonally flooded ground in grassland, heath and forest, or sometimes in mossy crevices amongst rocks. Flowers Aug.–Dec. Map 367.

S.A.: c. 14 km W of Penola, *D.N.Kraehenbuehl 1012* (AD, CANB); Comaum Pine Forest Reserve, *Hj.Eichler 18325* (CANB). Vic.: c. 23 km SSW of Casterton, *W.R.Barker 1386* (AD, MEL); Mt Langi Ghiran, *N.G.Walsh 2691* (MEL, NSW).

Occasional plants have the petals rosy pink on the abaxial surface. Nearly sympatric with *R. pachycarpus* in some areas where plants of intermediate character may occur.

27. *Ranunculus graniticola* Melville, *Kew Bull.* 10: 205, fig. 11 (1955), as *graniticolus*

T: valley below Stonehenge, Mt Buffalo Plateau, Vic., 27 Dec. 1952, *R.Melville 2579*; holotype: K (photo CANB); isotype: CANB, MEL, NSW, PERTH.

Illustrations: *R.Melville, loc. cit.*; A.B.Costin *et al.*, *Kosciusko Alpine Fl.* fig. 185 (1979); B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 309, figs 43–49 (1960); M.G.Corrick & B.A.Fuhrer, *Wildfl. Victoria*, 193, fig. 679 (2000).

Tufted perennial; roots fibrous. Leaves mostly basal; petiole 1–25 cm long, with long spreading hairs; lamina (often broadly) ovate to elliptic in outline, 1–6 cm long and wide, simple and coarsely dentate, or trifoliate, or biternately dissected or lobed with dentate segments, with short appressed hairs. Flowering stems 1 (–3)-flowered, 2–40 cm long, with spreading to subappressed hairs. Sepals 5, spreading, ±ovate, 3–7 mm long, hairy below. Petals 5 (rarely to 8), obovate-cuneate, 6–20 mm long, golden-yellow; nectary near petal-base, with lobe oblong, 0.2–1 mm long, usually emarginate and free for most of its length, rarely attached nearly throughout. Stamens 30–70. Pistils 20–65. Receptacle glabrous in stamen zone, hirsute above. Achenes lenticular, obovate-cuneate to semiorbicular, 2–3.5 mm long; faces smooth; margins narrowly ridged; beak 0.7–1 mm long, arching or strongly recurved, tip recoiled. $2n = 16$, B.G.Briggs, *op. cit.* 311; D.Goepfert, *Bot. Not.* 127: 473 (1974). Fig. 62G–J.

Extends from the Brindabella Ra., A.C.T., through the Snowy Mtns, N.S.W., to the eastern highlands of Vic. (apparently absent from the Baw Baws); in alpine and subalpine grassland and *Eucalyptus pauciflora* woodland. Flowers Dec.–Mar. Map 368.

N.S.W.: near Betts Ck S of the Paralyser, c. 9 km ENE of Mt Kosciuszko, *Hj.Eichler 13463* (AD, CANB, NSW); Daners Gap, *R.D.Hoogland & R.Schodde 8453*. A.C.T.: Mt Gingera, *E.M.Canning 627* (CANB). Vic.: Mt Buffalo, *S.T.Blake 7384* (BRI); headwaters of Moroka R., Big Plain, 3.2 km NW of Mt Wellington, *T.B.Muir 3156* (AD, MEL).

There is considerable variation with respect to patterns and degree of division of the leaves across the range of the species, although locally, forms may be relatively uniform. Briggs (1960) outlined patterns of dissection in relation to major geographic areas. The name *R. ligulatus* Melville has been applied to hybrids between this species and *R. millanii*.

28. *Ranunculus pascuinus* (Hook.f.) Melville, *Kew Bull.* 10: 198, fig. 4, fig. 5 (5–7) (1955)

Ranunculus lappaceus var. *pascuinus* Hook.f., *Fl. Tasman.* 1: 6 (1855). T: Arthurs Lakes, Tas., 17 Jan. 1845, *R.Gunn 634 p.p.*; lectotype: K (photo CANB), *fide* R.Melville, *Kew Bull.* 10: 199 (1955).

Ranunculus lappaceus var. *uniflorus* Hook.f., *Fl. Tasman.* 1: 6 (1855). T: near Launceston, 2000 ft alt., Tas., *R.Gunn 634 p.p.*; lectotype: K (photo CANB), *fide* R.Melville, *Kew Bull.* 10: 198 (1955).

Ranunculus lappaceus var. *subsericeus* Benth., *Fl. Austral.* 1: 13 (1863). T: Hampshire Hills, Tas., *R.Gunn 634 p.p.*; lectotype: K, *fide* Hj.Eichler, *Fl. Australia* 2: 460 (2007).

Illustrations: *R.Melville, loc. cit.*; M.Stones & W.M.Curtis, *Endemic Fl. Tasmania* 3: t. 51 (1971); Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 88, fig. 1B; 92, fig. 3B; 94, fig. 5H (1989).

Tufted perennial; roots fibrous. Stems, petioles and leaf-blades with appressed hairs. Leaves basal; petiole 1–10 cm long; lamina obliquely ovate to deltate in outline, 1–3.5 cm long, simple, 3-partite, or trifoliate with lanceolate to elliptic lateral leaflets, these often not opposed on rachis; leaflets entire or further toothed to ternately dissected. Flowering stems 1-flowered, 2–15 cm long. Sepals 5, spreading, ovate, 3.5–7 mm long, densely appressed-hairy below. Petals 5, broadly obovate-cuneate, 8–15 mm long, golden-yellow, often tinged

crimson or purple beneath; nectary near petal-base, with lobe ovate to oblong, 0.5–1 mm long, free for more than half this length. Stamens 30–50. Pistils 20–40. Receptacle glabrous in stamen zone, hirsute above. Achenes obovate-cuneate, 3–4 mm long, flattened; marginal ridge slightly raised; beak slender, 0.7–1.2 mm long, \pm erect, tip recurved. $2n = 16$, Y.Menadue & R.K.Crowden, in Å.Löve (ed.), *Taxon* 34: 551 (1985).

Endemic to Tas. where it occurs predominantly at Middlesex Plain and on the Central Plateau; frequent in subalpine meadows and open shrubland. Flowers Oct.–Jan. Map 369.

Tas.: c. 1 km SE of L. Augusta at the source of the R. Ouse, W.R.Barker 998 (AD); Iris R. near road from Wilmot to Waldheim, Hj.Eichler 16451 (CANB, HO); 3.5 km W of Liawenee and 7.5 km SE of L. Augusta dam, J.G.West 4824 (CANB 402735).

29. *Ranunculus dissectifolius* F.Muell. ex Benth., *Fl. Austral.* 1: 11 (1863)

T: Munyang mountains, F.Mueller; holo: K (photo CANB, MEL); iso: MEL (4 sheets) (photo CANB), NSW.

Illustrations: B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 317, figs 68–72 (1960); A.B.Costin *et al.*, *Kosciusko Alpine Fl.* fig. 184 (1979).

Tufted perennial; roots fibrous. Leaves mostly basal; petiole 2–12 cm long, spreading-pilose; lamina ovate to suborbicular in outline, 10–45 mm long, trifoliate, the leaflets again once or twice dissected into linear or linear-lanceolate lobes, densely pilose below, almost glabrous above. Flowering stems 1-flowered, 5–25 cm high, pilose below, often appressed-hirsute above. Sepals 5, spreading, elliptic to obovate, 5–9 mm long, densely hirsute below. Petals 6–14, narrowly or broadly obovate-cuneate, 7–16 mm long, golden-yellow; nectary near petal-base, pocket-like, 0.3–1 mm long, with or without a \pm ovate lobe to c. 0.8 mm long. Stamens 35–50. Pistils 40–100. Receptacle glabrous in stamen zone, hirsute above. Achenes \pm flattened-ellipsoid, 2–2.5 mm long; lateral faces smooth; marginal ridges obscure; beak stout, 1.0–1.8 mm long, straight or incurved. $2n = 16$, B.G.Briggs, *op. cit.* 318. Fig. 64J–L.

Restricted to the Mt Kosciuszko plateau in the Snowy Mtns, N.S.W.; in wet alpine and sub-alpine grassland, herbfield and *Sphagnum* bogs, 1850–2150 m alt. Flowers Dec.–Mar. Map 370.

N.S.W.: slopes of Gungartan, Kosciuszko Natl Park, 2000 m, J.Thompson 2905 (NSW); near Trapyard Ck, c. 8 km ENE of Mt Kosciuszko, Hj.Eichler 13488 (AD, CANB, MEL, NSW); Charlotte's Pass to Seaman's Hut, below Mt Stillwell, M.Gray 6070 & C.Totterdell (CANB, HO, MEL, NSW).

30. *Ranunculus eichlerianus* B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 313, fig. 4 (50–54) (1960), as *eichlerianus*

T: top of Dibbins Spur, near Mt Hotham, Vic., 28 Dec. 1955, B.G.Briggs; holo: NSW (photo CANB); iso: AD (photo CANB), K (photo CANB), NSW (photo CANB).

Illustrations: B.G.Briggs, *loc. cit.*; J.Leigh, R.Boden, & J.Briggs, *Extinct & Endangered Pl. Australia* 308 (1984); N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 51, fig. 8c (1996).

Tufted perennial; roots fibrous. Stems, petioles and leaf-undersurface densely appressed-hirsute. Leaves mostly basal; petiole 2–15 cm long; lamina ovate in outline, 15–40 mm long, trifoliate; leaflets ternately to biternately dissected into acute, linear-lanceolate lobes. Flowering stems 1-flowered, 5–24 cm high. Sepals 5, spreading, \pm elliptic, hairy below. Petals 5, obovate-cuneate, 7–12 mm long, golden-yellow; nectary near petal-base, with lobe oblong, 0.7–1.5 mm long, emarginate or obtuse, free for up to half its length. Stamens 35–65. Pistils 35–65. Receptacle glabrous in stamen zone, hirsute above. Achenes sublenticular, obovate-cuneate to semiorbicular, 2.5–3.5 mm long; margins narrowly ridged; faces smooth; beak 0.8–1.5 mm long, arching, tip recoiled. $2n = 16$, B.G.Briggs, *op. cit.* 314. Fig. 64A–C.

Endemic in Vic., mostly confined to Mt Hotham and nearby areas (Dargo High Plains, Mt Feathertop) with outliers near Mt Bogong, Mt Buller and The Bluff; in alpine and subalpine grassland and woodland on sheltered slopes, c. 1500–1850 m alt. Flowers Nov.–Jan. Map 371.

Vic.: S slope of Mt Feathertop, L.A.Craven 1634 (CANB, MEL); Eskdale Spur, Mt Bogong, L.A.Craven 2135 (CANB, MEL); Mt Hotham, Hj.Eichler 18950 (CANB); The Bluff, T.B.Muir 2771 (MEL).

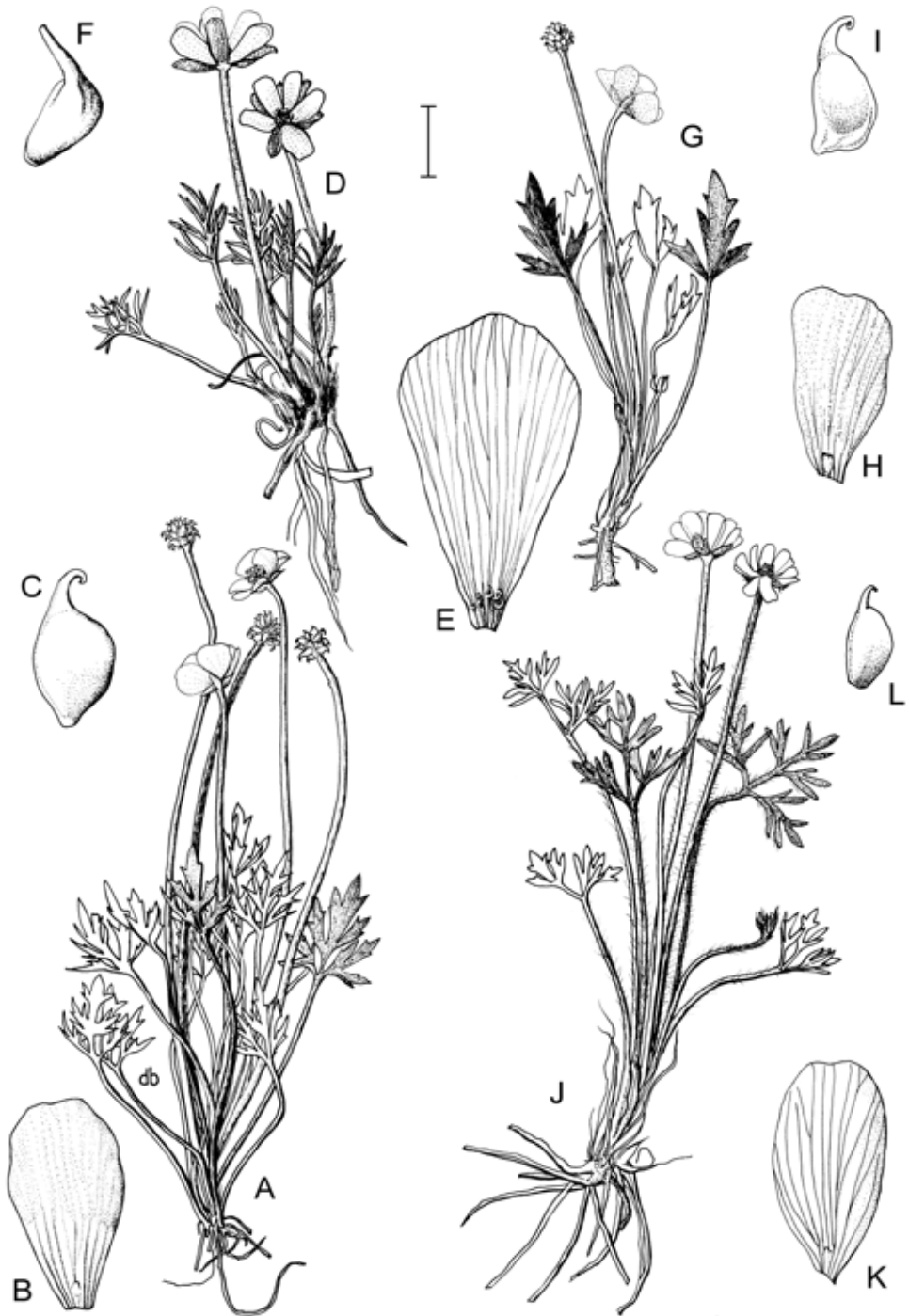


Figure 64. *Ranunculus*. **A–C.** *R. eichlerianus*. **A,** habit; **B,** petal (**A–B,** B.Briggs, 1 Jan. 1956, CANB); **C,** nutlet (H.Eichler 18950, CANB). **D–F.** *R. gunnianus*. **D,** habit; **E,** petal (**D–E,** H.Eichler 13517, CANB); **F,** nutlet (M.Gray 4808, CANB). **G–I.** *R. victoriensis*. **G,** habit; **H,** petal (**G–H,** B.Briggs s.n., Jan. 1956, CANB); **I,** nutlet (H.Eichler 14668, CANB). **J–L.** *R. dissectifolius*. **J,** habit; **K,** petal; **L,** nutlet (**J–L,** H.Eichler 13488, CANB). Scale bar: **A, D, G, J** = 20 mm; **B, E, H, K** = 4 mm; **C, F, I, L** = 2.5 mm. Drawn by D.Boyer.

31. *Ranunculus victoriensis* B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 314, figs 55–61 (1960)

T: near Wallaces Hut, Rocky Valley, Bogong High Plains, Vic., 26 Dec. 1955, *B.G.Briggs*; holotype: NSW (photo CANB); isotype: AD (photo CANB), B, BM *n.v.*, CANB 109933, G, K (photo CANB), MEL, NSW (photo CANB), NY *n.v.*, P *n.v.*

Illustrations: B.G.Briggs, *loc. cit.*; N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 51, fig. 8c (1996).

Tufted perennial; roots fibrous; stems, petioles and leaf surfaces densely covered with short (to c. 1 mm long), appressed hairs. Leaves basal (rarely a reduced cauline leaf present); petiole 2–17 cm long; lamina ovate, 12–50 mm long, simple with 2 deep incisions near apex or with several shallow notches (occasionally some leaves entire), to ternately or biternately dissected with lobes lanceolate to broadly lanceolate. Flowering stems 1-flowered, 5–28 cm high. Sepals 5, spreading, with appressed hairs below, elliptic to ovate, 5–7 mm long. Petals 5, obovate-cuneate, 8–14 mm long, golden-yellow; nectary near petal-base, with lobe ± oblong, 0.7–1.5 mm long, usually emarginate, free for most of length. Stamens 35–65. Pistils 30–60. Receptacle ± hirsute throughout. Achenes lenticular, obovate to semiobovate, 2.5–3.5 mm long; faces smooth; margins narrowly ridged; beak 0.8–1.5 mm long, arching or straight, tip recurved. $2n = 16$, B.G.Briggs, *op. cit.* 315. Fig. 64G–I.

Endemic in Vic., largely confined to the Bogong High Plains where very common, extending to Mt Hotham and Dargo High Plains, with an outlying occurrence on the Nunniong Plateau; in alpine and subalpine grassland, c. 1500–1850 m alt. Flowers Nov.–Jan. Map 372.

Vic.: near Strawberry Saddle, Mt Cope, *L.G.Adams* 2658 (CANB, G, K, MEL); Bogong High Plains, by Wilkinson Lodge, *T.B.Muir* 2506 (MEL); Nunniong Plains, *A.C.Beauglehole* 41392 (MEL, NSW).

Briggs (1960) regards this as probably a stabilised hybrid derived from *R. eichlerianus* and *R. muelleri*, and plants of intermediate morphology are found in areas of overlap with either of these species and *R. victoriensis*. The distribution and abundance of *R. victoriensis* in the Victorian alps exceed that of both putative parent species.

32. *Ranunculus muelleri* Benth., *Fl. Austral.* 1: 13 (1863)

T: summits of the Australian Alps, Vic., *F.Mueller*; lectotype: K (4 lower-mounted specimens) (photo CANB, NSW); isotype: MEL (photo CANB), *fide* B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 315 (1960).

Illustrations: B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 317, figs 62, 64–67 (1960); A.B.Costin *et al.*, *Kosciuszko Alpine Fl.* figs 179–180 (1979); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 163 (1990); all as *R. muelleri* var. *muelleri*.

Tufted perennial; roots fibrous. Petioles, scapes, leaf-undersurface and margins densely appressed-hirsute. Leaves with petioles 1–9 cm long; lamina elliptic, 8–30 mm long, entire or with 1 or 2 teeth near acute apex; base obtuse or cuneate; upper surface with rigid subappressed hairs. Flowering stems 1-flowered, 2–16 cm long, usually overtopping leaves. Sepals 5, spreading, elliptic to narrowly ovate, 5–12 mm long, with short appressed hairs below. Petals 5, obovate-cuneate, 7–22 mm long, golden-yellow; nectary near petal-base, in a shallow pocket, with or without a free triangular lobe 0.5 mm long. Stamens 15–70. Pistils 30–120. Receptacle glabrous in stamen zone, sparsely hirsute above. Achenes lenticular, 2–3 mm long; margins narrowly ridged; lateral faces smooth; beak stout, straight, often hooked at apex, 1–1.5 mm long. $2n = 16$, B.G.Briggs, *op. cit.* 316. Plate 56; Fig. 60A.

Occurs on the Mt Kosciuszko plateau, N.S.W., Bogong High Plains and Mt Hotham area, Vic.; in grasslands and herbfields; mostly above 1750 m alt., but down to 1540 m near Mt Hotham. Flowers (Nov.–) late Dec.–Feb. Map 373.

N.S.W.: Mt Kosciuszko, below Seamans Hut, *H.U.Stauffer* 5469 (BRI, CANB, G, MEL, NSW); Charlottes Pass, Ramshead Ra., Snowy Mtns, *L.G.Adams* 1548 (CANB); N slope of Club Lake Ck, *J.I.Paine* ANU10304 (CANB). Vic.: Mt Bogong, Jan. 1924, *J.Tadgell* (MEL).

This species and *R. acrophilus* are interfertile and intermediates are found where both species occur. See also note under *R. victoriensis*.

33. *Ranunculus acrophilus* B.G.Briggs, *Telopea* 5(4): 585 (1994)

Ranunculus muelleri var. *brevicaulis* B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 316, 317, fig. 63 (1960). T: Mt Lee, Mt Kosciuszko area, N.S.W., 3 Jan. 1959, B.G.Briggs; holo: NSW (photo CANB); iso: AD (photo CANB), BM n.v., G (photo CANB), K (photo CANB), NSW (photo CANB).

Illustrations: E.R.Rotherham *et al.*, *Fl. & Pl. New South Wales* 114, fig. 361 (1975); A.B.Costin *et al.*, *Kosciusko Alpine Fl.* figs 181–182 (1979); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 163 (1990); all as *R. muelleri* var. *brevicaulis*.

Tufted perennial; roots fibrous. Petioles, scapes, and leaf-undersurface densely appressed-hirsute. Leaves with petioles 0.5–2.5 cm long, shorter than lamina; lamina elliptic to obovate, 9–28 mm long, obtuse or cuneate at base, entire or often with 2 rather long teeth near acute apex; margins and upper surface with rigid spreading hairs. Flowering stems 1-flowered, 2–4 cm long, usually shorter than leaves. Sepals 5, spreading, elliptic to narrowly ovate, 5–12 mm long, with short appressed hairs below. Petals 5, obovate-cuneate, 7–22 mm long, golden-yellow; nectary near petal-base, in a shallow pocket, with or without a free triangular lobe 0.5 mm long. Stamens 15–70. Pistils 30–120. Receptacle glabrous in stamen zone, sparsely hirsute above. Achenes lenticular, 2–3 mm long; margins narrowly ridged; lateral faces smooth; beak straight or shortly hooked, 1.2–2.2 mm long. $2n = 16$, B.G.Briggs, *op. cit.* 316 (1960). Fig. 60B.

Restricted to the Mt Kosciuszko plateau on ridgetops of the main range from Mt Twynam to Mt Kosciuszko, N.S.W.; in *Epacris-Chionohebe* feldmark on fine shaly substrate; above 2150 m alt. Flowers Jan.–Feb. Map 374.

N.S.W.: Mt Kosciuszko, above L. Cootapatamba near Rawson Pass, *Hj.Eichler 13516* (CANB); near L. Albina, 11 Mar. 1949, *C.Skottsberg & A.B.Costin* (NSW).

Although hybrids with *R. muelleri* occur, the very distinct habitats occupied by the two species mean that the hybrid zone is very narrow (B.G.Briggs, *loc. cit.*, 1994).

34. *Ranunculus millanii* F.Muell., *Defin. Austral. Pl.* 21 (1855)

T: Mt Wellington, Vic., Nov. 1854, *F.Mueller*; lecto: MEL (photo CANB), *fide* *Hj.Eichler, Fl. Australia* 2: 460 (2007); remaining syn: G, K, MEL.

Illustrations: B.G.Briggs, *Proc. Linn. Soc. New South Wales* 84: 323, figs 87–91 (1960); E.R.Rotherham *et al.*, *Fl. & Pl. New South Wales* 114, fig. 359 (1975); A.B.Costin *et al.*, *Kosciusko Alpine Fl.* figs 177–178 (1979).

Tufted or stoloniferous perennial, procumbent; roots fibrous. Leaves with petioles 0.5–8 cm long, glabrous to pilose; lamina ±broadly ovate in outline, 4–20 mm long, divided into 3–5 linear segments 0.5–2 mm wide; lateral segments often 2- or 3-fid, glabrous to sparsely pilose. Flowering stems 1-flowered, 1–8 cm long. Sepals 5, rarely 6, spreading, ±elliptic, 2–5 mm long, usually pilose beneath. Petals 5 (–12), obovate-cuneate, 3.5–8 mm long, white to cream; nectary near petal-base, in a small semilunar pocket, with lobe usually absent, or occasionally to 0.2 mm long. Stamens 8–35. Pistils 9–25. Receptacle glabrous in stamen zone, hirsute above. Achenes lenticular, elliptic to ovate, 2–2.4 mm long, smooth; beak 0.5–1 mm long, erect or incurved, with tip often recoiled. $2n = 16$, B.G.Briggs, *op. cit.* 323; Y.Menadue & R.K.Crowden, in Á.Löve (ed.), *Taxon* 34: 551 (1985). Fig. 60F–G.

Alpine and subalpine tracts, extending from the Brindabella Ra., A.C.T., through the Snowy Mtns, N.S.W., to the eastern highlands of Vic. as far S as Mt Wellington; in mud in small depressions subject to periodic flooding, in swamps, fens and in wet mossy patches at margins of bogs; above 1450 m alt. Flowers Dec.–Mar. Map 375.

N.S.W.: near Betts Ck, c. 9 km ENE of Mt Kosciuszko, *Hj.Eichler 13446* (AD, CANB, MEL); Ogilvie Ck, WSW of Cabramurra, *R.G.Coveny 17594* (CANB, CHR, HO, MEL, NSW). A.C.T.: Smokers Flat S of Corin Dam Rd, c. 16 km W of Tharwa, *L.G.Adams 2617* (CANB). Vic.: Buckety Plain, Bogong High Plains, *L.G.Adams 2640* (CANB, K, MEL); valley E of The Horn, Mt Buffalo, *R.Melville 2584* (BRI, HO, MEL, NSW).

Ranunculus millanii readily hybridises with adjacent species of *Ranunculus* (see note at start of treatment). Hybrids typically have broader leaf-segments and yellowish petals, sometimes with developed nectary-lobes. The name *R. ligulatus* Melville has been applied to the hybrid *R. millanii* × *R. graniticola*.

35. *Ranunculus setaceus* Rodway, *Proc. Roy. Soc. Tasmania* 1900–1901: 107 (1902)

T: Ironstone Ra., Tas., *coll. unknown*; lecto: NSW 83180 dated Dec. 1899 (photo CANB); isolecto: HO (2 sheets); ? (dated 1900): MEL (photo CANB), *fide* Hj.Eichler, *Fl. Australia* 2: 461 (2007).

Illustrations: M.Stones & W.M.Curtis, *Endemic Fl. Tasmania* 3: t. 52A (1971); R.Melville, *Kew Bull.* 1955: 209, fig. 12 (14–19); Y.Menadue & R.K.Crowden, *Pap. Proc. Roy. Soc. Tasmania* 123: 88, fig. 1E; 92, fig. 3J; 94, fig. 5I (1989).

Shortly rhizomatous perennial; roots fibrous or fleshy, not tuberous. Leaf rosettes usually crowded. Leaves with lamina narrowly linear, 3–6 cm long, c. 1 mm wide, distally terete or flattened, simple or trifurcate with narrowly linear segments each with an apical or subapical hydathode, glabrous or with a few scattered hairs. Flowering stems 1-flowered, shorter than leaves, recurved when fruiting. Sepals 5, \pm glabrous, caducous. Petals 5, cream to pale greenish yellow, narrowly lanceolate to narrowly elliptic, 5–6.5 mm long; nectary c. 0.7–2.0 mm above petal-base, a lobeless semilunar pit. Stamens 10–15. Pistils 10–15. Receptacle sparsely hairy throughout. Achenes lenticular, obovate to semiorbicular, 3–4.5 mm long, smooth; beak short, recurved. $2n = 16$, Y.Menadue & R.K.Crowden, in Á.Löve (ed.), *Taxon* 34: 551 (1985). Fig. 60D–E.

Occurs locally on the mountains of the Western Tiers and on the Ben Lomond plateau, Tas.; in bogs and depressions subject to intermittent flooding and in small streams; 1100–1400 m alt. Flowers late Oct.–Jan., often flowering and fruiting under water. Map 376.

Tas.: Pine L., N of Great L., *Hj.Eichler 16980* (CANB); Menamatta Tarns, Ben Lomond, *A.Moscal 22456* (HO).

36. *Ranunculus anemoneus* F.Muell., *Defin. Austral. Pl.* 20 (1855)

T: summit of the Munyang mountains, Australian Alps, N.S.W., *F.Mueller*; lecto: MEL (photo CANB); isolecto: K (photo CANB), MEL (photo CANB), *fide* Hj.Eichler, *Fl. Australia* 2: 461 (2007).

Illustrations: F.Mueller, *Pl. Victoria* 1: t. 1 (1862); A.B.Costin *et al.*, *Kosciuszko Alpine Fl.* figs 173–176 (1979); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: pl. 10, 161 (1990).

Shortly rhizomatous erect, robust perennial; rootstock thick. Basal leaves with petioles 4–28 cm long, glabrous to pilose; lamina orbicular, 5–8 (–13) cm diam., deeply palmately 3–5-cleft, with segments digitately split into spreading and \pm overlapping coarsely dentate lobes, glabrous to pilose above, glabrous to subsericeous below; cauline leaves stem clasping, the lowermost similar to basal leaves, the upper smaller with narrower segments. Flowering stems 1–4-flowered, c. 15–35 cm or more high; pedicels pilose or subglabrous. Sepals 5–7, ovate, 1–1.5 cm long, acute, obtuse, apiculate or variably toothed or notched at apex, sericeous below. Petals usually 15–35, white, narrowly obovate or obovate-cuneate, 1.5–3 cm long; nectary near petal-base, a lobeless, shallow circular to oblong pit. Stamens c. 55–100. Pistils c. 120–170. Receptacle glabrous to sparsely pilose throughout. Achenes \pm obovate, c. 3 mm long, turgid, smooth; beak 2–2.5 mm long, straight or recurved. Plate 57; Fig. 58A–D.

Restricted to the Kosciuszko plateau of the Snowy Mtns, N.S.W.; in alpine herbfields and sub-alpine woodland, often near persistent snowpatches. Flowers in early summer. Map 377.

N.S.W.: c. 7.5 km E of Mt Kosciuszko, western slope above Trapyard Ck, *Hj.Eichler 13511* (AD, CANB); near L. Cootapatamba, Mt Kosciuszko, *Hj.Eichler 13519* (AD, CANB); Charlottes Pass, *H.U.Stauffer 5472* (AD, BRI, G, MEL).

Cattle and sheep had almost grazed *R. anemoneus* to extinction around Mt Kosciuszko, however, elimination of livestock from Kosciuszko Natl Park has led to a remarkable recovery of this spectacular species. J.Stirling (*Victoria Naturalist* 4: 72–74, 1887) noted the species as being present but endangered by grazing at Mt Hotham in Vic. where it no longer occurs. No specimens supporting Stirling's observation appear to exist, but it is unlikely that he could have mistaken it for any other alpine herb. Its closest affinities are with some alpine New Zealand species, especially with *R. buchananii* Hook.f.

37. *Ranunculus gunnianus* Hook., *J. Bot. (Hooker)* 1: 244, t. 133 (1834)

T: summit of the Western tier of mountains, Tas., *Mr Gunn* 276; holo: K (photo CANB).

Illustrations: A.B.Costin *et al.*, *Kosciuszko Alpine Fl.* fig. 186 (1979); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 161 (1990); M.G.Corrick & B.A.Fuhrer, *Wildfl. Victoria*, 193, fig. 680 (2000).

Tufted perennial; roots fleshy-fibrous; rootstock thick, erect or creeping. Leaves with petioles 2.5–20 cm long, \pm sericeous at base; lamina \pm ovate in outline, 1.5–6 cm long, 2–3-times pinnately divided into few–many subterete sulcate or linear to linear-lanceolate segments, often subfasciculate, mostly c. 1 mm diam., with scattered long hairs or glabrescent, each with a small terminal hydathode. Flowering stems 1-flowered, 5–25 cm high, sparsely pilose to villous. Sepals 5–7, spreading, obovate to oblong, 6–15 mm long, glabrous or pilose beneath, usually tinged purple. Petals 5–13, narrow-elliptic or obovate, 10–25 mm long, shining golden-yellow, pale purple below; nectaries near petal-base, lobeless, in shallow pits or superficial, 3 (–7) per petal. Stamens c. 40–75. Pistils c. 20–60. Receptacle glabrous. Achenes obovoid-oblong, c. 2.5 mm long, plump, smooth; beak \pm straight, 1–1.5 mm long. $2n = 48$, Y.Menadue & R.K.Crowden, in Å.Löve (ed.), *Taxon* 34: 551 (1985). Plate 55; Fig. 64D–F.

Occurs on the Mt Kosciuszko plateau, N.S.W., the eastern highlands of Vic., including Mt Baw Baw, and in Tas. on mountain tops above 1000 m; in bogs, herbfields, damp grass-land and, occasionally, subalpine woodland. Flowers late Oct.–Jan. Map 378.

N.S.W.: slope above L. Cootapatamba near Rawson Pass, Mt Kosciuszko area, *Hj.Eichler* 13517 (AD, CANB). Vic.: near Cope Hut, Bogong High Plains, *L.A.Craven* 1915 & *K.L.Gunn* (CANB, MEL); Mt Buffalo, valley E of The Horn, *R.Melville* 2565 (AD, BRI, MEL, NSW). Tas.: summit of Cradle Mtn, *Hj.Eichler* 16505 (CANB, HO); northern end of Ben Lomond Natl Park, above the ski village, *W.R.Barker* 1110 (AD).

Plants from Cradle Mountain – Mt Rufus areas and mountains of the SW in Tas. (e.g. Mt LaPerouse, Mt Anne) are distinctive in having broader (to c. 2 mm wide), \pm flattened ultimate leaf segments than do those seen from other Tasmanian and mainland localities. Plants in many areas may not flower for several years, appearing to require heavy snowfall or late snow-melt to initiate flowering.

F.Mueller, *Pl. Victoria* 1: 9 (1862), based his *Ranunculus* sect. *Pseudadonis* solely on *R. gunnianus*, which is unique in Australia in having several, usually 3, nectary-pits near the petal-base, a feature it shares with the New Zealand *R. sericophyllus* Hook.f. *Ranunculus sericophyllus* is reported to hybridise with several alpine New Zealand species. Nevertheless, *R. gunnianus* and *R. sericophyllus*, both with similar \pm repeatedly pinnatifid leaves, seem to be related and form together a natural group which does not appear to be represented in South America.

38. **Ranunculus repens* L., *Sp. Pl.* 1: 554 (1753)

T: Herb. Linn. No. 715.52; lecto: LINN, *fide* L.Benson, *Amer. Midl. Naturalist* 52: 336 (1954).

Illustrations: J.Damboldt, in G.Hegi, *Ill. Fl. Mitt.-Eur.* 2nd edn, 3/3: t. 120 (2); 266, fig. 174 (1974); Hj.Eichler, in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 1: 351, fig. 198 (D) (1986); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 164 (1990).

Stoloniferous perennial; roots fibrous; stolons robust, mostly above ground, rooting at nodes. Basal leaves very variable; petiole 2–35 cm long; lamina triangular-ovate, 2–15 cm long, trifoliate; leaflets \pm petiolulate, broadly ovate, entire and irregularly toothed, or further \pm ternately (sometimes \pm biternately) dissected, subsericeous, pilose or \pm glabrous. Uppermost stem-leaves sessile, linear-lanceolate, entire. Flowering stems 1–3 (–5)-flowered, 15–75 cm high, pilose to subsericeous. Sepals 5, appressed or spreading, ovate to broad-elliptic, 5–8 mm long, pubescent below. Petals usually 5, broadly obovate, 6–15 mm long, 5–10 mm wide, yellow, glossy; nectary near petal-base, with lobe obovate to cuneate, 1–2 mm long, free for most of this length. Stamens 35–75. Pistils c. 20–50. Receptacle hispid. Achenes \pm orbicular, 2.5–3.5 mm long, strongly laterally compressed, glabrous, finely punctulate, distinctly margined; beak c. 1 mm long, straight or curved. $2n = 32$, B.G.Briggs *Telopea* 9(4): 835 (2002). *Creeping Buttercup*.

Native in Eurasia. Introduced to Australia probably as a garden ornamental, now naturalised in the southern Mt Lofty Ra., S.A., south-eastern Qld, the tablelands and coastal regions of N.S.W., A.C.T., southern and eastern Vic., and settled parts of Tas., well established and spreading in moist places in fertile soil, in disturbed forests, farmland, roadside ditches and in wasteland. Flowers Oct.–Mar. Map 379.

S.A.: Stirling West, 4 Dec. 1964, *E.H. Ising* (AD, CANB). Qld: Holt Park, Mt Tamborine, *A.R. Bean* 16828 (BRI, MEL). N.S.W.: Sandy Ck, Booral-Bulahdelah Rd, *A. Rodd* 2352 (NSW). A.C.T.: L. Burley Griffin, *I.R. Telford* 10833 (AD, CANB, MEL, NSW). Vic.: Chapple Vale-Lavers Hill road, *I.C. Clarke* 2169 (AD, BRI, CANB, HO, MEL, NSW). Tas.: Wolfes Rd, Leslie Vale, *A.M. Buchanan* 14876 (HO).

39. **Ranunculus acris* L., *Sp. Pl.* 1: 554 (1753)

subsp. *acris*

T: Herb. Clifford: 231, *Ranunculus* 18; lecto: BM, *vide* L. Benson, *Amer. Midl. Naturalist* 52: 337 (1954).

Illustrations: S. Ross-Craig, *Drawings Brit. Pl.* 1: t. 29 (1948); J. Damboldt, in G. Hegi, *Ill. Fl. Mitt.-Eur.* 2nd edn, 3/3: t. 120 (3); 275, figs 179, 180; 277, fig. 181 (1974).

Erect rhizomatous perennial. Basal leaves with petioles 3–28 cm long; lamina ±orbicular to reniform in outline, 3–15 cm diam., ±palmately (3–) 5–7-partite; segments ovate-cuneate, usually ±3-fid, irregularly serrate to lacinate, glabrous, pilose or hirsute; cauline leaves simpler, with shorter petioles or the uppermost sessile. Flowering stem usually much branched with many flowers, 30–70 cm high. Sepals 5, ovate, 3–5 mm long, appressed to petals, pubescent beneath. Petals broadly obovate, 6–11 mm long, golden-yellow, glossy; nectary virtually at petal-base, with lobe obovate to cuneate, c. 1 mm long, free for almost entire length. Stamens c. 40–75. Pistils c. 25–60. Receptacle glabrous. Achenes ±orbicular 2–3.5 mm long, marginate, weakly biconvex, smooth; beak 0.2–0.5 mm long, straight or slightly curved. $2n = 14$, Y. Menadue (1986), unpublished.

Indigenous to Eurasia. Naturalised in north-eastern America, S Africa, New Zealand, south-eastern Vic. and south-eastern and north-western Tas., in pasture and disturbed habitats in cool, moist areas. Flowers Oct.–Mar. Map 380.

Vic.: 4 km S of Poowong, 28 Feb. 1994, *R. Jackson* (HO, MEL). Tas.: Balfour, *A. Moscal* 4785 (AD, HO, MEL).

Australian specimens are referable to the typical subspecies which is distinguished chiefly by having a shortly creeping rhizome and deeply divided leaves (S.M. Coles, *Watsonia* 8: 237–261 (1971)).

40. **Ranunculus sardous* Crantz, *Stirp. Austr.* Fasc. 2: 84 (1763)

T: Austria, Europe, *coll. unknown*; holotype probably at BP *n.v.*

Ranunculus angulatus C. Presl in J. & C. Presl, *Delic. Prag.* 7 (1822); *R. sardous* var. *angulatus* (C. Presl) Glück, *Biol. Morph. Untersuch. Wasser-Sumpfgewächse* 3: 501 (1911). T: Czech Republic, Prague, *coll. unknown*; holotype: ?PR *n.v.*

[*Ranunculus pholinotus* auct. non Retz: G. Benth, *Fl. Austral.* 1: 15 (1863)]

Illustrations: S. Ross-Craig, *Drawings Brit. Pl.* 1: t. 32 (1948); J. Damboldt, in G. Hegi, *Ill. Fl. Mitt.-Eur.* 2nd edn, 3/3: 263, fig. 172 (1974); N.G. Walsh, in N.G. Walsh & T.J. Entwistle (eds), *Fl. Victoria* 3: 45, fig. 5b (1996).

Erect, pilose to rarely subglabrous annual (rarely developing short stolons in very wet sites); roots fibrous. Basal leaves with petioles 6–32 cm long; lamina triangular-ovate in outline, 2–8 cm long, deeply 3-lobed or trifoliate, sometimes distinctly petiolulate; leaflets irregularly cut or toothed or crenate; cauline leaves shortly stalked or sessile and less divided. Flowering stem 5–18-flowered, hollow, 10–50 cm high. Sepals 5, reflexed, ovate, 4–7 mm long. Petals obovate, 8–14 mm long, pale yellow; nectary near petal-base, with lobe obovate to cuneate, c. 1 mm long, attached only at base. Stamens c. 40–60. Pistils 30–40. Receptacle hairy. Achenes in slightly elongated head, flattened, suborbicular, 2–2.5 mm long, greenish brown; faces with small obtuse tubercles near green margin, rarely smooth or evenly tuberculate; beak c. 0.5 mm long, curved upwards. $2n = 48$, Y. Menadue & R.K. Crowden, in Á. Löve (ed.), *Taxon* 34: 551 (1985). Fig. 65G–J.

Native of Europe and most Mediterranean countries of N Africa. Occurs near Mt Compass, S.A., south-central N.S.W., in the Goulburn R. valley and Gippsland, Vic., and in northern Tas. (including King Is.); usually in irrigated pasture, ditches and other water-retentive places. Flowers Oct.–Mar. Map 381.

S.A.: Nangkita-Finnis R area, *R.J.Bates* 266637 (AD, CANB, MEL). N.S.W.: Glenquarry near Moss Vale, *E.J.McBarron* 14967 (NSW). Vic.: c. 1.5 km N of Katamatite, 10 Jan. 1993, *A.George* (MEL); c. 4 km SE of Heyfield, 18 Oct. 1995, *R.B.Jackson* (CANB, MEL, NSW). Tas.: Balfour, *A.Moscal* 4786 (HO).

Williamson 1498 (MEL) from Port Franklin, Vic., differs from other Australian specimens seen in having quite smooth achenes. This form was previously known as *R. sardous* var. *angulatus* (C.Presl) Glück, and noted as such by A.J.Ewart (*Fl. Victoria* 512 (1931)), but contemporary European botanists now include this under *R. sardous* s. str.

41. **Ranunculus trilobus* Desf., *Fl. Atlant.* 1: 437, t. 113 (1798)

T: near Mayane [N. Africa], coll. unknown; holo: P n.v.

[*Ranunculus trachycarpus* auct. non Fisch. & C.A.Mey. (1837): J.M.Black, *Fl. S. Australia* 2nd edn, 2: 363 (1948)]

Illustrations: S.Pignatti, *Fl. d'Italia* 1: 313 (1982); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 165 (1990); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 45, fig. 5c (1996).

Erect or slightly spreading annual, glabrous or sparsely pilose; roots fibrous. Leaves with petioles 2–10 cm long, sparsely hairy; first basal leaves with lamina suborbicular, 1–4 cm long, entire or shallowly ternately divided, later leaves deeply ternately dissected to trifoliolate, segments cuneate-obovate, dentate or more deeply lobed; upper cauline leaves and bracts usually with linear-oblong segments. Flowering stems 20–80 cm high, several-many-flowered. Sepals 5, ovate, 3–5 mm long, reflexed, glabrous or sparsely pilose beneath. Petals (3–) 4 or 5, elliptic to obovate, 4–8 mm long, golden-yellow; nectary virtually at petal-base, with lobe cuneate to obovate, 0.5–1 mm long, free for more than half this length. Stamens 10–20. Pistils 18–50. Receptacle hispid. Achenes in a slightly elongated head, ovate-orbicular, 2.5–3.5 mm long, flat; faces brown, with many small conical-hemispherical tubercles; margins narrowly keeled, green; beak narrowly triangular, scarcely c. 0.5 mm long, recurved. $2n = 48$, D.Goepfert, *Bot. Not.* 127: 474 (1974). *Large Annual Buttercup*. Fig. 65A–C.

Native in Atlantic south-western Europe and north-western Africa. Naturalised locally near Perth, W.A., south-eastern S.A., Leeton district N.S.W., mid-Murray River area and between Horsham district and Melbourne, Vic., and the upper Derwent Valley, Tas.; moist depressions, roadsides, alluvial flats and irrigated land. Flowers Sept.–Mar. Map 382.

W.A.: Hope Valley, S of Fremantle, *R.A.Saffrey* 95 (AD, PERTH). S.A.: Mt Lofty summit estate, along Vantage Way, *Hj.Eichler* 17047 (AD, CANB). N.S.W.: Jerry Jerry State Forest, *G.Burrows* 13b (NSW). Vic.: Ovens River Flora Reserve, *A.C.Beaglehole* 81667 (HO, MEL, NSW). Tas.: Glenora, June 1973, *D.I.Morris* (CANB, HO).

42. **Ranunculus arvensis* L., *Sp. Pl.* 1: 555 (1753)

T: Herb. Linn. No. 715.65; lecto: LINN, fide L.Benson, *Amer. Midl. Naturalist* 52: 345 (1954).

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 1: t. 34 (1948); J.Damboldt, in G.Hegi, *Ill. Fl. von Mitt.-Eur.* 2nd edn, 3/3: t. 119 (4); 261, figs 170, 171 (1974); B.Krása, in S.Hejn & B.Slavík (eds), *Kvetena České Socialistické Republiky* 1: 435, t. 81, fig. 2 (1988).

Erect, sparsely pilose annual; roots fibrous. Lower leaves with petioles 1.5–7 cm long; lamina obovate or broadly spatulate, 2–4 cm long; stem-leaves trifoliolate or biternate, with obovate or linear-elliptical segments. Flowering stems 3–7 (–15)-flowered, 15–60 cm high, pedicels with sparse, recurved hairs. Sepals 5, spreading, ovate, 5–7 mm long, pale yellowish green, pilose beneath. Petals 5, obovate, 7–10 mm long, bright lemon-yellow; margins minutely ciliate; nectary near petal-base, with lobe cuneate or obovate, wider than petal just above its attachment, 1–2 mm long, free for up to half this length. Stamens 10–12. Pistils 6–12. Receptacle hirsute. Achenes broadly obovate, 6–8 mm long, strongly flattened; lateral faces with prominent spine-like tubercles to 3 mm long, longer near margins; beak 2–3 mm long, erect, straight to falcate. *Corn Buttercup*.

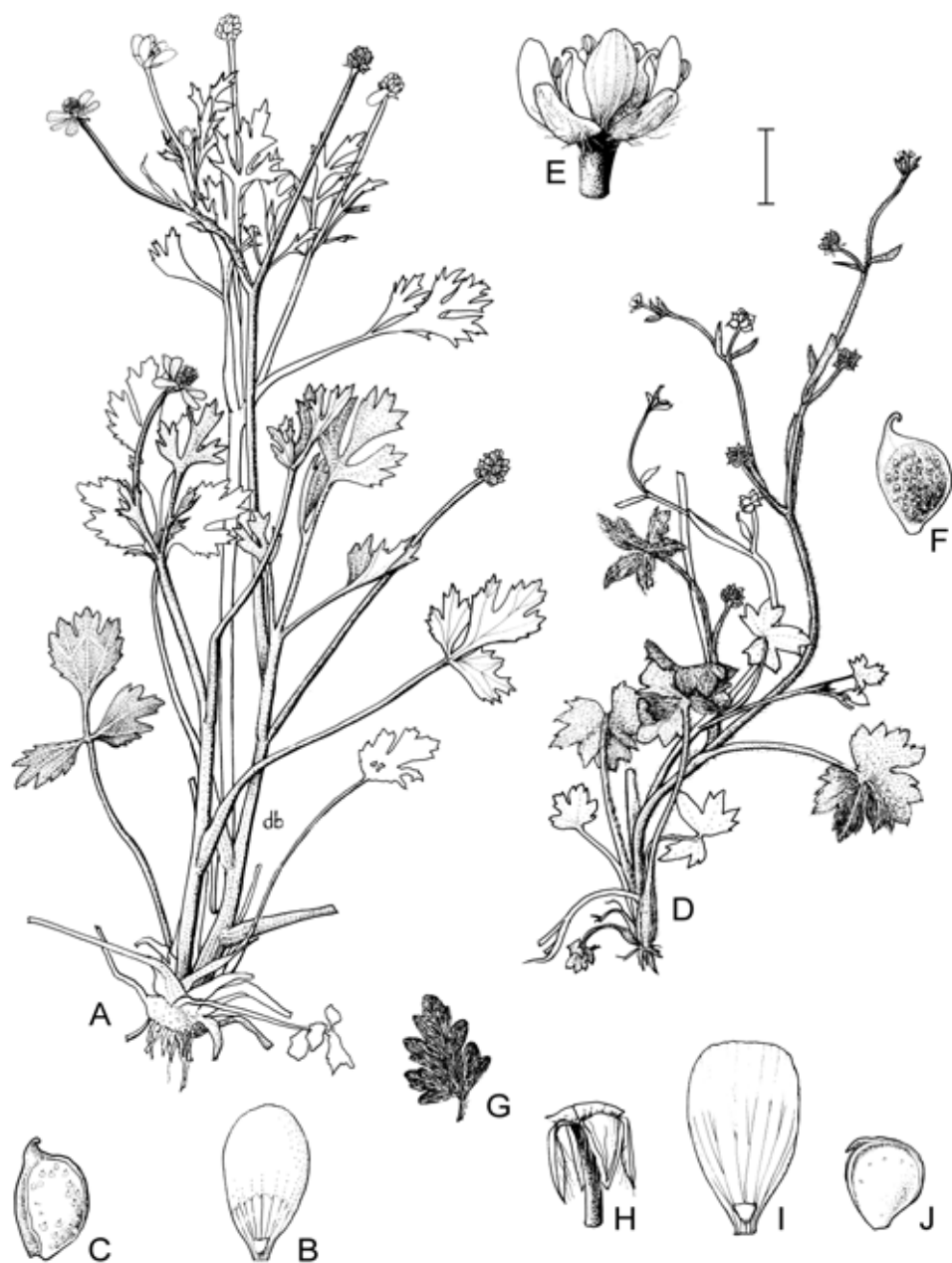


Figure 65. *Ranunculus*. **A–C**, *R. trilobus*. **A**, habit; **B**, petal; **C**, nutlet (**A–C**, H.Eichler 17047, CANB). **D–F**, *R. parviflorus*. **D**, habit; **E**, young flower; **F**, nutlet (**D–F**, A.Orchard 1839, CANB). **G–J**, *R. sardous*. **G**, stem leaf; **H**, calyx with reflexed sepals; **I**, petal; **J**, nutlet (**G–J**, K.Czornij 442, CANB). Scale bar: **A**, **D**, **G** = 20 mm; **B**, **E**, **H**, **I** = 4 mm; **C**, **F**, **J** = 2.5 mm. Drawn by D.Boyer.

Native of southern Europe, south-western Asia and northern Africa. Weakly and perhaps transitorily established as a weed of agriculture in south-eastern S.A., N.S.W. (Glen Innes district, first noted in 1949, persisting until at least 1978; Temora), and from northern Tas. Apparently not persistent in S.A. or Tas. Flowers Sept.–Oct. Map 383.

S.A.: Border Town, Nov. 1883, *S.Dixon* (AD). N.S.W.: New England Expt. Farm, Glen Innes, 24 Nov. 1949, *F.C.Butler* (NSW). Tas.: Cressy, 2 Jan. 1974, *B.Hyde-Wyatt* (HO).

Closely related to *R. muricatus* L. from which it differs in its spreading sepals, paler petals, deeply divided cauline leaves and more prominently spiny achenes.

43. **Ranunculus muricatus* L., *Sp. Pl.* 1: 555 (1753)

T: Herb. Linn. No. 715.66; lecto: LINN, *fide* A.Lourteig, *Darwiniana* 9: 487 (1951).

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales*: 310 (1982), as *Sharp Buttercup*; B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 165 (1990); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 45, fig. 5d (1996).

Suberect or spreading annual, glabrous to pilose. Basal leaves with petioles 5–15 cm long; lamina ±orbicular, 1.5–5 cm long, ±cordate, with 3–5 shallow rounded coarsely crenate-dentate lobes. Upper cauline leaves ±cuneate, with 3 narrow, entire or toothed segments. Flowering stems 10–50 cm high, 1–10-flowered. Sepals 5, strongly reflexed, ovate, c. 5 mm long, sparsely pilose below. Petals 5, obovate, 7–9 mm long, slightly longer than sepals, yellow; nectary near petal-base, with lobe obovate to cuneate, 1–2 mm long, free for up to half this length. Stamens 15–20. Pistils 8–20. Receptacle pubescent. Achenes broadly obovate, 5–8 mm long, flattened, brown; margin strongly keeled and grooved, smooth, green; faces with numerous short, acute tubercles (rarely almost smooth); beak stout, 2–3 mm long, nearly straight. $2n = 64$, Y.Menadue & R.K.Crowden in A.Löve (ed.), *Taxon* 34: 551 (1985). *Sharp Buttercup*, *Burr Buttercup*, *Prickle-fruit Buttercup*.

Native to the Mediterranean region. Naturalised in all States and Territories except N.T.; in W.A. scattered between Gin Gin and Albany areas; scattered in SE Qld (N to near Nambour), otherwise common near settlements in cooler districts; a weed of damp waste places and croplands, and occasionally lake and stream margins in native vegetation. Flowers Aug.–Mar., but mainly in spring. Map 384.

W.A.: Muchea townsite, 0.5 km along Carl St, *R.J.Cranfield* 5034 (CANB, PERTH). S.A.: Yallum, c. 15 km W of Penola, *D.Hunt* 2491 (AD, CANB). Qld: Indooroopilly, *L.Pedley* 1410 (BRI, CANB). N.S.W.: Barton Hwy, Jeir Ck crossing, *E.M.Canning* 6535 (CANB, MEL, NSW, P, US). A.C.T.: near Barton Hwy, c. 1.6 km N of Lyneham, *L.G.Adams* 732 (CANB, NAQ). Vic.: 10.1 km SW of Dunkeld, *P.C.Jobson* 3956 (BRI, CANB, MEL, NSW). Tas.: University of Tasmania, Sandy Bay, 10 Nov. 1984, *Y.Menadue* (HO, MEL, NSW).

44. **Ranunculus parviflorus* L., *Syst. Nat.* 10th edn, 2: 1087 (1759)

T: Herb. Linn. No. 715.67; lecto: LINN, *fide* L.Benson, *Amer. Midl. Naturalist* 52: 348 (1954).

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 1: t. 3 (3) (1948); H.J.Eichler in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 1: 349, fig. 197G (1986); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 47, fig. 6a (1996).

Decumbent to ascending annual, sparsely to densely pilose. Basal leaves with petioles 3–10 cm long; lamina orbicular-reniform, 1.5–4 cm diam., palmately 3–5-lobed, with lobes coarsely toothed, hairy on both surfaces. Cauline leaves similar, lobes often narrower; uppermost leaves often entire, ±sessile. Flowering stems 10–40 cm high, 2–10-flowered. Sepals 5, reflexed, ovate, c. 2 mm long, densely pilose below. Petals 2–5, obovate, 2–3 mm long, pale yellow; nectary near petal-base, with lobe ±ovate, c. 0.4 mm long, free above midway. Stamens 5–8. Pistils 6–24. Receptacle glabrous. Achenes orbicular-ovate, 2.5–3 mm diam., brown; margin paler, narrow-keeled; faces ±evenly covered with short tubercles, each terminated by a short hooked bristle; beak triangular or hooked at apex, c. 0.5 mm long. $2n = 28$, D.Goepfert, *Bot. Not.* 127: 479 (1974). *Small-flowered Buttercup*. Fig. 65D–F.

Native in Atlantic Europe and the Mediterranean region. Naturalised in scattered localities in south-eastern S.A., Vic. and Tas.; also on Lord Howe and Norfolk Is.; a weed in moist wasteland, pasture, gardens and roadsides. Flowers Aug.–Feb. Map 385.

S.A.: Mt Lofty Ra., Prairie c. 4 km SW of Chain of Ponds, *A.E.Orchard* 1839 (AD, CANB). Vic.: Walhalla, 30 Dec. 1964, *B.G.Briggs* (MEL, NSW); S Gippsland, Billys Ck, extension to the Morwell Natl Park, 27 Nov. 1988, *K.Harris* (CANB, MEL). Tas.: Hobart, Knocklofty quarry, 8 Oct. 1982, *Y.Menadue* (CANB, HO).

45. *Ranunculus hamatosetosus* H.Eichler, *Trans. Roy. Soc. S. Australia* 81: 180, figs 1, t. 2 (1) (1958)

T: northern Flinders Ra., Gammon Ra., Arcoona Bluff Ra., N of Arcoona Pound, S.A., *Hj.Eichler* 12633; holo: AD (photo CANB); iso: CANB, K, L, NSW, P, UC.

Illustrations: *Hj.Eichler, loc. cit.*; *Hj.Eichler*, in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 1: 349, fig. 197A (1986).

Slender annual, 3–25 cm high; stems simple or branching from base, \pm densely pilose at least near base. Adult leaves with petioles 1–6 cm long; lamina reniform to \pm semiorbicular in outline, 5–25 mm long, deeply trifid, with median segment entire or coarsely 3-dentate and lateral segments 2-lobed, each lobe up to 3-toothed. Lower pedicels (when fruiting) 7–30 mm long, upper flowers almost sessile. Sepals 3, 2–2.5 mm long, pilose below. Petals 0–2, oblong, c. 2–2.25 mm long, 1- or 2-nerved; nectary-scale above middle of petal, minute, semielliptic to semiorbicular. Stamens 4 or 5. Pistils 10–17. Receptacle glabrous. Achenes obliquely ovate, 3–5 mm long, virtually flat, \pm stipitate; margin thickened, smooth; lateral faces with 15–20 long bristles each terminated by a short curved hair; beak triangular, slightly curved, up to half total achene length, terminating in a short hook. Fig. 66G–I.

Occurs in the Gawler, Flinders and Mt Lofty Ranges, S.A.; in shady, humid places, often between rocks and along creek beds. Flowers July–Sept. Map 386.

S.A.: Scrubby Peak waterfall, Gawler Ra., *R.Bates* 3361 (AD); Hiltaba Stn, *B.J.Blalock* 1897 (AD); Corunna Hill, *R.J.Chinnock* 1824 & *B.Copley* (AD, CANB); Mambray Ck, c. 45 km SE of Port Augusta, *Hj.Eichler* 17644 (AD, CANB); Mt Hack, *T.R.N.Lothian* 5251 (AD, MEL).

46. *Ranunculus sessiliflorus* R.Br. ex DC., *Syst. Nat.* 1: 302 (1817)

T: circa Port-Jackson [near Sydney], N.S.W., *R.Brown*; holo: G-DC (photo CANB); iso: BM (photo CANB), CANB 278203, L. [R.Melville, in *Kew Bull.* 11: 283 (1957), designated the L sheet as holotype, but there is no evidence that De Candolle saw this specimen.]

Ranunculus parviflorus var. *australis* Benth., *Fl. Austral.* 1: 14 (1863), *p.p.* (*R. sessiliflorus*, *R. collinus*, *R. pumilio*, *R. leptocaulis* and *R. pilulifer* are quoted as synonyms); lecto: *R. sessiliflorus* R.Br. ex DC, *fide* *Hj.Eichler, Fl. Australia* 2: 461 (2007).

[*Ranunculus parviflorus* auct. non L.: J.M.Black, *Fl. S. Australia* 2nd edn, 2: 363 (1948), *p.p. maj.*]

Slender annual, 2–35 cm high, sparingly to \pm densely pilose on lower part; stems usually branched near base. Adult leaves with petioles 2–5 cm long; lamina palmatisect or trifoliate, 4–15 mm long, the median segment 3-dentate, the lateral \pm 2-fid with 3 or 4 teeth to each lobe. Flowers leaf-opposed, subsessile, the lower ones occasionally shortly pedicellate with fruiting pedicels to 1.5 cm long. Sepals 3 or 4, oblong to elliptic, c. 2 mm long, pilose below. Petals 0–2, elliptic- to linear-spathulate, 1–2 mm long; nectary lobe above middle, minute, \pm triangular, obtuse. Stamens 3–6. Pistils 6–20. Receptacle glabrous. Achenes suborbicular to obovate, 1.3–2.5 mm long, virtually flat; lateral faces each bearing 7–25 conical tubercles terminated by a recurved bristle; beak short-triangular, 0.3–0.5 (–1) mm long, \pm acute. (*Australian*) *Smallflower Buttercup*.

Found in all States and Territories except N.T. Two varieties are recognised.

Leaves palmatilobed or palmatisect or 3- or 5-fid, but not distinctly compound;
leaf segments cuneate to flabelliform

46a. var. *sessiliflorus*

Leaves trifoliate; leaflets cut into linear to narrowly lanceolate segments

46b. var. *pilulifer*

46a. *Ranunculus sessiliflorus* R.Br. ex DC. var. *sessiliflorus*

Illustrations: R.Melville, *Kew Bull.* 11: 278, fig. 1A–C; 283, fig. 5 (1–15) (1957); *Hj.Eichler, Trans. Roy. Soc. S. Australia* 81: t. 1, fig. 2 (1958); T.D.Stanley & E.M.Ross, *Fl. SE Queensland* 1: 173, fig. 23E (1984).

Leaves with lamina palmately lobed or dissected, or 3- or 5-fid, not distinctly compound; segments cuneate, elliptic or ±flabelliform, typically broader than 2 mm. $2n = 14$, Y. Menadue & R.K. Crowden, in Á. Löve (ed.), *Taxon* 34: 551 (1985). Fig. 66D–F.

Occurs in southern W.A. in scattered locations. Widespread in south-eastern Australia: in eastern S.A. and from south-eastern Qld through the Great Dividing Ra., N.S.W., throughout Vic. and in Tas. (mostly eastern and uncommon); in semi-arid areas mostly along creeks and in other moist sheltered sites, otherwise occupying a range of habitats, e.g. grassland, woodland, from near sea-level to subalps, often in rocky country. Flowers Aug.–Mar., mainly Sept.–Oct. Map 387.

W.A.: Hamelin Bay, *Hj. Eichler 23031* (CANB, PERTH). S.A.: Northern Flinders Ra., Gammon Ra., First Ck E of Loch Ness Well, *Hj. Eichler 12934* (AD, CANB). Qld: The Gap, Brisbane, *S.T. Blake 20481* (BRI, NSW). N.S.W.: Wingen Maid Nature Reserve, *J.R. Hosking 2075* (CANB, MEL, NE, NSW). A.C.T.: Black Mtn, *M. Gray 5543* (CANB). Vic.: Greta West, *J.R. Hosking 1751* (CANB, MEL, NE, NSW). Tas.: Tippogoree Hills, East Tamar, *P. Collier 2637* (HO).

Occasional specimens from Qld, N.S.W., A.C.T., Vic. and Tas. have achenes with relatively long (0.5–1 mm), flat beaks and, frequently, more prominent tubercles. In these features they show a slight approach to *R. hamatosetosus* (which is not known from these areas). There appears to be no clear distributional or ecological pattern to this form however, and it seems to be merely an aberrant form of *R. sessiliflorus* var. *sessiliflorus* with the typical form of which it invariably occurs.

46b. *Ranunculus sessiliflorus* var. *pilulifer* (Hook.) Melville, *Kew Bull.* 11: 278, fig. 1G, fig. 5 (16–23) (1957)

Ranunculus pilulifer Hook., *Icon. Pl.* 6 (12): t. 600 (1843); *R. pumilio* var. *pilulifer* (Hook.) Hook.f., *Fl. Tasman.* 1: 10 (1855). T: Swan River settlement, W.A., *J. Drummond* 9; holo: K (photo CANB).

[*Ranunculus parviflorus* var. *australis* auct. non Benth.: G. Benth., *Fl. Austral.* 1: 14 (1863), p.p. (*R. pilulifer* is quoted as a synonym; lectotype excluded, see under *R. sessiliflorus*)]

Illustrations: R. Melville, loc. cit.; Hj. Eichler, *Trans. Roy. Soc. S. Australia* 81: t. 1, fig. 2 (1958); B.G. Briggs & R.O. Makinson, in G.J. Harden (ed.), *Fl. New South Wales* 1: 166 (1990).

Leaves with lamina trifoliolate; leaflets cut into linear to narrowly lanceolate segments generally 0.5–1.5 mm wide.

Occurs in W.A., south-eastern S.A., south-eastern Qld, N.S.W. and north-western Vic. Largely co-extensive with var. *sessiliflorus* (but apparently absent from A.C.T. and Tas.), usually in drier habitats, and generally less common. Flowers June–Oct. Map 388.

W.A.: Cowalleup Rock, 16 km SSE of Ongerup, *K. Newbey 6237* (PERTH). S.A.: Dangali Conservation Park (c. 1 km W of Tipperary Dam), *B.J. Conn 947* & *W.R. Barker* (AD). Qld: 24 km NW of Talwood, *S.L. Everist 5930* (BRI). N.S.W.: Tundulya, 40 km SE of Louth, *C.W.E. Moore 3981* (BRI, CANB, NSW). Vic.: Groggal Swamp, c. 3 km E of Miram (near Kaniva), 10 Dec. 1958, *A. Hicks* (AD, MEL).

Ranunculus sessiliflorus var. *pilulifer* may deserve the rank of species (*R. pilulifer* Hook.). Alternatively, its striking vegetative resemblance to *R. pumilio* has prompted suggestions that it may be a result of hybridisation between *R. sessiliflorus* and *R. pumilio*.

47. *Ranunculus pumilio* R.Br. ex DC., *Syst. Nat.* 1: 271 (1817)

T: Tasmania, hab. in terrâ Van-Diemen, *R. Brown*; holo: G-DC (photo CANB); iso: BM (photo CANB); L (as *Montis Tabularis*, *Brown Iter Austral.* 5257) n.v., fide R. Melville, *Kew Bull.* 11: 285 (1957).

Ranunculus leptocaulis Hook., *J. Bot. (Hooker)* 1: 244 (1834). T: swamps, Tas., *Mr Gunn 230*; holo: K (photo CANB).

[*Ranunculus parviflorus* var. *australis* auct. non Benth.: G. Benth., *Fl. Austral.* 1: 14 (1863), p.p. (*R. pumilio* and *R. leptocaulis* are quoted as synonyms; lectotype excluded, see under *R. sessiliflorus*)]

Slender annual, 1–40 cm high, ±densely pilose at least in lower part; stems branched from base. Adult leaves: petioles 1–7.5 cm long; lamina trifoliolate or palmatisect, 0.5–2.5 cm long, with lobes cut into ±oblong to linear, acute segments mostly 0.5–1.5 mm wide. Flowers mostly pedicellate (upper flowers sometimes sessile); pedicels 3–15 mm long (to 5 cm in fruit).



Figure 66. *Ranunculus*. A–C, *R. pumilio* var. *pumilio*. A, flower; B, leaf (A–B, N.Burbidge 6523, CANB); C, nutlet (L.Craven 2509, CANB). D–F, *R. sessiliflorus* var. *sessiliflorus*. D, habit; E, flower; F, nutlet (D–F, H.Eichler 12934, CANB). G–I, *R. hamatosetosus*. G, habit; H, flower; I, nutlet (G–I, H.Eichler 17644, CANB). J–L, *R. pentandrus* var. *platycarpus*. J, habit (H.Eichler 18290, CANB); K, flower; L, nutlet (K–L, H.Aston 2438, CANB). Scale bar: A, C, E, F, H, I, K, L = 2.5 mm; B, D, G, J = 20 mm. Drawn by D.Boyer.

Sepals 3–5, elliptic to obovate, c. 2 mm long. Petals 2–4, ovate-spathulate, 1.5–2 mm long, yellow; nectary-lobe above middle of petal, minute, semi-elliptic or triangular. Stamens 4–6. Pistils 10–25. Receptacle glabrous. Achenes suborbicular, biconvex, 1.5–2 mm long, smooth or tuberculate; beak \pm triangular, c. 0.2 mm long, obtuse or minutely hooked. *Smallflower Buttercup*, *Ferny Buttercup*, *Small-flowered Buttercup*, *Ferny Small-flowered Buttercup*.

Occurs in all States and Territories except N.T. Two varieties are recognised.

Achenes \pm densely covered with c. 50 minute tubercles each bearing a short stiff curved or appressed hair; sepals 5

47a. var. *pumilio*

Achenes smooth, glabrous; sepals 3 (rarely 4)

47b. var. *politus*

47a. *Ranunculus pumilio* R.Br. ex DC. var. *pumilio*

Illustrations: Hj.Eichler, *Trans. Roy. Soc. S. Australia* 81: t. 1, fig. 2 (1958); G.M.Cunningham *et al.*, *Pl. W New South Wales* 310 (1982), as *Ferny Buttercup*; B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 166 (1990).

Sepals 5. Lateral faces of achenes \pm densely covered with (usually c. 50) minute tubercles, each bearing a short, stiff, curved or appressed hair. Hairs distinctly longer than subtending tubercles. $2n = 14$, Y.Menadue & R.K.Crowden, in Á.Löve (ed.), *Taxon* 34: 551 (1985). Fig. 66A–C.

Occurs in all Australian States and Territories except N.T.; rare in W.A. and Qld and restricted to the southern parts of these States; in Tas. apparently confined to the Midlands region; grows in moist and/or shaded locations. Flowers Aug.–Nov. Map 389.

W.A.: 89 miles [142 km] E of Norseman, *A.C.Beaglehole* 13362 (MEL, PERTH). S.A.: L. Leak, c. 30 km NW of Mt Gambier, *R.Bates* 4001 (AD). Qld: along Maranoa R. at Mitchell, 12 Sept. 1959, *A.Hicks* (AD). N.S.W.: 34 km SE of Bourke, *Hj.Eichler* 22859 (CANB, MEL, NSW). A.C.T.: Black Mtn, Canberra, *H.S.McKee* 11704 (BRI, NSW). Vic.: 3.2 km N of Strathmerton on Bouchers Rd, *T.B.Muir* 4690 (CANB, MEL). Tas.: Agnews Marsh near L. Crescent, 30 Nov. 1983, *Y.Menadue* (CANB).

47b. *Ranunculus pumilio* var. *politus* Melville, *Kew Bull.* 11: 285, fig. 1 (F), fig. 6 (7–12) (1957)

T: County of Lowan, Vic., 11 Sept. 1898, *F.M.Reader*; holo: MEL; iso: K (photo CANB).

Illustrations: R.Melville, *loc. cit.*; Hj.Eichler, *Trans. Roy. Soc. S. Australia* 81: t. 1, fig. 2 (1958); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 166 (1990).

Sepals 3 (rarely 4). Lateral faces of achenes smooth and glabrous.

Largely co-extensive with var. *pumilio* but less common and not known from Qld, A.C.T. or Tas. Flowers from late winter to early spring. Map 390.

W.A.: Government House L., Rottnest Is., *J.Ripley* 32 (PERTH). S.A.: near Comet Bore, *C.R.Alcock* 5680 *p.p.* (CANB). N.S.W.: Jokers Springs, Mt Kaputar Natl Park, *R.Coveny* 8809 & *S.K.Roy* (NSW); Wamboota, 25 Sept. 1945, *C.W.E.Moore* (CANB). Vic.: Wyperfeld Natl Park, 3.5 km SW of Wonga Hut, *A.C.Beaglehole* 28428 (CANB).

Although the two varieties of *R. pumilio* are very similar vegetatively and occasionally occur together, *R. pumilio* var. *politus* may deserve recognition at a higher rank, especially in view of the consistent difference in the achenes and the number of sepals. Chromosome counts and observation on hybridisation are desired.

48. *Ranunculus pentandrus* J.M.Black, *Trans. Roy. Soc. S. Australia* 49: 272 (1925)

T: flooded land on Minnie Downs, near Warburton R., Qld, *L.Reese*; holo: AD95735080 (photo CANB), iso: K (photo CANB).

Slender \pm erect annual, 2–40 cm high, glabrous or sparingly pilose; stems usually branched from base. Adult lower leaves with petioles 1.5–5 cm long; lamina trifoliate, 0.7–2.5 cm long; leaflets ternately dissected into narrow- to linear-lanceolate lobes. Lower flowers usually pedicellate with fruiting pedicels to 3 cm long, upper flowers subsessile. Sepals 3–5, elliptic to obovate-oblong, 1.7–2 mm long. Petals 1 or 2, elliptic to obovate-spathulate,

1.5–2 mm long, whitish; nectary near middle of petal, with lobe \pm semicircular, c. 0.2 mm long. Stamens 3–5. Pistils 6–20. Receptacle glabrous. Achenes suborbicular to broadly ovate, 2–4 mm long, strongly flattened, often twisted; faces smooth or tuberculate; margins smooth, slightly thickened, pale reddish brown; beak triangular, 0.3–1 mm long. $2n = 14$, D.Goepfert, *Bot. Not.* 127: 479 (1974). *Smooth Buttercup*, *Inland Buttercup*.

Occurs inland, in all mainland States, but not N.T. Two varieties are recognised.

Lateral faces of achenes smooth, glabrous, without or with very few tubercles

48a. var. *pentandrus*

Centre part of lateral faces of achenes with scattered short conical tubercles, each terminated by a short, recurved bristle or hair

48b. var. *platycarpus*

48a. *Ranunculus pentandrus* J.M.Black var. *pentandrus*

Illustrations: Hj.Eichler, *Trans. Roy. Soc. S. Australia* 81: t. 1, fig. 1 (1958); T.D.Stanley & E.M.Ross, *Fl. SE Queensland* 1: 173, fig. 23F (1984); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 166 (1990).

Achenes with lateral faces smooth and glabrous, or occasionally with up to c. 10 tubercles, these either not tipped by hairs or with a microscopic hooked bristle.

Extends from far north-eastern S.A. to south-western Qld near Dalby and north-western N.S.W.; grows along watercourses and on floodplains in heavy clay soil. Flowers Aug.–Oct. Map 391.

S.A.: Pandie Pandie, 16 Aug. 1934, *J.B.Cleland* (AD). Qld: S Galway, c. 65 km SW of Windorah, *S.L.Everist* 7415 (BRI). N.S.W.: Iolanthe, 26 km SW of Garah, *K.L.Wilson* 1907 (BRI, K, NSW).

48b. *Ranunculus pentandrus* var. *platycarpus* (F.Muell.) H.Eichler, *Suppl. J.M.Black's Fl. S. Australia* 2nd edn, 149 (1965)

Ranunculus sessiliflorus var. *platycarpus* F.Muell., *Rep. Pl. Babbage's Exped.* 7 (1859). T: Wonnomulla, S.A., *B.H.Babbage*; holo: n.v., presumed lost; Murray River, *F.Mueller*; neo: MEL, *fide* N.G.Walsh, *Fl. Australia* 2: 462 (2007).

Ranunculus parviflorus var. *glabrescens* J.M.Black, *Fl. S. Australia* 2: 237 (1924); *R. pentandrus* var. *glabrescens* (J.M.Black) Melville, *Kew Bull.* 11: 282 (1957). T: Renmark, South Australia, 3 Oct. 1915, coll. unknown [*J.M.Black*]; lecto: AD (photo CANB), *fide* R.Melville, *Kew Bull.* 11: 282 (1957).

Illustrations: Hj.Eichler, *Trans. Roy. Soc. S. Australia* 81: t. 1, fig. 1 (1958), as *R. pentandrus* var. *glabrescens*; T.S.Henshall, in J.P.Jessop (ed.), *Fl. Central Australia* 87, fig. 108 (1981); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 166 (1990).

Achenes with c. 20 or more tubercles over the central part of the lateral faces, each tubercle tipped by a distinct recurved hair or bristle. Fig. 66J–L.

Apparently rather rare in W.A. with disjunct occurrences in Austin and Coolgardie districts; widespread in S.A., southern Qld, western N.S.W. and north-western Vic; occurs mainly along inland watercourses and other wet places, usually in heavy soil but also in river sand. Flowers June–Sept. Map 392.

W.A.: 15 km S of Mt Magnet on Great Northern Hwy, *P.G.Wilson* 12343 (PERTH). S.A.: Upper Murray district, Spectacle Lagoon, c. 12 km S of Barmera, *Hj.Eichler* 18290 (CANB). Qld: 10 km W of St George, along the Balonne Hwy towards Bollon, *H.I.Aston* 2438 (AD, BRI, CANB, HO, K, MEL, NSW). N.S.W.: on E side of Darling R., 16 km NNE of Wentworth, 2 km S of Tapio Stn, *T.B.Muir* 5797 (BRI, MEL). Vic.: Kings Billabong E of Redcliffs, 10 Aug. 1963, *A.Hicks* (CANB).

49. **Ranunculus flammula* L., *Sp. Pl.* 1: 548 (1753)

subsp. *flammula*

T: Herb. Linn. No. 715.1; lecto: LINN, *fide* L.Benson, *Amer. Midl. Naturalist* 52: 359 (1954).

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 1: t. 25 (1948); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 167 (1990); N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 49, fig. 7c (1996).

Erect or ascending perennial, to c. 80 cm high, glabrous or with scattered appressed hairs; mostly rooting at lower nodes. Leaves mostly cauline, the lower with petioles to c. 10 cm

long; lamina narrow-elliptic to lanceolate, 1–6 (–12) cm long, 2–15 (–30) mm wide, acute, entire or with a few small teeth; upper leaves usually smaller, relatively narrower and (sub) sessile. Flowers few–many, in cymes, leaf-opposed. Sepals 5 or rarely 4, spreading, ovate to obovate, 2–4 mm long, appressed-hairy beneath. Petals 5, obovate-cuneate, 4–8 mm long, pale yellow; nectary near petal-base, with lobe cuneate, truncate, c. 0.2 mm long, fused for entire length. Stamens 25–40. Pistils c. 10–50. Receptacle glabrous. Achenes obovate, 1–2 mm long, smooth, minutely reticulate, obscurely bordered, glabrous; beak minute, blunt. $2n = 32$, D.Goepfert, *Bot. Not.* 127: 478 (1974). *Lesser Spearwort*.

Native of Europe, NW Africa and Asia. Naturalised in wet places in pastures and along drainage channels in S.A. (Mt Compass area), the Central Tablelands of N.S.W., the Warburton-Macclesfield region in Vic. and north-eastern Tas. Flowers mainly Nov.–Mar. Map 393.

S.A.: Willowburn wetland, E Mt Compass, *D.E.Murfet 1748* (AD). N.S.W.: near Wingecarribee Swamp, 17 Nov. 1987, *P.Kodala* (NSW). Vic.: Woori Yallock Ck, at Yellingbo, May 1966, *I.Tankard* (AD, MEL). Tas.: ‘Nabowla’ near Scottsdale, 14 Nov. 1984, *Walker* (HO).

Three subspecies, distinguished principally on leaf dimensions and growth habit, are recognised in Europe. All Australian material is referable to the typical subspecies.

50. **Ranunculus ophioglossifolius* Vill., *Hist. Pl. Dauphiné* 3(2): 731, t. 49 (1789)

T: not designated; *n.v.*

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 1: t. 24 (1948); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 49, fig. 7b (1996).

Erect or ascending annual to c. 50 cm high, glabrous or with few appressed hairs; roots fibrous, often produced from lower nodes. Leaves mostly cauline, the lower ones with petioles to c. 12 cm long; lamina ovate or suborbicular, to c. 40 mm long, 20 mm wide, sometimes cordate at base; upper leaves shortly petiolate, narrowly elliptic, to 65 mm long, 10 mm wide, the uppermost smaller, \pm sessile; all entire or obscurely callous-toothed. Flowers few–many, in cymes, leaf-opposed. Sepals 4 or 5, spreading or slightly recurved, ovate to obovate, 2–4 mm long, with appressed hairs beneath. Petals obovate-cuneate, 2.5–4.5 mm long, pale yellow; nectary near petal-base, with lobe broad, triangular or retuse, c. 0.2 mm long, free. Stamens c. 6–10. Pistils 20–50. Receptacle glabrous. Achenes flattened-ovoid, 1.5–2 mm long, obscurely bordered; faces granular to tuberculate; beak \pm triangular, 0.5–1 mm long, $2n = 16$, D.Goepfert, *Bot. Not.* 127: 478 (1974). *Snake-tongue Buttercup*.

Native of western Europe, the Mediterranean area and SW Asia. Naturalised and localised in a few places in south-eastern S.A. and in south-western Vic.; grows in swamps and other drainage areas. Flowers Sept.–Dec. Map 394.

S.A.: waterhole 10 km SE of Penola, *R.Bates 16353* (AD, CANB). Vic.: Haddon between Linton and Ballarat, Dec. 1912, *H.B.Williamson* (MEL); 17 km NW of Portland P.O., *A.C.Beauglehole 93504* (MEL); Snake Valley–Mt Emu Rd, 0.4 km W of crossing with Chepstowe–Pittong Rd, 5 km SE of Mt Emu, *S.J.Forbes 1879* & *N.H.Scarlett* (MEL).

51. **Ranunculus scleratus* L., *Sp. Pl.* 1: 551 (1753)

subsp. **scleratus**

T: Herb. Clifford: 230, *Ranunculus* 12; lecto: BM, *fide* L.Benson, *Amer. Midl. Naturalist* 52: 361 (1954).

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 310 (1982), as *Celery Buttercup*; T.D.Stanley & E.M.Ross, *Fl. SE Queensland* 1: 173, fig. 231 (1984), as *R. scleratus*; B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 167 (1990).

Erect semi-aquatic annual or overwintering biennial, 20–80 cm high, glabrous or with scattered soft hairs; roots fibrous. Stem stout, hollow, ridged, branched above. Lower leaves with petioles 2–30 cm long; lamina broadly ovate to reniform, cordate, 2–8 cm long, palmately 3–5-lobed; lobes obovate-cuneate, shallowly 3-lobed and crenate. Upper leaves sessile, deeply trifid with \pm oblong segments, or simple. Flowers often more than 30 in a cyme, leaf-opposed. Sepals 5, reflexed, obovate, 2–4 mm long, pilose beneath. Petals 5,

narrowly ovate to broadly obovate, 3–4 mm long, pale yellow; nectary near petal-base, a \pm circular pit c. 0.5 mm diam., unlobed. Stamens usually c. 20. Pistils c. 100–700. Receptacle hairy. Achenes very numerous, in an elongated head, glabrous, flattened-obovoid, to c. 1 mm long; beak minute. $2n = 32$, D.Goepfert, *Bot. Not.* 127: 480 (1974); B.G.Briggs, *Telopea* 9(4): 835 (2002). *Celery Buttercup*.

Native of Europe, northern Africa, western and central Asia. Naturalised locally at L. Mariginup, W.A., near the Murray R., S.A., and the Brisbane area, Qld, more frequent in northern and central coastal and southern districts of N.S.W., Canberra area, A.C.T., in Vic. along the Murray R. floodplain and in southern districts, and at Hobart, Tas. (where possibly no longer extant); occurs in lakes, wet ditches in pastures, mud at river banks etc. Flowers mainly Aug.–Dec. (but records for most months). Map 395.

W.A.: L. Mariginup, 25 km N of Perth, *K.Paijmans* 3772 (CANB). S.A.: Wall Flat, *R.Bates* 22721 (AD). Qld: Brisbane R., Long Pocket, *G.N.Batianoff* 200814 (AD, BRI, CANB, MEL, DNA). N.S.W.: Warwick Farm, near racecourse, c. 1.6 km N of Liverpool, *E.F.Constable* NSW 48221 (G, NSW). A.C.T.: Kellys Dairy Farm, Fyshwick, *B.J.Lepschi* 62 (CANB, NSW). Vic.: 3 km S of Strathmerton, *H.I.Aston* (BRI, MEL). Tas.: Hobart, *s. dat.*, *L.Rodway* (HO).

Two subspecies are recognised; subsp. *reptabundus* (Rupr.) Hulten is native to northern Russia and differs from the typical subspecies in its apetalous flowers. Poisonous to stock.

Doubtful Name

Ranunculus lappaceus var. *phlebius* Stirling, *Trans. Proc. Bot. Soc. Edinburgh* 22: 349 (1905), *nom. nud.*

Without a type or adequate description it is impossible to determine whether this name can be identified with any Australian taxon.

9. MYOSURUS

Hj.Eichler & J.A.Jeanes

Myosurus L., *Sp. Pl.* 1: 284 (1753); *Gen. Pl.* 5th edn, 137 (1754); from the Greek *mys* (a mouse) and *oura* (a tail) alluding to the long, slender, fruiting spike.

Type: *M. minimus* L.

Small, glabrous, tufted, annual herbs. Leaves all in a basal rosette, linear-filiform or very narrowly spathulate, entire, somewhat dilated towards base. Peduncle without bracts. Flowers bisexual, actinomorphic, solitary, terminal. Sepals 5, spurred; spurs descending and appressed to stem. Petals 5–7 or fewer, sometimes absent, inconspicuous, usually smaller than sepals, filiform-tubular, widest near the apex; nectary a narrow groove. Stamens 5–20. Achenes very numerous (to 200 or more), spirally arranged in a slender, subulate spike on a greatly elongated fruiting receptacle, each with a stylar beak.

About 15 not well defined species in the temperate regions of both Hemispheres. In Australia only 1 species recorded; though it has often been reported to be introduced, it is probably native and specifically distinct from the European and northern American *M. minimus*, under which name it has generally been treated.

E.Huth, Revision der kleineren Ranunculaceen-Gattungen *Myosurus*, *Trautvetteria*, *Hamadryas*, *Glaucidium*, *Hydrastis*, *Eranthis*, *Coptis*, *Anemonopsis*, *Actaea*, *Cimicifuga* und *Xanthorrhiza*, *Bot. Jahrb. Syst.* 16: 278–288, 289–324 (1892); G.R.Campbell, The genus *Myosurus* L. (Ranunculaceae) in N America, *Aliso* 2 (4): 389–403 (1952).

***Myosurus australis* F.Muell., *Trans. Philos. Soc. Victoria* 1: 6 (1854)**

Myosurus minimus var. *australis* (F.Muell.) Huth, *Bot. Jahrb. Syst.* 16: 284 (1892). T: on moist places or in the open plains where rainwater lodges for a considerable time, near the Emu Creek, Hopkin's River, Avoca, Avon, Richardson and Murray; lecto: Avoca R., Dec. 1853, *F.Mueller*; MEL, *fide* Hj.Eichler, *Fl. Australia* 2: 461 (2007), (photo CANB); ?isolectos: MEL; remaining syns: MEL.

[*Myosurus minimus* auct. non L.: G.Bentham, *Fl. Austral.* 1: 8 (1863)]

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 309 (1982), as *M. minimus*; N.G.Walsh, in N.G.Walsh & T.J.Entwistle (eds), *Fl. Victoria* 3: 63, fig. 13i–k (1996), as *M. minimus* var. *australis*.

Plants 3–15 (–20) cm high. Leaves narrow-linear, 1–8 (–12) cm long, 0.5–1.5 (–2.5) mm wide, sometimes slightly expanded above, usually withered in fruit. Peduncles usually 2–30, 1–3 cm long at anthesis, elongating to c. 10 cm or more in fruit. Sepals 1.5–4.5 mm long, yellowish green, caducous; spur 0.5–2 mm long. Petals usually 3–5, sometimes absent, 1.5–3.5 mm long; nectary minute. Stamens 5–10. Fruiting spikes cylindric, 0.5–5 cm long, 1.5–2.5 mm thick, gradually narrowed to the apex; achenes typically 100–300 per spike, reddish brown, dorsally diamond-shaped to trullate, 1–1.5 mm long, including the appressed, ascending, 0.2–0.6 mm long beak. *Mousetail*. Fig. 55A–E.

Occurs in all mainland States, chiefly in moist places near inland watercourses. Flowers July–Nov. Map 396.

W.A.: 13 km NNW of Buningtonia Spring, ca 40 km SSW of Zanthus, *K.R.Newbey 7141* (PERTH). S.A.: 15 km S of Oodlawirra, *M.Crisp 625* (CANB). Qld: Diamantina R., 1.5 miles [2.4 km] W of Roseberth HS, *R.Filson 3356* (MEL). N.S.W.: on E side of Darling R., 16 km NNE of Wentworth and 2 km S of Tapio Stn, *T.B.Muir 5803* (MEL). Vic.: Wyperfeld Natl Park, Devils Pools, N of Wonga Hut, *A.C.Beauglehole 28898* (AD, MEL).

The European and northern American *Myosurus minimus* L. differs in the shape of the back of the achenes, which is elliptic or oblanceolate to oblong and twice or more as long as broad.

10. ADONIS

Hj.Eichler & J.A.Jeanes

Adonis L., *Sp. Pl.* 1: 547 (1753); *Gen. Pl.* 5th edn, 242 (1754); in Greek mythology the name of a beautiful youth, beloved of Persephone and Aphrodite, who was killed by a wild boar and from whose blood grew the flower *Adonis*.

Type: *A. annua* L.

Annual or perennial herbs with branching leafy stems. Leaves alternate, 2–4-pinnate with narrowly linear segments. Peduncle without bracts. Flowers bisexual, actinomorphic, usually solitary, terminal. Perianth segments not spurred. Sepals 5 (rarely to 8), appressed or spreading, glabrous or pilose, sometimes petaloid and/or caducous. Petals 3–20, intensely coloured, glossy, yellow or red, without claw or nectaries. Stamens numerous. Achenes numerous, transversely veined and rugose, glabrous or hairy, at maturity forming an elongated head. Fruiting receptacle cylindrically elongated or conical.

A genus of about 35 species native to temperate Eurasia and the Mediterranean area; 1 species introduced to Australia as a garden ornamental, occasionally escaping and becoming naturalised. Some species contain pharmaceutically used glycosides (similar to *Digitalis*).

E.Huth, Revision der Arten von *Adonis* und *Knowltonia*, *Helios* 8: 61–73 (1890); H.Riedl, Revision der einjährigen Arten von *Adonis* L., *Ann. Naturhist. Mus. Wien* 66: 51–90 (1963); C.Steinberg, Revisione sistematica e distributiva delle *Adonis* in Italia, *Webbia* 25: 299–351 (1971); P.M.Kloot, The species of *Adonis* L. naturalised in Australia, *Muelleria* 3: 200–207 (1976); C.C.Heyn & B.Pazy, The annual species of *Adonis* (Ranunculaceae) - a polyploid complex, *Pl. Syst. Ecol.* 168: 181–193 (1989).

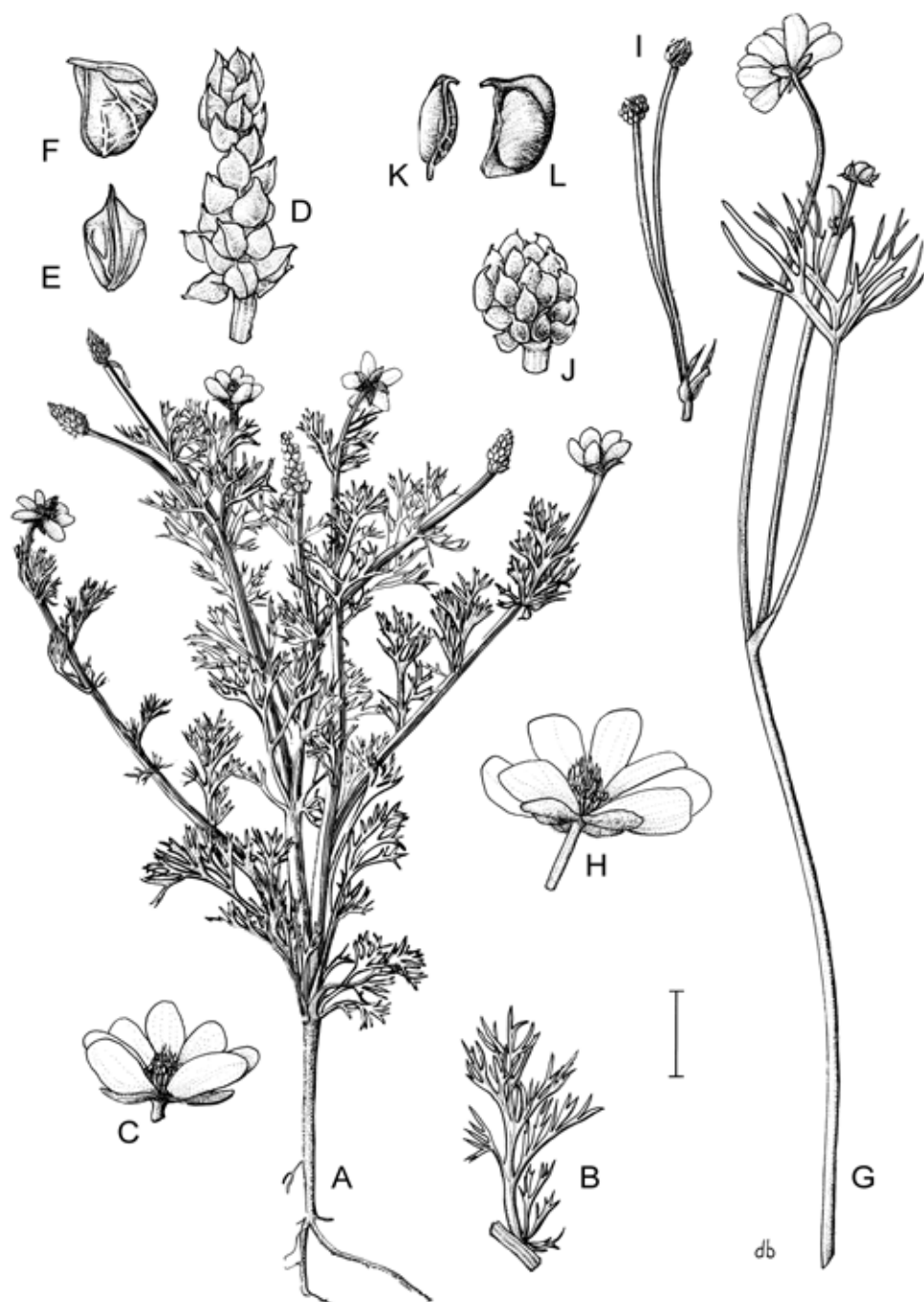


Figure 67. A–F, *Adonis microcarpa*. A, habit; B, leaf; C, flower; D, fruiting head; E, nutlet; F, nutlet (side view) (A–F, P.Kloot K7201, CANB). G–L, *Ranunculus meristus*. G, flowering stem; H, flower; I, fruiting scape; J, fruiting head; K, nutlet; L, nutlet (side view) (G–L, CSIRO Armidale SWQS 1319, CANB). Scale bar: A, G, I = 24 mm; B = 12 mm; C, H = 8 mm; D, J = 6 mm; E, F, K, L = 3 mm. Drawn by D.Boyer.

****Adonis microcarpa* DC., *Syst. Nat.* 1: 223 (1817)**

Adonis dentata subsp. *microcarpa* (DC.) Riedl, *Ann. Naturhist. Mus. Wien* 66: 73 (1963). T: 'Habitat inter segetes Hispaniae circa Tudelam, *Dufour.*; in insulâ Ivicâ, *Delaroche*; Teneriffae, *Broussonet*'; lecto: G, *fide* C.Steinberg, *Webbia* 25: 340 (1971); remaining syn: G-DC (photo CANB).

[*Adonis annua* auct. non L.: N.Beadle, *Stud. Fl. NE New South Wales* 2: 123 (1973)]

[*Adonis aestivalis* auct. non L.: J.H.Willis, *Handb. Pl. Victoria* 2: 146 (1973)]

[*Adonis autumnalis* auct. non L.: J.M.Black, *Fl. S. Australia* 2nd edn, 2: 364 (1948)]

Illustrations: N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 40 fig. 4c, d (1996); B.G.Briggs & R.O.Makinson, in G.J.Harden (ed.), *Fl. New South Wales* 1: 167 (1990).

Erect annual, 10–50 cm high. Stem usually branched, sparsely villose towards base, glabrous above. Leaves 2- or 3-pinnate, to 6 cm long, with linear, acute segments, glabrous. Peduncle 1–5 cm long, lengthening as flower matures. Flowers solitary, 15–25 mm diam., terminal. Sepals appressed to spreading, ovate-oblong, 5–12 mm long, glabrous, dark purplish brown. Petals 5–10, suberect, obovate, 7–15 mm long, longer than the sepals, usually yellow, rarely bright-red, with a black basal spot. Stamens numerous; anthers dark purple. Carpels 10–50. Achenes 2.5–4 mm long, arranged in a \pm cylindrical head c. 15–25 mm long, each with a short straight green beak. *Pheasant's Eye*. Fig. 67A–F.

All mainland States and Territories and 1 record from Flinders Is., Tas.; native to southern Europe. In Australia it occurs as a weed mainly in barley and wheat fields. Flowers Aug.–Dec. Map 397.

W.A.: Dumbleyung South, 16 Oct. 1973, *D.McQuinn* (AD, CANB, MEL). N.T.: 4 km NW of Alice Springs, *R.Swinbourne* 464 (DNA). S.A.: 500 m S of Snowtown, *P.M.Kloot* K7201 (AD, CANB). Qld: 'Summerhill Park', 10 km W of Bell, 17 Sept. 1992, *R.A.McKenzie* (DNA, K, MEL, NSW). N.S.W.: Lisgar Stn, c. 15 km S of Yetman, *C.W.E.Moore* 8754 (CANB). Vic.: Murray Mallee, c. 10 km by road N of Willenabrana, *D.E.Albrecht* 5010 (MEL). Tas.: Wybalenna area, Flinders Is., 12 May 1999, *S.Welsh* (HO).

BERBERIDACEAE

*B.D.Morley*¹

Nandina by *A.J.G.Wilson*²

Herbs, sometimes with fleshy rhizomes, shrubs, or small trees. Leaves deciduous or evergreen, alternate, radical or cauline in some herbs, exstipulate or stipules reduced, simple or pinnately or ternately divided or modified into spines. Inflorescence paniculate, cymose, racemose, spicate or flowers solitary, bracteate. Flowers actinomorphic, bisexual. Perianth in 2 or 3 whorls, each of 4–6 members variously differentiated; whorls sometimes similar, rarely absent, free, caducous; outer members valvate and sepal-like; inner members imbricate and petal-like, with nectariferous scales or sacs, sometimes spurred, or nectaries absent. Stamens hypogynous, usually as many or twice as many as petals, antipetalous, free; anthers dehiscing intorsely, by lengthwise slits or valves from base upwards; filaments sometimes absent. Ovary superior; disc absent; carpel 1, unilocular; style short or absent; stigma subentire, terminal; ovules many, few or solitary, basal or on abaxial suture, anatropous. Fruit a berry. Seeds sometimes arillate; embryo small; endosperm copious.

A family of about 16 genera and 550 species; 3 genera and 5 species naturalised in Australia. The herbaceous species are distributed in northern temperate regions of America and Eurasia (e.g. species of *Epimedium* L., *Vancouveria* Morren & Decne., *Podophyllum* L., *Dysosma* Woodson, *Jeffersonia* Barton and *Bongardia* C.A.Mey.), and shrubby species (including

¹ c/- State Herbarium of South Australia, Botanic Gardens, North Terrace, Adelaide, South Australia 5000.

² Australian Biological Resources Study, GPO Box 787, Australian Capital Territory 2601.

BERBERIDACEAE

Nandina Thunb.) occur in the same area and also extend into eastern Africa and South America (*Berberis* spp.) and the Caribbean and Malesia (*Mahonia* spp.).

The family includes species which are important garden ornamentals, such as the taxa that have become naturalised in Australia. Species such as *Berberis vulgaris* L. are an intermediate host plant in Europe for *Puccinia graminis* Pers. : Pers., the black rust of wheat and other grasses, and accordingly the introduction of species in the family is under strict quarantine control. *Berberis* fruits are sometimes made into conserves.

Records of *Epimedium pinnatum* subsp. *colchicum* (Boiss.) Busch from Forrest, A.C.T., (*N.T.Burbidge s.n.*, 18 Oct. 1962, CANB); *Mahonia bealei* (Fortune) Carr. from Mt Wilson, N.S.W., (*C.T.White 8516*, BRI) and *M. japonica* (Thunb.) DC. also from Mt Wilson (*E.F.Constable s.n.*, 30 Nov. 1948, NSW) do not appear to be from naturalised plants.

L.W.A.Ahrendt, *Berberis* and *Mahonia*, *J. Linn. Soc., Bot.* 57: 1–410 (1961); H.Loconte, *Berberidaceae*, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 147–152 (1993).

KEY TO GENERA

- | | | |
|----|---|-------------|
| 1 | Leaves simple (rarely trifoliate or variable in bigeneric hybrids);
branches spiny | 1. BERBERIS |
| 1: | Leaves always pinnate; branches spineless | |
| 2 | Leaves 1-pinnate; flowers yellow; fruit blue, pruinose | 2. MAHONIA |
| 2: | Leaves 2- or 3-pinnate; flowers white to cream; fruit red | 3. NANDINA |

1. BERBERIS

B.D.Morley

Berberis L., *Sp. Pl.* 1: 330 (1753); *Gen. Pl.* 5th edn, 153 (1754); from *berberys*, the Arabic name for the fruit.

Type: *B. vulgaris* L.

Shrubs or small trees, inner bark and wood yellow, glabrous or pubescent. Leaves evergreen or deciduous, alternate, simple; normal leaves in fascicles on short axillary spurs; modified leaves usually as tripartite spines on long shoots. Inflorescence usually terminal on lateral shoots, variously racemose, fascicled or flowers solitary. Perianth yellow: sepal-like whorl 6, subtended by 2 or 3 bracts; petal-like whorl 6, often smaller than sepal-like whorl, each with 2 nectary-glands at base. Stamens 6, irritable when touched; anthers 2-valved. Ovary with 1–many ovules; stigma sessile or on short style. Fruit red, purple-red, pruinose or black, 1–several-seeded.

There are an uncertain number (several hundred) of *Berberis* species in temperate North and South America, Eurasia and North Africa, with a number being cultivated as ornamental hardy garden shrubs. The two taxa naturalised in Australia are presumed to have escaped from cultivation.

Berberis vulgaris L. and *B. thunbergii* DC. are reported to be naturalised in the Tablelands of N.S.W., but no material has been seen for this treatment.

Branchlets glabrous, yellowish; leaves more than 2 cm long, chartaceous, semi-deciduous, acuminate; flowers pale yellow; fruit dark purple-red, pruinose when ripe

1. *B. floribunda*

Branchlets downy, red-brown; leaves less than 2 cm long, rigid, evergreen, 3-spined at apex; flowers golden, flushed with red; fruit dark blue, pruinose when ripe

2. *B. darwinii*

1. **Berberis floribunda* Wall. ex G.Don, *Gen. Hist.* 1: 115 (1831)

T: Nepal; holo: *n.v.*

[*Berberis aristata* auct. non DC.: G.J.Harden, in G.J.Harden (ed.), *Fl. New South Wales* 1: 168 (1990)]

Shrub to 5 m; branchlets terete or subterete, yellowish, glabrous. Leaves semi-deciduous; lamina elliptic or ovate to ovate-elliptic, 2.5–6.5 cm long, 1.2–2.4 cm wide, attenuate, entire to spinulose at margin (coarsely serrate in summer shoots), acuminate, chartaceous, dull green above, paler yellow-green below; spines absent or 1–3-partite, to 15 mm long. Flowers pale yellow; pedicel to 7 mm long, yellowish. Fruit oblong to ellipsoidal, c. 7 mm long, dark purple-red, pruinose when ripe; style 2–5 mm long, persistent. Fig. 68J–M.

Naturalised in the Yerranderie and Tenterfield areas of N.S.W. since at least 1953; a native of Nepal. A garden ornamental. Flowers spring and summer. Map 398.

N.S.W.: Yerranderie, *L.A.S.Johnson & A.N.Rodd* 430 (NSW); Yerranderie, 20 Sept. 1986, *G.R.Sainty s.n.* (NSW); Yerranderie, Feb. 1953, *Fraser s.n.* (NSW); Macquarie Pass, *E.J.McBarron* 16462 (NSW); Tenterfield, *D.Brown* 16 (NSW).

This species has been commonly distributed and grown in cultivation erroneously as '*B. aristata*', (L.W.A.Ahrendt, *J. Linn. Soc., Bot.* 57: 1–410, 1961). *Berberis aristata* DC. from Nepal is very rare in cultivation and its identity is obscure. *Berberis floribunda*, *B. glaucocarpa* Stapf from India and Nepal, and *B. chitria* Hort. (*non* Lindl., *nom. illeg.*) are closely allied to *B. aristata*, and are all more common in cultivation than it. *Berberis glaucocarpa* is even naturalised in the United Kingdom.

The naturalised taxon at Yerranderie, N.S.W., is here referred to *B. floribunda* (not *B. aristata* as in N.C.W.Beadle *et al.*, *Fl. Sydney Region* 148, 1982) and is an escape from cultivation. The material (*D.Brown* 16) with larger leaves from Tenterfield, N.S.W., is closer to *B. chitria*, which is also in cultivation. The variation patterns of critical characters of species and recorded hybrids within subsect. *Chitriae* suggests that some naturalised Australian specimens have possibly arisen as seedlings from garden plants. This accounts for the difficulty in identifying material, and the character expression found in a genus of species notorious for hybridity and having seeds distributed by birds.

2. **Berberis darwinii* Hook., *Icon. Pl.* 7: t. 672 (1844)

T: 'Hab. Chiloe, *C.Darwin, Esq.*; Valdivia and Osorno, *Bridges, n.* 582, 585.'; syn: *n.v.*

Illustrations: W.J.Hooker, *Bot. Mag.* 77: t. 4590 (1851); G.J.Harden in G.J.Harden (ed.), *Fl. New South Wales* 1: 168 (1990), as *B. aristata*.

Shrub to 3.5 m; branchlets subterete, red-brown, shortly pilose. Leaves evergreen; lamina obovate to obovate-oblong, 1–2 cm long, 0.5–1.2 cm wide, cuneate at base, remotely spiny-toothed at margin, 3-spined at apex, thick, rigid, glossy dark green above, paler green below; spines slender, 3- or 5-partite, 3–7 mm long. Flowers golden, flushed with red; pedicel 6–10 mm long, red. Fruit globose, c. 7 mm long, dark blue, pruinose when ripe; style 4 mm long, persistent. Fig. 68E–I.

Naturalised in the Mt Wilson area, N.S.W., and the Dandenongs, Vic., since at least 1932 and 1977 respectively, also reported from S.A. and Tas.; native to Chile and Argentina. A garden ornamental. Flowers Sept.–Nov. Map 399.

N.S.W.: Mt Wilson, *C.T.White* 8515 (BRI); Mt Wilson, 24 Sept. 1949, *L.A.S.Johnson* (NSW); Mt Wilson, *J.Thompson* 1928 (NSW). Vic.: Sherbrooke Forest, 10 Mar. 1977, *P.Gullan & A.Opie* (MEL).

2. MAHONIA

B.D.Morley

Mahonia Nutt., *Gen. N. Amer. Pl.* 1: 211 (1818), *nom. cons.*; commemorates the American horticulturist Bernard M'Mahon 1775–1816.

Type: *M. aquifolium* (Pursh) Nutt.



Figure 68. A–B, *Mahonia pinnata*. A, flowering shoot (M.Mulvaney s.n., CANB); B, inflorescence bracts and bracteoles (R.Pullen 10141, NSW). C–D, *Mahonia aquifolium*. C, flowering shoot; D, inflorescence bracts (C–D, Bates 15218, AD). E–I, *Berberis darwinii*. E, leafy shoot; F, axillary spur; G, leaf; H, leaf (E–H, P.Gullan 77 & A.Opie, MEL); I, young fruits (J.Thompson 1928, NSW). J–M, *Berberis floribunda*. J, flowering shoot; K, leaf; L, axillary spur; M, inflorescence bracts (J–M, D.Brown 16, NSW). Scale bar: A = 40 mm; B, M = 4 mm; C, J = 30 mm; D, G, I, L = 7 mm; E = 20 mm; F = 2 mm; H = 5 mm; K = 15 mm. Drawn by G.Dashorst.

Shrubs or small trees, inner bark and wood yellow. Stems spineless. Leaves evergreen, alternate, pinnate. Inflorescence often a fascicle of dense, spike-like racemes, otherwise racemose. Perianth as in *Berberis*. Fruit as in *Berberis*.

There are an uncertain number (between 30 and 100) of *Mahonia* species distributed in Asia from the Himalayas, into Japan and south into Malesia, and in North and South America. A number are beautiful and hardy garden shrubs or small trees. The two taxa naturalised in Australia are presumed to have escaped from cultivation.

Leaves with 5–9 (rarely 11) leaflets; leaflets obliquely ovate, margin flat with marginal spines, glossy above; pedicel not bracteolate

1. *M. aquifolium*

Leaves with 7–11 (rarely 13) leaflets; leaflets ovate-lanceolate, margin undulate with marginal spines, glossy or duller bluish green above; pedicel bracteolate near mid-point

2. *M. pinnata*

1. **Mahonia aquifolium* (Pursh) Nutt., *Gen. N. Amer. Pl.* 1: 212 (1818)

Berberis aquifolium Pursh, *Fl. Amer. Sept.* 1: 219 (1814). T: great rapids of the Colombia R., April, May, *M. Lewis*; holo: *n.v.*

Shrub to 2 m, usually less than 1 m, suckering underground; bark grey-brown. Leaves: lamina to 30 cm long; leaflets 5–9 (rarely 11), obliquely ovate, to 10 cm long, to 5 cm wide, glossy above, paler and dull beneath; margin flat, with 15–35 spines. Racemes 5–8 cm long, in fascicles of 3 or 4. Pedicel to 10 mm long; bracteoles absent. Fruit globose, c. 6 mm long, dark blue, pruinose; stigma sessile. *Oregon Grape*. Fig. 68C–D.

Naturalised at Wirrabara, S.A., since at least 1988 and in the A.C.T. since at least 1993; native to the W coast of North America from British Columbia into California. A hardy garden ornamental. Map 400.

S.A.: Wirrabara Forest, *R. Bates 15218* (AD). A.C.T.: Cotter Dam Wall, *B.J. Lepschi 916* (AD, CANB).

Hybridisation, both in the wild and in cultivation, with taxa such as *M. repens* G. Don and *M. pinnata* (Lag.) Fedde occurs, making identification of *M. aquifolium* difficult.

2. **Mahonia pinnata* (Lag.) Fedde, *Bot. Jahrb. Syst.* 31: 86 (1901)

Berberis pinnata Lag., *Elench. Pl.* 14 (1816). T: 'Habitat in N.H. circa Monterey et Nutka, legit D.L. Nee'; *n.v.* *Mahonia fascicularis* DC., *Syst. Nat.* 2: 19 (1821); *Berberis fascicularis* (DC.) Sims, *Bot. Mag.* 50: t. 2396 (1823). T: not designated.

[*Mahonia leschenaultii* auct. non (Wall.) Takeda: N.C.W. Beadle, O.D. Evans & R.C. Carolin, *Fl. Sydney Region* 153 (1982); G.J. Harden, in G.J. Harden (ed.), *Fl. New South Wales* 1: 169 (1990).]

Illustration: G.J. Harden in G.J. Harden (ed.), *Fl. New South Wales* 1: 169 (1990), as *M. leschenaultii*.

Shrub 3 m high or more. Leaf lamina to 25 cm long; leaflets 7–11 (rarely 13), ovate-lanceolate, to 6.5 cm long, to 2.5 cm wide, glossy or duller bluish green above, paler below; margin undulate, with 8–12 spines. Racemes 4–6 cm long, in fascicles of c. 5. Pedicel to 10 mm long; bracteoles ovate, c. 1 mm long, near midpoint of pedicel. Fruit subglobose, c. 6 mm long; stigma sessile, blue, pruinose. Fig. 68A–B.

Naturalised on and near Black Mountain, A.C.T., since at least 1975; also reported from Robinson, N.S.W. (G.J. Harden & L. Murray (eds), *Suppl. Fl. New South Wales* 1: 22 (2000)). Native in California and adjacent Mexico. Flowers spring. Map 401.

A.C.T.: Scrivener Dam, *I.R. Telford 10841* (CBG, NSW); Black Mtn, *R. Pullen 10141* (CANB, NSW); Black Mtn, 25 Oct. 1985, *M. Mulvaney s.n.* (CANB); Black Mtn, *B.J. Lepschi 217* (CANB).

This species is uncommon in cultivation, being more commonly represented by a range of hybrid progeny resulting from crossing with *M. aquifolium*. Both L.W.A. Ahrendt, *J. Linn. Soc., Bot.* 57: 338–340 (1961) and D. Clarke (in W.J. Bean, *Trees & Shrubs Hardy Brit. Isles*, 8th edn, 2: 687–688, 1973) explain the complexities of the taxonomy of *M. pinnata*.

The collection from Scrivener Dam, A.C.T. (*I.R. Telford 10841*, CBG, NSW), appears to be a hybrid of *M. pinnata*, not *M. leschenaultii* (Wall.) Takeda (N.C.W. Beadle *et al.*, *Fl. Sydney*

Region 148, 1982), which is a species native to the Nilghiri Hills of southern India and not in cultivation. The *R.Pullen 10141*, *M.Mulvaney s.n.* and *B.J.Lepschi 217* collections are also possibly hybrid in origin, as the pedicels have a few scattered bracteoles.

3. NANDINA

A.J.G. Wilson

Nandina Thunb., *Nov. Gen. Pl.* 1: 14 (1781); from *Nanten*, the Japanese name of the plant.

Type: *N. domestica* Thunb.

Shrubs with clumping, cane-like stems, glabrous, without spines. Leaves evergreen, alternate, 2- or 3-pinnate; petioles stem-clasping. Inflorescences terminal, paniculate, many-flowered. Perianth white to cream; sepal-like members numerous; inner whorl petal-like, 6. Stamens 6; anthers subsessile, opening by longitudinal slits. Ovary with 1–3 ovules (usually 1 in Australia); style short; stigma conical. Fruit red, 1–3-seeded (usually 1 in Australia).

A monotypic genus, native from India to Japan, and widely naturalised, including in eastern Australia.

Sometimes placed in its own family, Nandinaceae Horan. (P.F.Horaninov, *Prim. Lin. Syst. Nat.* 90 (1834)).

G.J.Harden & L.Murray (eds), *Suppl. Fl. New South Wales* 1: 22 (2000).

****Nandina domestica*** Thunb., *Nov. Gen. Pl.* 1: 14 (1781)

T: Japan; not designated

Shrub to 2 (–3) m high; stems erect, sheathed by petioles or scarred. Leaves to 50 cm long, closely arranged towards top of stems, ±horizontal, swollen at main joints of pinnae and pinnules; leaflets to 8 cm long, lanceolate or elliptic to narrowly rhombic, acuminate, glossy green becoming yellowish, red or purple in autumn and winter; midvein conspicuous. Inflorescence ±erect, to 40 cm long. Flowers to 5–7.5 mm diam. Berry globose, 6–10 mm diam., bright red. *Sacred Bamboo*, *Heavenly Bamboo*.

Occasionally naturalised in N.S.W. in disturbed areas, though frequently cultivated. Flowering Nov.–Dec.; fruiting May–July. Map 402.

N.S.W.: W side of old railway cutting, 0.5 km S of Oatley Railway Stn, *P.C.Jobson 4237* (NSW); Long Gully below Marsupial Park, Oxley Park, *J.R.Hosking 617* & *R.Holtkamp* (CANB, NE, NSW, MEL).

MENISPERMACEAE

*L.L.Forman*¹

Shrubs or climbers, often woody, rarely trees (not in Australia), dioecious. Leaves alternate (spiral), sometimes peltate, often palmately nerved at base; stipules absent. Inflorescences various, but basically cymose, sometimes condensed or reduced, usually with male and female inflorescences similar. Flowers small, usually 3-merous. Sepals rarely spirally arranged, usually in 1 or 2 whorls of 3, sometimes 1 whorl of 4, the innermost whorl sometimes valvate or connate; in female sometimes reduced to 1 or 2, otherwise similar to male flower. Petals usually 3 or 6 in 1 or 2 whorls, or absent, free or ±connate; in female

¹ deceased, formerly Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AB, United Kingdom.

MENISPERMACEAE

sometimes reduced to 1 or 2, otherwise similar to male flower. Stamens often 3 or 6, sometimes to c. 40, often free and opposite a petal, or variously connate, sometimes forming a peltate syndandrium. Staminodes sometimes present in female. Carpels free, (1–) 3–12, or to c. 30 (not in Australia); ovules 2, attached ventrally, only 1 developing. Fruit of 1–6 or more drupes, sometimes on a carpophore; style-scar terminal, ventral or near-basal; endocarp usually bony and usually variously ornamented on at least the dorsal surface, usually with a ventral intrusion (condyle) into the seed cavity around which the seed is curved. Seed often curved, sometimes straight; endosperm present or absent.

A family of c. 75 genera and over 500 species, which are almost entirely tropical. In Australia there are 13 genera and 24 species, of which 3 genera and 16 species are endemic. Mostly climbing in open woodland or in forests where the canopy is interrupted, e.g. along river banks, forest margins or in clearings. A number of species are used in local medicine or as poisons, e.g. to stupefy fish or as dart poisons (e.g. curare in South America). All species contain alkaloids. Several genera are host plants for the larvae of fruit-piercing moths (*Othreis* spp.) which cause extensive damage to commercial fruit crops.

Cocculus orbiculatus (L.) DC., a species from SE Asia, is known as an escape from cultivation from a single sterile specimen collected at Brisbane: *W.T.Jones 147* (CANB).

G.Bentham, Menispermaceae, *Fl. Austral.* 1: 54–59 (1863); L.Diels, in H.G.A.Engler, Menispermaceae, *Pflanzenr.* 46: 1–345 (1910); L.L.Forman, The Tribe *Triclisieae* Diels in Asia, the Pacific and Australia, *Kew Bull.* 30: 77–100 (1975); L.L.Forman, Menispermaceae, *Fl. Males.* ser. I, 10: 157–253 (1986); P.J.A.Kessler, Menispermaceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 402–418 (1993).

KEY TO GENERA BASED ON MALE PLANTS

- | | |
|---|-------------------|
| 1 Stems bearing prickles | 11. ECHINOSTEPHIA |
| 1: Stems not bearing prickles | |
| 2 Inflorescence umbelliform or a peduncled capitulum | 13. STEPHANIA |
| 2: Inflorescence not as above | |
| 3 Sepals spirally arranged | 8. HYP SERPA |
| 3: Sepals in distinct whorls of 3, or in 1 whorl of 4 | |
| 4 Innermost whorl of sepals valvate, at least at apex | |
| 5 Petals dimorphic; stamens 3 | 3. PLEOGYNE |
| 5: Petals equal; stamens 6 | |
| 6 Sepals glabrous apart from ciliate margins, outer sepals much smaller than inner ones | 4. TILIACORA |
| 6: Sepals densely pilose, progressively smaller towards outside | 2. CARRONIA |
| 4: Innermost whorl of sepals imbricate | |
| 7 Leaves peltate or subpeltate | |
| 8 Petals larger than sepals | 9. SARCOPETALUM |
| 8: Petals smaller than sepals | |
| 9 Sepals 4; petals connate into a cup; stamens connate into a peltate syndandrium | 12. CISSAMPELOS |
| 9: Sepals 6 or more; petals free; stamens free or only partly connate | 7. PARAPACHYGONE |
| 7: Leaves neither peltate nor subpeltate | |
| 10 Stamens 9–18, partly connate in a tight cluster | 1. PYCNARRHENA |
| 10: Stamens 6, free | |

MENISPERMACEAE

- | | |
|---|-----------------------|
| 11 Main basal nerves and their main outer laterals extending to leaf margin | 10. LEGNEPHORA |
| 11: Main basal nerves and their main outer laterals not extending to leaf margin | |
| 12 Inflorescence yellowish pubescent, always axillary and subracemose | 6. PACHYGONE |
| 12: Inflorescence glabrous or puberulous, axillary or on leafless plants, racemose or branched-spiciform | 5. TINOSPORA |

KEY TO GENERA BASED ON FEMALE PLANTS

- | | |
|--|--------------------------|
| 1 Stems bearing prickles | 11. ECHINOSTEPHIA |
| 1: Stems not bearing prickles | |
| 2 Inflorescence with accrescent persistent rotund bracts, often obscuring drupes | 12. CISSAMPELOS |
| 2: Inflorescence without accrescent bracts | |
| 3 Inflorescence umbelliform or a peduncled capitulum | 13. STEPHANIA |
| 3: Inflorescence not umbelliform or a peduncled capitulum | |
| 4 Drupe with style or its scar terminal or shortly below the apex; seed straight and \pm ellipsoidal, or dorsiventrally flattened and concave | |
| 5 Seed \pm ellipsoidal, filled by large embryo with thick cotyledons, endosperm absent; leaves penninerved, subbasal nerves sometimes present | 1. PYCNARRHENA |
| 5: Seed dorsiventrally flattened and concave, largely filled with endosperm which surrounds the very thin, flat embryo; leaves palmately nerved at base | 5. TINOSPORA |
| 4: Drupe with style or its scar near base; seed strongly curved, \pm horseshoe-shaped or bean-shaped | |
| 6 Sepals spirally arranged | 8. HYPSEPA |
| 6: Sepals in distinct whorls of 3 | |
| 7 Carpels 9–12; drupes borne on a shortly branched carpophore | 4. TILIACORA |
| 7: Carpels 1–6; drupes not on a branched carpophore | |
| 8 Drupes narrowed at base into a short stipe | |
| 9 Endocarp bony; seed horseshoe-shaped | 2. CARRONIA |
| 9: Endocarp crustaceous; seed curved, bean-shaped | 3. PLEOGYNE |
| 8: Drupes not narrowed at base into a stipe | |
| 10 Leaves peltate or subpeltate | |
| 11 Leaves lanceolate to oblong, penninerved; drupe c. 2.5 cm long; seed without endosperm | 7. PARAPACHYGONE |
| 11: Leaves broadly ovate to deltate-ovate, palmately nerved; drupe c. 0.6 cm long; seed with endosperm | 9. SARCOPETALUM |
| 10: Leaves neither peltate nor subpeltate | |
| 12 Main basal nerves and their main outer laterals extending to leaf margin | 10. LEGNEPHORA |
| 12: Main basal nerves and their main outer laterals not extending to leaf margin | 6. PACHYGONE |

MENISPERMACEAE

1. PYCNARRHENA

Pycnarrhena Miers ex Hook.f. & Thomson, *Fl. Ind.* 1: 206 (1855); from the Greek *pycnos* (dense, crowded) and *arrhen* (male), in reference to the fascicled male flowers.

Type: *P. pleniflora* Miers ex Hook.f. & Thomson

Woody climbers, without prickles. Leaves: petiole swollen at base and usually at apex, leaving prominent cup-like scar on stem; lamina penninerved (in Australia), \pm elliptic, with sub-basal nerves sometimes present. Inflorescences cymose or flowers fascicled, often cauliflorous, without accrescent bracts. Male flowers: sepals 6–15, in whorls of 3, imbricate, the outermost minute; petals absent or 3–6, minute; stamens 9–18, partly connate in a tight cluster. Female flowers: staminodes absent; carpels 3–6; stigma recurved. Drupes \pm subglobose, borne on subglobose carpophore; style-scar shortly below apex on ventral side; endocarp thin and crustaceous or thick and bony. Seed \pm straight and \pm ellipsoidal; endosperm absent; cotyledons large and thick.

A genus of 9 species in southern China, SE Asia, Malesia, Solomon Is., Australia and Vanuatu; 2 species in Qld (1 endemic).

L.L.Forman, The Menispermaceae of Malesia and Adjacent Areas: VI, *Pycnarrhena*, *Kew Bull.* 26: 405–417 (1972).

Flowers in peduncled cymes 1.5–7 cm long; petals present; drupes c. 1 cm diam.; endocarp very thin, crustaceous

1. *P. novoguineensis*

Flowers in fascicles to 0.7 cm long; petals absent; drupes c. 2–2.5 cm diam.; endocarp thick, bony

2. *P. ozantha*

1. *Pycnarrhena novoguineensis* Miq., *Ann. Mus. Bot. Lugduno-Batavum* 4: 87 (1868)

T: W New Guinea, *A.Zippelius s.n.*; holotype: L.

Pycnarrhena australiana F.Muell., *Victorian Naturalist* 3: 61 (1886). T: Endeavour R., Qld, 1886, *W.A.Persieh* 668, 680 & 704; syn: MEL; Bellenden Ker Range, Qld, 1881, *G.H.H.Karsten s.n.*; syn: MEL.

Pycnarrhena sayeri Diels in H.G.A.Engler, *Pflanzenr.* 46: 55 (1910). T: near Trinity Bay, Qld, 1886, *W.A.Sayer s.n.*; holotype: B; isotype: MEL.

Large woody climber. Leaves: petiole 1.5–3.5 cm long; lamina elliptic or oblong-elliptic, usually 14–28 cm long, 4.5–8 cm wide, usually obtuse to rounded at base, acuminate, glabrous apart from midrib sometimes puberulous below. Inflorescences axillary or cauliflorous, 1.5–7 cm long, cymose with long slender peduncle, puberulous. Male flowers yellow; pedicel to 3 mm long or flowers sessile; inner sepals 3–6, 2–2.25 mm long; petals 3 or 4, 1 mm long; stamens 9–16 in a cluster c. 0.5 mm long. Female flowers: carpels 3, 1 mm long. Infructescence to 9 cm long, branched, on long slender peduncle. Drupes c. 1 cm diam., yellow to red, glabrous; endocarp very thin, crustaceous. Fig. 69J–K.

Occurs on Cape York Penin., Qld, S to Hinchinbrook Is.; in rainforest and mesophyll vine forest, locally common. Also in New Guinea. Map 403.

Qld: Rocky R., *B.Hyland* 5441 (K, QRS); intake, Freshwater Ck, Cook district, *H.Flecker* in *NQNC* 10110 (BRI); foot of Lamb Ra., 3 km E of Mt Williams, *C.Lyons* 14 (BRI); 30 km NE of Cardwell, North Brook Is., *M.A.Thorsborne* 1 (BRI); Long Scrub, Bamaga, at tip of Cape York Penin., *L.J.Webb* & *J.G.Tracey* 6985A (BRI).

2. *Pycnarrhena ozantha* Diels, *Bot. Jahrb. Syst.* 52: 187 (1915)

T: Sepik Distr., Papua New Guinea, *C.L.Ledermann* 10266; isotype: K, L.

Woody climber. Leaves: petiole 1.2–2.3 cm long; lamina elliptic to oblong-elliptic, 7–22 cm long, 3–8 cm wide, rounded to cuneate at base, acuminate, glabrous apart from midrib puberulous below. Inflorescences axillary or ramiflorous, fasciculate. Male flowers yellow; pedicel 4–7 mm long, puberulous; sepals 8–10, the larger ones 2–2.5 mm long; petals absent; stamens 9–15, tightly clustered, 0.75–1 mm long. Female flowers: carpels 4–6, 1 mm long. Drupes c. 2–2.5 cm diam., yellow to red, glabrous; peduncle to 1.5 cm long; endocarp thick, bony. Plate 63.

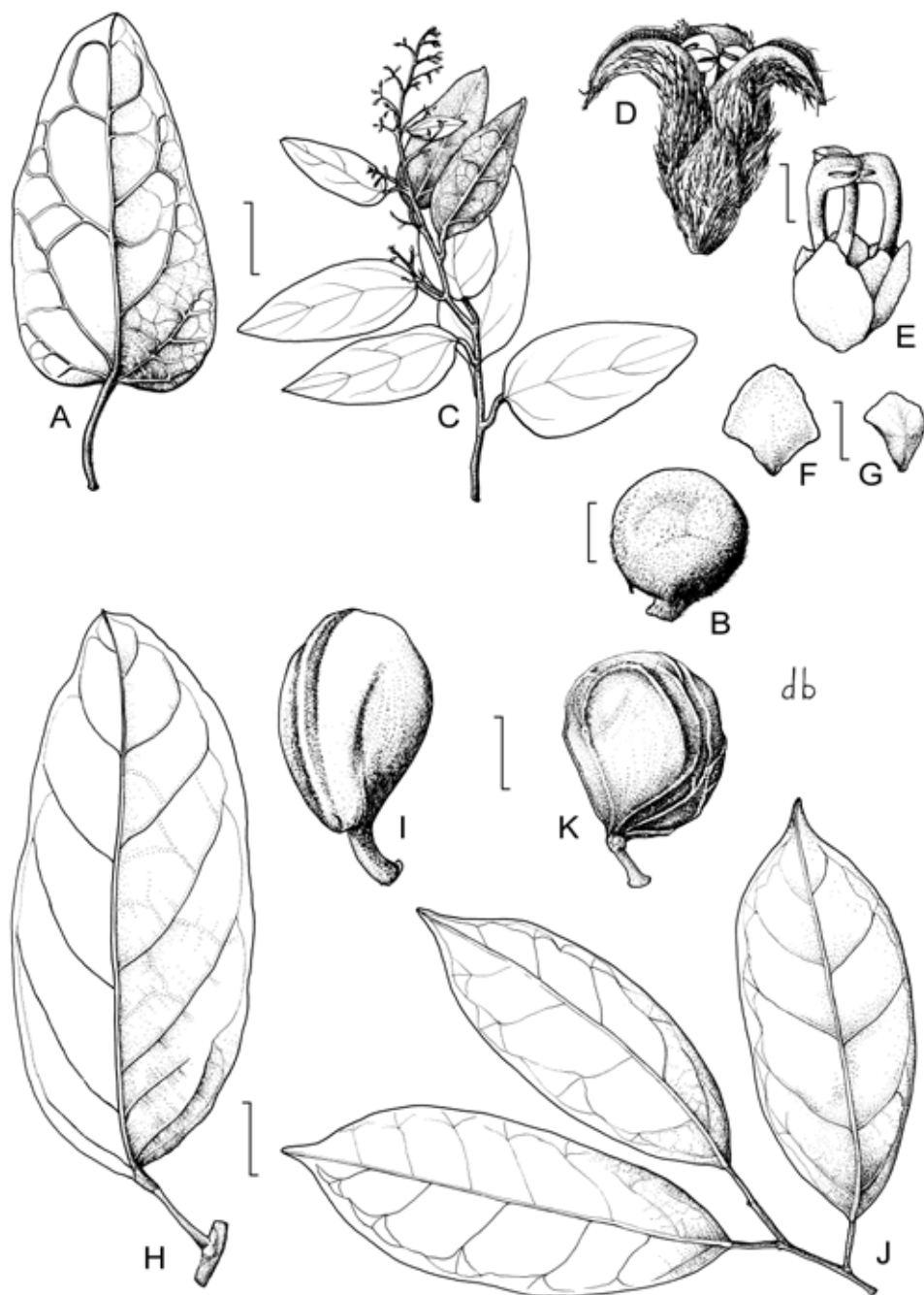


Figure 69. A–G, *Pleogyne australis*. A, leaf; B, drupe; C, flowering branchlet (A–C, W.Jones 1645, CANB); D, male flower; E, male flower with sepals removed; F, outer petal; G, inner petal (D–G, P.Beasley 859, CANB). H–I, *Carronia protensa*. H, leaf; I, drupe (H–I, J.Wrigley 437, CANB). J–K, *Pycnarrhena novoguineensis*. J, leafy branchlet; K, drupe (J–K, L.Smith 11716, CANB). Scale bars: A–C, H, J = 20 mm; D–G = 0.5 mm; I = 4 mm; K = 10 mm. Drawn by D.Boyer.

Occurs on the eastern side of Cape York Penin., Qld; in rainforest. Also from New Guinea to New Ireland and Vanuatu. Map 404.

Qld: Claudie R., *B.Hyland 21005V* (K, QRS); *loc. id.*, *B.Hyland 21170V* (K, QRS); McIlwraith Ra., *W.T.Jones 2280* (CANB); upper Massey Ck, c. 24 km S of ENE of Coen, *L.S.Smith 11716* (BRI, K).

2. CARRONIA

Carronia F.Muell., *Fragm.* 9: 71 (1875); named after the Australian botanist W.Carron.

Type: *C. multiseppalea* F.Muell.

Husemannia F.Muell., *S. Sci. Rec.* 3: 127 (1883). T: *H. protensa* F.Muell.

Large woody climbers, without prickles. Stems tomentose, glabrescent, often bearing prominent discoid petiole scars. Leaves with lamina penninerved, sometimes with basal nerves present. Inflorescences axillary, terminal or ramiflorous, subspicate or paniculate, without accrescent bracts. Male flowers: sepals c. 9–30 in vertically imbricating whorls of 3, bracteole-like, densely pilose, the outer whorls progressively smaller, the innermost whorl valvate; petals 6, equal, \pm clawed; stamens 6, usually free. Female flowers: staminodes absent; carpels 6, densely pilose; style subulate, glabrous. Drupes narrowed at base into a stipe; style-scar near base; endocarp strongly curved, bony, sometimes with a dorsal ridge. Seed horseshoe-shaped; endosperm absent; cotyledons thick.

A genus of 4 species of which 3 are endemic to Australia and 1 is endemic to New Guinea.

- | | | |
|----|---|----------------------------|
| 1 | Inflorescence branched, either paniculate or with subspicate branches; drupes drying with a prominent dorsal ridge; leaves usually lanceolate to elliptic | |
| 2 | Flowers pedicellate in a rather lax panicle; drupes tomentose | 1. <i>C. pedicellata</i> |
| 2: | Flowers subsessile in compact clusters along subspicate branches of inflorescence; drupes minutely puberulous | 2. <i>C. protensa</i> |
| 1: | Inflorescence unbranched, subspicate; drupe drying without a prominent dorsal ridge; leaves usually elongate, \pm oblong | 3. <i>C. multiseppalea</i> |

1. *Carronia pedicellata* Forman, *Kew Bull.* 37: 371 (1982)

T: Babinda, Qld, 1977, *B.Jago 4*; holo: QRS; iso: K.

Leaves: petiole 1.3–3.5 cm long, tomentulose to pubescent; lamina lanceolate or elliptic, 8.5–16 cm long, 3.5–6 cm wide, glabrous or sparsely pubescent above apart from sometimes pubescent midrib, pubescent below especially along main nerves. Inflorescences axillary, paniculate, 5–17 cm long, tomentose. Male flowers: pedicel 1–2 mm long, pubescent; sepals c. 18, cream, externally silky-pubescent, with innermost 3 sepals elliptic, acute and 2.5 mm long; petals attached to base of stamens, 0.75 mm long; stamens very shortly connate at base, 1 mm long. Female flowers pedicellate; sepals to c. 24; carpels 1 mm long. Drupes subobovoid, 12–14 mm long, drying with a prominent dorsal ridge, red, fulvous-tomentose; stipe c. 2 mm long.

Occurs in north-eastern Qld near Innisfail; in rainforest. Map 405.

Qld: Weinerts Ck, Babinda, *R.L.Jago 393* (QRS); Lacey's Ck, c. 5.6 km W of Clump Point, *L.S.Smith & L.J.Webb 4881* (BRI).

2. *Carronia protensa* (F.Muell.) Diels in H.G.A.Engler, *Pflanzenr.* 46: 76, fig. 26Q–S (1910)

Husemannia protensa F.Muell., *S. Sci. Rec.* 3: 127 (1883). T: Daintree R., Qld, 1882, *T.Pentzke 1*; syn: MEL; isosyn: BM, BRI, K; Endeavour R., Qld, 1882, *W.A.Persieh 3*; syn: MEL; *loc. id.*, 1882, *W.A.Persieh 636*; syn: MEL.

Aristegia husemanii F.Muell., *S. Sci. Rec.* 3: 127 (1883), *nom. prov.*, *nom. inval.*

Leaves: petiole 2–9 cm long, tomentulose to glabrescent; lamina usually lanceolate to elliptic, 10–37 cm long, 4–17 cm wide, glabrous above, pubescent to glabrescent below. Inflorescences axillary and terminal, sometimes ramiflorous, to 40 cm long, with subspicate lateral branches to 12 cm long, blackish-brown-tomentose. Male flowers subsessile in compact clusters; sepals c. 21–27, greenish, externally densely pilose, with innermost 3 sepals broadly elliptic and 3 mm long; petals 1 mm long; stamens 2 mm long. Female flowers subsessile; carpels 1 mm long. Drupes subobovoid, 15–18 mm long, drying with prominent dorsal ridge, red, minutely puberulous; stipe 2–5 mm long. Fig. 69H–I.

Occurs in north-eastern Qld; in rainforest and complex mesophyll vine forest, in soil derived from basalt and on granite, to 760 m alt. Flowers Sept.–Jan.; fruits Feb.–Apr. Map 406.

Qld: S.F.R. 755, Gosschalk L.A., *D.Fitzsimon* 185 (QRS); S.F.R. 310, Upper Goldsborough L.A., *R.Gray* 1052 (K, QRS); S.F.R. 191, Barron, *B.Hyland* 6003 (QRS); 3 km S of Malanda, *L.W.Jessup* 530A (BRI, K); Cup Ck via Bloomfield, *V.Scarth-Johnson* 746A (BRI).

3. *Carronia multisepalea* F.Muell., *Fragm.* 9: 171 (1875)

T: Bellinger R., N.S.W., *Carron* s.n.; syn: MEL; Clarence R., N.S.W., Nov. 1875, *J.F.Wilcox* s.n.; syn: MEL.

Illustration: L.Diels in H.G.A.Engler, *Pflanzenr.* 46: 77, fig. 26J–P (1910).

Leaves: petiole 1.5–6 cm long, tomentulose to glabrescent; lamina usually elongate, ±oblong, usually 11–22 cm long, 3.3–7 cm wide, pubescent to glabrous above, tomentulose to glabrous below. Male inflorescences axillary or sometimes terminal, subspicate, to 18 cm long, bearing few-flowered clusters, tomentulose. Male flowers sessile; sepals to c. 30, forming vertical imbricate rows, subrotund, externally densely pilose, inner sepals to 4 mm long; petals subrhomboidal, 1–1.5 mm long; stamens 2 mm long. Female flowers usually solitary along inflorescence axis; carpels 1 mm long. Drupes subobovoid, 13–17 mm long, drying without a pronounced dorsal ridge, red, tomentulose; stipe 1–2 mm long.

Occurs in south-eastern Qld and north-eastern N.S.W. in coastal regions; in rainforest, recorded in basalt soil, to 780 m alt., locally common. Flowers Sept.–Nov.; fruits Jan.–Mar. Map 407.

Qld: Blackall Ra., Nov. 1916, *C.T.White* s.n. (BRI); Upper Tallebudgera, Dec. 1918, *C.T.White* s.n. (BRI). N.S.W.: Lismore, *W.Bäuerlen* 544 (BRI, MEL, NSW); Alstonville, *R.T.Baker* 1751 (K); Mt Nardi, Konorigan Ra., *R.Coveny* & *A.Rodd* 4494 (BRI, K, NSW).

3. PLEOGYNE

Pleogyne Miers, *Ann. Mag. Nat. Hist.* ser. 2, 7: 37, 43 (1851); from the Greek *pleon* (more) and *gyne* (female), in reference to the several carpels.

Type: *P. australis* Benth.

Microclisia Benth. in G.Bentham & J.D.Hooker, *Gen. Pl.* 1(1): Addend. 435 (1862). T: *M. australis* (Benth.) Benth. ex Miers

Slender woody climber, without prickles. Leaves with lamina penninerved, sometimes with basal nerves present. Inflorescences axillary or terminal, male paniculate, female subracemose, without accrescent bracts. Male flowers: sepals 12–15, in whorls of 3, the innermost whorl larger and valvate, all externally pilose; petals 6, minute, dimorphic; stamens 3, introrse. Female flowers: staminodes absent; carpels 6; style subulate, recurved. Drupes narrowed at base into a short stipe; style-scar near base; endocarp crustaceous. Seed bean-shaped; endosperm absent; cotyledons thick, slightly curved.

A monotypic genus endemic to eastern Qld and possibly W.A.

Pleogyne australis Benth., *Fl. Austral.* 1: 59 (1863)

Microclisia australis (Benth.) Benth. ex Miers, *Ann. Mag. Nat. Hist.* ser. 3, 19: 325 (1867). T: Moreton Bay, Qld, *F.Mueller* s.n.; syn: K; Keppel Bay, [Qld], 11 Aug. 1802, *R.Brown* 4926; syn: BM, K, MEL.

Pleogyne cunninghamii Miers, *op. cit.* 324. T: Cambridge Gulf, [W.A.], Sept. 1819, *A.Cunningham* 469; holo: K; iso: BM.

Illustration: L. Diels in H.G.A. Engler, *Pflanzenr.* 46: 89, fig. 31 (1910).

Leaves: petiole 0.5–2 cm long, usually tomentose; lamina usually ovate to lanceolate, 4–13 cm long, 2.5–7 cm wide, entire or (?margin of shade leaves) occasionally with a few, large, acute teeth in basal part, pubescent to subglabrous above, tomentose to subglabrous below; nerves and reticulation prominent on both surfaces. Inflorescences 2–8 cm long, tomentose. Male flowers shortly pedicellate or subsessile, yellowish; inner 3 sepals acuminate-ovate, 1.5–2 mm long, externally densely pilose; petals 0.5–0.75 mm long; stamens 1 mm long. Female flowers: carpels 1.5 mm long, densely pilose. Drupes subglobose, 6–10 mm long, black, puberulous. Fig. 69A–G.

Occurs in eastern Qld and possibly in north-eastern W.A.; habitats include Araucarian vine forest, rainforest and dry scrub in a variety of soils, locally common. Map 408.

Qld: Worlds End Pocket, Pine Mtn Rd, N of Ipswich, *L. Bird* 347179 (K, NSW); Nudgee Waterhole, Brisbane, *S.T. Blake* 15475 (BRI); Coondoo, *C.T. White* 7146 (BRI); Toomba HS, N Kennedy district, *K.A. Williams* 77205 (BRI).

Apparently not collected in W.A. since 1819 when the Cunningham collection cited above was made, but this may be wrongly localised.

4. TILIACORA

Tiliacora Colebr., *Trans. Linn. Soc. London* 13: 53, 67 (1821), *nom. cons.*; from a Bengali name for the type species.

Type: *T. racemosa* Colebr.

Woody climbers, without prickles. Leaves with lamina penninerved and with basal nerves present. Inflorescences axillary or cauliflorous, subracemose, composed of few-flowered cymes or, especially in female, of solitary flowers, without accrescent bracts. Male flowers: sepals 6–12, in whorls of 3, the outermost smallest, the innermost much larger and (in Australia) valvate apically, subimbricate basally; petals 6 (in Australia), equal; stamens 6 (in Australia), free. Female flowers: staminodes absent; carpels 9–12, inserted on a gynophore; style short, acute. Drupes subobovoid, borne on branches of carpophore; style-scar near base; endocarp bony, horseshoe-shaped, with dorsal transverse ridges. Seed horseshoe-shaped, with ruminant endosperm; cotyledons elongate, flattened.

A genus of 22 species mostly in tropical Africa; 2 occur in SE Asia and 1 in Australia.

Tiliacora australiana Forman, *Kew Bull.* 37: 370 (1982)

T: Little Nourlangie Rock, N.T., 22 Jan. 1980, *C.R. Dunlop* 5198; holo: K; iso: DNA.

Stems to 5 cm diam. Leaves: petiole 1.5–3 cm long, usually partly rugulose, puberulous to subglabrous; lamina lanceolate to ovate-lanceolate, 5–11.5 cm long, 2–6.5 cm wide, slightly puberulous on lower surface when young, glabrescent. Inflorescences 2.5–14 cm long, adpressed-puberulous; cymes (sometimes 1-flowered) on branches 3–10 mm long, the flowers sessile. Male flowers: sepals c. 12, yellow, glabrous, lateral margins minutely ciliolate, the innermost sepals broadly elliptic and 3–3.5 mm long; petals 2–2.5 mm long, glabrous; stamens 2–3 mm long. Female flowers: carpels narrowly ovoid, 1.5 mm long, borne on a very shortly-lobed columnar gynophore 1–2 mm long; style short, acute. Drupes 10 mm long, colour not known, glabrous.

Occurs in northern N.T. and on Cape York Penin., Qld; climbing in trees and scrambling over rocks in sandstone area in N.T., in rainforest and monsoon forest in Qld. Flowers recorded Jan. Map 409.

N.T.: Little Nourlangie Rock, *C.R. Dunlop* 5060 (DNA); Nourlangie Rock area, *J. McKean* B783 (DNA, K). Qld: Pascoe R., *B. Hyland* 10840 (QRS); Chili Ck, Natl Park Reserve 8, Weymouth Parish, *B. Hyland* 11219 (BRI, QRS); Jenny Tableland, Lakefield Natl Park, Princess Bay, *D. Smyth* JT16 (BRI).

MENISPERMACEAE

5. TINOSPORA

Tinospora Miers, *Ann. Mag. Nat. Hist. ser. 2*, 7: 35, 38 (1851), *nom. cons.*; from the Latin *tinus* (*Viburnum tinus*) and the Greek *spora* (seed), in reference to the endocarp.

Type: *T. cordifolia* (Willd.) Miers ex Hook.f. & Thomson

Fawcettia F.Muell., *Fragm.* 10: 93 (1877). T: *F. tinosporoides* F.Muell.

Woody climbers, without prickles. Leaves very variable in Australian species, palmately nerved at base, nerves not extending to leaf margin. Inflorescences often racemose, axillary or sometimes on leafless plants, glabrous or puberulous, without accrescent bracts. Male flowers: sepals usually 6 in 2 whorls, the inner usually larger, imbricate, sometimes a third reduced outer whorl present; petals usually 6, free (in Australia); stamens 6, free (in Australia). Female flowers: staminodes 6; carpels 3; stigma reflexed. Drupes of various shapes, borne on carpophore; style-scar terminal; endocarp bony, dorsally convex and variously ornamented (in Australia), with a ventral aperture. Seed dorsiventrally flattened and concave; endosperm present, usually ruminate; cotyledons thin, foliaceous.

A genus of c. 32 species from Africa and Asia to Australia, New Caledonia and Guam; 3 species endemic to Australia.

L.L.Forman, A revision of *Tinospora* in Asia to Australia and the Pacific, *Kew Bull.* 36: 375–421 (1981).

- 1 Leaves lacking glandular patches below in basal nerve-axils, never linear; inflorescences branched towards base; male flowers sessile; endocarps 16–18 mm long, densely spinulose

1. *T. tinosporoides*

- 1: Leaves with glandular patches below in basal nerve-axils, or leaves linear; inflorescences racemose; male flowers pedicellate; endocarps 6–8 mm long, \pm rugose or spinulose

- 2 Leaves 5.5–14 cm wide, usually \pm triangular to ovate; inner sepals 3–4 mm long; petals 1.5–2 mm long; stamens 3–4 mm long; endocarps 7–8 mm long, \pm rugose

2. *T. smilacina*

- 2: Leaves 0.3–4.5 cm wide, usually linear to narrowly triangular; inner sepals 2.5–3 mm long; petals 1–1.3 mm long; stamens 1.7–2 mm long; endocarps 6 mm long, spinulose

3. *T. esiangkara*

1. *Tinospora tinosporoides* (F.Muell.) Forman, *Kew Bull.* 36: 409 (1981)

Fawcettia tinosporoides F.Muell., *Fragm.* 10: 93 (1877). T: Richmond R., N.S.W., 1878, *C.H.Fawcett s.n.*; syn: MEL.

Illustrations: L.Diels in H.G.A.Engler, *Pflanzenr.* 46: 130, fig. 47 (1910), as *Fawcettia tinosporoides*; L.L.Forman, *Kew Bull.* 36: 410, fig. 5B–D (1981).

Woody climber, entirely glabrous. Leaves: petiole 3–14 cm long; lamina usually triangular to ovate, 8–17 cm long, 5–13 cm wide, sometimes with basal triangular or rounded lobes, usually truncate or slightly cordate at base, with reticulation prominent on both surfaces, basal glandular patches absent. Male inflorescences axillary or cauliflorous, 3–15 cm long, basally with dense spikes to 1.5 cm long, apically spiciform. Male flowers sessile; sepals 7–9 in 3 whorls, innermost sepals 2 mm long; petals 1.25 mm long; stamens 1.5 mm long. Female inflorescences paniculate, to 30 cm long. Female flowers: pedicel 1–1.5 mm long; staminodes 1–1.5 mm long; carpels 1–1.5 mm long. Drupes red; endocarp subobovoid, 16–18 mm long, surface densely spinulose.

Occurs near the coast of south-eastern Qld and north-eastern N.S.W. close to the interstate boundary; locally common in rainforest on basalt, also occurs in complex notophyll vine forest. Map 410.

Qld: Burleigh Heads Natl Park, *W.J.McDonald* 2200 (BRI). N.S.W.: O'Donnell Ck, Toonumbar State Forest, 16 km W of Wiangaree, *E.F.Constable* NSW 90151 (K, NSW); Richmond R., *C.H.Fawcett* 198 (MEL); Alstonville, *W.H.Tomlins* NSW 198448 (NSW); *loc. id.*, *W.H.Tomlins* NSW 198450 (NSW).



Figure 70. A–E, *Tinospora smilacina*. A, flowering branch, male; B, male flower (A–B, A.George 15648, CANB); C, infructescence; D, endocarp, ventral view; E, endocarp, dorsal view (C–E, H.Reeve 523 & Njumabuy, CANB). F–H, *Sarcopetalum harveyanum*. F, leafy branchlet; G, endocarp, lateral view; H, endocarp, dorsal view (F–H, F.Crome 441, CANB). I–K, *Tinospora esiangkara*. I, fruiting branch; J, endocarp, dorsal view; K, endocarp, ventral view (I–K, G.Wightman & L.Craven 1372, CANB). Scale bar: A, C, F, I = 20 mm; B = 2.5 mm; D, E, G, H, J, K = 4 mm. Drawn by D.Boyer.

2. *Tinospora smilacina* Benth., *J. Proc. Linn. Soc., Bot.* 5, suppl. 2: 52 (1861)

Tinospora smilacina var. *typica* Domin, *Biblioth. Bot.* 89: 667 (1925), *nom. inval.* T: Plains of Promise, [N.T.], 29 Aug. 1856, *D.Moore s.n.*; holotype: K.

Tinospora walcottii F.Muell. ex Benth., *Fl. Austral.* 1: 56 (1863). T: Nichol [Nickol] Bay, W.A., *P.Walcott s.n.*; holotype: K; isotype: MEL.

Tinospora berneyi F.M.Bailey, *Queensland Agric. J.* 18: 76, 340 (1907); *T. smilacina* var. *berneyi* (F.M.Bailey) Domin, *loc. cit.* T: Spring Valley, Hughenden, Qld, Sept. 1905, *F.L.Berney* 5; syn: BRI, K; *loc. id.*, Mar. 1906, *F.L.Berney* 73; syn: BRI.

Illustrations: J.Banks & D.Solander, *Ill. Austral. Pl. Cook's Voy.* 1: pl. 4 (1900); L.L.Forman, *Kew Bull.* 36: 401, fig. 3H–L (1981).

Woody climber with milky sap, entirely glabrous. Leaves: petiole usually 1–7 cm long; lamina usually \pm triangular to ovate, 6.5–15 cm long, 5.5–14 cm wide, cuneate to cordate at base, with glandular patches below in basal nerve-axils. Inflorescences sometimes on leafless plants, axillary, racemose, 4–11 cm long. Male flowers yellow; pedicel 1–5 mm long; inner sepals 3–4 mm long; petals 1.5–2 mm long; stamens 3–4 mm long. Female flowers pedicellate; staminodes 0.5 mm long; carpels 2 mm long. Drupes red; endocarp usually \pm ellipsoidal, 7–8 mm long, 4–5 mm wide, obscurely to coarsely rugose. Fig. 70A–E.

Occurs from Nickol Bay to the Kimberley, northern W.A., throughout most of N.T. extending S to Ormiston Gorge Reserve, in northern and eastern Qld and extending S into north eastern N.S.W. Grows in a wide variety of habitats, including sandy and rocky areas, grassland, monsoon forest and rainforest. Map 411.

W.A.: 10 km N of Noonkanbah Stn, *C.A.Gardner & M.Lazarides 6531* (CANB). N.T.: South West Is., Sir Edward Pellew Group, *L.A.Craven 3691* (CANB); Ormiston Gorge Reserve, 19 Jan. 1976, *J.Wauchope* (DNA). Qld: Durkam Stn, 10 km NE of Cooktown, *T.J.McDonald & G.N.Batianoff 1518* (BRI, K). N.S.W.: Acacia Ck, McPherson Ra., Feb. 1905, *J.L.Boorman* (NSW).

There appear to be ecological races which merge together. Plants with ovate leaves with a cordate base and thin texture occur in areas with higher rainfall, while thicker, broadly triangular leaves with a truncate or cuneate base predominate in drier areas. The many intermediates and variations in leaf-shape do not allow the recognition of more than one taxon. The species is common in some localities yet rare in others. It is used medicinally by Aborigines: leaves are chewed to treat colds, and stems are used to prepare poultices for painful swellings in legs. It is the host plant for fruit-piercing moths which can cause considerable damage to fruit crops; it is apparently the only host in Australia for *Othreis materna* (L.) and is a major host for *O. fullonia* (Clerck).

3. *Tinospora esiangkara* (F.M.Bailey) Forman, *Fl. Australia* 2: 462 (2007)

Limacia esiangkara F.M.Bailey, *Queensland Fl.* 6: 1997 (1902). T: Mapoon, Qld, 22 Jan. 1901, *J.F.Bailey s.n.*; holotype: BRI.

Tinospora angusta Forman, *Kew Bull.* 36: 383 (1981), *nom. superfl.* T: Nourlangie Creek, N.T., 28 Feb. 1973, *L.A.Craven 2452*; holotype: CANB; isotype: BRI, DNA, K.

Slender woody climber. Leaves: petiole 0.6–1.7 cm long; lamina usually linear to narrowly triangular, sometimes triangular or ovate, 6–10.5 cm long, 0.3–4.5 cm wide, very variable at base, sometimes hastate, patent-puberulous to glabrous on both surfaces, with glandular patches below in basal nerve-axils. Inflorescences axillary, racemose, 2–9 cm long, patent-puberulous or glabrous. Male flowers yellow-green; pedicel 2–3 mm long; inner sepals reflexed, 2.5–3 mm long; petals 1–1.3 mm long; stamens 1.7–2 mm long. Female flowers: pedicel 2–3 mm long; staminodes 0.5 mm long; carpels 1.3 mm long. Drupes red; endocarp broadly subellipsoidal, 6 mm long, spinulose. Fig. 70I–K.

Occurs on North West Cape, W.A., in Arnhem Land, N.T., and on Cape York Penin., Qld; in a variety of habitats including rocky limestone outcrops and ridges, sandstone areas, low scrub, open woodland and rainforest margins. Flowers and fruits Dec.–July. Map 412.

W.A.: c. 10 km S of centre of Exmouth in creek S of Mowbowra Ck, North West Cape, *M.Trudgen 12865* (PERTH). N.T.: Magela Ck, *C.Dunlop 3360* (DNA). Qld: c. 2 km NNW of mouth of McIvor R.,

J.R.Clarkson 7277 (BRI); Archer Hill, Archer Point, *B.Gray* 2475 (QRS); Iron Range Rd, 2.6 km past Garraway Creek Crossing, Cape Weymouth, *P.I.Forster* 4189 (BRI).

Roots eaten by Aborigines after roasting.

6. PACHYGONE

Pachygone Miers, *Ann. Mag. Nat. Hist.* ser. 2, 7: 37, 43 (1851); from the Greek *pachys* (thick) and *gone* (offspring), referring to the thick cotyledons.

Type: *P. plukenetii* (DC.) Miers

Tristichocalyx F.Muell., *Fragm.* 4: 27 (1863). T: *T. pubescens* (Benth.) F.Muell.

Woody climbers, without prickles. Leaves usually \pm ovate, base 3–5-nerved. Inflorescences axillary, subracemose, without accrescent bracts. Male flowers: sepals usually 6 in 2 whorls, sometimes 1 or 2 additional reduced outermost whorls present, imbricate; petals 6, auriculate towards base, clasping the opposite stamen; stamens 6, free. Female flowers: staminodes 6; carpels 3; style reflexed; stigma entire. Drupes without carpophore or stipe, with style-scar near base; endocarp bony, \pm obovoid, subcompressed, rather smooth, laterally perforate, with a central hollow condyle around which the seed is strongly curved. Seed without endosperm; cotyledons large, thick.

A genus of c. 10 species in SE Asia, Malesia, Australia and the Pacific; 1 species occurs in Australia.

***Pachygone ovata* (Poir.) Hook.f. & Thomson, *Fl. Ind.* 1: 203 (1855)**

Cissampelos ovata Poir., *Encycl.* 5: 10 (1804). T: 'Indes orientales', *P.Sonnerat*; holo: *n.v.*

Pachygone pubescens Benth., *Fl. Austral.* 1: 58 (1863); *Tristichocalyx pubescens* (Benth.) F.Muell., *Fragm.* 4: 27 (1863); *Cebatha pubescens* (Benth.) Kuntze, *Revis. Gen. Pl.* 1: 9 (1891). T: Quail Is., [Qld], Sept. 1855, *J.Flood*; holo: K; iso: MEL.

Tinospora hullsii F.Muell., *Fragm.* 5: 147 (1866); *Pachygone hullsii* (F.Muell.) F.Muell., *Fragm.* 9: 81 (1875). T: Escape Cliffs, N.T., *C.Hulls*; holo: MEL; iso: BRI, K.

Illustrations: L.Diels in H.G.A.Engler, *Pflanzenr.* 46: 243, fig. 80 (1910); J.Brock, *Top End Native Pl.* 274 (1988).

Climber, yellowish pubescent, especially on inflorescences, young stems and usually petioles and lamina below. Leaves: petiole 2.5–5 cm long; lamina usually ovate-lanceolate to broadly ovate, 5–15 cm long, 3–10 cm wide, 3–5-nerved at base, with main basal nerves usually extending more than half length of lamina but not extending to leaf margin, sometimes glabrous. Inflorescences 4–17 cm long, with flowers often in clusters of c. 3–5. Male flowers: pedicel usually 1–3 mm long; sepals yellow, with inner 3 or 6 elliptic to rotund and 1.5–2.5 mm long; petals 1–1.5 mm long; stamens 1.25–1.5 mm long. Female flowers: staminodes minute; carpels 0.75 mm long. Drupes 7–8 mm long, drying smooth, glabrous. Fig. 71A–B.

Occurs in northern coastal regions of W.A., N.T. and Qld, also on Christmas Is.; in evergreen to deciduous notophyll vine forest, also in rainforest, grassland–beach scrub and coastal vine thicket, in a wide variety of soils, locally common. Also in southern India, Sri Lanka, central and eastern Malesia. Flowers June–Aug.; fruits Sept.–Nov. Map 413.

W.A.: Lone Dingo, c. 25 km NNW of mining campsite, Mitchell Plateau, N Kimberley, *K.F.Kenneally* 8577 (K, PERTH, QRS). N.T.: 1 km N of Mt Bunday Quarry, *J.Russell-Smith* 788 (BRI, CANB, DNA, MEL); NE coast of Cape van Diemen, Melville Is., *L.J.Webb* & *J.G.Tracey* 12295 (BRI, CANB). Qld: Reef Point, Hunt Channel, Whitsunday Is., *G.N.Batianoff* & *C.Dalliston* 3035 (BRI); Bathurst Bay, *B.Hyland* 6288 (K, QRS).

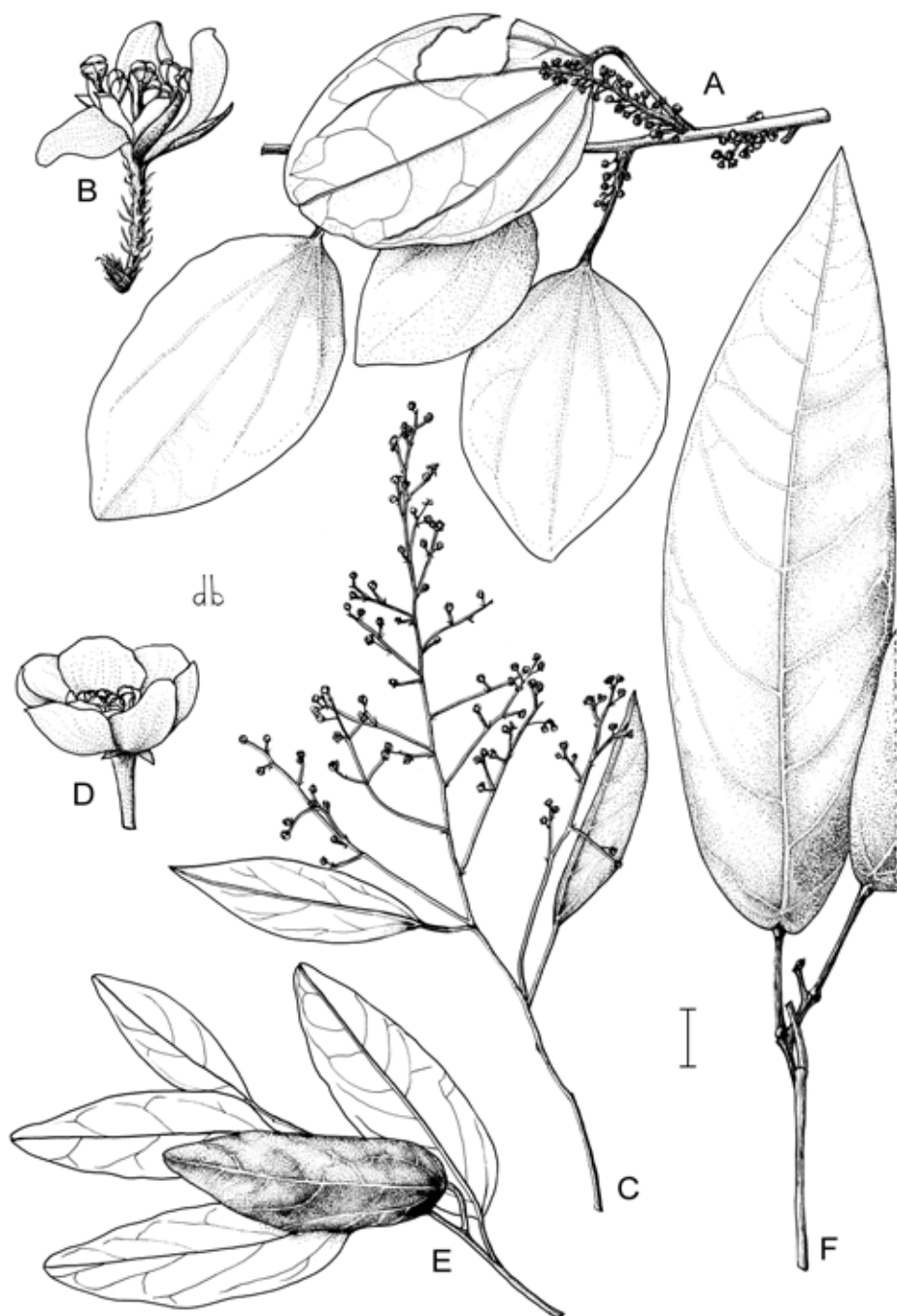


Figure 71. A–B, *Pachygone ovata*. A, flowering branchlet, male; B, male flower (A–B, J.Russell-Smith 788, CANB). C–E, *Hypserpa laurina*. C, flowering branchlet, male; D, male flower (C–D, A.Dockrill 1321, CANB); E, leaves (J.Wrigley & I.Telford 1080, CANB). F, *Parapachygone longifolia*, leaf (W.Jones 2061, CANB). Scale bar: A, C, E, F = 16 mm; B = 1 mm; D = 2 mm. Drawn by D.Boyer.

MENISPERMACEAE

7. PARAPACHYGONE

Parapachygone Forman, *Fl. Australia* 2: 462 (2007); from the Greek *para* (near) and *Pachygone*, an allied genus.

Type: *P. longifolia* (F.M.Bailey) Forman

Woody climbers, without prickles. Leaves slightly peltate, penninerved. Inflorescences axillary or terminal on lateral branches, narrowly paniculate, without accrescent bracts. Male flowers: sepals 8 or 9, imbricate, in whorls of 3, the outermost whorl of 2 or 3 sepals smallest; petals 6, free, flat, fleshy; stamens c. 18–20, free or only partly connate; anthers dehiscing vertically. Female flowers: staminodes absent; carpels 3; stigma lobulate. Drupes without stipe or carpophore; style-scar near base; endocarp bony, ±rotund in outline, subcompressed, dorsally obscurely ridged or spinulose, laterally imperforate. Seed deeply curved around a flat, bilamellate condyle; endosperm absent; cotyledons thick.

A monotypic genus endemic to Qld.

Parapachygone longifolia (F.M.Bailey) Forman, *Fl. Australia* 2: 462 (2007)

Pachygone longifolia F.M.Bailey, *Queensland Fl.* 1: 34, pl. 3 (1899). T: Mourilyan Harbour, Qld, *W.Mugford* 37; holo: BRI.

Illustration: F.M.Bailey, *loc. cit.*, as *Pachygone longifolia*.

Climber, entirely glabrous. Leaves: petiole 2–4 cm long, inserted 2–4 mm from basal margin; lamina lanceolate to oblong, 17–30 cm long, 6.5–17 cm wide, with c. 6–9 pairs of lateral nerves. Inflorescences 5–8 cm long when axillary, to c. 40 cm long when terminal, then sometimes with reduced leaves subtending the lateral branches. Male flowers (from unopened buds): pedicel 1–2 mm long; sepals cream, with the inner 6 rotund and 2 mm long; petals elliptic, 0.75 mm long; stamens 0.75 mm long. Female flowers: inner sepals broadly elliptic, reflexed, 4 mm long; petals elliptic, 2 mm long; carpels 2 mm long. Drupes red, c. 2.5 cm diam., drying rugose. Plate 60; Fig. 71F.

Occurs in coastal regions of north-eastern Qld; in rainforest, mesophyll palm forest and mixed mesophyll vine forest, in soils derived from metamorphics, recorded to 720 m alt. Flowers Oct.–Nov.; fruits Feb. Map 414.

Qld: Brampton Beach, near Babinda, Feb. 1959, *H.B.Gill s.n.* (BRI); S.F.R. 756, E McNamee L.A., *B.Gray* 795 (QRS); T.R. 1230, Boonjee L.A., *B.Gray* 1125 (QRS); Portion 142, Bellenden Ker, *B.Hyland* 11389 (QRS); Cape Tribulation, *K.A.Williams* 82123 (BRI).

8. HYPSERPA

Hypserpa Miers, *Ann. Mag. Nat. Hist.* ser. 2, 7: 36, 40 (1851); from the Greek *hypsos* (height) and *herpo* (creep), in reference to its climbing habit.

Type: *H. cuspidata* (Hook.f. & Thomson) Miers = *H. nitida* Miers

Adeliopsis Benth. in G.Bentham & J.D.Hooker, *Gen. Pl.* 1(1): Addend. 436 (1862); *Adelioides* R.Br. ex Benth., *Fl. Austral.* 1: 59 (1863), *nom. inval.*; *Adelioides* Sol. ex Britten in J.Banks & D.Solander, *Ill. Austral. Pl. Cook's Voy.* 1: 6, pl. 5 (1900), *nom. illeg.* T: *A. decumbens* Benth.

Selwynia F.Muell., *Fragm.* 4: 153 (1864). T: *S. laurina* F.Muell.

Woody climbers, without prickles. Leaves mostly ovate to elliptic, with 1–3 pairs of basal nerves which do not extend to leaf margin. Inflorescences axillary or terminal, thyrsoid, or apparently paniculate or racemose (in Australia), without accrescent bracts. Male flowers: sepals 6–12, spirally arranged, imbricate, usually glabrous, outer ones minute and bracteole-like, inner ones larger; petals 3–9, fleshy, glabrous; stamens 7–c. 40, free or connate. Female flowers: sepals and petals similar to male; staminodes absent (in Australia); carpels 2 or 3; stigma reflexed, entire, sometimes convoluted. Drupes subcompressed-obovoid to subglobose, without stipe or carpophore; style-scar near base; endocarp bony, with 2 lateral

hollow chambers, sometimes each with an external aperture, dorsally smooth to rugose. Seed horseshoe-shaped; embryo narrow, embedded in endosperm; cotyledons as long as or slightly shorter than radicle.

A genus of c. 7 species from tropical SE Asia to Polynesia; 4 species in Australia.

- | | | |
|--|---|----------------------------------|
| 1 | Young stems and lower surface of leaves whitish-tomentose to ferruginous-pilose | 1. <i>H. decumbens</i> |
| 1: Young stems and lower surface of leaves puberulous or glabrous | | |
| 2 | Reticulation of leaves scarcely raised; areolae usually convex; male inflorescences paniculate; male flowers subsessile or pedicel to 1 mm long | 2. <i>H. polyandra</i> |
| 2: | Reticulation of leaves clearly raised; areolae concave; male inflorescences thyrsoid or racemose, with pedicels 1–5 mm long | |
| 3 | Reticulation of leaves fine; leaves never peltate or subpeltate; male inflorescences very laxly thyrsoid, to c. 20 cm long | 3. <i>H. laurina</i> |
| 3: | Reticulation of leaves coarse; leaves sometimes peltate or subpeltate; male inflorescences racemose, to 3 cm long | 4. <i>H. smilacifolia</i> |

1. *Hypserpa decumbens* (Benth.) Diels in H.G.A.Engler, *Pflanzenr.* 46: 212 (1910)

Adeliopsis decumbens Benth., *Fl. Austral.* 1: 59 (1863); *Adelioides decumbens* (Benth.) Sol. ex Britten in J.Banks & D.Solander, *Ill. Austral. Pl. Cook's Voy.* 1: 6, pl. 5 (1900). T: Point Fear, [Qld], 1770, J.Banks & D.Solander s.n.; holotype: BM; iso: MEL.

Illustrations: J.Banks & D.Solander, *Ill. Austral. Pl. Cook's Voy.* 1: 6, pl. 5 (1900), as *Adelioides decumbens*; L.Diels in H.G.A.Engler, *Pflanzenr.* 46: 211, fig. 73 (1910).

Tall climber. Young stems tomentose to densely pilose. Leaves: petiole 0.5–6 cm long; lamina usually ovate to elliptic or broadly elliptic, 5–13 cm long, 2–8 cm wide, sometimes hastate at base, whitish-tomentose to ferruginous-pilose below, with 1 or 2 pairs of basal nerves. Inflorescences subracemose, 2–3 cm long, tomentose. Male flowers: pedicel 2–4 mm long, tomentose; sepals 7 or 8, cream, with inner ones broadly elliptic and 2.5–3 mm long, ciliolate or glabrous, the outermost pubescent; petals 3 or 4, obovate, 1.75 mm long; stamens 9–12, 1.75–2 mm long. Female flowers: carpels 2 or 3, 1.25 mm long; stigma convoluted. Drupes subglobose, 5 mm diam., red, glabrous; endocarp smooth, with a deeply curved groove on each lateral face, imperforate.

Occurs on Melville Is., N.T., in northern and eastern Qld, and in north-eastern N.S.W.; in rainforest, notophyll and mesophyll vine forest, low eucalypt woodland and growing on shrubs on sand dunes, locally common, mostly in sandy soil, to 740 m alt. Flowers Aug.–Mar.; fruits Jan.–Feb. Map 415.

N.T.: Taracumbie Ck, Melville Is., *L.J.Webb & J.G.Tracey 12292* (BRI, QRS). Qld: Iron Ra., *B.Hyland 11613* (K, QRS); Cape Flattery, 53 km NNE of Cooktown, *T.J.McDonald & G.N.Batianoff 1591* (BRI); Bamaga Mission, *L.S.Smith 12397* (BRI). N.S.W.: Brunswick Heads, *L.Murray 92* (BRI, K, NSW).

2. *Hypserpa polyandra* Becc., *Malesia* 1: 148 (1877)

var. *polyandra*

T: W New Guinea, Andai, *O.Beccari P.P.552*; syn: FI n.v.; Aru Is., 1873, *O.Beccari s.n.*; syn: K.

Large climber. Stems to 14 cm diam. Branchlets, leaves and inflorescences puberulous to glabrescent. Leaves: petiole 2–4 cm long; lamina ovate-elliptic to elliptic, 8–14 cm long, 4–7.5 cm wide, with 1 or 2 pairs of basal nerves. Inflorescences paniculate, to 11 cm long, 6 cm wide. Male flowers: subsessile or with pedicel to 1 mm long; sepals 7–12, yellow, margin sometimes minutely ciliolate, with larger inner ones ±rotund and 2–3 mm long; petals usually 5–7, shape variable, to 1 mm long; stamens c. 20–40, connate, 1.5–2 mm long. Female flowers: carpels 3, 0.75 mm long. Drupes ±rotund in outline, 9–10 mm long, red, glabrous; endocarp dorsally rugose, laterally perforate. Plate 59.

Occurs on Melville Is., N.T., and on north-eastern Cape York Penin., Qld; in rainforest and evergreen vine forest. Also from south-eastern Indonesia to New Guinea, Solomon Is., Vanuatu and Caroline Is. There are 2 varieties, 1 occurring only in eastern New Guinea. Flowers Jan. Map 416.

N.T.: Hanguana Jungle, Melville Is., *J.Russell-Smith 4584* (DNA). Qld: Claudie R., *B.Hyland 11200* (BRI, QRS); *loc. id.*, *B.Hyland 11509* (K, QRS); *loc. id.*, *B.Hyland 21003V* (QRS); *loc. id.*, *B.Hyland 21092V* (QRS).

3. *Hypserpa laurina* (F.Muell.) Diels in H.G.A.Engler, *Pflanzenr.* 46: 209 (1910)

Selwynia laurina F.Muell., *Fragm.* 4: 153 (1864); *Cocculus selwynii* F.Muell., *Fragm.* 4: 153 (1864), *nom. illeg., pro syn.*; *Hypserpa selwynii* (F.Muell.) F.Muell., *Fragm.* 9: 82 (1875), as *Selwyni*, *nom. illeg.*; *Limacia selwynii* (F.Muell.) F.M.Bailey, *Queensland Fl.* 1: 30 (1899), *nom. illeg.* T: Rockingham Bay, Qld, 1864, *J.Dallachy s.n.*; *holo:* MEL; *iso:* BM, BO, BRI, K.

Illustration: L.Diels in H.G.A.Engler, *Pflanzenr.* 46: 208, fig. 72 (1910).

Slender climber, entirely glabrous or almost so, branches pendulous. Young stems powdery-glaucous. Leaves: petiole 1–3 cm long; lamina elliptic to oblong-elliptic, 7–13 cm long, 3–5 cm wide, sometimes lobed at base when juvenile, with 1 or 2 pairs of basal nerves, often drying reddish brown; minute reticulation raised on both surfaces. Inflorescence thyrsoid, very lax, to c. 20 cm long. Male flowers: pedicel 1–5 mm long; sepals 7–9, yellowish, inner ones ±rotund and 1.5–2 mm long; petals usually 7–9, obtriangular, 0.75–1 mm long; stamens 11–15, free, 1–1.25 mm long. Female flowers: carpels 3, 1 mm long. Drupes broadly obovate in outline, 10–12 mm long, red; endocarp with a broad, rugose, dorsal band, laterally perforate. Fig. 71C–E.

Occurs on Dauan Is., Torres Strait, the northern tip of Cape York Penin. and in north-eastern Qld; in rainforest, mesophyll vine forest and scrub, in various soils including coarse sandy clay and sandy loam, to 900 m alt., locally common. Also in south-western New Guinea. Flowers July–Feb.; fruits Nov.–Apr. Map 417.

Qld: Dauan Is., Torres Strait, *E.Cameron 2343* (QRS); Cape York, *J.R.Clarkson 5686* (BRI, QRS); Mission Beach, south Mission Beach road, *B.Hyland 5248* (BRI, K, QRS); L. Barrine, Atherton Tableland, *S.F.Kajewski 1342* (A, BRI, K, MEL); Etty Bay, via Innisfail, *L.J.Webb 2390* (CANB).

4. *Hypserpa smilacifolia* Diels in H.G.A.Engler, *Pflanzenr.* 46: 208 (1910)

T: Rockingham Bay, Qld, 28 July 1868, *J.Dallachy s.n.*; *holo:* B.

Hypserpa reticulata Forman, *Kew Bull.* 37: 372 (1982). T: State Forest Reserve 185, Noel L.A., Qld, 3 Oct. 1977, *A.W.Dockrill 1393*; *holo:* K; *iso:* BRI, QRS.

Stem to c. 11 cm diam., sparsely puberulous. Leaves sometimes peltate or subpeltate; petiole 1.5–7.3 cm long, attached at base or to 3 mm from basal margin; lamina elliptic, oblong or ovate, 6–15 cm long, 2.5–9.5 cm wide, sometimes hastate at base, with 1–3 pairs of ±basal nerves, reticulation prominent and coarse, especially below, both surfaces glabrous. Male inflorescences axillary, racemose, 2.5–3 cm long, pubescent. Male flowers: pedicel 4–5 mm long, pubescent; sepals 6–9, rotund, cream, the inner ones 4 mm long; petals 5 or 6, obovate-rhomboidal, 2 mm long; stamens 7–9, clavate, 2–2.5 mm long. Female flowers unknown. Drupes transversely obovate in outline, 10–11 mm long, yellowish, glabrous; endocarp dorsally ridged, smooth, with a deeply curved groove on each lateral face, imperforate.

Occurs in north-eastern Qld; in rainforest and microphyll vine-fern forest, at 600–1300 m alt. Flowers Aug.–Oct.; fruits Dec. Map 418.

Qld: S.F.R. 185, Haig L.A., *B.Gray 2700* (QRS); *loc. id.*, *B.Hyland 11324* (BRI, QRS); Davies Ck, *W.T.Jones 2429* (CANB); S.F.R. 650, Mt Fisher, *K.Sanderson 880* (QRS).

MENISPERMACEAE

9. SARCOPETALUM

Sarcopetalum F.Muell., *Pl. Victoria* 1: 26, suppl. t. 3 (1862); from the Greek *sarcos* (flesh) and *petalon* (leaf or petal), in reference to the fleshy petals.

Type: *S. harveyanum* F.Muell.

Woody climbers, without prickles. Leaves subpeltate or peltate, usually \pm cordate, palmately nerved. Inflorescences axillary or arising from old, leafless stems, subracemose, without accrescent bracts. Male flowers: sepals usually 3–6, sometimes 2, minute, in whorls of 3, imbricate; petals 3–5, thick, fleshy, larger than sepals; stamens with the filaments connate in a column; anthers 3 or 4, free, radiating from top of column. Female flowers: sepals and petals as in male; staminodes 3–5, free; carpels 3–6; stigma recurved, divided into 2 or 3 subulate points. Drupe without stipe or carpophore; style-scar near base; endocarp \pm semicircular in outline, bony, dorsally ridged or spinulose, laterally concave. Seed semi-annular; embryo subterete, embedded in endosperm; cotyledons elongate, flattened.

A monotypic genus in eastern Australia and southern New Guinea.

L.L.Forman, The Menispermaceae of Malesia: V, Tribe Cocculeae Hook.f. & Thoms., *Kew Bull.* 22: 361–362 (1968).

Sarcopetalum harveyanum F.Muell., *Pl. Victoria* 1: 27, suppl. t. 3 (1862)

T: Snowy R., Vic., *F.Mueller s.n.*; syn: K, MEL; Parramatta, N.S.W., *W.Woolfs s.n.*; syn: MEL.

Illustrations: F.Mueller, *Pl. Victoria* 1: suppl. t. 3 (1862); L.Diels in H.G.A.Engler, *Pflanzenr.* 46: 253, fig. 85 (1910).

Large climber. Older stems verruculose. Leaves: petiole 4–11 cm long, inserted almost at base or to 3 mm from basal margin of lamina; lamina broadly ovate or deltate-ovate, 9–22 cm long, 7–20 cm wide, deeply or shallowly cordate to truncate at base, entire or occasionally with few teeth, acuminate or obtuse, palmately 7–9-nerved, reticulation prominent above and below, glabrous. Inflorescences 4–16 cm long, papillose. Male flowers: sepals subtriangular, c. 1 mm long; petals cream to pink, \pm broadly cuneate, 2 mm long; synandrium 1.5 mm long. Female flowers: staminodes 0.5 mm long; carpels 1.5 mm long. Drupe red to purple, glabrous; endocarp 6 mm long, dorsally ridged or spinulose. Fig. 70F–H.

Occurs in Qld near Mareeba and Rockingham Bay, near Shoalwater Bay, and from near Biggenden, Qld, through eastern N.S.W. to Gippsland, Vic., also in southern New Guinea; in forests including rainforest, wet and dry sclerophyll forest, and in scrub on sand dunes, in basaltic soils, laterite ridges and sandstone, to 1200 m alt., locally common. Flowers Oct.–Mar.; fruits May–Aug. Map 419.

Qld: Mission Beach, *B.Hyland 3093* (BRI, K); Bauple, June 1945, *M.S.Clemens s.n.* (BRI, K). N.S.W.: St Albans, c. 10 km N of Wisemans Ferry, *W.Bishop et al. 688* (K, NSW). Vic.: Snowy R., E Gippsland, Oct. 1908, *C.S.Sutton s.n.* (MEL).

10. LEGNEPHORA

Legnephora Miers, *Ann. Mag. Nat. Hist.* ser. 3, 19: 89 (1867); from the Greek *legne* (fringe) and *phoros* (bearing), in reference to the fringed lateral crests on the endocarp.

Type: *L. moorei* (F.Muell.) Miers

Woody climbers, without prickles. Leaves \pm broadly ovate, palmately nerved, with nerves extending to leaf margin. Inflorescences pedunculate cymes, 1 or few supra-axillary or racemously arranged, without accrescent bracts. Male flowers: sepals 6, in whorls of 3, imbricate, outer 3 usually narrower than inner 3; petals 6 with sides folded inwards around the opposite stamen, glabrous; stamens 6, free; anthers dehiscing transversely, \pm introrse, the cells separated abaxially by the thickened connective. Female flowers: sepals 6; petals absent; staminodes 6, claviform; carpels 3; stigma recurved, flattened. Drupe curved, without stipe or carpophore; style-scar near base; endocarp bony, rotund in outline with entire dorsal

wing and prominent lateral curved crests. Seed horseshoe-shaped; embryo narrow, embedded in endosperm; cotyledons slightly shorter than radicle.

A genus of 5 species, 4 in the Philippines and eastern Malesia to Solomon Is., 1 endemic in eastern Australia.

L.L.Forman, The Menispermaceae of Malesia and adjacent areas: VII, A re-revision of *Legnephora* Miers, *Kew Bull.* 27: 275–280 (1972).

Legnephora moorei (F.Muell.) Miers, *Ann. Mag. Nat. Hist.* ser. 3, 19: 90 (1867), as *Moorii*

Cocculus moorei F.Muell., *Fragm.* 1: 162 (1859); *Cebatha moorei* (F.Muell.) Kuntze, *Revis. Gen. Pl.* 1: 9 (1891); *Legnephora moorei* var. *typica* Domin, *Biblioth. Bot.* 89: 668 (1925), *nom. inval.* T: Moreton Bay, [Qld], W.Hill s.n.; syn: K; *loc. id.*, F.Mueller s.n.; syn: MEL; Wide Bay, [Qld], F.Mueller s.n.; syn: MEL.

Tristichocalyx diffusus Miers, *Contr. Bot.* 3: 286, t. 128 (1871); *Cebatha diffusa* (Miers) Kuntze, *Revis. Gen. Pl.* 1: 9 (1891). T: 'Interior of New Holland', 1836, T.L.Mitchell s.n.; holo: CGE n.v., *fide* J.Miers, *loc. cit.*

Legnephora moorei var. *subacuta* Domin, *Biblioth. Bot.* 89: 668 (1925). T: Burnett R., [Qld], Dec. 1856, F.Mueller s.n.; syn: K.

[*Pericampylus incanus* auct. non (Colebr.) Miers ex Hook.f. & Thomson: G.Bentham, *Fl. Austral.* 1: 56 (1863)]

Illustrations: F.M.Bailey, *Queensland Fl.* 1: 29, tt. 1, 2 (1899).

Young stems and petioles yellow-puberulous, sometimes tomentulose or with a yellow-hispid indumentum also present. Leaves: petiole 4–17 cm long; lamina broadly ovate to subreniform, 7–26 cm long and wide, cordate to rounded at base, rounded or obtuse at apex, often apiculate, glaucous and subglabrous to tomentulose below. Inflorescences 2–9 cm long, puberulous. Male flowers green to white; sepals elliptic, 2 mm long, tomentose, inner 3 broader; petals scarcely 1 mm long; stamens 1 mm long. Female flowers: staminodes 1 mm long; carpels 1 mm long, pilose. Drupe dark blue, glabrous or slightly pubescent; endocarp 9–11 mm long and wide, 4 mm thick, with a thin, dorsal wing 2 mm wide, and lateral, fimbriate, curved crests. Fig. 72A–D.

Occurs from near Herberton, Qld, to near Brown Mtn, N.S.W.; in rainforest, microphyll vine forest and scrub, on basalt, loams or sandstone, to 1000 m alt. Flowers mainly Oct.–Jan.; fruits mainly Nov.–Mar. Map 420.

Qld: Worlds End Pocket, Pine Mt Rd, N of Ipswich, *L.Bird 347181* (BRI, K, NSW); Boobie, c. 6.4 km E of Kingaroy, *L.Pedley 68* (BRI). N.S.W.: Mt Terry, 2 km from Albion Park, *I.R.Telford 10684* (CANB, K, MEL).

The species is a host plant for the larva of a fruit-piercing moth (see H.Tryon, *Queensland Agric. J.* n.s. 21: 388 (1924) under *Pericampylus incanus* (Colebr.) Miers ex Hook.f. & Thomson). The bark contains an active poison. The plant is reputed to be poisonous to cattle (S.L.Everist, *Poison. Pl. Australia* 527, 1981).

11. ECHINOSTEPHIA

Echinostephia (Diels) Domin, *Biblioth. Bot.* 89: 669 (1925); from the Greek *echinos* (hedgehog) and *stephos* (crown), in reference to the prickles on the stem and the joined anthers.

Stephania sect. *Echinostephia* Diels in H.G.A.Engler, *Pflanzenr.* 46: 264 (1910). Type: *E. aculeata* (F.M.Bailey) Domin

Slender climber with underground tuber. Stems and often petioles set with recurved prickles. Leaves peltate, palmately nerved. Inflorescences supra-axillary or terminal, cymose or composed of a raceme of cymes, without accrescent bracts. Male flowers: sepals 6 in 2 whorls, imbricate; petals 6; stamens 3; filaments connate, separating at apex of column but anthers partly joined; anthers dehiscing subvertically to obliquely. Female flowers: sepals and petals as in male; staminodes absent; carpels 3; stigma entire, recurved. Drupes curved, without stipe or carpophore; style-scar near base; endocarp bony, transversely ridged on dorsal band (which is obliquely and broadly horseshoe-shaped), with margin of the condyle

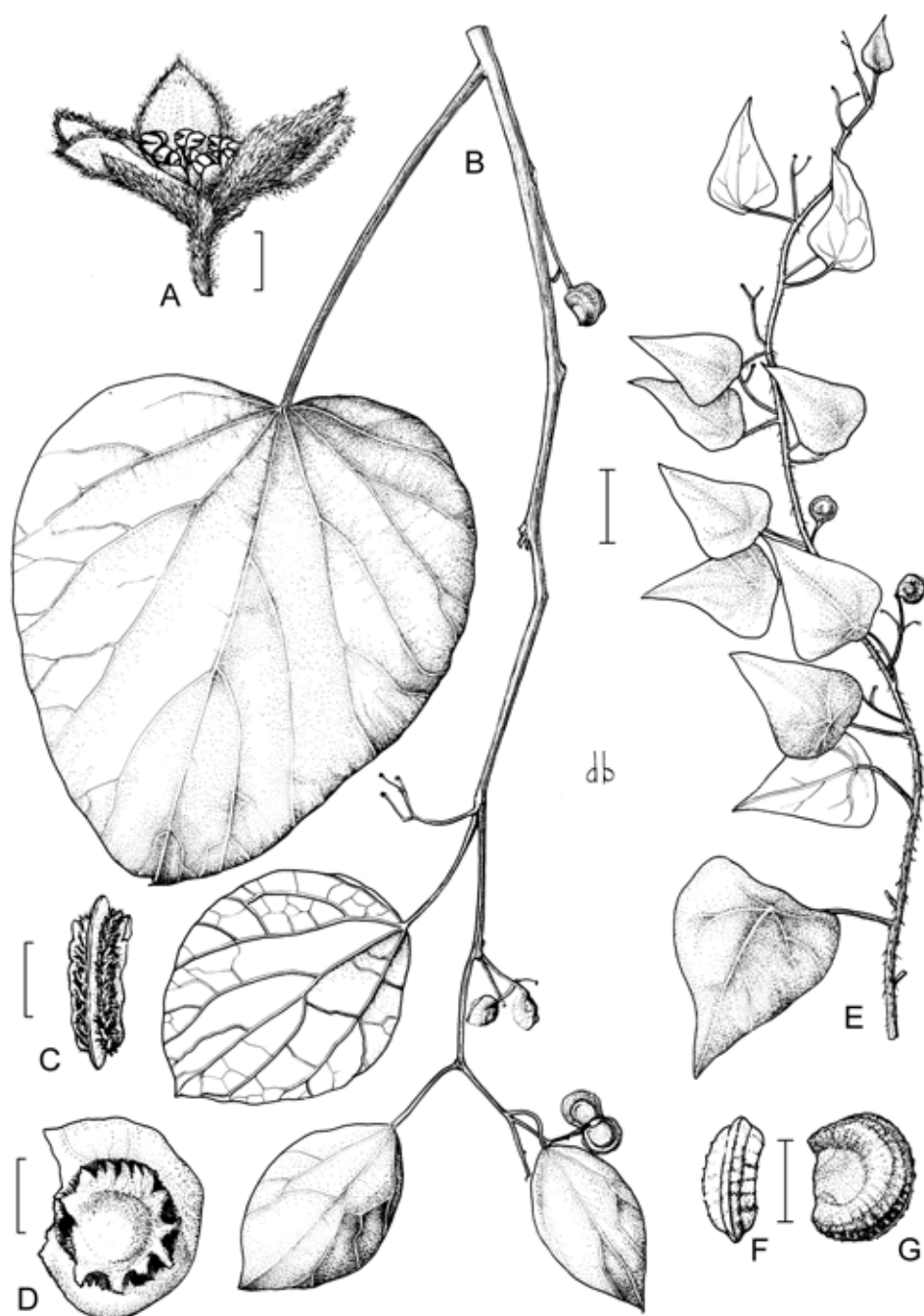


Figure 72. A–D, *Legnephora moorei*. A, male flower (M.Clemens July/Nov. 1947, CANB); B, fruiting branch; C, endocarp, dorsal view; D, endocarp, lateral view (B–D, W.Jones 1625, CANB). E–G, *Echinostephia aculeata*. E, fruiting branch; F, endocarp, dorsal view; G, endocarp, lateral view (E–G, W.Jones 3516, CANB). Scale bars: A = 1 mm; B, E = 20 mm; C, D, F, G = 4 mm. Drawn by D.Boyer.

radially ridged; very small lateral excentric perforation present. Seed curved, bean-shaped; embryo semi-annular, surrounded by endosperm; cotyledons \pm equalling radicle.

A monotypic genus, endemic to eastern Australia.

***Echinostephia aculeata* (F.M.Bailey) Domin, *Biblioth. Bot.* 89: 669 (1925)**

Stephania aculeata F.M.Bailey, *Bot. Bull. Dept. Agric., Queensland* 3: 7 (1891). T: Mt Gravatt, Qld, Nov. 1887, *F.M.Bailey s.n.*; holo: BRI; ?iso: NSW.

Illustration: L.Diels in H.G.A.Engler, *Pflanzenr.* 46: 265, fig. 88 (1910), as *Stephania aculeata*.

Tuber large. Leaves: petiole 2–6 cm long; lamina triangular to triangular-ovate, 4.5–9 cm long, 3.5–8 cm wide, truncate to slightly cordate at base, usually acute at apex, glabrous, glaucous below. Inflorescences very slender, to c. 18 cm long; cymes 1.5–6 cm long, glabrous. Male flowers: pedicel to c. 5 mm long, filiform; outer 3 sepals obovate, inner 3 sepals broadly elliptic, all 0.75–1 mm long, glabrous; petals cuneate-obovate, 0.3 mm long, glabrous; stamens c. 0.25 mm long. Female flowers: carpels sparsely papillose, 0.3 mm long. Drupes glabrous; endocarp obliquely \pm suborbicular in outline, 4–4.5 mm diam., ridges on the dorsal band not strongly pronounced. Fig. 72E–G.

Restricted to south-eastern Qld and north-eastern N.S.W.; grows in various forest types including rainforest, wet and dry sclerophyll forest, vine forest, also wattle scrub beneath *Eucalyptus* forest, sometimes prostrate among grasses. Map 421.

Qld: Woogaroo Ck, Goodna, Aug. 1980, *L.Bird s.n.* (BRI); Mt Gravatt, Brisbane, 9 Nov. 1887, *J.H.Simmonds s.n.* (BRI). N.S.W.: Whian Whian, 29 Mar. 1962, *W.T.Jones s.n.* (BRI); Copmanhurst, May 1909, *H.M.R.Rupp s.n.* (NSW).

12. CISSAMPELOS

Cissampelos L., *Sp. Pl.* 2: 1031 (1753); *Gen. Pl.* 5th edn, 455 (1754); from the Greek *chissos* (*Hedera*) and *ampelos* (*Vitis*), in reference to its climbing habit.

Type: *C. pareira* L.

Scandent shrubs or woody climbers, without prickles. Leaves peltate (in Australia), palmately nerved. Male inflorescences axillary, pedunculate, corymbose cymes, solitary or in fascicles. Male flowers: sepals 4, imbricate; petals connate into a cup-shaped corolla (in Australia); stamens connate into a peltate synandrium; anthers 4 (in Australia). Female inflorescences axillary, thyrsoid, elongate, composed of fascicles of flowers arising in the axils of accrescent, \pm orbicular bracts (in Australia). Female flowers: sepal 1; petal 1 (in Australia); staminodes absent; carpel 1; stigma trifid. Drupe curved, pubescent, without stipe or carpophore; style-scar near base; endocarp bony, dorsally ridged or tuberculate. Seed horseshoe-shaped; embryo elongate, narrow, embedded in endosperm; cotyledons flattened, as long as or shorter than radicle.

A pantropical genus of 20–25 species; 1 pantropical variety occurs in Qld.

***Cissampelos pareira* L., *Sp. Pl.* 2: 1031 (1753)**

var. ***hirsuta*** (Buch.-Ham. ex DC.) Forman, *Kew Bull.* 22: 356 (1968)

Cissampelos hirsuta Buch.-Ham. ex DC., *Syst. Nat.* 1: 535 (1817); *C. convolvulacea* var. *hirsuta* (Buch.-Ham. ex DC.) Hassk., *Pl. Jav. Rar.* 171 (1848). T: Nepal, *F.Buchanan-Hamilton s.n.*; holo: BM.

Cissampelos pareira p.p. quoad 'β' L., *Sp. Pl.* 2: 1032 (1753). T: Central America, *n.v.*

Cissampelos pariera var. *Upper Massey Creek* (*L.S.Smith 11741*), R.J.F.Henderson (ed.), *Names Distr. Queensland Pl. Algae Lichens* 108 (2002)

Illustration: L.L.Forman, *Fl. Males.* ser. I, 10: 235, fig. 17 (1986).

Young stems puberulous to glabrous. Leaves: petiole 2–9 cm long, inserted 1–18 mm from basal margin of lamina; lamina \pm broadly ovate, 4.5–11 cm long, 4.5–12 cm wide, usually

cordate at base, usually appressed-puberulous on lower surface. Male cymes 2–4 cm long, pubescent. Male flowers green to yellowish; sepals obovate, 1.25–1.5 mm long, externally pilose; corolla c. 0.5 mm long; synandrium c. 0.75 mm long. Female thyrses to 18 cm long; accrescent bracts to 1.5 cm long. Female flowers: sepals broadly obovate, 1.5 mm long; petals broadly cuneate-obovate, 0.75 mm long; carpel scarcely 0.5 mm long, pilose with glabrous style of about equal length. Drupe orange to red; endocarp obovate in outline, 5 mm long, with dorsal, transverse ridges.

Occurs on Cape York Penin., Qld; in rainforest at low altitudes. Map 422.

Qld: Lockerbie, 16 km WSW of Somerset, *L.J.Brass 18397* (A, BRI); Bamaga Rd, 5 km S of Cape York, *B.Gray 4292* (QRS); Endeavour R., *W.A.Persieh 654* (MEL).

13. STEPHANIA

Stephania Lour., *Fl. Cochinch.* 598, 608 (1790); from the Greek *stephane* (encircling wreath or crown), in reference to the ring of connate anthers.

Type: *S. rotunda* Lour.

Climbers with woody or herbaceous stems, without prickles; root sometimes tuberous. Leaves peltate, palmately nerved. Inflorescences axillary (in Australia), umbelliform or capitulate, without persistent accrescent bracts. Male flowers: sepals 6 or 8 in 2 equal or unequal whorls, \pm obovate, free; petals 3 or 4, \pm broadly obovate, free; stamens connate into a peltate synandrium; anther cells 6–8, dehiscing horizontally. Female flowers: sepals and petals similar to male (in Australia); staminodes absent; carpel 1; stigma shortly lobed. Drupe curved, glabrous, without stipe or carpophore; style-scar near base; endocarp bearing a dorsal, horseshoe-shaped band which is tuberculate or ridged, often perforate. Seed horseshoe-shaped; cotyledons \pm equalling radicle, surrounded by endosperm.

A genus of c. 35–40 species in the warmer, mainly tropical, parts of the Old World; 4 species in Australia (3 endemic).

- | | | |
|----|---|--------------------------------|
| 1 | Inflorescence to 1 cm long, flowers in a capitulum; leaves minutely papillose below | 1. <i>S. bancroftii</i> |
| 1: | Inflorescence more than 2 cm long, umbelliform; leaves glabrous or puberulous below, not minutely papillose | |
| 2 | Flowers distinctly pedicellate; leaf apex rounded or rounded-obtuse | |
| 3 | Inflorescence twice umbellate; leaves broadly ovate to triangular-ovate | 2. <i>S. tuberosa</i> |
| 3: | Inflorescence an umbel of cymes; leaves reniform-ovate | 3. <i>S. renifolia</i> |
| 2: | Flowers sessile or subsessile in small heads; leaf apex \pm acuminate | 4. <i>S. japonica</i> |

1. *Stephania bancroftii* F.M.Bailey, *Queensland Agric. J.* 24: 221 (1910)

T: Stannary Hills, Qld, *T.L.Bancroft s.n.*; holo: BRI; iso: K.

Root tuberous, subglobose, c. 25 cm diam. Leaves: petiole 2.5–11 cm long, inserted 25–30 mm from basal lamina margin; lamina broadly ovate, 4.5–13 cm long, 5–14 cm wide, slightly cordate at base, rounded at apex, minutely papillose below, drying submembranous. Male inflorescence a peduncled dense head of flowers, barely 1 cm long. Female inflorescence similar to male, 1–1.8 cm long. Male flowers: pedicel c. 0.3 mm long; sepals 6, 0.75 mm long, externally minutely papillose; petals 3, 0.6 mm long; synandrium 0.5 mm long. Female flowers: pedicel thick, c. 1 mm long; sepals and petals c. 1 mm long; carpel 1.3–1.5 mm long. Drupe (*vide* F.M.Bailey, *loc. cit.*) flattened-pyriform, 6 mm long.

Endemic to northern Qld near the Broken and Wild Rivers; grows in shrubby woodland and deciduous vine thickets on peaty loam and edge of dry rainforest, at 450–800 m alt. Flowers Nov.–Dec. Map 423.

Qld: Broken R., Gorge Ck area, 'Wondo Vale', *M. Godwin* 207 (BRI); Wild River Gorge via Herberton, *M. Godwin* 2326 (BRI); Forty Mile Scrub Natl Park, c. 63.9 km S of Mt Garnet, along the Kennedy Forty Mile Hwy, *P. Huber* PH28 (BRI, K).

The species is known only from the type and the above three collections. The original description referred to fruits, but these have not been traced, and it contains a description of the flowers by H. Tryon. It is stated that the original collector 'found the plant to be equally poisonous with the other Queensland species'.

2. *Stephania tuberosa* Forman, *Fl. Australia* 2: 463 (2007)

T: cult. in Stafford, Brisbane, originally from Cape York, Qld, 1 Dec. 1971, *D. Smith* s.n.; holo: K; iso: BRI, CANB, MEL.

Stephania sp. *Bamaga* (*L.S. Smith* AQ170418), R.J.F. Henderson (ed.), *Names Distr. Queensland Pl. Algae Lichens* 108 (2002)

Stems ?annual, containing orange-brown sap and arising from large tuber to c. 90 cm diam. Leaves: petiole 5–18 cm long, inserted 9–40 mm from basal lamina margin; lamina broadly ovate to triangular-ovate, 6–21 cm long, 6–16 cm wide, rounded to truncate at base, rounded-obtuse at apex, glabrous, glaucous below, drying membranous. Male inflorescence slender, twice-umbellate, 4–8 cm long, glabrous. Male flowers: pedicel 3–4 mm long; sepals 6, 1.25–1.5 mm long, ?orange-brown, glabrous, the outer 3 narrower; petals 3, 1.25 mm long, orange-brown, glabrous; synandrium 0.5 mm long, slightly domed at apex. Female plant unknown.

Endemic to Bamaga, Cape York Penin., Qld; no further field data known. Map 424.

Qld: cult. Brisbane (originally from Bamaga, Cape York Penin.), Feb. 1966, *L.S. Smith* s.n. (BRI, K).

This species is known only from the type and the above collection, both cultivated. Notes on the label state that the petals are orange-brown, but this may also refer to the sepals.

3. *Stephania renifolia* Forman, *Fl. Australia* 2: 463 (2007)

T: 13 miles [21 km] SE of Lawgi, Port Curtis district, Qld, 30 Oct. 1963, *N.H. Speck* 1936; holo: CANB; iso: BRI, K.

Stephania sp. *Eidsvold* (*T.L. Bancroft* AQ63239), R.J.F. Henderson (ed.), *Names Distr. Queensland Pl. Algae Lichens* 108 (2002)

Stems woody, slender, not known if tuberous. Leaves: petiole 3–10 cm long, attached c. 1–4 mm from basal lamina margin; lamina reniform-ovate, 5–9 cm long, 5.5–11 cm wide, slightly cordate at base, broadly rounded at apex, glabrous, thinly papery. Inflorescences each an umbel of cymes, 2–6 cm long, glabrous. Male flowers: pedicel 1–3 mm long; sepals 6, equal, obovate, 1.25 mm long, glabrous; petals 3, concave-rotund, 1 mm long, glabrous; synandrium 0.5 mm long, with apex slightly sunken and flat. Female flowers and fruits unknown.

Endemic to south-eastern Qld; growing in softwood scrub. Flowers Oct. Map 425.

Qld: Eidsvold, *T.L. Bancroft* s.n. (BRI).

This species is known only from the type and the above collection.

4. *Stephania japonica* (Thunb.) Miers, *Ann. Mag. Nat. Hist.* ser. 3, 18: 14 (1866)

Menispermum japonicum Thunb., *Fl. Jap.* 193 (1784); *Cocculus japonicus* (Thunb.) DC., *Syst. Nat.* 1: 516 (1817). T: Japan, *C.P. Thunberg* s.n.; lecto: UPS, *fide* L.L. Forman, *Kew Bull.* 11: 54 (1956).

Root not tuberous. Leaves: petiole 3–12 cm long, attached 6–35 mm from basal lamina margin; lamina broadly triangular-ovate to ovate, 4–17 cm long, 4–14 cm wide, broadly rounded to slightly cordate at base, usually ± acuminate at apex, glabrous above, glabrous or puberulous below. Inflorescence a compound, umbelliform cyme, 4–9 cm long, glabrous or puberulous; flowers in dense clusters. Male flowers sessile or subsessile, white to cream; sepals 6 or 8, c. 1 mm long; petals 3 or 4, 0.5–1 mm long. Female flowers: carpel 0.75–1 mm long. Drupe usually sessile or subsessile, ± obovate in outline, 4–8 mm long, red; endocarp with dorsal transverse ridges, usually perforate.

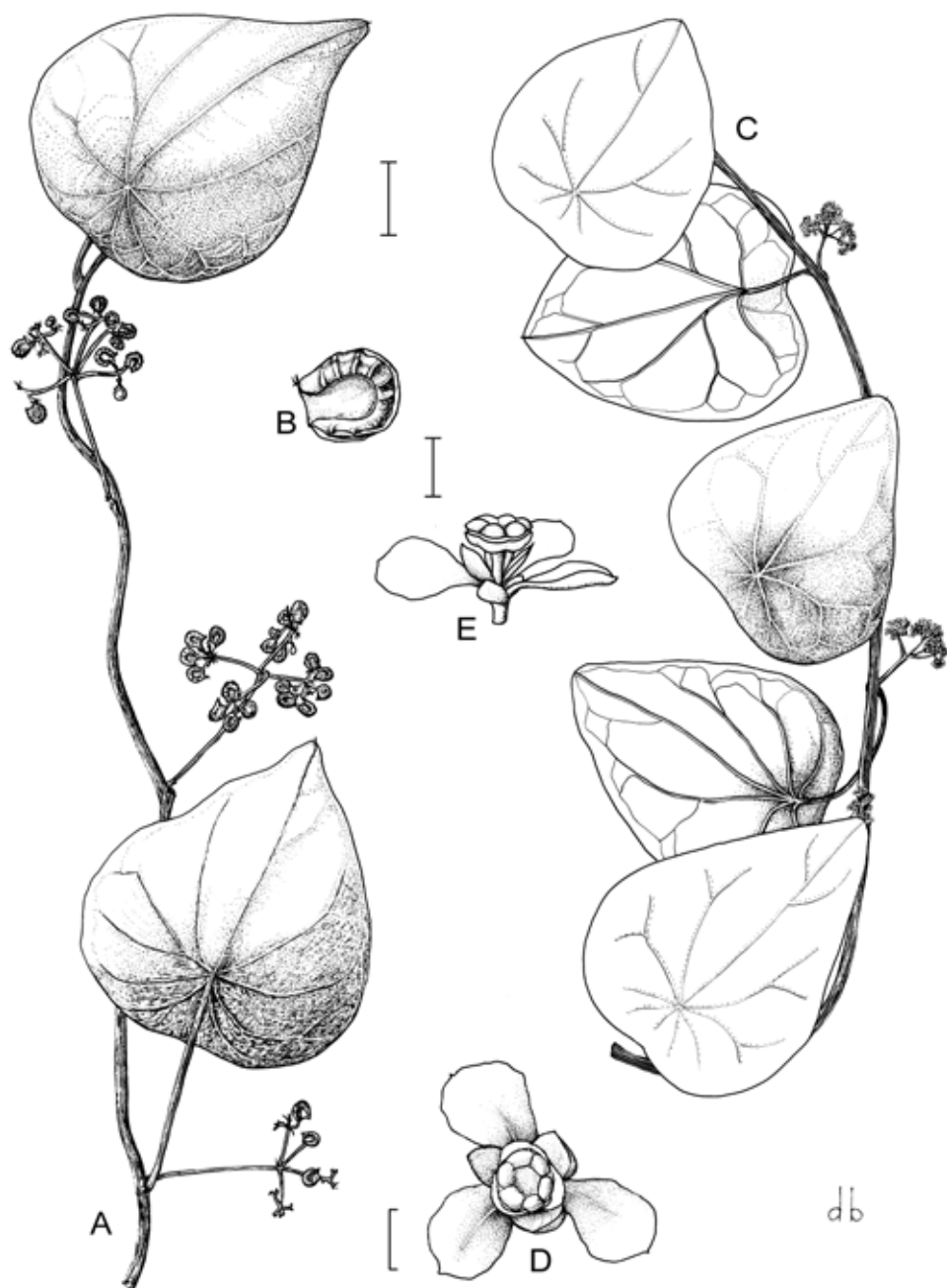


Figure 73. A–B, *Stephania japonica* var. *discolor*. A, fruiting branch; B, drupe, lateral view (A–B, R.Schodde 3485, CANB). C–E, *Stephania japonica* var. *japonica*. C, flowering branch, male; D, male flower top view; E, male flower side view (C–E, L.Adams & C.Dunlop 2971, CANB). Scale bars: A, C = 20 mm; B = 4 mm; D, E = 0.5 mm. Drawn by D.Boyer.

Occurs in Japan, and from SE Asia to northern and eastern Australia and Polynesia. The species contains 3 varieties, all of which occur in Australia. There are intermediates between the varieties.

The only collections of the species known from W.A. are 2 sterile specimens with glabrous leaves, which therefore belong either to var. *timoriensis* or var. *japonica* (W.A.: between Njitparriya and Dilmariyu, 3 km SE of Bungle Bungle Outcamp, *S.J.Forbes* 2589S (MEL); Muwundulngi, c. 6 km ENE of Bungle Bungle Outcamp, *N.H.Scarlett* 84-361 (MEL)).

- | | | |
|----|---|-----------------------------|
| 1 | Leaves glabrous below (region around insertion of petiole sometimes puberulous) | |
| 2 | Inflorescence glabrous on peduncle and branches | 4a. var. japonica |
| 2: | Inflorescence puberulous | 4b. var. timoriensis |
| 1: | Leaves puberulous below (apart from region around insertion of petiole) | 4c. var. discolor |

4a. *Stephania japonica* (Thunb.) Miers var. *japonica*

Leaves and inflorescence peduncles and branches glabrous. Fig. 73C–D.

Scattered occurrences in northern N.T. and from Cape York Penin. to Moreton Is., Qld; in rainforest, notophyll vine forest and coastal scrub on laterite, sandstone and in sand, locally frequent, to 1100 m alt. Also in SE Asia, China, Japan, Malesia and Polynesia. Map 426.

N.T.: Nangalala, *H.Reeve & Waliri* 548 (CANB); c. 16 km S of Oenpelli Mission, *L.G.Adams & C.R.Dunlop* 2971 (BRI, CANB, K). Qld: Newcastle Bay, 4.5 km S of Somerset, *L.J.Brass* 18717 (BRI); Sandy Ck, c. 33 km from Aurukun on road to Merluna, *J.R.Clarkson* 4148 (BRI, K, QRS).

4b. *Stephania japonica* var. *timoriensis* (DC.) Forman, *Kew Bull.* 11: 55 (1956)

Cocculus japonicus var. *timoriensis* DC., *Prodr.* 1: 96 (1824). T: Timor, *A.Zippelius s.n.*; holotype: G n.v.

Cocculus forsteri DC., *Syst. Nat.* 1: 517 (1817); *Stephania forsteri* (DC.) A.Gray, *U.S. Expl. Exped., Phan.* 1: 36 (1854). T: *s. loc.* [Tahiti?], *J.R. & G.Forster*; holotype: not located, *fide* P.S.Green, *Fl. Australia* 49: 54 (1994).

Illustrations: L.L.Forman, *Fl. Males.* ser. I, 10: 246, fig. 19a–d, f–h (1986); P.S.Green, *op. cit.* 60, fig. 36c.

Leaves glabrous, apart from area around petiole insertion sometimes puberulous; inflorescences puberulous.

Occurs in north-western N.T. and in eastern Qld from Cape York Penin. to Moreton Is.; in monsoon forest and rainforest, often at forest margin, in strand vegetation, also as a weed in built-up areas, often in sandy soil, locally common. Also in India, Malesia and Polynesia. Map 427.

N.T.: Holmes Jungle, 12.9 km E of Darwin, *G.Chippendale* 7903 (DNA); White Stone Ck, 2 km W of Woolner Rd, *M.O.Rankin* 1526 (BRI). Qld: Cape Pallarenda, *T.D.Stanley* 80136 (BRI); Penrith Is., 64 km E of Mackay, 3 Aug. 1969, *H.Heatwole s.n.* (BRI).

4c. *Stephania japonica* var. *discolor* (Blume) Forman, *Kew Bull.* 11: 56 (1956)

Clypea discolor Blume, *Bijdr.* 26 (1825). T: Java, *C.L.Blume s.n.*; holotype: L.

Cissampelos hernandiifolia Willd., *Sp. Pl.* 4: 861 (1806); *Stephania hernandiifolia* (Willd.) Walp., *Repert. Bot. Syst.* 1: 96 (1842). T: India, *W.Roxburgh s.n.*; holotype: B.

Stephania gaudichaudii A.Gray, *U.S. Expl. Exped., Phan.* 1: 37 (1854). T: Sydney, N.S.W., *U.S. Expl. Exped. s.n.*; holotype: US.

Stephania australis A.Gray ex Miers, *Contr. Bot.* 3: 229 (1871). T: Parramatta, N.S.W., *A.Cunningham s.n.*; syn: K.

Leaves puberulous below (apart from region around insertion of petiole sometimes glabrous); inflorescences puberulous. Fig. 73A–B.

Widespread through eastern Qld from near Cairns, extending S to near Twofold Bay, south-eastern N.S.W.; in various types of forest, in beach scrub and climbing over rocks and grassy

banks, sometimes a vine weed (e.g. on citrus trees), locally common, often in sandy soil, to 1000 m alt. Formerly recorded for Vic. but now considered locally extinct. Also in SE Asia and Malesia (except the Philippines). Map 428.

Qld: 40 Mile Scrub, N Kennedy district, *J.R.Clarkson* 6352 (BRI, QRS); E of Gympie, S of Rainbow Beach, Cooloola Natl Park, *W.Morawetz et al.* 22-271284 (QRS). N.S.W.: Mt Wombelong, Warrumbungle Ra., 30 km W of Coonabarabran, *H.Streimann* 529 (BRI, NSW); Shoalhaven Gorge, c. 3 km above Tallowa Dam site, *R.Pullen* (BRI, CANB).

Reputed to be poisonous to cattle and sheep, but has proved harmless in feeding tests (S.L.Everist, *Poison. Pl. Australia* 528, 1981).

Unplaced name

Stephania pallidula Miers, *Contr. Bot.* 3: 229 (1871)

T: Fitzroy and Stokes Range, [N.T.], June 1856, *F.Mueller s.n.*; holo: K.

Based on a sterile specimen; believed to be a synonym of *Stephania japonica*. The specimen has glabrous leaves and could therefore belong to either var. *japonica* or var. *timoriensis*.

PAPAVERACEAE

*R.W.Kiger*¹

Argemone by *G.B.Ownbey*²

Annual, biennial or perennial, caulescent or (not in Australia) scapose herbs, or subshrubs, shrubs, or (not in Australia) small trees, usually tap-rooted, sometimes rhizomatous; sap bitter, often sticky. Stems leafy or (not in Australia) naked, simple or branching. Leaves simple, usually alternate, sometimes subopposite or (not in Australia) opposite or whorled, mostly 1–3 times pinnately or (not in Australia) palmately lobed or dissected, sometimes unlobed, exstipulate. Inflorescences axillary or terminal, unifloral or multifloral and cymiform or (not in Australia) racemose, paniculate, corymbiform, or umbelliform, usually bracteate. Flowers actinomorphic, bisexual, sometimes hypanthiate. Sepals 2 or 3, distinct or connate, usually obovate, caducous. Petals distinct, usually obovate, mostly twice as many as sepals, sometimes more or (not in Australia) absent, sometimes fugacious. Stamens usually many. Pistil 1, 2–18-carpellate; ovary superior, 1- or 2-locular; placentae 2 or more, parietal; style present or absent; stigmas or stigma lobes 2–many. Fruits capsular, linear to subglobose, 1- or 2-locular, sometimes incompletely multilocular by placental intrusion, dehiscence valvate, poricidal or (not in Australia) transverse. Seeds usually many, small, sometimes arillate.

The family includes 25–30 genera, distributed worldwide but mainly in the Northern Hemisphere, and is represented in Australia by 6 genera and 15 species, all introduced as crop weeds, ship-ballast waifs, or ornamentals. Papaveraceae are economically important for narcotics and food seeds derived from *Papaver somniferum*, and otherwise for many species and varieties grown ornamentally, especially of *Argemone*, *Papaver*, *Romneya*, *Eschscholzia*, *Dendromecon* Benth. (Bush Poppy), *Hunnemannia* Sweet (Tulip Poppy), *Macleaya* R.Br. (Plume Poppy), *Meconopsis* Vig. (Blue Poppy) and *Stylophorum* Nutt. (Celandine Poppy).

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PAPAVERACEAE

W.R.Ernst (1962b) recognised four subfamilies, three of which are represented in Australia: Chelidonioideae W.R.Ernst (*Glaucium*), Eschscholzioideae W.R.Ernst (*Eschscholzia*) and Papaveroideae (*Argemone*, *Papaver*, *Roemeria* and *Romneya*). The Platystemonoideae W.R.Ernst are confined to western North America.

G.Bentham, Papavereae, *Fl. Austral.* 1: 62–63 (1863); F.Fedde, Papaveraceae-Hypecoideae et Papaveraceae-Papaveroideae, in H.G.A.Engler, *Pflanzenr.* 40: 1–430 (1909); J.Hutchinson, Contributions towards a phylogenetic classification of flowering plants: V. The genera of Papaveraceae, *Kew Bull.* 1925: 161–168 (1925); F.Fedde, Papaveraceae, in H.G.A.Engler *et al.*, *Nat. Pflanzenfam.* 2nd edn, 17b: 5–145 (1936); H.Harms, Reihe Rhoeadales, in H.G.A.Engler *et al.*, *Nat. Pflanzenfam.* 2nd edn, 17b: 1–4 (1936); W.R.Ernst, *A Comparative Morphology of the Papaveraceae*, unpubl. PhD thesis, Stanford Univ. (1962a); W.R.Ernst, The genera of Papaveraceae and Fumariaceae in the southeastern United States, *J. Arnold Arbor.* 43: 315–343 (1962b); F.R.Stermitz, Alkaloid chemistry and the systematics of *Papaver* and *Argemone*, *Recent Advances Phytochem.* 1: 161–183 (1968); C.R.Gunn, Seeds and fruits of Papaveraceae and Fumariaceae, *Seed Sci. Techn.* 8: 3–58 (1980); C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild Cult.* (1993); J.W.Kadereit, Papaveraceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 494–506 (1993); P.S.Green, *Fl. Australia* 49: 55–57 (1994).

KEY TO GENERA

- | | |
|---|------------------------|
| 1 Plants subshrubby or shrubby | 5. ROMNEYA |
| 1: Plants herbaceous | |
| 2 Sepals connate, calyptrate; hypanthium present | 6. ESCHSCHOLZIA |
| 2: Sepals distinct, not calyptrate; hypanthium absent | |
| 3 Stigmas radiating on a sessile disc | 3. PAPAVER |
| 3: Stigmatic disc absent | |
| 4 Leaves harshly prickly | 2. ARGEMONE |
| 4: Leaves not harshly prickly | |
| 5 Herbage distinctly glaucous; petals yellow to reddish orange; filaments yellow | 1. GLAUCIUM |
| 5: Herbage not distinctly glaucous; petals bright red or violet; filaments dark violet or black | 4. ROEMERIA |

1. GLAUCIUM

R.W.Kiger

Glaucium Mill., *Gard. Dict. Abr.* 4th edn, 547 (1754); from the Greek *glaukos* (grey-green), in reference to the colour of the waxy bloom on most parts.

Type: not designated.

Annual, biennial or perennial, caulescent, sometimes (not in Australia) sub-shrubby herbs from taproots, glaucous; sap yellow. Stems leafy, branching. Leaves: basal leaves rosulate, petiolate; cauline leaves alternate, sessile; lamina pinnately lobed or (not in Australia) unlobed, dentate or sometimes (not in Australia) sinuate or entire, not harshly prickly. Flowers solitary, axillary or terminal, without hypanthium. Sepals 2, distinct. Petals 4. Filaments yellow. Ovary 2-locular; style absent or indistinct; stigma 2-lobed, not on a disc. Capsule erect, sublinear, 2-locular, 2-valved, dehiscent from the apex or (not in Australia) the base. Seeds many, reticulate-pitted, dark brown, embedded in a pithy septum; aril absent. *Horned Poppy*, *Sea Poppy*.

A genus of about 25 species, native to Europe and central and south-western Asia. Two species are introduced in Australia.

Basal leaves almost glabrous to moderately pubescent; upper leaves not distinctly stem-clasping; petals orange to reddish orange, usually with darker basal spots; capsules pubescent to almost glabrous

1. *G. corniculatum*

Basal leaves densely pubescent; upper leaves stem-clasping; petals yellow or orange-yellow, usually without darker basal spots; capsules glabrous, tuberculate or scabrous

2. *G. flavum***1. **Glaucium corniculatum* (L.) Rudolph, *Fl. Jen.* 13 (1781)**

Chelidonium corniculatum L., *Sp. Pl.* 1: 506 (1753), *Glaucium corniculatum* var. *phoeniceum* DC., *Prodr.* 1: 122 (1824), *nom. inval.* (= *G. corniculatum* var. *corniculatum*). T: 'Hungaria, Bohemia, Monspeli'; lecto: Herb. Linn. 668.4; LINN *n.v.*, *fide* S.M.H.Jafri, in S.I.Ali *et al.*, *Fl. Libya* 40: 6 (1977).

Glaucium corniculatum var. *flaviflorum* DC., *Prodr.* 1: 122 (1824). T: not cited; holo: ?G.

Illustrations: B.D.Morley & H.R.Toelken, *Fl. Pl. Australia* 57, fig. 26g (1983); C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild Cult.* pl. 6 (1993).

Plant annual or occasionally biennial, to 0.5 m. Leaves to 25 cm long; lamina pinnately lobed or parted, deeply dentate; basal leaves almost glabrous to moderately pubescent; lower leaves lyrate; upper leaves ovate, sometimes slightly cordate-clasping. Pedicel stout, to 5 cm long. Sepals 15–30 mm long. Petals obovate, to 40 mm long, orange to reddish orange, usually with a blackish basal spot. Capsule straight or somewhat arcuate, to 25 cm long, appressed-to ascending-pubescent or almost glabrous. *Bristly Horned Poppy*, *Horned Poppy*.

One collection seen from south-eastern W.A., 3 records from southern N.T., sporadic in eastern S.A., south-eastern Qld, N.S.W. and Vic., usually inland; native to Europe, widely introduced beyond. Occurs in open low or flat areas around streams, swamps, crops and animal enclosures; in loam and alluvium. Flowers and fruits Aug.–Jan. Map 429.

W.A.: Forrest, 23 Jan. 1943, *J.Martin* (CANB). N.T.: Halfway Bore, Todd River Stn, *D.J.Nelson* 2484 (NT). S.A.: Morgan, 2 Sept. 1962, *M.E.Phillips* (CANB). Qld: Baralaba, Sept. 1945, *E.T.Cooney* (BRI). N.S.W.: Cootawundi, *G.M.Cunningham* & *P.L.Milthorpe* 1194 (NSW). Vic.: Pullat, c. 15 km S of Rainbow, 12 Nov. 1965, *F.Pitt* (MEL).

2. **Glaucium flavum* Crantz, *Stirp. Austr. Fasc.* 2: 133 (1763)

T: 'in pomariis Kramer', Austria; holo: ?BP.

Chelidonium glaucium L., *Sp. Pl.* 1: 506 (1753); *Glaucium luteum* Scop., *Fl. Carniol.* 2nd edn, 1: 369 (1771). T: 'Angliae, Helvetiae, Galliae, Italiae, Virginiae arenosis'; lecto: Herb. Burser IX: 47; UPS *n.v.*, *fide* B.Jonsell & C.Jarvis, *Nordic J. Bot.* 14: 162 (1994).

Illustration: C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild. Cult.* pl. 7 (1993).

Plant biennial or perennial, to 0.8 m. Leaves to 30 cm long; lamina pinnately lobed or parted, deeply dentate; basal leaves densely pubescent; lower leaves lyrate; upper leaves ovate, cordate-clasping. Pedicel stout, to 4 cm long. Sepals 20–30 mm long. Petals obovate, 25–40 mm long, yellow, sometimes orangish, sometimes with a reddish to violet basal spot. Capsule straight or usually arcuate, to 30 cm long, glabrous, tuberculate or scabrous. *Horned Poppy*, *Yellow Horned Poppy*. Fig. 74A–D.

Very sporadic in south-eastern S.A., N.S.W., Vic. and Tas., usually near the coast; native from coastal western and southern Europe to the Black Sea and Transcaucasus in Asia, also well established as a ruderal in central Europe, widely introduced beyond as a ship-ballast waif and occasional garden escape. Occurs in open, low areas on dunes, beaches and streambanks; in sand and calcareous soil. Flowers and fruits Nov.–Apr. Map 430.

S.A.: Port Gawler, *Hj.Eichler* 18174 (CANB). N.S.W.: Barraba, Nov. 1959, *coll. unknown* (NSW). Vic.: mouth of Skeleton Ck, Altona, *J.Cullimore* 105 (MEL). Tas.: Coles Bay, 13 Apr. 1914, *R.A.Black* (MEL).



Figure 74. A–D, *Glaucium flavum*. A, habit; B, bud; C, stamens; D, capsule apex (A–D, H.Eichler 18174, CANB). E–H, *Papaver hybridum*. E, habit; F, bud; G, stamens; H, capsule (E, G, L.Lockwood & L.Meredith 48, CANB; F, H, M.Gray 4900, CANB). Scale bars: A, E = 30 mm; B–D, F–H = 10 mm. Drawn by R.Errey.

PAPAVERACEAE

2. ARGEMONE

G.B.Ownbey

Argemone L., *Sp. Pl.* 1: 508 (1753); the Greek name of a poppy-like plant.

Type: *A. mexicana* L.

Annual or perennial herbs or (not in Australia) subshrubs, 0.3–1.6 m tall, with taproot, glaucous, smooth, prickly or hispid; latex pale to bright yellow to orange. Stems erect or ascending, leafy, branching; axes determinate. Leaves alternate, sessile, often clasping; lamina usually lobed, dentate, prickly on margin, often mottled over veins. Inflorescence cymose, bracteate, few-flowered. Flowers conspicuous, without hypanthium. Sepals 3, distinct, imbricate, each with a subterminal saccate process (horn). Petals 6 in 2 whorls, usually yellow or (not in Australia) white or lavender. Stamens numerous. Pistil: ovary unilocular, usually 3–5-carpellate; ovules numerous; style short; stigmas 1 per carpel, without a stigmatic disc. Capsule erect, prickly or spinose, dehiscing apically by valves. Seeds subspherical, numerous, minutely pitted; aril present.

A genus of 32 species native to North America, South America and Hawaii. In addition to the 3 yellow-flowered species naturalised in Australia, there are herbarium records of 2 white-flowered species that are presumed to be cultivated or temporary escapes from cultivation. They are *A. albiflora* Hornem. (*A. alba* Lestib.) from coastal south-eastern U.S.A. and *A. grandiflora* Sweet, from east-central Mexico.

Numerous alkaloids occur in *Argemone* and their distribution by species has taxonomic correlations. The toxicity of alkaloidal components has been reported to result in losses of livestock and poisoning of humans. Decoctions of *A. mexicana* and its close relatives have been used in folk medicine for the treatment of infections.

G.B.Ownbey, Monograph of the genus *Argemone* for North America and the West Indies, *Mem. Torrey Bot. Club* 21: 1–159 (1958); G.B.Ownbey, The genus *Argemone* in South America and Hawaii, *Brittonia* 13: 91–109 (1961); S.B.Sorará, Nota sobre el género *Argemone* (Papaveraceae) en la República Argentina, *Darwiniana* 20: 445–457 (1976).

- | | | |
|----|--|----------------------------|
| 1 | Petals 22–32 mm long, 9–22 mm wide; capsules oblong to ovate-elliptic, 25–36 (–45) mm long; capsular spines 14–26 per valve, unequal; seeds 1.5–1.8 mm diam. | |
| 2 | Buds (excluding sepal horns) subspherical or slightly longer than wide; petals bright yellow | 1. <i>A. mexicana</i> |
| 2: | Buds (excluding sepal horns) oblong, about twice as long as wide; petals pale yellow | 2. <i>A. ochroleuca</i> |
| 1: | Petals 30–38 mm long, 20–32 mm wide; capsules fusiform or subfusiform, 35–50 mm long; capsular spines 10–14 per valve, \pm equal; seeds 1.8–2.5 mm diam. | 3. <i>A. subfusiformis</i> |

1. **Argemone mexicana* L., *Sp. Pl.* 1: 508 (1753)

T: Herb. Linn. No. 670.1; lecto: LINN, *fide* W.Fawcett & A.B.Rendle, *Fl. Jamaica (Dicots I)* 3: 222 (1914).

Illustrations: G.B.Ownbey, *Mem. Torrey Bot. Club* 21: 32, figs 1–3 (1958); C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild Cult.* pl. 28 (1993).

Buds (excluding sepal horns) subspherical or slightly longer than wide, 12–16 mm long, 9–12 mm wide. Sepals with 4–8 prickles; sepal horn 6–10 mm long. Petals narrowly to broadly obovate, 22–32 mm long, 12–22 mm wide, bright yellow. Stamens 50–100. Capsules oblong to broadly ovate-elliptic, 26–36 mm long (including stigma), 14–18 mm wide (excluding spines), 4–6-carpellate, spinose; capsular spines 14–20 per valve, straight to outwardly curved, very unequal, the largest 5–9 mm long. Seeds 1.5–1.7 mm diam. $2n = 28$, *fide* G.B.Ownbey, *op. cit.* 15. *Mexican Poppy, Prickly Poppy.* Plate 61.

Occurs in Perth, W.A., south-eastern Qld and north-eastern N.S.W., and possibly Sydney, although its persistence outside cultivation in Sydney is dubious. Native to the humid

subtropics of the West Indies and adjacent mainland coasts; now a worldwide subtropical weed of road-sides, fields and waste ground. Map 431.

W.A.: Garden Is., *R.J.Cranfield* 37 (PERTH). Qld: 9.7 km S of Rolleston on Injune road, *L.A.S.Johnson & D.F.Blaxell* 971 (NSW); Condamine, *C.T.White* 11314 (BRI). N.S.W.: [cult.] Governors Domain, Sydney, 1903, *J.H.Camfield s.n.* (NSW).

Based on chromosome counts of American material, a diploid.

2. **Argemone ochroleuca* Sweet, *Brit. Fl. Gard.* 3: t. 242 (1828)

subsp. *ochroleuca*

Argemone mexicana var. *ochroleuca* (Sweet) Lindl., *Edwards's Bot. Reg.* 16: t. 1343 (1830). T: A specimen sent to Sweet by Robert Barclay, raised from seeds received from Mexico; holo: K.

Illustrations: G.B.Ownbey, *Mem. Torrey Bot. Club* 21: 43, figs 4, 5 (1958).

Buds (excluding sepal horns) oblong, 10–16 mm long, 5–8 mm wide. Sepals with (1–) 2–4 (–6) prickles; sepal horn 5–10 mm long. Petals obovate to narrowly obovate or obcuneate, 22–26 (–30) mm long, 9–16 mm wide, pale yellow. Stamens 30–70. Capsules ovate-elliptic to oblong, 25–35 (–45) mm long (including stigma), 12–18 mm wide (excluding spines), 3–4 (–6)-carpellate, spinose; capsular spines 18–26 per valve, straight or outwardly curved, usually highly variable in size, the largest 8–10 (–12) mm long. Seeds 1.5–1.8 mm diam. $2n = 56$, *fide* G.B.Ownbey, *op. cit.* 15. *Mexican Poppy*, *Prickly Poppy*.

Naturalised throughout Australia on roadsides, flats and fallow ground. Native to the upland, less humid parts of Mexico. Map 432.

W.A.: 20 km N of Carnarvon, *P.G.Wilson* 12605 (PERTH). N.T.: Todd R., 12 km SE of Alice Springs, *Nelson* 2740 (DNA). S.A.: Northern Flinders Ra., Parachilna, 30 Dec. 1971, *H.Amtsberg* (AD, MEL). Qld: Mackay, *T.Stanley & E.Ross* 78251 (BRI). N.S.W.: Fowlers Gap, N of Broken Hill, *S.Jacobs* 2322 (AD, NSW). Vic.: Snowy R. at Long Point, 21 Dec. 1986, *J.Cuthbertson* (MEL). Tas.: Lindisfarne, 15 Jan. 1948, *H.F.Gulline* (HO).

Based on chromosome counts of Mexican material, a tetraploid. It may hybridise with *A. subfusiformis*.

3. **Argemone subfusiformis* G.B.Ownbey, *Brittonia* 13: 97 (1961)

subsp. *subfusiformis*

T: Famatina, La Rioja, Dept. Famatina, Argentina, alt. 1620 m, 6 Feb. 1942, *T.Meyer* 4243; holo: GH; iso: F, LIL, US.

[*Argemone mexicana* var. *ochroleuca* auct. non (Sweet) Lindl.: S.Sorará, *Darwiniana* 20: 450 (1976)]

Illustrations: G.B.Ownbey, *op. cit.* 100, figs 12–14.

Buds (excluding sepal horns) oblong, 14–20 mm long, 10–12 mm wide. Sepals with 3–10 prickles; sepal horn 9–12 mm long. Petals deltate to narrowly obovate or obcuneate, 30–38 mm long, 20–32 mm wide, pale to bright yellow. Stamens 50–75. Capsules fusiform or subfusiform, 35–50 mm long (including stigma), 12–16 mm wide (excluding spines), 3–4 (–5)-carpellate, spinose; capsular spines 10–14 per valve, outwardly curved, \pm equal, the largest 9–10 mm long. Seeds 1.8–2.5 mm diam. *American Poppy*, *Prickly Poppy*.

Naturalised in north-eastern N.S.W.; on disturbed soil, roadsides, gullies and waste places. Native to temperate S America. Map 433.

N.S.W.: North Star, S of Goondiwindi, Nov. 1968, *J.Nixon s.n.* (NSW); bridge over Clarence R., Yates Crossing, Ewingar–Baryulgil road, *S.Jacobs & J.Pickard* 2975 (NSW); halfway between Gunnedah and Quirindi, *A.Rodd* 297 (NSW); Bruinbun, Macquarie R., 13 km SSE of Hill End, *L.A.S.Johnson* 8119 (NSW); Katoomba, *B.Auld* 120216 (NSW).

This species may hybridise with *A. ochroleuca*. Also recorded from Norfolk Is. (P.S.Green, *Fl. Australia* 49: 55 (1994)).

PAPAVERACEAE

3. PAPAVER

R.W.Kiger

Papaver L., *Sp. Pl.* 1: 506 (1753); *Gen. Pl.* 5th edn, 224 (1754); classical Latin name for poppy, perhaps from the Greek *papa* (pap), alluding to the thick, sometimes milky sap.

Type: *P. somniferum* L.

Annual, biennial or perennial, caulescent or (not in Australia) scapose herbs from taproots; sap white, orange or red. Stems leafy. Leaves: basal leaves rosulate, petiolate; cauline leaves alternate, with the lower petiolate, the upper sessile or sometimes stem-clasping; lamina 1–3 times pinnately lobed or dissected, usually toothed, scalloped or incised. Inflorescence cymiform, bracteate; flowers in clusters of 1–3 on long peduncles or (not in Australia) scapes; buds nodding or (not in Australia) erect. Flowers without hypanthium. Sepals 2, distinct, usually caducous. Petals 4 or rarely 6, obovate, often caducous. Ovary 1-locular; style absent; stigmas 3–18, radiating on a sessile, ±lobed disc, velvety. Capsule erect, subglobose to subcylindrical, 1-locular, incompletely multilocular by placental intrusion, 3–18-pored or (not in Australia) -short-valved beneath the persistent or sometimes deciduous stigmatic disc. Seeds many, minutely pitted; aril absent. *Poppy*.

A genus of about 80 species native mainly in temperate and arctic North America and Eurasia, also in northern and southern Africa. Six species representing 4 sections (*Papaver*, *Argemonidium* Spach, *Rhoeadium* Spach and *Horridum* Spach) are introduced in Australia.

Papaver is rich in alkaloids, notably opiates. Some species are diploids, others are polyploids, and some apparently are aneuploid. Most commonly, $n = 6$ or 7 or a multiple.

S.Danert, Zur Systematik von *Papaver somniferum* L., *Kulturpflanze* 6: 61–88 (1958); R.W.Kiger, Sectional nomenclature in *Papaver* L., *Taxon* 22: 579–582 (1973); R.W.Kiger, Revised sectional nomenclature in *Papaver* L., *Taxon* 34: 150–152 (1985); J.W.Kadereit, A revision of *Papaver* section *Argemonidium*, *Notes Roy. Bot. Gard. Edinburgh* 44: 25–43 (1986a); J.W.Kadereit, A revision of *Papaver* L. sect. *Papaver* (Papaveraceae), *Bot. Jahrb. Syst.* 108: 1–16 (1986b); J.W.Kadereit, Experimental evidence on the affinities of *Papaver somniferum* (Papaveraceae), *Pl. Syst. Evol.* 156: 189–195 (1987); J.Novák & V.Preininger, Chemotaxonomic review of the genus *Papaver*, *Preslia* 59: 1–13 (1987); J.W.Kadereit, Sectional affinities and geographical distribution in the genus *Papaver* L. (Papaveraceae), *Beitr. Biol. Pflanzen* 63: 139–156 (1988a); J.W.Kadereit, The affinities of the south-hemispherical *Papaver aculeatum* Thunb. (Papaveraceae), *Bot. Jahrb. Syst.* 109(3): 335–341 (1988b); J.W.Kadereit, A revision of *Papaver* L. section *Rhoeadium* Spach., *Notes Roy. Bot. Gard. Edinburgh* 45: 225–286 (1989); J.W.Kadereit, Some suggestions on the geographical origin of the central, west and north European synanthropic species of *Papaver* L., *Bot. J. Linn. Soc.* 103: 221–231 (1990).

- | | | |
|----|---|--------------------------------|
| 1 | Stems densely covered with patent prickles; leaf lobes distinctly prickly-tipped | 6. <i>P. aculeatum</i> |
| 1: | Stems glabrous or variously pubescent but without prickles; leaf lobes not distinctly prickly-tipped | |
| 2 | Upper leaves stem-clasping | 3. <i>P. somniferum</i> |
| 2: | Upper leaves not stem-clasping | |
| 3 | Ovaries and capsules setose | |
| 4 | Capsules oblong to clavate, sparsely and weakly setose | 1. <i>P. argemone</i> |
| 4: | Capsules obovoid-ellipsoid to subglobose, densely and firmly setose | 2. <i>P. hybridum</i> |
| 3: | Ovaries and capsules glabrous | |
| 5 | Peduncles spreading- to ascending-hispid distally; mature capsules less than 2 times longer than wide | 5. <i>P. rhoeas</i> |
| 5: | Peduncles strongly appressed-hispid distally; mature capsules 2 times or more longer than wide | 4. <i>P. dubium</i> |

1. **Papaver argemone* L., *Sp. Pl.* 1: 506 (1753)

T: 'Europae campis arenosis'; lecto: Herb. Linn. 669.2; LINN *n.v.*, *fide* B.Jonsell & C.Jarvis, *Nordic J. Bot.* 14: 162 (1994).

Illustrations: C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild Cult.* 144 (1993); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 68, fig. 15a, b (1996).

Plant annual, caulescent, to 0.5 m, hispid, without prickles. Stems simple or branching. Leaves to 12 cm long; upper leaves not stem-clasping; lamina deeply pinnately or bipinnately lobed; lobes not prickly-tipped. Peduncle appressed-hispid. Petals to 25 mm long, dark red, sometimes with dark basal spot. Stamens: filaments purple, clavate; anthers pale blue. Ovary setose; stigmas 4–6; disc convex and radially vaulted. Capsule sessile, subcylindrical to clavate, to 2 cm long, distinctly ribbed, sparsely and weakly setose.

Three collections seen, from Guyra, N.S.W., Romsey, Vic., and Deloraine, Tas., expected elsewhere and cited in several publications as occurring in S.A.; native to Europe and south-western Asia, widely introduced beyond. Occurs in pasture; in alluvium. Flowers and fruits mid Oct.–Nov. Map 434.

N.S.W.: Guyra, 18 Nov. 1975, *P.A.Parker* (NSW). Vic.: Romsey, *Moffat s.n.* (MEL). Tas.: Deloraine, 1915, *R.A.Black* (MEL).

In its native range, *Papaver argemone* is a complex of five diploid, tetraploid and hexaploid subspecies (J.W.Kadereit 1986a, 1990).

2. **Papaver hybridum* L., *Sp. Pl.* 1: 506 (1753)

T: 'Europa australiore'; not designated.

Illustrations: C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild Cult.* 144 (1993); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 68, fig. 15c, d (1996).

Plant annual, caulescent, to 0.5 m, hispid, without prickles. Stems branching. Leaves to 10 cm long; upper leaves not stem-clasping; lamina deeply pinnately or bipinnately lobed; lobes not prickly-tipped. Peduncle appressed-hispid. Petals to 25 mm long, early caducous, red to purplish red, with dark basal spot. Stamens: filaments purple, clavate; anthers pale blue. Ovary setose; stigmas 4–8; disc convex and radially vaulted. Capsule sessile, obovoid-ellipsoid to subglobose, to 1.5 cm long, obscurely to distinctly ribbed, densely and firmly setose; disc often deciduous. *Rough Poppy*. Fig. 74E–H.

Sporadic in southern W.A., southern N.T., S.A., southern Qld, N.S.W., A.C.T., Vic. and reported (by D.Morris, HO) from the midlands and E coast of Tas.; native to Eurasia and northern Africa, widely introduced beyond. Occurs along roadsides and railways, in paddocks, croplands, orchards, lawns, waste places, and on stream banks, flats and slopes, in open areas and woodlands; in sand, sandy loam and clay loam; to 700 m alt. Flowers and fruits Aug.–Dec. Map 435.

W.A.: Kojonup, *G.Perry 1048* (PERTH). N.T.: 6.4 km S of Alice Springs, McDonnell Siding, 11 Sept. 1962, *G.Chippendale* (BRI, MEL). S.A.: Chaunceys Line, ESE of Hartley, *Hj.Eichler 17655* (CANB). Qld: Cunamulla, Gilruth Plains, *G.H.Allen A296* (CANB). N.S.W.: 40 km NNW of Cobar, Bundella Stn, Elura mining lease, Emu Tank, *M.D.Crisp 4210* (CANB). A.C.T.: Black Mtn, Canberra, *H.S.McKee 11770* (BRI, CANB, NSW). Vic.: 27.2 km from Kerang towards Quambatook, 16 Oct. 1963, *M.E.Phillips* (CANB). Tas.: no specimens seen.

3. **Papaver somniferum* L., *Sp. Pl.* 1: 508 (1753)

T: 'Europae australioris ruderatis'; lecto: Herb. Linn. 669.8; LINN *n.v.*, *fide* S.M.H.Jafri & M.Qaiser in E.Nasir & S.I.Ali, *Fl. W. Pakistan* 61: 20 (1974).

Papaver setigerum DC. in J.B.A.P.M. de Lamarck & A.P. de Candolle, *Fl. Franç.* 3rd edn 6: 585 (1815); *P. somniferum* var. *setigerum* (DC.) Elkan, *Tent. Monogr. Papaver* 30 (1839); *P. somniferum* subsp. *setigerum* (DC.) Arcang., *Comp. Fl. Ital.* 25 (1882). T: Île du Levant (Îles d'Hyères), cultivated at Avignon, France, *E.Requien*; types: G, K, P *n.v.*, *fide* R.D.Meikle, *Fl. Cyprus* 1: 79 (1977).

Papaver album Mill., *Gard. Dict.* 8th edn (1768). T: not cited.

Illustrations: C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild Cult.* pl. 92–94 (1993); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 68, fig. 15e, f (1996).

Plant annual, caulescent, to 1.5 m, almost glabrous to setose, without prickles, glaucous. Stems simple or branching. Leaves to 30 cm long; upper leaves stem-clasping; lamina unlobed or pinnately lobed, usually shallowly to deeply toothed; lobes not prickly-tipped. Peduncle often sparsely setose. Sepals glabrous or setose. Petals to 60 mm long, white, pink, red or purple, often with dark or pale basal spot. Stamens: filaments white to dark violet, filiform or clavate; anthers pale yellow to brownish. Ovary glabrous; stigmas 5–18; disc \pm flat. Capsule stipitate, subglobose, to 9 cm long, not ribbed, glabrous, glaucous. *Common Poppy, Opium Poppy.* Plate 62.

One collection seen from south-western W.A., sporadic in southern S.A., south-eastern Qld, N.S.W., A.C.T. and Vic., one record from Tas. (where it is also cultivated); unknown in wild state, probably originally from south-eastern Europe and/or Asia Minor, long established as a weed in the Azores, Canary Islands, Madeira and the Mediterranean, widely introduced beyond from cultivation and as a crop weed. Occurs along roadsides, railways, in paddocks, pastures, cultivated fields, dumps, gravel pits, on shores, stream banks, stream beds, flats, slopes, dunes and ridges; in gravel, sand, loam and clay; to 800 m alt. Flowers and fruits Aug.–Jan. Map 436.

W.A.: Merredin, 8 Oct. 1974, *J.A.C.Smith* (PERTH). S.A.: Glen Osmond, 25 Nov. 1976, *D.E.Symon* (CANB). Qld: Mt Tamborine, Main Western Rd, 30 Nov. 1989, *J.Lockey* (BRI). N.S.W.: c. 2 km N of Narrabri on Moree Rd, *K.L.Wilson* 1948 (BRI, NSW). A.C.T.: Molonglo Gorge, *J.E.Ward & F.Davies* 52 (CANB). Vic.: Nioka Scout Camp, Plenty Gorge Metro Park, Melbourne area, 5 Nov. 1987, *J.Patrick* (CANB, MEL). Tas.: Proctors Rd, 22 Dec. 1978, *B.Robinson* (CANB).

Papaver somniferum has long been cultivated as the source of opium (and the modern derivatives heroin, morphine and codeine) and also for edible seeds and oil. As well, various colour forms with lacinate and/or doubled petals are grown as ornamentals. Two subspecies (or varieties) are sometimes distinguished: subsp. (or var.) *somniferum* and subsp. (or var.) *setigerum*, the former comprising the cultivated forms, and the latter the weedy Atlantic and Mediterranean form, which some have posited as the progenitor of the cultivated plants. Subsp. *somniferum* is characterised by glabrous sepals, pale filaments and glabrous or only very sparsely setose upper leaf surfaces, and subsp. *setigerum* by setose sepals, dark filaments and sparsely to densely setose upper leaf surfaces. These distinctions hold only generally, however, and individual plants with intermediate conditions are not uncommon, especially in Australia and other areas where the species has been introduced in relatively recent times.

4. **Papaver dubium* L., *Sp. Pl.* 2: 1196 (1753)

T: 'Inter Sueciae, Angliae segetes'; lecto: Herb. Linn. 669.7; LINN *n.v.*, *fide* S.M.H.Jafri & M.Qaiser, in E.Nasir & S.I.Ali, *Fl. W. Pakistan* 61: 15 (1974).

Illustrations: C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild Cult.* 166 (1993); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 68, fig. 15g, h (1996).

Plant annual, caulescent, sometimes subscapose, to 0.7 m, hirsute to hispid, without prickles. Stems simple or branching. Leaves to 20 cm long; basal and lower cauline laminae pinnately lobed; upper cauline laminae pinnately or bipinnately lobed, not stem-clasping; lobes not prickly-tipped. Peduncle spreading- to ascending-hispid proximally, strongly appressed-hispid distally. Petals to 30 mm long, orange to red, rarely with dark basal spot. Stamens: filaments purple, filiform; anthers violet. Ovary glabrous; stigmas 7–9; disc \pm flat. Capsule sessile or substipitate, narrowly obovoid, to 2 cm long, 2 or more times longer than wide, usually distinctly ribbed, glabrous. *Longhead Poppy.*

One collection seen from south-eastern Qld, sporadic in south-eastern S.A., N.S.W., A.C.T., Vic. and Tas., expected elsewhere; native to Europe and south-western Asia, widely introduced beyond. Occurs along roadsides, railways, stream edges, in cultivated fields, lawns, dumps and clearings, on flats, slopes, and ridges; in gravel, ballast, sand, loam and clay; to 600 m alt. Flowers and fruits Sept.–Jan. Map 437.

S.A.: Adelaide, Nov. 1849, *F.Mueller* (MEL). Qld: Toowoomba, Dec. 1916, *E.W.Bick* (BRI). N.S.W.: Glenfield, Macquarie Fields, *E.J.McBarron* 8588 (MEL, NSW). A.C.T.: Black Mtn, Canberra, *M.Gray* & *E.D'Arnay* 5780 (CANB). Vic.: Bungaree, c. 10 km E of Ballarat, *R.V.Smith* 67/191 (BRI, CANB, MEL). Tas.: 5 km S of Karoola, N side of Browns Mtn, *P.Jobson* 408 (MEL).

In its native range, this species is a tetraploid complex of five subspecies whose morphologies and distributions overlap to a considerable degree (J.W.Kadereit 1989, 1990).

Papaver dubium sometimes seems to intergrade with *P. rhoeas*, but usually they can be distinguished readily by the nature of the distal pubescence on the peduncles (whether strongly appressed or not), and by the shape of the mature capsules (whether more or less than twice as long as wide).

5. **Papaver rhoeas* L., *Sp. Pl.* 1: 507 (1753)

T: 'Europae arvis, agris'; lecto: Herb. Linn. 669.6; LINN *n.v.*, *fide* B.Jonsell & C.Jarvis, *Nordic J. Bot.* 14: 162 (1994).

Illustrations: C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild Cult.* 165, 166, pl. 85–90 (1993); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 68, fig. 15i, j (1996).

Plant annual, caulescent, sometimes subscapose, to 0.8 m, hispid to setulose, without prickles. Stems simple or usually branching. Leaves to 15 cm long; upper leaves often somewhat clustered, not stem-clasping; lamina pinnately or bipinnately lobed; lobes not prickly-tipped. Peduncle sparsely to densely spreading- or ascending-hispid throughout. Petals to 35 mm long, white, pink, orange or red, often with dark basal spot. Stamens: filaments purple, filiform; anthers bluish. Ovary glabrous; stigmas 5–18; disc ±flat. Capsule sessile or substipitate, turbinate to subglobose, to 2 cm long, less than 2 times longer than wide, obscurely ribbed, glabrous. *Corn Poppy*, *Field Poppy*, *Flanders Poppy*.

Very sporadic in south-western W.A., south-eastern S.A., N.S.W., A.C.T., Vic. and Tas., expected elsewhere; native to Europe, northern Africa, and south-western Asia, widely introduced beyond as a crop weed and garden escape. Occurs along open roadsides, in cultivated fields and dumps. Flowers and fruits Sept.–Mar. Map 438.

W.A.: Rockingham, *G.Perry* 1189 (PERTH). S.A.: Adelaide, Nov. 1849, *F.Mueller* (MEL). N.S.W.: Coonamble, 19 Sept. 1974, *L.F.Briers* (NSW). A.C.T.: Lyneham, Barton Hwy, *E.D'Arnay* 157 (CANB). Vic.: near Darby River Natl Park, 20 Oct. 1909, *Audas* & *St John* (MEL). Tas.: Hobart, 12 Mar. 1917, *R.A.Black* (MEL).

J.W.Kadereit (1990) suggested that *Papaver rhoeas* originated on the eastern coast of the Mediterranean, probably derived from one or more of the other species of the section that are native in that region, and only after (and because) 'suitable habitats in sufficient extent were provided by man'. Various forms with pale pink or white, unspotted, sometimes doubled petals are grown for ornament, notably the Shirley poppies.

6. **Papaver aculeatum* Thunb., *Prodr. Pl. Cap.* 92 (1800)

T: Cape of Good Hope, Africa, [1772–1775], *C.P.Thunberg s.n.*; holo: UPS *n.v.*, *fide* J.W.Kadereit, *Bot. Jahrb. Syst.* 109(3): 336 (1988).

Papaver horridum DC., *Syst. Nat.* 2: 79 (1821). T: Australia, 1799–1810, *G.Caley s.n.*; holo: BM (ex Herb. Lambert) *n.v.*, *fide* J.W.Kadereit, *loc. cit.*

Papaver gariepinum Burchell ex DC., *Syst. Nat.* 2: 79 (1821). T: South Africa, Gareip (Orange) River, *W.Burchell*; holo: ?K *n.v.*

Papaver aculeatum var. *pusillum* F.Muell., *Pap. & Proc. Roy. Soc. Tasmania* 1876: 30 (1877). T: King Island, Tasmania, *Neate*; holo: MEL.

Illustrations: W.Curtis, *Bot. Mag.* 64: t. 3623 (1837); N.G.Walsh, in N.G.Walsh & T.J.Entwisle (eds), *Fl. Victoria* 3: 68, fig. 15k, l (1996).

Plant annual, caulescent, to 1 m, patent-setose throughout, patent-prickly on axes, and veins, lobes and tips of leaves, with prickles to 6 mm long. Stems simple or usually branching. Leaves to 30 cm long; lower leaves indistinctly petiolate or sessile; upper leaves sessile, sometimes somewhat stem-clasping; lamina ovate to obovate, pinnately or bipinnately lobed.

Petals to 25 mm long, orange-red or -pink, without basal spot. Stamens: filaments yellow, filiform; anthers yellow. Ovary glabrous or sparsely setose near apex; stigmas 5–11; disc \pm flat. Capsule sessile, clavate to obovoid, to 25 mm long, ribbed, glabrous or sparsely setose near apex, tuberculate along ribs. $2n = 22$ (*fide*, J.W.Kadereit, *loc. cit.*). *Bristle Poppy*, *Native Poppy*.

Sporadic in S.A., Qld, N.S.W., A.C.T., Vic. and on King and Flinders Islands, Tas. Native in southern Africa. Occurs along roadsides, in pastures, paddocks, cultivated fields, shores, and on stream banks, flats, slopes, gullies, cliffs and dunes, in open areas, scrub and woodland; in gravel, shellgrit, sand, sandy loam, clay loam and clay. Flowers and fruits Sept.–Mar. Map 439.

S.A.: Pelican Lagoon, *D.Symon 14283* (BRI, CANB). Qld: near summit, Mt Kiangarow, *L.S.Smith 6257* (BRI). N.S.W.: L. Urana, 6.4 km SW of Urana, *E.J.McBarron 5988* (MEL, NSW). A.C.T.: Paddys R., near Cotter, *C.J.Shepherd & M.Gray 5611* (CANB). Vic.: West Beach, L. Albury, *M.G.Corrack 6432* (MEL). Tas.: Flinders Is., *F.Mueller s.n.* (MEL).

Considering morphological, cytological and phytogeographic evidence, J.W.Kadereit (1988b) concluded that *Papaver aculeatum* probably is not native to Australia, and that instead its disjunct occurrence in Australia is synanthropic, due to introduction from southern Africa fairly early in the colonial period.

4. ROEMERIA

R.W.Kiger

Roemeria Medik., *Ann. Bot. (Usteri)* 1(3): 15 (1792); in honour of Johann Jakob Roemer, 1763–1819, Swiss physician and naturalist at Zürich.

Type: *R. violacea* Medik.

Annual caulescent herbs from taproots, not distinctly glaucous; sap yellow. Stems leafy. Leaves: basal leaves rosulate, indistinctly petiolate, usually few; cauline leaves alternate, usually few and remote, with lower leaves indistinctly petiolate and upper leaves sessile; lamina bi- or tripinnately divided, not harshly prickly. Inflorescences axillary and terminal, bracteate, 1-flowered. Flowers without hypanthium. Sepals 2, distinct. Petals 4. Ovary 1-locular; style absent or obscure; stigmas 2–4 or rarely 6, capitate-radiate, not on a disc. Capsule erect to somewhat nodding, slenderly cylindrical or terete, 2–4 (–6)-valved, 1-locular, dehiscing from apex almost to base. Seeds many; aril absent.

A genus of 5 or 6 species native from southern Europe to south-western and south-central Asia. One species introduced in Australia.

**Roemeria hybrida* (L.) DC., *Syst. Nat.* 2: 92 (1821)

Chelidonium hybridum L., *Sp. Pl.* 1: 506 (1753); *Roemeria violacea* Medik., *Ann. Bot. (Usteri)* 1(3): 15 (1792), *nom. illeg.* T: 'Europa australiore'; lecto: Herb. Linn. 668.6; LINN *n.v.*, *fide* S.M.H.Jafri & M.Qaiser, in E.Nasir & S.I.Ali, *Fl. W. Pakistan* 61: 6 (1974).

Roemeria hybrida var. *velutino-eriocarpa* Fedde in H.G.A.Engler, *Pflanzenr.* 40: 241 (1909). T: Afghanistan, [1835–1841], *W.Griffith 139a*, 421; syn: ?B.

Illustrations: B.D.Morley & H.R.Toelken, *Fl. Pl. Australia* 57, fig. 26f (1983); C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild Cult.* 178 (1993).

Plant to 0.5 m, glabrescent to sparsely setose. Stems simple or usually branching. Leaves to 8 cm long; petiole to 1.5 cm long; lamina bipinnately or tripinnately divided; margin entire; ultimate segments lanceolate to linear, usually tipped with short, delicate bristles. Peduncle to 8 cm long. Petals to 2.5 cm long, violet. Stamens: filaments blackish; anthers blue. Capsule straight to slightly curved, to 10 cm long, glabrous to sparsely hispid or setose; valves tipped with short, usually hispid ligules not extending beyond stigmas. Seeds grey, reticulate-pitted.

One record, from Loveday, S.A., also reported from Vic., although no specimens have been located, and expected elsewhere; native from southern Europe to south-central Asia. Grows in sandy loam. Flowers and fruits ?May–?Sept. Map 440.

S.A.: Loveday, 20 Sept. 1943, *E.Gauba* (MEL).

Roemeria hybrida is closely related to *R. refracta* DC., which has a similar native range and also could be introduced into Australia. The most obvious, and apparently the only consistent, differences between the two are that *R. refracta* has bright red petals with a blackish basal spot sometimes edged with white, and yellow-brown anthers. Some Asian and south-east European plants, as well as some introduced outside the native ranges, are intermediate in one or both of the other characters that have been used to distinguish the two species: the nature of any capsule pubescence, and the presence of awns on the tips of the capsule valves.

5. ROMNEYA

R.W.Kiger

Romneya Harv., *London J. Bot.* 4: 74 (1845); in honour of Reverend T. Romney Robinson, 1792–1882, Irish astronomer at Armagh.

Type: *R. coulteri* Harv.

Perennial sub-shrubs branching from base, rhizomatous, glaucescent; sap colourless. Stems herbaceous above the base, leafy. Leaves alternate, petiolate; lamina pinnately or bipinnately lobed or divided, entire. Inflorescences terminal, bracteate, 1-flowered. Flowers delicately fragrant, without hypanthium. Sepals 3, distinct. Petals 6. Anthers yellow. Ovary 1-locular; style absent; stigmas 7–12, flat, proximally coherent and radiate-ascending, not on a disc, velvety. Capsule erect, oblong to ovoid, 7–12-valved, incompletely to fully multilocular by placental intrusion, dehiscent from the apex to about the middle, setose. Seeds many; aril absent.

A genus of 2 closely related taxa sometimes regarded as conspecific, endemic to western North America, cultivated there and elsewhere for their showy white flowers (the largest in the family), and sometimes escaping. Both species are introduced in Australia.

Leaves to 20 cm long; calyx beaked at bud apex, sepals glabrous; petals to 10 cm long; seeds papillose

1. *R. coulteri*

Leaves to 10 cm long; calyx not or only indistinctly beaked at bud apex, sepals appressed-pubescent; petals to 8 cm long; seeds smooth

2. *R. trichocalyx*

1. **Romneya coulteri* Harv., *London J. Bot.* 4: 75, t. 3 (1845)

T: northern California, U.S.A., [1831–1832], *T.Coulter*; iso: GH *n.v.*, *fide* Harvard University Herbarium on-line Type catalogue.

Illustrations: W.L.Jepson, *Fl. Calif.* 7: 563, fig. 119 (1922); B.D.Morley & H.R.Toelken, *Fl. Pl. Australia* t. 26e (1983).

Plant to 2.5 m high. Leaves to 20 cm long; lamina broadly ovate. Calyx beaked at bud apex; sepals glabrous. Petals obovate to suborbicular, 6–10 cm long, white, crinkled. Capsule 30–40 mm long, hispid. Seeds papillose, minutely ridged. *California Tree Poppy*, *Matilija Poppy*. Fig. 75A–C.

Occurs in south-western W.A. near the coast, with one record from Canberra, A.C.T., expected elsewhere; native to western North America in California. Occurs along roadsides, railways, and in disturbed heath; in sand and sandy clay. Flowers and fruits Oct.–Dec. Map 441.

W.A.: Hamel, *G.J.Keighery 5381* (CANB, PERTH). A.C.T.: Commonwealth Club, Canberra, *N.T.Burbidge 7532* (CANB, NSW).

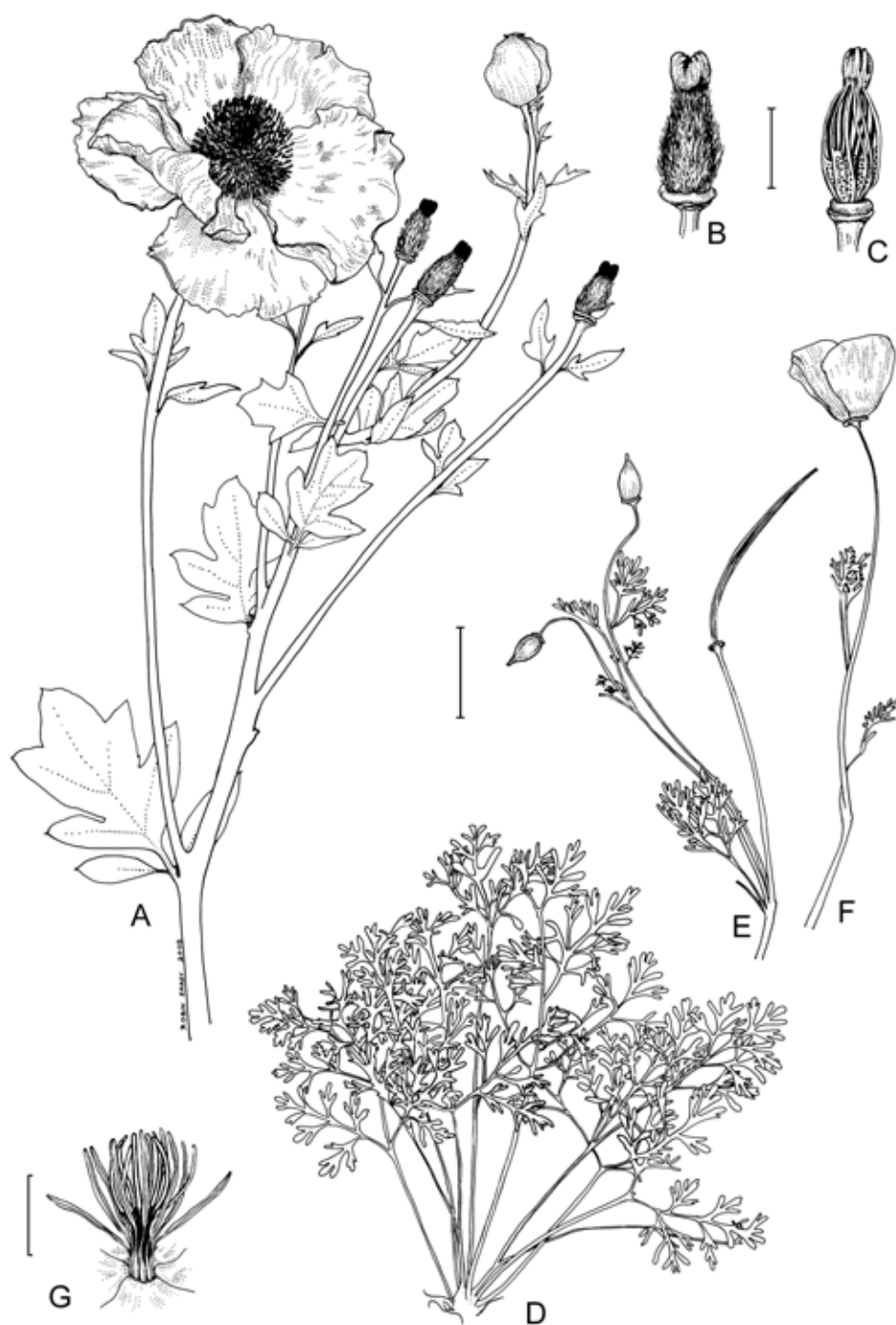


Figure 75. A–C, *Romneya coulteri*. A, habit; B, capsule; C, old capsule (A–C, N.T.Burbidge 7532, CANB). D–G, *Eschscholzia californica*. D, leaves (F.Davies & I.R.Telford 64, CANB); E, habit; F, flowering stem; G, stamens (E–G, R.O.Makinson 998, CANB). Scale bars: A, D–F = 30 mm; B, C, G = 10 mm. Drawn by R.Errey.

2. **Romneya trichocalyx* Eastw., *Proc. Calif. Acad. Sci.* ser. 3, 1: 133, t. 11, figs 4a, 4c (1898)

Romneya coulteri var. *trichocalyx* (Eastw.) Jeps., *Fl. Calif.* 7: 563 (1922). T: North America, from cultivation at San Francisco; holo: CAS n.v., *fide Californian Academy of Science on-line Type catalogue*.

Illustrations: C.Grey-Wilson, *Poppies: Guide Poppy Fam. Wild Cult.* 183, t. 103, t. 104 (1993).

Similar to *R. coulteri* but differs in: leaves to 10 cm long; calyx not or only indistinctly beaked at bud apex; sepals appressed-pubescent; petals 4–8 cm long; capsules 25–35 mm long; seeds smooth.

Two records, from Bridgetown, W.A., and Canberra, A.C.T., expected elsewhere; native to western North America in California and Baja California. Occurs along roadsides; in sandy loam. Flowers and fruits Dec. Map 442.

W.A.: Bridgetown, *G.J.Keighery 2141* (PERTH). A.C.T.: Capital Hill area, National Circuit, Canberra, *K.Mowle 181* (CANB).

6. ESCHSCHOLZIA

R.W.Kiger

Eschscholzia Cham. in C.G.D.Nees von Esenbeck, *Horae Phys. Berol.* 73 (1820); in honour of Johann Friedrich Gustav von Eschscholtz, 1793–1831, Estonian physician and naturalist who travelled with Chamisso aboard the *Rurik* on the Romanzoff Expedition around the world, commanded by Lieutenant Kotzebue.

Type: *E. californica* Cham.

Annual or perennial, caulescent or subscapose herbs from taproots; sap colourless or orange. Stems sparsely leafy above base. Leaves alternate to subopposite; basal and lower cauline leaves petiolate; upper cauline leaves subsessile or sessile; lamina 1–3 times ternately dissected; margin entire. Inflorescences cymiform, bracteate, 1–many-flowered; buds erect or (not in Australia) nodding. Flowers: hypanthium surrounding the ovary base, bearing perianth and stamens sub-perigynously from beneath a flaring free rim. Sepals 2, connate, calyptrate, caducous as a unit. Petals usually 4. Filaments basally adnate to petals, stout, usually shorter than anthers. Ovary 1-locular; style short to obsolete; stigmas usually 4, unequal. Capsule erect, elongate, terete, ribbed, 1-locular, 2-valved, deciduous, dehiscing explosively from base on separation. Seeds many, reticulate or (not in Australia) minutely pitted; aril absent.

A genus of 12 species, all endemic to western N America. One species is widely cultivated, escapes fairly readily, and has become established in south-eastern and far western Australia.

W.L.Jepson, *Eschscholzia*, *Fl. Calif.* 1: 564–575 (1922); J.C.Clark, *Systematic Studies of Eschscholzia (Papaveraceae)*, unpubl. PhD thesis, Univ. Calif. Davis (1979).

****Eschscholzia californica*** Cham. in C.G.D.Nees von Esenbeck, *Horae Phys. Berol.* 73, t. 15 (1820)

T: San Francisco, California, U.S.A., 1816, *L.K.A.Chamisso & J.F.G. von Eschscholtz*; holo: ?LE.

Illustrations: W.Curtis, *Bot. Mag.* 56: t. 2887 (1829); W.L.Jepson, *Fl. Calif.* 1: 565, 566, 569, figs 121–123 (1922); B.D.Morley & H.R.Toelken, *Fl. Pl. Australia* 57, fig. 26a, b (1983).

Plants to 0.6 m, glabrous, sometimes glaucous. Stems branching. Leaves to 8 cm long. Peduncle to 15 cm long. Petals flabelliform, to 6 cm long, light yellow to deep orange, often darker spotted at base. Stamens: filaments yellowish; anthers yellow. Capsule straight to slightly curved, to 10 cm long, glabrous. Seeds brown to black. *Californian Poppy*. Fig. 75D–G.

Sporadic in western W.A., south-eastern S.A., south-eastern Qld, N.S.W., A.C.T., Vic. and Tas.; native to south-western North America, widely introduced beyond as a garden escape. Occurs in open, disturbed areas along roadsides, railways, stock routes, paths and streams, on flats, floodplains, sandbars, banks, slopes and dumps, in yards, streambeds, gorges and woodland clearings; often in sandy alluvium; to 1000+ m alt. Flowers and fruits July–May. Map 443.

W.A.: Prevelly Park, W of Margaret River, *G.J.Keighery 6616* (CANB, PERTH). S.A.: E side of bridge, Blanchetown, R. Murray, *Hj.Eichler 18179* (AD, CANB). Qld: Stanthorpe, *S.L.Everist & L.J.Webb 1345* (BRI). N.S.W.: Campbelltown, *E.J.McBarron 18160* (AD, NSW). A.C.T.: Point Hut Crossing, Murrumbidgee R., *B.J.Lepschi 314* (CANB, MEL). Vic.: Alpine Natl Park near confluence of Pine Ck and Snowy R., *R.J.Fletcher 231* (MEL). Tas.: Plenty, *A.M.Buchanan 13639* (HO).

FUMARIACEAE

*N.G.Walsh*¹

Fumaria with *G.M.Norton*²

Annual or perennial herbs, procumbent to erect, sometimes twining, sometimes tuberous. Leaves alternate, sometimes wholly basal, pinnately compound; lacking stipules. Inflorescences racemose or cymose. Flowers strongly zygomorphic to almost regular, bisexual, hypogynous. Sepals 2, often peltately attached, small, caducous, not enclosing the bud. Petals 4, in 2 series; outer series larger than the inner and often pouched (unpouched in *Hypecoum* and *Pteridophyllum*); inner pair variably united along one side (but remaining free in *Hypecoum* and *Pteridophyllum*). Stamens 6 in most genera, in two bundles of three, with filaments in each bundle connivent, the outer pair of anthers unilocular, inner anther bilocular; stamens 4 and distinct in *Hypecoum* and *Pteridophyllum*. Gynoecium of 2 fused carpels; ovary unilocular with parietal placentation; ovules 2–many, anatropous to campylotropous; stigmas 2, or 2–several-lobed. Fruit capsular, longitudinally dehiscent, or nut-like and indehiscent, or breaking transversely into 1-seeded segments. Seeds generally arillate with copious oily endosperm.

A family of about 19 genera and 400 species, primarily from temperate regions of the Northern Hemisphere but also in southern Africa. Several members of the family are cultivated as ornamentals, notably *Corydalis* DC. and its segregate genera, and *Dicentra* Bernh. Four genera and 10 species are naturalised in Australia, mostly as weeds in cereal crops or gardens, but only *Fumaria* (7 species) is common and widespread.

Some authorities (e.g. Hoot *et al.*, 1997) treat Fumariaceae and monotypic Pteridophyllaceae within a broad concept of Papaveraceae. Molecular and morphological analyses of these families indicate that this is a valid approach where *Pteridophyllum* is sister to all other genera and the Fumariaceae sister to Papaveraceae *sens. lat.* The subfamilies of Fumariaceae are supported by this work. Equally valid though is recognition of three distinct families that form a monophyletic group and this has been the approach followed in Kubitzki *et al.* (1993). The contention of e.g. Bruckner (1982) that *Hypecoum* and *Pteridophyllum* are more closely allied to sections of the Papaveraceae than to the remainder of the Fumariaceae is shown to be very unlikely by Hoot's work.

G.Bentham, Papaveraceae, *Fl. Austral.* 1: 62–63 (1863); F.Fedde, Papaveraceae, in H.G.A.Engler *et al.*, *Nat. Pflanzenfam.* 2nd edn, 17b: 5–145 (1936); P.D.Sell, Papaveraceae, *Fl. Europ.* 1: 246–259 (1964); C.Bruckner, *Zur Kenntnis der Fruchtmorphologie der Papaveraceae und Hypecoaceae*, *Feddes Repert.* 93: 153–212 (1982); M.Lidén, *Synopsis of*

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FUMARIACEAE

Fumarioideae (Papaveraceae), *Opera Bot.* 88: 1–133 (1986); M.Lidén, Fumariaceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich (eds), *Fam. Gen. Vasc. Pl.* 2: 310–318 (1993); S.Hoot *et al.*, Data congruence and phylogeny of the Papaveraceae s.l. based on four data sets: *atpB* and *rbcL* sequences, *trnK* restriction sites, and morphological characters, *Syst. Bot.* 22(3): 575–590 (1997).

KEY TO GENERA

- | | | |
|----|--|--|
| 1 | Inflorescence cymose; flowers with 2 pairs of similar petals, inner petals deeply trilobed, stamens 4; fruit narrow, linear to falcate, breaking transversely into one-seeded segments, or indehiscent; plant strongly curry-scented | (Subfamily Hypecooideae)
1. HYPECOUM |
| 1: | Inflorescence racemose; flowers with outer pair of petals differing from inner pair; inner petals entire, stamens 6; fruit a 1–several-seeded capsule, or 1-seeded, indehiscent and nut-like; plants not curry-scented | (Subfamily Fumarioideae) |
| 2 | Fruit several-seeded; rhizomatous perennials with flowers usually more than 14 mm long | 2. PSEUDOFUMARIA |
| 2: | Fruit 1-seeded; tap-rooted annuals; flowers (in Australian species) to 14 mm long | |
| 3 | Raceme globular to ovoid; fruit flat | 3. PLATYCAPNOS |
| 3: | Raceme elongate; fruit ±spheroid | 4. FUMARIA |

1. HYPECOUM

N.G.Walsh

Hypecoum L., *Sp. Pl.* 1: 124 (1753); *Gen. Pl.* 5th edn, 60 (1754); from the Greek name for a group of plants to which the genus belongs.

Type: *H. procumbens* L.

Semi-succulent annuals, usually glabrous, glaucous. Stems procumbent to erect, branching from base. Leaves 2–3-pinnatisect. Inflorescence cymose. Bracts leaf-like, exceeding pedicel. Flowers zygomorphic, usually yellow. Sepals attached at base. Outer pair of petals entire or 3-lobed; inner pair smaller, usually deeply 3-lobed with the mid-lobe spatulate, often fringed with hairs. Stamens 4, usually with winged filaments. Pistil: ovary with numerous ovules; style with 2 stigmas. Fruit narrow, linear, breaking transversely into 1-seeded segments, or indehiscent, or rarely a pod-like capsule dehiscing by 2 valves. Seeds ovoid, octahedral or D-shaped, ±tuberculate.

About 15 species, mainly in the Mediterranean regions and Asia Minor, a few extending eastwards to Mongolia and northern China. One species naturalised in Australia.

A.B.Mowat & T.G.Tutin, *Hypecoum*, *Fl. Europ.* 1: 251–252 (1964); J.Cullen, *Hypecoum*, *Fl. Iran.* 34: 23–25 (1966); H.I.Aston, *Hypecoum pendulum* L. in Australia, *Muelleria* 3: 177–182 (1976); A.E.Dahl, Infrageneric division of the genus *Hypecoum* (Papaveraceae), *Nordic J. Bot.* 10: 129–140 (1990).

****Hypecoum pendulum* L., *Sp. Pl.* 1: 124 (1753)**

T: In Galloprovincia [France], Herb. Linn. 171.4; lecto: LINN, *fide* S.M.H.Jafri & S.Qaiser, in E.Nasir & S.I.Ali (eds), *Fl. W. Pakistan* 61: 29 (1974)

Illustrations: M.Zohary, *Fl. Palaestina* I, pl. 348 (1966); B.D.Morley & H.R.Toelken, *Fl. Pl. Australia* 58, fig. 27a–e (1983); J.P.Jessop & H.R.Toelken, *Fl. S. Australia* 1: 369, fig. 205d (1986).

Strongly curry-scented annual to 40 cm high. Leaves basal and subtending branches, 3-pinnatisect, to 15 cm long, 2.5 cm wide; ultimate segments narrow-linear. Pedicel becoming thickened and strongly recurved in fruit. Sepals ovate, 2–2.5 mm long. Outer petals rhombic or obscurely trilobed, 6–11 mm long, pale yellow; inner petals deeply trilobed, 5–8 mm long, yellow, flecked purplish brown, with the mid-lobe fringed on the dilated apical part. Stamens with winged filaments, brown-spotted. Style subequal to inner petals. Fruit 4-angled, linear to slightly arcuate, 4–6 cm long, 2–5 mm wide, c. 9-seeded, tardily breaking into articles. Seeds D-shaped, flattened, c. 2.5 mm long, 2 mm wide, brown, minutely areolate. Fig. 76U–X.

Occurs from Yorke Penin. to near Port Pirie, S.A., and near Swan Hill, Vic. Native through Mediterranean regions of Europe and Africa, to south-west Asia. Occurs in sandy soil, recorded growing with cereal crops and along nearby roadsides, and in clearings in mallee scrub. Flowers Sept.–Oct. Map 444.

S.A.: N of Booborowri, Hundred of Ayers, 24 Sept. 1987, *P. Cousins* (AD, MEL). Vic.: c. 4.5 km W of Lake Boga township, 19 Nov. 1975, *W.J. Anderson* (AD, CANB, MEL, NSW, PERTH).

The three varieties of *H. pendulum* given by J. Cullen (1966) are distinguished on variable attributes and have not been maintained in most subsequent treatments.

2. PSEUDOFUMARIA

N.G. Walsh

Pseudofumaria Medik., *Philos. Bot.* 1: 110 (1789); from the Greek *pseudes* (false) and the generic name *Fumaria*.

Type: *P. lutea* (L.) Borkh.

Corydalis sect. *Stylotome* Prantl in H.G.A. Engler & K.A.E. Prantl, *Nat. Pflanzenfam.* 3: 144 (1889), *p.p., nom. illeg.*

Glabrous, tufted perennials, usually growing in rock or wall crevices, inodorous, rhizomatous. Leaves 2–3-pinnatisect, at least partly glaucous. Inflorescence racemose, pedunculate, many-flowered. Bracts shorter than the pedicel which elongates and is spreading to reflexed in fruit. Flowers zygomorphic. Sepals lateral, basally or ±centrally attached. Outer pair of petals broadly winged, emarginate, upper petal with a short basal spur; inner pair of petals free, oblong, with a short basal claw and indentation along one side. Stamens 6. Stigma with 2 crescentic lobes and short paired apical appendages. Fruit a papery, oblong, 3–13-seeded capsule.

A genus of 2 species from Italy and the north-western Balkans, widely naturalised; one subspecies weakly naturalised in Australia.

A.B. Mowat & A.O. Chater, *Corydalis*, *Fl. Europ.* 1: 252 (1964).

****Pseudofumaria alba* (Mill.) Lidén, *Opera Bot.* 88: 32 (1986)**

subsp. ***alba***

Fumaria alba Mill., *Gard. Dict.* 8th edn, no. 3 (1768); *Corydalis capnoides* var. *albida* DC., *Syst. Nat.* 2: 126 (1821); *Capnoides albida* (DC.) Bernh., *Linnaea* 13: 665 (1838). T: locality and date unknown, *P. Miller*; holo: BM-Mill. *n.v.*, *fide* M. Lidén, *Opera Bot.* 88: 32 (1986).

Corydalis ochroleuca W.D.J. Koch, *Flora* 15: 708 (1831). T: Greece, Vordoni, littorale adriatici, date unknown, ?*W.D.J. Koch*; holo: L *n.v.*

[*Corydalis lutea* auct. non (L.) DC.: G. Harden, in G.J. Harden (ed.), *Fl. New South Wales* 1: 173 (1990)]

Illustrations: S. Pignatti, *Fl. D'Italia* 1: 360 (1982), as *Corydalis ochroleuca*; M. Lidén, *Opera Bot.* 88: 31, fig. 27B (1986).

Perennial to c. 50 cm high, with flowering stems ascending from leaves tufted at base. Leaves: petiole narrowly winged; leaflets glaucous on both surfaces, obovate to cuneate, commonly c. 1 cm long. Raceme 12–25-flowered; peduncle erect, 2–8 cm long. Sepals ovate, c. 2 mm long, dentate. Corolla 13–17 mm long, creamy white with inner petals tipped yellow. Capsule c. 1 cm long, 3–9-seeded. Seeds ovate, c. 2 mm long, 1 mm wide, tuberculate in concentric rows, dull.

Recorded from near the Warrumbungle Ra., N.S.W., and Hobart, Tas., where an occasional weed in and near gardens. Native near the Adriatic Sea and northern Italy, naturalised in western Europe. An occasional escape from cultivation, apparently preferring lime-rich substrates, such as cracks in concrete pavements and mortar-joints of walls etc. Flowers Nov. Map 445.

N.S.W.: Tooraweenah district, 1959, *A.J.Buckley* (NSW). Tas.: Old Customs House, Hobart, 15 Nov. 1961, *W.M.Blackland & D.I.Morris* (HO).

Pseudofumaria lutea (L.) Borkh. (syn. *Corydalis lutea* (L.) DC., *Fumaria lutea* L., *Corydalis capnoides* Pers.) is also cultivated, but does not appear to be as weedy as *P. alba*. It differs from *P. alba* in having larger (c. 4 mm long) sepals, uniformly butter-yellow petals, and leaves usually green above, glaucous beneath.

3. PLATYCAPNOS

N.G.Walsh

Platycapnos (DC.) Bernh., *Linnaea* 8: 471 (1833); from the Greek *platys* (flat) and *kapnos* (smoke, another name for *Fumaria*).

Fumaria sect. *Platycapnos* DC., *Syst. Nat.* 2: 131 (1821). T: *P. spicata* (L.) Bernh.

Erect to ascending annuals or perennials, glabrous, inodorous, tap-rooted. Leaves 2-pinnatisect; leaflets filiform. Inflorescence racemose, globular or elongate, many-flowered. Bracts equal to or exceeding the pedicel which is reflexed in fruit. Flowers zygomorphic. Sepals lateral, basally attached. Petals entire; upper petal with short, inflated spur; inner pair of petals united along lower margin. Stamens 6. Style dilated into 2 lobes below the paired stigmatic arms. Fruit nut-like, indehiscent, 1-seeded, flattened.

A genus of 2 or 3 species from western Mediterranean countries; one species introduced to Australia.

****Platycapnos spicata* (L.) Bernh., *Linnaea* 8: 471 (1833)**

Fumaria spicata L., *Sp. Pl.* 1: 700 (1753). T: Lipsiae in horto. In Galliae Narbonense spont, France, *s. dat.*, *J.Burser* 7: 96; lecto: UPS *n.v.*, *fide* M.Lidén, *Opera Bot.* 88: 40 (1986).

Illustrations: S.Pignatti, *Fl. D'Italia* 1: 366 (1982); M.Lidén, *Opera Bot.* 88: 40, fig. 34C, D (1986).

Slender glaucous annual to c. 25 cm high, branched mostly from near base. Leaflets to 5 mm long, apiculate. Racemes globular to ovoid, very dense, to 60-flowered. Sepals oblong, to 2 mm long. Corolla 5–6 mm long, white or pink, prominently veined green, dark at apex, reddening after fertilisation. Fruit ovate, c. 3 mm long, acute, muricate. Fig. 76R–T.

Known from a single collection from near Balaklava, c. 75 km N of Adelaide, S.A.. Native to Mediterranean areas of southern Europe and northern Africa. A weed of cultivated ground and calcareous screes. Flowers Sept. Map 446.

S.A.: S of Balaklava near Woods Railway Station, Sept., 1922, *Prof. Osborne* (AD).

It is doubtful that this species has ever been truly naturalised in Australia.

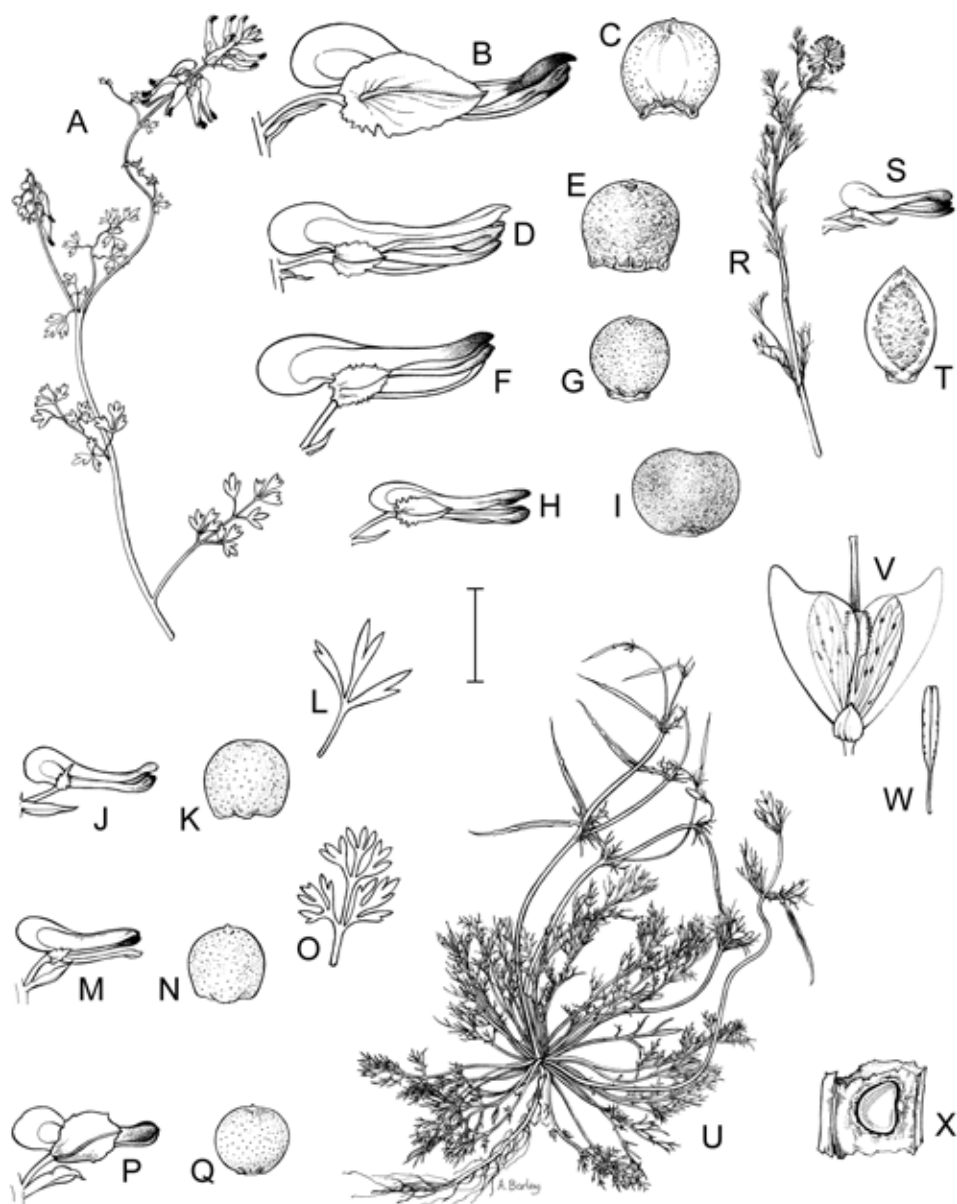


Figure 76. A–Q, *Fumaria*. A–C, *F. capreolata*. A, habit; B, flower; C, fruit (A–C, A.Beauglehole 84634, MEL). D–E, *F. bastardi*. D, flower; E, fruit (D–E, M.Gray 5792, NSW). F–G, *F. muralis* subsp. *muralis*. F, flower; G, fruit (F–G, A.Beauglehole 76913, MEL). H–I, *F. officinalis* subsp. *officinalis*. H, flower; I, fruit (H–I, E.Gibson, 20 Oct. 1925, MEL). J–L, *F. indica*. J, flower; K, fruit; L, leaf (J–L, K.Green, Aug. 1958, NSW). M–O, *F. parviflora* var. *parviflora*. M, flower; N, fruit; O, leaf (M–O, D.Symon 13232, AD); P–Q, *F. densiflora*. P, flower; Q, fruit (P–Q, F.M.Reader 6, MEL). R–T, *Platycarpus spicata*. R, habit; S, flower; T, fruit (R–T, Prof.Osborne, 6 Sept. 1922, AD). U–X, *Hypecoum pendulum*. U, habit; V, flower; W, stamen; X, article of fruit (U–X, W.J.Anderson, 1 Oct. 1978, MEL). Scale bar: A, R = 50 mm; L = 17 mm; O, V, W = 10 mm; B, D, F, H, J, M, P, S = 8 mm; C, E, G, I, K, N, Q, T, X = 5 mm; U = 100 mm. Drawn by A.Barley.

FUMARIACEAE

4. FUMARIA

N.G. Walsh & G.M. Norton

Fumaria L., *Sp. Pl.* 1: 699 (1753); *Gen. Pl.* 5th edn, 314 (1754); from the Latin *fumus* (smoke), a translation of the Greek name for some of the species, the sap of which causes eye-irritation similar to that caused by smoke.

Type: *F. officinalis* L.

Fumaria sect. *Sphaerocarpus* DC., *Syst. Nat.* 2: 131 (1821). T: *F. capreolata* L.

Glabrous, herbaceous annuals with erect, semi-erect or weakly climbing stems, inodorous, taprooted. Leaves: 2–4-pinnatisect when mature; immature leaves simple to ternate. Inflorescence a leaf-opposed or terminal elongated raceme. Pedicel short, subtended by bracts. Flowers zygomorphic. Sepals often peltately attached, lateral. Petals entire; dorsal petal produced into a rounded spur; inner pair of petals joined at apex. Stamens 6. Stigma usually 2-lobed. Fruit nut-like, indehiscent, 1-seeded, approximately spherical, with 2 apical pits. $2n = 16$ –112 in an even-numbered polyploid series from $2x$ to $14x$ lacking only $12x$, M.Lidén, *Opera Bot.* 88: 15 (1986).

Approximately 50 species, mostly European with a few species extending into southern Asia and eastern Africa; 7 species naturalised in Australia where they are commonly weeds of cultivated land and wastelands not prone to waterlogging.

The genus is known for its high allopolyploidy-based specific plasticity, which makes it problematic from a taxonomical point of view and has led to a number of renamings and regroupings of species over the years. There is still no consensus as to the exact number of species to be recognised due to several unresolved issues concerning species delimitation. Further complications arise from conceptual differences among European taxonomists regarding the subdivision of species. One group of taxonomists, represented by Sell and Murrell (Sell & Murrell, in press), insists that certain subspecies and variants are distinct and uniform enough to be named as such. Their taxonomic treatment of the genus is based on the work by Pugsley and extensive field observations. These suggest that sometimes variants describe regionally endemic forms, which behave differently to others in certain situations. However, while individual ecotypes might be easily distinguished in their native range, this is not always the case in Australia. Multiple introductions from different regions in Europe and/or Asia have in a number of cases led to the presence of a wide range of forms and their intermediates in Australia, making recognition of subdivisions beyond species level very difficult. This is particularly evident in all white-flowering forms of *F. parviflora*.

A second group of taxonomists, among them Lidén (Lidén, 1986), addresses exactly this difficulty by concluding that species subdivision beyond subspecies level is undesirable on strictly taxonomic grounds. The recognition of ecotypes and variation, which in many cases may only be based on single gene mutations, is regarded as insufficient grounds for further subdivision of species. This approach, however, has led to unresolved problems in the naming of the pink- and white-flowering variants of *F. parviflora*.

In this flora, a middle path has been chosen between the two positions described above by treating separately only universally recognised subdivisions of species. However, in the case of *F. bastardii*, an exception has been made and a discussion of three variants recognised by Sell and Murrell has been included. Considering that this species has attained major cropping weed status in south-eastern Australia in recent decades, this was regarded as important, as evidence suggests that the three variants behave differently in agronomic terms.

Plants grown in shaded sites or ‘out of season’ frequently produce small, cleistogamous flowers. Pink-flowered species are more affected than white-flowered ones. Many incorrect determinations of Australian specimens have resulted from plants of this type as most keys are based on normal-sized flowers. The following key should permit identification of both normal and cleistogamous-flowered specimens.

Measurements are based on fresh field specimens. Corolla lengths include the posterior spur of the dorsal petal. Heights refer to plants growing in full sun and without competition from other plants. All species can grow to heights of more than one metre if forced to compete or scramble for light.

H.W.Pugsley, A revision of the genera *Fumaria* and *Rupicapnos*, *J. Linn. Soc., Bot.* 44: 233–353 (1919); P.D.Sell, Taxonomic and Nomenclatural notes on European *Fumaria* species, *Feddes Repert.* 68: 174–178 (1963); P.D.Sell & G.Murrell, *Fl. Great Britain & Ireland*, Vol. I (in press).

- 1 Corolla 9 mm long or more
- 2 Flower predominantly white (rarely flushed red); sepals 4 mm long or more; fruiting pedicel strongly recurved after fertilisation **1. *F. capreolata***
- 2: Flower predominantly pink; sepals less than 4 mm long; fruiting pedicel erect to slightly recurved
- 3 Fruit wider than long, truncate to shallowly emarginate at apex; lower petal distinctly spatulate **4. *F. officinalis***
- 3: Fruit longer than wide, or \pm as long as wide, rounded to pointed at apex; lower petal linear to narrowly spatulate
- 4 Inner petals with pale yellow median streak (becoming more prominent on drying); lower petal more than 0.5 mm wide medially; peduncle and pedicel rather stout; pedicel remaining erect in fruit; fruit rather straight-sided, truncate at base, distinctly tuberculate-rugulose at maturity **2. *F. bastardii***
- 4: Inner petals not or rarely with median yellow streak; lower petal less than 0.5 mm wide medially; peduncle and pedicel slender; pedicel commonly spreading to slightly recurved in fruit; fruit rounded, smooth to minutely tuberculate **3. *F. muralis***
- 1: Corolla less than 9 mm long
- 5 Sepals less than 1.5 mm long (usually less than 1 mm); bracts exceeding flowering pedicel
- 6 Flowers white (sometimes becoming flushed red after fertilisation) or rosy-pink, but inner petals without dark purplish apex; largest leaf segments only rarely wider than c. 0.5 mm **6. *F. parviflora***
- 6: Flowers pink; inner petals with dark purplish apex; largest leaf segments more than 0.5 mm wide **7. *F. indica***
- 5: Sepals more than 1.5 mm long; bracts longer or shorter than flowering pedicel
- 7 Sepals broadly ovate to subrotund, wider than corolla; bracts exceeding flowering pedicel **5. *F. densiflora***
- 7: Sepals ovate, narrower than corolla; bracts shorter than or equal to flowering pedicel
- 8 Fruit wider than long, truncate to shallowly emarginate at apex; lower petal distinctly spatulate **4. *F. officinalis***
- 8: Fruit no wider than long, rounded to subacute at apex; lower petal linear to narrowly spatulate
- 9 Inner petals with median yellow streak; pedicel remaining erect in fruit; fruit rather straight-sided, truncate at base, distinctly tuberculate-rugulose **2. *F. bastardii***
- 9: Inner petals not or rarely with median yellow streak; pedicel commonly arcuate and spreading in fruit; fruit rounded at base, smooth to minutely tuberculate **3. *F. muralis***

1. **Fumaria capreolata* L., *Sp. Pl.* 1: 701 (1753)

Fumaria officinalis var. *capreolata* (L.) Ewart, *Victorian Naturalist* 24: 191 (1908). T: 'Prope Olbyam Galliae Narbonense', France, (date unknown), *Burser Hortus Siccus*. VII(I): 94; holotype: UPS *n.v.*, *fide* M.Lidén, *Opera Bot.* 88: 69 (1986).

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 315 (1981); B.D.Morley & H.R.Toelken, *Fl. Pl. Australia* 58, fig. 27f–h (1983); M.Lidén, *Opera Bot.* 88: 68, fig. 58A–H (1986).

Diffuse to weakly climbing, usually pale green, rarely glaucous herb with few branches and long internodes, to c. 1 m high. Largest ultimate segments of leaves often more than 5 mm long and 2 mm wide. Raceme shorter than or subequal to peduncle. Bracts $\frac{1}{2}$ as long to as long as pedicel. Pedicel usually strongly recurved in late flower and fruit. Sepals peltately attached, ovate, 4–6 mm long, 2.5–4 mm wide, about as wide as corolla, obscurely to distinctly dentate. Corolla 10–14 mm long, white or flushed pinkish, with upper and inner petals blackish red at apex. Fruit 2–2.5 mm long and wide, rounded at base, obscurely keeled, obtuse to truncate at apex, smooth, or slightly tuberculate toward keel, with small, rounded apical pits. *White Fumitory*. Fig. 76A–C.

Common and widespread in drier areas of southern mainland Australia from near Port Augusta, S.A., to near Brisbane, Qld; also occurs in south-western W.A. Native to the Mediterranean region and south-western Europe, widely naturalised in warmer temperate countries. Prefers well-drained, light-textured soils, mostly with high content of organic matter and therefore good moisture-holding capacity; frequently occurring near settlements. Flowers usually Sept.–Nov. Map 447.

W.A.: 10.8 km E of Midland Junction, *L.Nunn 3114* (CANB, PERTH). S.A.: Mt Remarkable, *L.D.Williams 12589* (AD). Qld: Chinchilla area, 6 Sept. 1954, *T.Crawley* (BRI, CANB). N.S.W.: Narrabri Ck, Narrabri, *R.Coveny 12329* (BRI, NSW). Vic.: Echuca Regional Park, *A.C.Beauglehole 80292* (CANB, MEL).

Shade forms are fewer-flowered with the fruiting pedicel less recurved, sepals narrower and subentire and the flowers slightly smaller than typical.

2. **Fumaria bastardii* Boreau in P.E.S.Duchartre, *Rev. Bot.* 2: 359 (1847)

T: Angers, France, 1847, *A.Boreau*; lectotype: K *n.v.*; isotype: P *n.v.*, *fide* M.Lidén, *Opera Bot.* 88: 70 (1986).

[*Fumaria officinalis* auct. non L.: E.M.Bennett, in N.G.Marchant *et al.*, *Fl. Perth Region* 1: 69–70 (1987), *p.p.*]

[*Fumaria officinalis* subsp. *wirtgenii* auct. non (W.D.J.Koch) Arcang.: H.R.Toelken, in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 1: 371 (1986); G.J.Harden in G.J.Harden (ed.), *Fl. New South Wales* 1: 175 (1990), *p.p.*]

[*Fumaria vaillantii* auct. non Loisel.: H.J.Eichler, *Suppl. J.M.Black's Fl. S. Australia* 153 (1965); J.H.Willis, *Handb. Pl. Victoria* 2: 163 (1973); H.R.Toelken, in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 1: 372 (1986), *p.p.*]

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 2: t. 16 (1948); N.T.Burbidge, *Fl. Austral. Cap. Terr.* 183, fig. 170B (1970); M.Lidén, *Opera Bot.* 88: 71, fig. 60 (1986).

Weakly erect herb, to c. 50 cm high. Largest ultimate segments of leaves to 5 mm long and 2 mm wide, rarely more. Raceme usually much longer than peduncle; peduncle stout. Bracts $\frac{1}{3}$ – $\frac{3}{4}$ as long as pedicel. Pedicel rather thick, straight, remaining suberect. Sepals peltately attached, ovate, 2–3.5 mm long, 1–2.5 mm wide, dentate, narrower than corolla. Corolla (7–) 9–13 mm long, pink; inner petals dark purplish at apex with a yellowish central stripe; upper petal concolorous or rarely purplish at apex; lower petal linear or narrowly spatulate, commonly recurved, more than 0.5 mm wide medially. Fruit 2–2.5 mm long and wide, rather straight-sided, keeled toward base, truncate at base, slightly pointed or rounded at apex, rugulose-tuberculate when dry, with prominent apical pits. *Bastards Fumitory*. Fig. 76D–E.

A few records from south-western W.A.; rare in S.A.; common in south-eastern Australia, extending to N of Brisbane, Qld; also on Lord Howe Is; prefers well-drained, acidic soils, rare in alkaline soils. Widespread in the Mediterranean region and western Europe, widely naturalised in other countries. Occurs across a wide range of habitats. Flowers usually Aug.–Nov. Map 448.

W.A.: Wongamine Nature Reserve, *G.J.Keighery* 7055 (CANB, PERTH). S.A.: Lipson, *C.R.Alcock* 868 (AD). Qld: Rochedale, 9 Oct. 1964, *J.Burke* (BRI, CANB). N.S.W.: Douglas Park, *E.J.McBarron* 11036 (NSW). A.C.T.: Murrumbidgee R., 100 m S of Cotter Pump Station, *J.E.Ward* 9 (CANB, MEL). Vic.: Vermont, *D.E.Albrecht* 475 (CANB, MEL). Tas.: Karoola, 225 km N of Hobart, *P.Jobson* 411 (HO, MEL).

Morphology of the plants is strongly influenced by light environment: in sunny conditions, strongly branching from base and frequently producing a large rosette; in shaded conditions, weakly climbing with elongated internodes, branching poorly from base, but frequently from upper nodes. Flowers of shade forms are paler, almost white, and may not exceed 7 mm in length, but the characteristic fruits enable identification.

A species with considerable morphological and ecotype variation in Australia, suggesting multiple introductions from different regions within Europe. When applying the taxonomical divisions laid out by Sell and Murrell (in press), the following three variants are found:

a. var. *bastardii*

Vigorously branching, weakly erect herb. Largest ultimate segments of leaves to 5 mm long and 2 mm wide. Raceme usually 3 times as long as peduncle. Sepals ovate to lanceolate, rarely longer than 3 mm and wider than 2 mm. Corolla 10–13 mm long; upper petal concolorous. Fruit to 2.5 mm long and 2.25 mm wide, mostly longer than wide, usually subacute at apex. This variant occurs most frequently in Australia. Its weed potential is high due to substantial seed production capacity.

b. var. *hibernica* Pugsley ex Praeger

Vigorously branching, weakly erect to scrambling herb. Ultimate segments of leaves to 5 mm long, sometimes longer, and commonly to 2.5 mm wide, often wider in lower-order leaves. Raceme usually 2.5–3 times longer than peduncle. Sepals ovate, rarely longer than 3 mm, but often slightly wider than 2 mm. Corolla to 12.5 mm long; upper petal with purplish wings, very acute at apex. Fruit to 2.25 mm long and wide, often longer than wide and subacute at apex. This variant is comparatively rare in Australia, but behaves similarly to the previous variant.

c. var. *gussonei* (Boiss.) Pugsley

Weakly erect, often straggly herb. Largest ultimate segments of leaves to 5 mm long and 2 mm wide, usually slightly glaucous, particularly when young. Raceme frequently only twice as long as peduncle. Sepals ovate, to 3.5 mm long and 2.5 mm wide. Corolla rarely longer than 11.5 mm; upper petal with purplish wings. Fruit to 2.25 mm long and wide, often slightly wider than long, rounded at apex. This variant occurs frequently in Australia. It appears to be more tolerant to post-emergence herbicides than the above variants.

3. **Fumaria muralis* Sond. ex W.D.J.Koch, *Syn. Fl. Germ. Helv.* 2nd edn, 1017 (1845)

subsp. *muralis*

T: Hamburg, Germany, 1844, *O.W.Sonder*; lecto: MEL, *fide* N.G.Walsh, *Muelleria* 7: 496 (1992).

[*Fumaria officinalis* auct. non L.: E.M.Bennett, in N.G.Marchant *et al.*, *Fl. Perth Region* 1: 69–70 (1987), p.p.]

[*Fumaria officinalis* subsp. *wirtgenii* auct. non (W.D.J.Koch) Arcang.: H.R.Toelken, in J.P.Jessop & H.R.Toelken, *Fl. S. Australia* 4th edn, 1: 371 (1986); G.J.Harden in G.J.Harden (ed.), *Fl. New South Wales* 1: 175 (1990), p.p.]

[*Fumaria vaillantii* auct. non Loisel.: Hj.Eichler, *Suppl. J.M.Black's Fl. S. Australia* 153 (1965); J.H.Willis, *Handb. Pl. Victoria* 2: 163 (1973); H.R.Toelken, in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 1: 372 (1986), p.p.]

[*Fumaria muralis* subsp. *boraei* auct. non (Jord.) Pugsley: H.R.Toelken, in J.P.Jessop & H.R.Toelken (eds), *Fl. S. Australia* 4th edn, 1: 371 (1986)]

Illustrations: W.M.Curtis, *Stud. Fl. Tasmania* 1: 28, fig. 9 (1956); N.T.Burbidge, *Fl. Austral. Cap. Terr.* 183, fig. 170A (1970); G.M.Cunningham *et al.*, *Pl. W New South Wales* 315 (1981).

Weakly erect or scrambling herb with branches to c. 2 m long, freely branching. Largest ultimate segments of leaves to 5 mm long and 3 mm wide, rarely more. Raceme subequal to peduncle; peduncle slender. Bracts usually $1/2$ – $3/4$ as long as pedicel. Pedicel slender,

spreading to slightly recurved in fruit. Sepals peltately attached, ovate, 2.5–4 mm long, dentate, narrower than corolla. Corolla (6–) 9–11 mm long, pink, with upper and inner petals blackish at apex, the inner petals rarely with faint median yellow streak; lower petal less than 0.5 mm wide medially, linear to narrowly spathulate. Fruit broadly ovate to broadly obovate, 2–2.25 mm long, usually slightly longer than wide, tapered near base, slightly keeled, obtuse to broadly acute at apex, smooth to minutely rugulose-tuberculate towards keel, with shallow apical pits. *Wall Fumitory*. Plate 64; Fig. 76F–G.

Occurs from near Perth to near Esperance, W.A., widespread in south-eastern Australia from near Port Pirie, S.A., to near Brisbane, Qld, extending to Tas.; also on Lord Howe and Norfolk Is. Native to western Europe; widely naturalised in temperate countries. A common weed of gardens and disturbed ground; prefers loamy, acidic soils. Flowers usually May–Nov. Map 449.

W.A.: Green Is., Oyster Harbour, Albany, *G.J.Keighery* 8456 (PERTH). S.A.: Waite Institute, Glen Osmond, *D.E.Symon* 12827 (AD, CANB, NSW). Qld: South Pine R., *L.Pedley* 1275 (BRI, CANB). N.S.W.: 9 km N of Canowindra, *B.J.Lepschi* 185 (CANB, MEL). A.C.T.: Molonglo R. gorge, *R.Melville* 853 (K, MEL). Vic.: Wallace, *R.V.Smith* 67/189 (AD, CANB, K, MEL, NSW). Tas.: Newtown, *D.I.Morris* 8072 (AD, HO).

A variable species. Plants with small, pale, cleistogamous flowers 6–8 mm long are common, comprising up to 20% of all collections. Some collections have in the past been referred to subsp. *boraei* (Jord.) Pugsley, which differs from subsp. *muralis* in having larger flowers (corolla 11–12 mm long, sepals 4–5 mm long), 15–20 per raceme, and slightly larger fruit, but no Australian specimens exhibiting this combination of features have been seen.

4. **Fumaria officinalis* L., *Sp. Pl.* 1: 700 (1753)

T: Europe; lecto: LINN 881.13, *n.v.*, *fide* P.D.Sell, *Feddes Repert.* 68: 178 (1963).

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 2: t. 20 (1948); M.Lidén, *Opera Bot.* 88: 82, fig. 70B, C–H, 83, 71B–C (1986).

Suberect to diffuse herb to c. 50 cm high, usually branching from near base; green to distinctly glaucous. Largest ultimate segments of leaves to c. 5 mm long and 1.5 mm wide. Raceme much longer than peduncle, often subsessile. Bracts $\frac{1}{2}$ as long to as long as pedicel. Pedicel rather thick, straight, remaining suberect. Sepals peltately attached, ovate, 2–3.5 mm long, usually deeply toothed, rarely subentire, slightly narrower than corolla. Corolla usually 6.5–9 mm long, occasionally longer, pink, blackish purple at apex; upper and lower petals subspathulate to spathulate; inner petals with a median yellow streak. Fruit slightly to distinctly wider than long, c. 2 mm long, 2–3 mm wide, rounded at base, truncate to shallowly emarginate at apex, often obreniform in outline, rugulose-tuberculate, with shallow apical pits. *Common Fumitory*. Fig. 76H–I.

Uncommon in south-eastern Australia, with scattered records from near Burra, S.A., to near Brisbane, Qld, including Tas., but apparently not in Vic; prefers calcareous soils. Native throughout much of Europe and the Mediterranean region.

There are two subspecies recognised in Australia.

Plant green to slightly glaucous; corolla 7–9.5 mm long; lower petal subspathulate; sepals 2–3 mm long and 1–2 mm wide, rarely longer; fruit variable in size, to 2 mm long and almost 3 mm wide, without persistent apiculus at apex

subsp. **officinalis**

Plant distinctly glaucous; corolla to 8 mm long, lower petal abruptly spathulate; sepals to 2 mm long and 1.5 mm wide; fruit to 2.5 mm long and 3 mm wide, mostly with a persistent apiculus at apex

subsp. **wirtgenii**

4a. **Fumaria officinalis* L. subsp. **officinalis**

Plant green to slightly glaucous. Sepals 2–3 mm long and 1–2 mm wide, rarely longer. Corolla 7–9.5 mm, with lower petal subspathulate. Fruit variable in size, to 2 mm long and almost 3 mm wide, without persistent apiculus at apex.

Uncommon in south-eastern Australia, with scattered records from near Burra, S.A., to near Brisbane, Qld, including Tas., but apparently not in Vic; prefers calcareous soils. Native throughout much of Europe and the Mediterranean region. Flowers July–Nov. Map 450.

S.A.: Burra Gorge, *N.N.Donner* 8236 (AD). Qld: 10 km E of Jondaryan, 18 Sept. 1969, *W.D.M.Thompson* (BRI). N.S.W.: Bathurst, Sept. 1963, *C.H.Mort* (NSW). Tas.: Sassafras, near Latrobe, 27 Nov. 1980, *B.H.Hyde-Wyatt* (HO).

4b. **Fumaria officinalis* subsp. *wirtgenii* (W.D.J.Koch) Arcang., *Comp. Fl. Ital.* 27 (1882)

Fumaria wirtgenii W.D.J.Koch, *Syn. Fl. Germ.*, 2nd edn, 1018 (1845). T: 'zu Moselweifs bei Coblenz, Wirtgen'; *n.v.*

Plant distinctly glaucous. Sepals to 2 mm long and 1.5 mm wide. Corolla to 8 mm long, with lower petal abruptly spatulate. Fruit to 2.5 long and 3 mm wide, mostly with a persistent apiculus at apex.

Known from a single collection from Wagga Wagga, N.S.W. Flowers recorded in July. Map 451.

N.S.W.: Wagga Wagga, experimental fields of Charles Sturt Univ., 18 July 1997, *G.M.Norton* (Charles Sturt Univ. Herb.).

Most Australian records are referable to the typical subspecies with only one confirmed record of subsp. *wirtgenii* from Wagga Wagga, NSW. Most Australian records of subsp. *wirtgenii* derive from misdeterminations of small-flowered forms of *F. muralis* or *F. bastardii*.

5. **Fumaria densiflora* DC., *Cat. Pl. Horti Monsp.* 113 (1813)

Fumaria officinalis var. *densiflora* (DC.) Parl., *Monogr. Fumar.* 55 (1844). T: near Toulon, France, 1810, *M.Ziz*; holo: G-DC.

Fumaria micrantha Lag., *Gen. Sp. Pl.* 21 (1816). T: Spain, *s. dat.*, *M.Lagasca y Segura*; type destroyed.

Illustrations: G.M.Cunningham *et al.*, *Pl. W New South Wales* 315 (1981); M.Lidén, *Opera Bot.* 88: 84, fig. 72D–G (1986).

Erect to somewhat spreading herb to c. 40 cm high, branching from near base. Largest ultimate segments of leaves to c. 4 mm long and 1 mm wide. Raceme sessile to subsessile; axis rather stout. Bracts longer than flowering pedicel. Pedicel thickened at apex, remaining suberect. Sepals peltately attached, orbicular to broadly ovate, to almost 4 mm long and wide, wider than corolla, dentate, at least near base. Corolla with broad rounded spur, 5.5–7 mm long, usually deep pink, darker at apex; inner petals with a median yellow streak. Fruit 2–2.3 mm long and wide, rounded at base and apex, sometimes minutely apiculate, finely tuberculate, with small but distinct apical pits. *Dense-flowered Fumitory*. Fig. 76P–Q.

Scattered through south-eastern Australia from Eyre Penin., S.A., to near Bundaberg, Qld and S to Tas., with isolated occurrences in the southern wheat-belt of W.A. (pre-1950), and near Alice Springs, N.T. Native to the Mediterranean region. Commonly a weed of cereal crops. Occurs across a wide range of habitats. Flowers usually Aug.–Oct. Map 451.

W.A.: Merredin, Oct. 1937, *N.H.Langfield* (PERTH). N.T.: 10 km S of Alice Springs, *D.J.Nelson* 2025 (AD, MEL). S.A.: Oraparinna (Flinders Ra.) Natl Park, *D.E.Symon* 7543 (AD). Qld: Moonford, 25 Sept. 1971, *I.Romano* (BRI). N.S.W.: Condobolin, *P.L.Milthorpe* 3893 (NSW). Vic.: Beulah, *R.V.Smith* 69/108 (MEL). Tas.: Ferntree, *D.I.Morris* 81280 (HO, MEL).

6. **Fumaria parviflora* Lam., *Encycl.* 2: 567 (1788)

Fumaria officinalis var. *parviflora* (Lam.) Ewart, *Fl. Victoria* 527 (1931). T: Paris (cultivated, seed originally from southern France), *J.B.A.P.M. de Lamarck*; holo: P-Lam. *n.v.*

Illustrations: S.Ross-Craig, *Drawings Brit. Pl.* 2: t. 22 (1948); M.Lidén, *Opera Bot.* 88: 89, fig. 79A (1986).

Erect or weakly climbing, glaucous herb to c. 1 m high, branching from near base. Largest ultimate segments of leaves to c. 2 mm long and rarely more than 0.5 mm wide, often subterete. Raceme exceeding peduncle, sometimes subsessile. Bracts longer than flowering pedicel. Pedicel thickening in fruit, remaining suberect. Sepals attached basally, oblong or

c. triangular, 0.5–1 mm long, often deeply incised. Corolla with short, broad spur, 4.5–6 mm long, white or pink, without a distinct yellow median streak. Fruit c. 2 mm long and wide, sometimes squarish near base, distinctly keeled, blunt to somewhat acute at apex, tuberculate, with very shallow apical pits. *Small-flowered Fumitory*. Fig. 76M–O.

Scattered and rather uncommon in south-eastern mainland Australia from Port Augusta, S.A., to near Brisbane, Qld, with single records from W.A. and N.T. Two varieties are recognised in Australia.

The foliage of some mature specimens includes, to varying degrees, wide, flat, barely divided leaves which are typical of juvenile plants.

Green or glaucous herb; largest ultimate leaf segments rarely more than 0.5 mm wide; corolla white, sometimes with pink suffusion after fertilisation; inner petals dark purplish at apex; upper wing with narrow and entire to wide and emarginate wings; fruit suborbicular to acuminate, frequently with persistent apiculus at apex

6a. var. *parviflora*

Glaucous herb; largest ultimate leaf segments to 0.5 mm wide; corolla rosy pink, almost concolorous; inner petals not dark purplish at apex; upper wing with emarginate wings; fruit suborbicular without a persistent apiculus at apex

6b. var. *indicoides*

6a. **Fumaria parviflora* Lam. var. *parviflora*

Green or glaucous herb. Largest ultimate leaf segments rarely more than 0.5 mm wide. Corolla white, sometimes suffused pink after fertilisation; inner petals dark purplish at apex; upper wing with narrow and entire to wide and emarginate wings. Fruit suborbicular to acuminate, frequently with persistent apiculus at apex.

Scattered and rather uncommon in south-eastern Australia from Port Augusta, S.A., to near Brisbane, Qld, (but not in Tas.), with isolated occurrences at Lake Grace, W.A., and Alice Springs, N.T. Native to the Mediterranean region, widely naturalised. A common weed of cereal crops in areas with calcareous soils, sometimes growing in association with *F. densiflora*. Flowers usually Aug.–Oct. Map 453.

W.A.: Lake Grace, 31 Aug. 1971, *D.Elliot* (PERTH). N.T.: Alice Springs trucking yards, 26 Aug. 1976, *A.Mitchell* (AD). S.A.: Caltowie, *D.E.Symon* 13232 (AD, NSW). Qld: Agricultural College, Lawes, *J.Swarbrick* 6570 (BRI). N.S.W.: Fort Grey, *L.A.S.Johnson* 2006 (NSW). Vic.: Irymple Sports Oval, 18 Sept. 1980, *J.H.Browne* (MEL).

This variety has been separated by Sell (in press) into a number of different variants on the basis of foliage colour, number of sub-divisions of leaf segments, width of ultimate leaf segments, wing shape of the upper petal and fruit shape. However, these are often difficult to distinguish in Australia due to the frequent occurrence of intermediate forms.

6b. **Fumaria parviflora* var. *indicoides* Pugsley, *J. Linn. Soc., London (Bot.)* 44: 325 (1919)

T: 'Bornmueller, Iter Persico-Turicum, 1892–3, No. 9, Persia australis (Farsistan), ut *F. parviflora*, transiens ad *F. segetalem*, Hamm. Bagdad, Samaur, (ex Herb. Schadfli)'; syn: K; Aleppo, *Russell*; syn: BM.

Glaucous herb. Largest ultimate leaf segments to 0.5 mm wide. Corolla rosy pink, almost concolorous; inner petals not dark purplish at apex; upper wing with emarginate wings. Fruit suborbicular without a persistent apiculus at apex.

Known from a single record from Owen in S.A. Flowers recorded July. Map 454.

S.A.: Owen, 15 July 1997, *G.M.Norton* (MEL).

7. **Fumaria indica* (Hausskn.) Pugsley, *J. Linn. Soc., Bot.* 44: 313 (1919)

Fumaria vaillantii var. *indica* Hausskn., *Flora* 56: 443 (1873). T: Mt Nilgiri, Khoondas, Maio, India, (date unknown), R.F.Hohenacker, *Pl. Ind. Or.* 1488; lecto: B; isolecto: K, LD, S, UPS, W n.v., fide M.Lidén, *Opera Bot.* 88: 89 (1986).

Illustration: M.Lidén, *Opera Bot.* 88: 89, fig. 79A (1986).

Prostrate to suberect herb, to c. 50 cm high, usually branched freely. Largest ultimate segments of leaves to c. 10 mm long and 1.5 mm wide. Raceme subsessile or shortly pedunculate. Bracts subequal to or longer than flowering pedicel. Pedicel much thickened in fruit, remaining suberect. Sepals attached virtually at base, triangular to almost linear, 0.5–1.5 mm long, dentate to lacinate, narrower than corolla. Corolla 5–6 mm long, pale to rosy pink; inner petals deep reddish purple at apex, without apparent yellow median streak. Fruit 2–2.3 mm long, usually slightly wider than long, squarish near base, rather straight-sided, truncate or slightly retuse at apex, tuberculate, with small but distinct apical pits. *Indian Fumitory*. Fig. 76J–L.

Uncommon in Australia with a few scattered, mostly inland occurrences from NW of Alice Springs, N.T., Yorke Penin., S.A., to near Toowoomba, Qld. Native to central and south-western Asia. Occurs mostly in sandy irrigated soil in warm, dry areas. Flowers Aug.–Oct. Map 455.

N.T.: Yuendumu Rd, 90 miles [144 km] W of Stuart Hwy, *J. Must* 296 (NT). S.A.: headwaters, Aroona Dam, Flinders Ra., *T.R.N.Loethian* 5236 (AD, MEL). Qld: Jondaryan, Oct. 1950, *C.Fleming* (BRI). N.S.W.: Broken Hill, 16 Aug. 1025, *A.Morris* (NSW). Vic.: Pumping Station, Red Cliffs, Aug. 1955, *S.M.Carr* (MEL).

Very close to the preceding species and best distinguished from it by the longer, wider leaf-segments, the pink flowers and larger fruits.

Doubtful name

Corydalis capnoides Pers., *Syn. Pl.* 2: 270 (1806)

'Hab. in Helvetia, Gallia, Italia, Carniolia'; holo: n.v.

This species was recorded by J.Audas and P.Morris in *J. Dept. Agric. Victoria* 23: 109 (1925) as collected at Mornington, Victoria, but no herbarium specimen has been located, nor has the plant been re-collected. Either the specimen was misidentified, or the species has not persisted.

PLATANACEAE

*A.E.Orchard*¹ & *B.J.Lepschi*²

Trees, tall (to 30–50 m), monoecious, deciduous, with leaves, young stems and inflorescences densely dendritic-tomentose; wind-pollinated. Leaves alternate, stipulate, petiolate; petiole swollen at base, enclosing young bud; lamina simple, palmately lobed or palmatisect, with margins often coarsely toothed. Flowers borne in dense unisexual globose clusters sessile on elongate axes, small, 3–4 (–8)-merous; perianth in 2 whorls, hypogynous, minute, distinct or basally connate. Staminate flowers with tiny or vestigial sepals and petals; sometimes with vestigial carpels; stamens as many as and opposite petals, subsessile; anthers opening by lateral slits; connective with a terminal peltate appendage. Pistillate flowers often with 3 or 4

¹ PO Box 3427, Weston Creek, Australian Capital Territory 2611.

² Australian National Herbarium, GPO Box 1600, Australian Capital Territory 2601.

PLATANACEAE

staminodes; carpels (3–) 5–8 (–9), free, in 2 or 3 whorls, imperfectly closed, with style terminal and stigma extending onto apex of carpel; ovules 1 (rarely 2) per carpel, pendulous, orthotropous or slightly hemitropous, bitegmic, crassinucellar. Fruits small, hairy achenes or nutlets, borne in globular clusters on elongate axes; seeds with thin testa, scanty endosperm.

A family of a single genus and about 8 or 9 species, found in temperate regions of the northern hemisphere (Europe, Asia and N America). Well-represented in the fossil record, with records back to the Lower Cretaceous (Crane *et al.*, 1993; Anderson *et al.*, 2005). A number of species are widely used in horticulture, particularly in parks and avenues.

The family has traditionally been placed in Hamamelidales (Cronquist, 1981; Schwartzwalder & Dilcher, 1991; Kubitzki, 1993; Takhtajan, 1997) often in close proximity to Hamamelidaceae. More recently, molecular evidence has suggested a placement in Proteales in the basal eudicots, along with Nelumbonaceae and Proteaceae. Chase *et al.* (1993) found Platanaceae to be sister to Nelumbonaceae and both to be sister to Proteaceae, and this placement is now generally accepted (Chase *et al.*, 2003; Stevens, 2001 onwards).

Since the taxonomic arrangement of the *Flora of Australia* follows that of Cronquist (1981), Platanaceae would have been placed as the first family in volume 3, but at the time that volume was published the family was not considered to be naturalised in Australia.

L.E.Boothroyd, The morphology and anatomy of the inflorescence and flower of the Platanaceae, *Amer. J. Bot.* 17: 678–693 (1930); A.J.Cronquist, *Integrated Syst. Classif. Fl. Pl.* (1981); R.N.Schwartzwalder Jr. & D.L.Dilcher, Systematic placement of the Platanaceae in the Hamamelidae, *Ann. Missouri Bot. Gard.* 78: 962–969 (1991); P.R.Crane *et al.*, Early Cretaceous (Early to Middle Albian) platanoid inflorescences associated with *Sapindopsis* leaves from the Potomac group of eastern North America. *Syst. Bot.* 18: 328–344 (1993); K.Kubitzki, Platanaceae, in K.Kubitzki, J.G.Rohwer & V.Bittrich, *Fam. Gen. Vasc. Pl.* 2: 521–522 (1993); M.W.Chase *et al.*, Phylogenetics of seed plants: an analysis of nucleotide sequences from the plastid gene *rbcL*, *Ann. Missouri Bot. Gard.* 80: 528–580 (1993); A.Takhtajan, *Divers. Classif. Fl. Pl.* (1997); P.F.Stevens, Angiosperm Phylogeny Website, Version 7, May 2006: <http://www.mobot.org/MOBOT/research/APweb/welcome.html>; M.Chase *et al.*, An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II, *Bot. J. Linn. Soc.* 141: 399–436 (2003); C.L.Anderson, K.Bremer & E.M.Friis, Dating phylogenetically basal eudicots using *rbcL* sequences and multiple fossil reference points, *Amer. J. Bot.* 92: 1737–1748 (2005).

PLATANUS

Platanus L., *Sp. Pl.* 2: 999 (1753); *Gen. Pl.* 5th edn, 433 (1754); from the Greek *platanos*, perhaps from *platys* (flat, broad), referring to the leaves.

Type: *P. orientalis* L.

Description as for family.

A genus of about 8 species extending from E Asia (1 sp.) to Europe and N America (3 spp.), in temperate regions. Extensively cultivated as street and park trees. One species naturalised in Australia. *Platanus occidentalis*, *P. orientalis*, *P. wrightii*, *P. racemosa* and some cultivar selections are in cultivation (Spencer, 1997).

B.M.G.Jones, The origin of London Plane, *Bot. Soc. Brit. Isles Proc.* 7: 507–508 (1968); R.Spencer, *Hort. Fl. SE Australia* 2: 89–93 (1997); G.López González, Sobre el Plátano de Paseo, *Platanus orientalis* var. *acerifolia* Dryand. (Platanaceae), y su posible origen, *Anales Jard. Bot. Madrid* 56: 159–161 (1998); A.Vigouroux *et al.*, Le statut d'hybride de *Platanus acerifolia* confirme et celui de *P. densicoma* mis en évidence à l'aide de marqueurs génétiques moléculaires; conséquences, *Acta Bot. Gallica* 144(2): 243–251 (1998).

***Platanus** × **hispanica** Mill. ex Münchh. ‘**Acerifolia**’ Geerinck, *Bull. Jard. Bot. Natl. Belg.* 49 (1–2): 160–161 (1979)

Platanus orientalis var. *acerifolia* Aiton, *Hort. Kew.* 3: 364 (1789); *P. acerifolia* (Aiton) Willd., *Sp. Pl.* 1: 474 (1797). T: not cited; neo: Herb. Willdenow 17712 (1); B, *fide* G.López González, *Anales Jard. Bot. Madrid* 56: 159–161 (1998)

Platanus hispanica Mill. ex Münchh., *Hausvater* 5: 229 (1770). T: Spain; holo: *n.v.*

Platanus hybrida Brot., *Fl. Lusit.* 2: 487 (1804). T: ‘Colitur in solo raro subhumido, et climate Lusitano nimis laetatur’; holo: *n.v.*

Platanus vulgaris Spach., *Ann. Sci. Nat. Bot.* ser. 2, 15: 291 (1841), *p.p.*, *nom. illeg.* T: *n.v.*

Illustration: M.L.Rocha Alfonso, *Fl. Iber.* 2: 4, pl. 1 (1990), as *P. hispanica*.

Tree to 30 m tall. Bark on trunk and larger branches smooth, exfoliating in large flakes leaving a mottled red, grey and yellow pattern; bark on lower trunk becoming grey and fibrous. Leaves with stipules to 1.2 cm long, densely pubescent with dendritic hairs; petiole to 8 cm long, densely pubescent with dendritic hairs; lamina broadly to very broadly ovate, palmately 3–5-lobed with lobes themselves coarsely toothed or lobed, 8–20 cm long, 10–22 cm wide, truncate to subcordate at base, with palmate venation, glabrescent, with dense indumentum of dendritic hairs persistent only on veins. Flowers usually 4-merous. Male flowers: sepals ovate, pubescent; petals oblong; stamens c. 4. Female flowers: calyx cupular; petals present, strap-like; carpels c. 6. Fruiting heads 1–3 (–4) per inflorescence, 2–3 cm diam. Achenes surrounded by numerous long hairs attached to receptacle, narrowly obovate, 7–9 mm long, glabrous and rugose at apex, otherwise densely hairy with dendritic hairs. *London Plane, Plane Tree.*

Perhaps originally from Turkey, or perhaps a horticultural hybrid. Widely planted in temperate regions throughout the world. In Australia planted in temperate regions as a street or park tree. Sparingly naturalised at least in the A.C.T. and W.A., and perhaps overlooked elsewhere. Flowers spring; fruits summer–autumn. Map 456.

W.A.: Mill St, Perth city, *G.Keighery 13207* (PERTH). A.C.T.: S shore of L. Burley Griffin, N of Alexandrina Dr., between Blue Gum Point and Attunga Point, Yarralumla, *B.J.Lepschi 5491* & *D.J.Mallinson* (CANB, NSW); S shore of L. Burley Griffin, N of Alexandrina Dr., near Attunga Point, Yarralumla, *B.J.Lepschi 5505* & *D.J.Mallinson* (CANB, K, NSW, MO).

The status and origin of this taxon are unclear. It was long accepted that it arose as a natural or deliberate hybrid between *P. orientalis* and *P. occidentalis* in England in the 17th century. More recently Jones (1968) showed that English cultivars originated from Anti Taurus in Turkey, and suggested that this species should be considered a selection of *P. orientalis*. This conclusion was supported by López González (1998) who suggested that the plants may have reached England via Spain or France. Vigouroux *et al.* (1998), on the other hand, claimed to have confirmed the hybrid origin of the species. It is now extensively cultivated under the common name London Plane. It is a popular street and park tree because of its resistance to urban pollution, and is widely naturalised in southern Europe and elsewhere.

The nomenclature is similarly confused. The name *P. acerifolia* has traditionally been applied to the taxon, however, some believe that the name *P. hispanica* has priority, and this name is accepted here, as well as in some European works, for example *Flora Iberica*. *Flora of Turkey* adopted the name *P. hybrida*. Other works, for example *Flora of China* and *Flora Europaea*, maintain usage of *P. acerifolia*. Geerinck (1979) proposed the cultivar name ‘*Acerifolia*’ within *P. hispanica*, while López González (1998) treated it as *P. orientalis* var *acerifolia* (believing it to be a selection of *P. orientalis*), and Vigouroux *et al.* (1998) treated it as *P. acerifolia*, of hybrid origin. Cultivated forms have also been sold under the name *Platanus orientalis* ‘*Hispanica*’. In Europe there are many additional species, infraspecies and cultivar names in use or in synonymy, but most of these have not been used in Australia.

MAPS

Number in brackets refers to the page on which the taxon is described.



1. *Bubbia queenslandiana*
subsp. *queenslandiana* (3)

4. *Bubbia whiteana* (4)
7. *Tasmannia purpurascens* (6)

10. *Tasmannia lanceolata* (8)

13. *Tasmannia glaucifolia* (10)

2. *Bubbia queenslandiana*
subsp. *australis* (3)

5. *Tasmannia insipida* (5)
8. *Tasmannia stipitata* (8)

11. *Tasmannia xerophila*
subsp. *xerophila* (9)

14. *Galbulimima baccata* (13)

3. *Bubbia semecarpoides* (4)

6. *Tasmannia membranacea* (6)

9. *Tasmannia vickeriana* (8)

12. *Tasmannia xerophila*
subsp. *robusta* (9)

15. *Eupomatia laurina* (14)

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16. *Eupomatia bennettii* (16)19. *Artabotrys carnosipetalus* (20)22. *Desmos polycarpus* (23)25. *Melodorum topazensis* (25)28. *Melodorum crassipetalum* (27)17. *Eupomatia barbata* (16)20. *Desmos goezeanus* (22)23. *Mitrella tiwiensis* (23)26. *Melodorum leichhardtii* (27)29. *Melodorum scabridulum* (28)18. *Austrobaileya scandens* (17)21. *Desmos wardianus* (22)24. *Melodorum uhrii* (25)27. *Melodorum unguiculatum* (27)30. *Melodorum rupestre* (28)



31. *Uvaria concava* (29)

34. *Cyathostemma micranthum* (32)

37. *Xylopiia monosperma* (34)

40. *Pseuduvaria froggattii* (38)

43. *Pseuduvaria mulgraveana*
var. *glabrescens* (39)

32. *Uvaria holtzei* (30)

35. *Cyathostemma glabrum* (32)

38. *Goniothalamus australis* (35)

41. *Pseuduvaria hylandii* (38)

44. *Pseuduvaria villosa* (39)

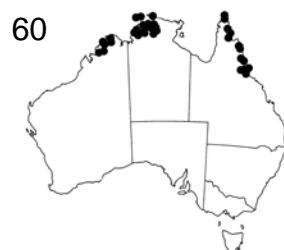
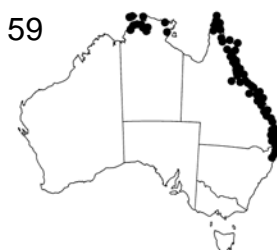
33. *Uvaria rufa* (30)

36. *Xylopiia maccraeae* (33)

39. *Cananga odorata* (35)

42. *Pseuduvaria mulgraveana*
var. *mulgraveana* (39)

45. *Mitrephora diversifolia* (40)



46. *Haplostichanthus fruticosus* (41)

49. *Haplostichanthus submontanus* subsp. *submontanus* (42)

52. *Fitzalania heteropetala* (45)

55. *Miliusa brahei* (48)

58. *Polyalthia patinata* (49)

47. *Haplostichanthus rufescens* (41)

50. *Haplostichanthus submontanus* subsp. *sessiliflorus* (44)

53. *Fitzalania bidwillii* (45)

56. *Miliusa traceyi* (48)

59. *Polyalthia nitidissima* (50)

48. *Haplostichanthus ramiflorus* (42)

51. *Haplostichanthus johnsonii* (44)

54. *Miliusa horsfieldii* (46)

57. *Polyalthia michaelii* (49)

60. *Polyalthia australis* (50)

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61. *Meiogyne stenopetala* (51)62. *Meiogyne hirsuta* (52)63. *Meiogyne cylindrocarpa*
subsp. *cylindrocarpa* (53)64. *Meiogyne cylindrocarpa*
subsp. *trichocarpa* (53)65. *Meiogyne verrucosa* (53)66. *Annona muricata* (56)67. *Annona glabra* (56)68. *Annona squamosa* (56)69. *Annona reticulata* (57)70. *Myristica globosa*
subsp. *muelleri* (59)71. *Myristica insipida*
var. *insipida* (60)72. *Myristica insipida*
var. *cimicifera* (60)73. *Myristica lancifolia* (60)74. *Horsfieldia australiana* (62)75. *Trimenia moorei* (63)



76. *Hedycarya angustifolia* (67)
 79. *Austromatthaea elegans* (70)
 82. *Wilkiea smithii* (75)
 85. *Wilkiea angustifolia* (77)
 88. *Wilkiea macrophylla* (78)

77. *Hedycarya loxocarya* (69)
 80. *Hemmantia webbii* (72)
 83. *Wilkiea hylandii* (75)
 86. *Wilkiea cordata* (77)
 89. *Wilkiea rigidifolia* (80)

78. *Levieria acuminata* (69)
 81. *Wilkiea austroqueenslandica* (74)
 84. *Wilkiea pubescens* (77)
 87. *Wilkiea huegeliana* (78)
 90. *Wilkiea longipes* (80)

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**91.** *Wilkiea* sp. A (81)**94.** *Steganthera cooperorum* (83)**97.** *Steganthera australiana* (86)**100.** *Palmeria scandens* (90)**103.** *Doryphora aromatica* (93)**92.** *Wilkiea* sp. B (81)**95.** *Steganthera laxiflora*
subsp. *laxiflora* (85)**98.** *Steganthera hirsuta* (86)**101.** *Palmeria foremanii* (90)**104.** *Doryphora sassafras* (93)**93.** *Steganthera macoorai* (83)**96.** *Steganthera laxiflora*
subsp. *lewisensis* (85)**99.** *Endressia wardellii* (88)**102.** *Palmeria hypotephra* (91)**105.** *Daphnandra repandula* (95)

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**106.** *Daphnandra apatela* (96)**109.** *Daphnandra melasmene* (99)**112.** *Atherosperma moschatum*
subsp. *moschatum* (103)**115.** *Beilschmiedia bancroftii* (111)**118.** *Beilschmiedia collina* (112)**107.** *Daphnandra micrantha* (96)**110.** *Daphnandra johnsonii* (100)**113.** *Atherosperma moschatum*
subsp. *integrifolium* (103)**116.** *Beilschmiedia brunnea* (111)**119.** *Beilschmiedia elliptica* (113)**108.** *Daphnandra tenuipes* (99)**111.** *Dryadodaphne trachyphloia* (100)**114.** *Idiospermum australiense* (105)**117.** *Beilschmiedia castrisinensis* (112)**120.** *Beilschmiedia obtusifolia* (113)

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121. *Beilschmiedia*
oligandra (113)

124. *Beilschmiedia tooram* (116)

127. *Cassytha glabella*
f. dispar (121)

130. *Cassytha micrantha* (122)

133. *Cassytha flava* (124)

122. *Beilschmiedia*
peninsularis (114)

125. *Beilschmiedia volckii* (116)

128. *Cassytha glabella*
f. casuarinae (121)

131. *Cassytha pedicellosa* (122)

134. *Cassytha pubescens* (125)

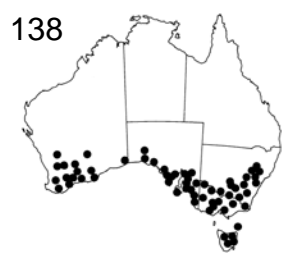
123. *Beilschmiedia recurva* (114)

126. *Cassytha glabella f. glabella* (121)

129. *Cassytha glabella*
f. bicallosa (122)

132. *Cassytha capillaris* (123)

135. *Cassytha phaeolasia* (126)



136. *Cassytha filiformis* (127)

139. *Cassytha aurea*
var. *aurea* (129)

142. *Cassytha rufa* (130)

145. *Cassytha peninsularis* (132)

148. *Cassytha racemosa*
f. *pilosa* (134)

137. *Cassytha nodiflora* (127)

140. *Cassytha aurea*
var. *hirta* (129)

143. *Cassytha pomiformis* (130)

146. *Cassytha flindersii* (133)

149. *Cassytha muelleri* (135)

138. *Cassytha melanantha* (128)

141. *Cassytha candida* (130)

144. *Cassytha paniculata* (132)

147. *Cassytha racemosa*
f. *racemosa* (134)

150. *Cinnamomum bailey anum* (137)

151



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**151.** *Cinnamomum camphora* (137)**152.** *Cinnamomum laubatii* (138)**153.** *Cinnamomum oliveri* (138)**154.** *Cinnamomum propinquum* (140)**155.** *Cinnamomum virens* (140)**156.** *Cryptocarya angulata* (152)**157.** *Cryptocarya bamagana* (153)**158.** *Cryptocarya bellendenkerana* (153)**159.** *Cryptocarya bidwillii* (153)**160.** *Cryptocarya brassii* (154)**161.** *Cryptocarya burckiana* (154)**162.** *Cryptocarya clarksoniana* (155)**163.** *Cryptocarya claudiana* (155)**164.** *Cryptocarya cocosoides* (155)**165.** *Cryptocarya corrugata* (156)



166. *Cryptocarya*
cunninghamii (156)

169. *Cryptocarya*
endiandrifolia (159)

172. *Cryptocarya floydii* (160)

175. *Cryptocarya*
glaucescens (161)

178. *Cryptocarya hypospodia* (163)

167. *Cryptocarya*
densiflora (157)

170. *Cryptocarya*
erythroxylon (159)

173. *Cryptocarya foetida* (160)

176. *Cryptocarya*
glaucocarpa (163)

179. *Cryptocarya laevigata* (164)

168. *Cryptocarya*
dorrigoensis (157)

171. *Cryptocarya*
exfoliata (159)

174. *Cryptocarya foveolata* (161)

177. *Cryptocarya*
grandis (163)

180. *Cryptocarya leucophylla* (165)



181. *Cryptocarya lividula* (165)

184. *Cryptocarya meisneriana* (166)

187. *Cryptocarya murrayi* (169)

190. *Cryptocarya obovata* (170)

193. *Cryptocarya putida* (171)

182. *Cryptocarya macdonaldii* (165)

185. *Cryptocarya melanocarpa* (168)

188. *Cryptocarya nova-anglica* (169)

191. *Cryptocarya onoprienkoana* (170)

194. *Cryptocarya rhodosperma* (172)

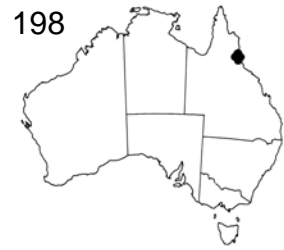
183. *Cryptocarya mackinnoniana* (166)

186. *Cryptocarya microneura* (168)

189. *Cryptocarya oblata* (170)

192. *Cryptocarya pleurosperma* (171)

195. *Cryptocarya rigida* (172)



196. *Cryptocarya saccharata* (173)

199. *Cryptocarya triplinervis*
var. *triplinervis* (175)

202. *Cryptocarya vulgaris* (177)

205. *Endiandra acuminata* (187)

208. *Endiandra bessaphila* (188)

197. *Cryptocarya sclerophylla* (173)

200. *Cryptocarya triplinervis*
var. *pubens* (175)

203. *Cryptocarya whiffiniana* (177)

206. *Endiandra*
anthropophagorum (187)

209. *Endiandra collinsii* (188)

198. *Cryptocarya smaragdina* (173)

201. *Cryptocarya triplinervis*
var. *riparia* (175)

204. *Cryptocarya williwilliana* (177)

207. *Endiandra*
bellendenkerana (188)

210. *Endiandra compressa* (190)



211. *Endiandra cooperana* (190)
214. *Endiandra dichrophylla* (191)
217. *Endiandra floydii* (194)
220. *Endiandra grayi* (195)
223. *Endiandra impressicosta* (196)

212. *Endiandra cowleyana* (191)
215. *Endiandra dielsiana* (192)
218. *Endiandra glauca* (194)
221. *Endiandra hayesii* (195)
224. *Endiandra insignis* (197)

213. *Endiandra crassiflora* (191)
216. *Endiandra discolor* (192)
219. *Endiandra globosa* (195)
222. *Endiandra hypotephra* (196)
225. *Endiandra introrsa* (197)



226. *Endiandra jonesii* (198)
 229. *Endiandra longipedicellata* (200)
 232. *Endiandra monothyra* subsp. *trichophylla* (201)
 235. *Endiandra muelleri* subsp. *bracteata* (203)
 238. *Endiandra pubens* (204)

227. *Endiandra leptodendron* (198)
 230. *Endiandra microneura* (200)
 233. *Endiandra montana* (202)
 236. *Endiandra palmerstonii* (203)
 239. *Endiandra sankeyana* (204)

228. *Endiandra limnophila* (198)
 231. *Endiandra monothyra* subsp. *monothyra* (201)
 234. *Endiandra muelleri* subsp. *muelleri* (202)
 237. *Endiandra phaeocarpa* (203)
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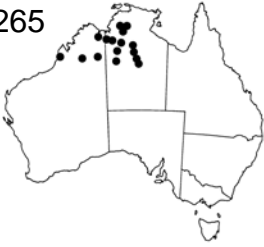
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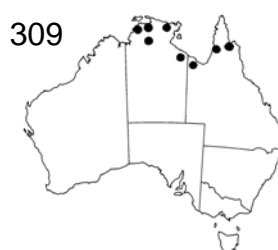
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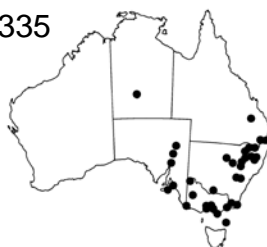
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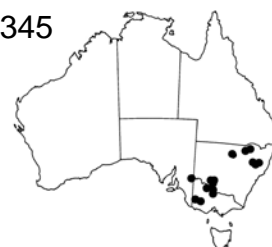
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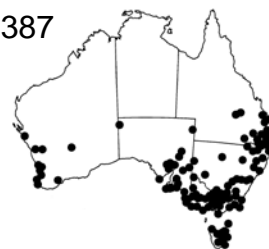
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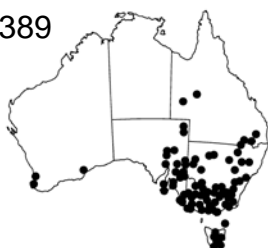
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379. **Ranunculus repens* (343)

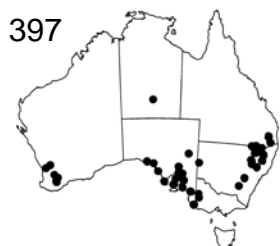
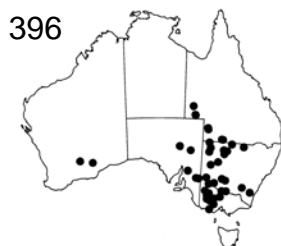
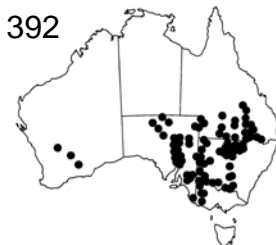
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401. **Mahonia pinnata* (361)

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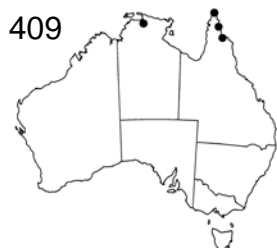
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subsp. *flammula* (352)

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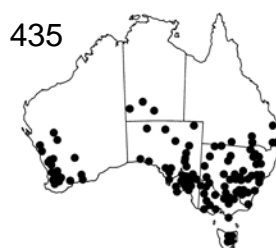
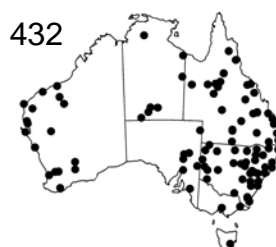
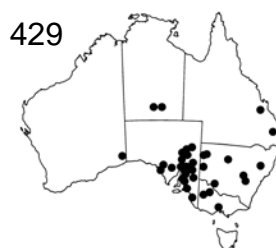
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subsp. *subfusiformis* (391)

434. **Papaver argemone* (393)

435. **Papaver hybridum* (393)

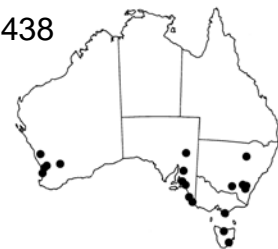
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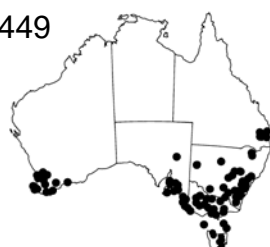
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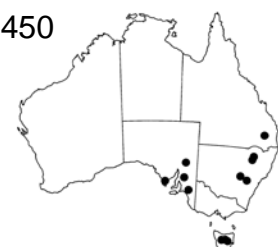
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436. *Papaver somniferum (393)

439. *Papaver aculeatum (395)

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437. *Papaver dubium (394)

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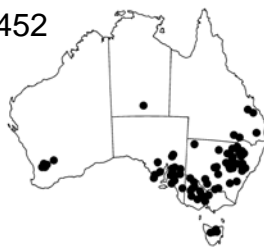
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450. *Fumaria officinalis
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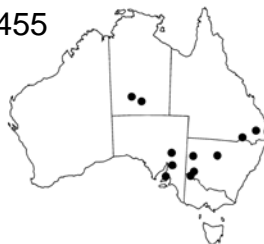
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451. *Fumaria officinalis*
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454. *Fumaria parviflora*
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452. *Fumaria densiflora* (410)

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'*Acerifolia*' (414)

APPENDIX

New taxa, combinations and lectotypifications

New taxa, combinations and lectotypifications occurring in this volume of the *Flora of Australia* are formally published here. The families are arranged in the same order as they appear in the text. For economy the entries are brief; the treatment in the main text is more comprehensive. Accepted names are in **bold**, basionyms and synonyms in *italic*. The date of publication of this Volume will be given in Volume 39.

ANNONACEAE

L.W.Jessup (unless otherwise acknowledged)

Artabotrys carnosipetalus Jessup, *sp. nov.*

A. camptopetalo Diels simulans, sed floribus singulis, pedicellis longioribus (12–15 mm contra 2–3 mm longis), carpellis numerosis (9 contra c. 3) et petalorum apicibus nonnihil incurvatis.

T: Claudie R., Qld, 17 Sept. 1983, *B.Gray 3240*; holo: BRI; iso: BRI (spirit), QRS.

Named from the Latin *carnosus* (fleshy) and *petalum* (petal), in reference to the thick fleshy petals found in this species.

Desmos polycarpus Jessup, *sp. nov.*

D. goezeano affinis, a quo sepalis parvis, 12–14 mm longis (in ille 22–24 mm), staminibus numerosis circa 150 (in ille 80–90) et carpellis numerosis circa 100 (in ille 22–32) et seminibus brevibus, 6.5–7 mm (in ille 9–12 mm) subglobosis (non ellipsoideis) differt.

T: Cultivated at Indooroopilly, originally from Mossman River, Qld, Dec. 1994, *L.W.Jessup 920*; holo: BRI.

Named from the Greek *poly-* (many-) and *carpos* (fruit), in reference to the many apocarps (maturing carpels) in the flower of this species.

Mitrella tiwiensis Jessup & Bygrave, *sp. nov.*

Mitrellam kentii simulans, sed petalis longioribus, exterioribus 20–25 mm longis et interioribus 6.3–7 mm longis differt (in *M. kentii*, petala exteriora 10–12 mm longis et interiora 4–5 mm longis sunt).

T: Bathurst Island, 23 km E Rocky Point, N.T., 11°28'S, 130°21'E, 11 Dec. 1991, *J.Russell-Smith 8573 & J.Brock*; holo: BRI; iso: DNA, K, L, MO *n.v.*

The specific epithet refers to the Tiwi Islands, a recognised collective name for Bathurst and Melville Islands, the only places where this species has been collected. The cooperation of Dr Paul Bygrave in early studies of this plant is gratefully acknowledged.

Melodorum topazensis Jessup, *sp. nov.*

Melodorum uhrii simulans, sed floribus singulis (non paniculatis), ovulis in quoque carpello 6 (non solitariis) et lamina superficie glabra differt (non pubescenti).

T: Topaz (cultivated), Qld, 26 Apr. 1987, *G.Sankowsky 625* & *N.Sankowsky*; holo: BRI.

The specific epithet refers to the locality of Topaz on the Atherton Tableland where the species was first collected.

Melodorum unguiculatum Jessup, *sp. nov.*

Melodorum leichhardtii simulans, sed petalis exterioribus depressis-ovatis latioribus quam longioribus, non incrassatis et intus non sulcatis, petalis interioribus mitriformis, ungue lamina longiore, ovulis in quoque carpello 8 (in *M. leichhardtii* 4 vel 5), apocarpiis pubescentibus trichomatibus multiradiatis-stellatis (in *M. leichhardtii* squamis peltatis) praeditis, differt.

T: Cultivated at Tolga, ex Stone Crossing, Wenlock River, Qld, 8 Dec. 1991, *G.Sankowsky 1396* & *N.Sankowsky*; holo: BRI, iso: BRI (spirit), DNA.

Named from the Latin *unguiculatus* (clawed), in reference to the conspicuously long claw of the inner petals of this species.

Melodorum crassipetalum Jessup, *sp. nov.*

Melodorum leichhardtii simulans sed carpellis paucis (5 vel 6 contra 18–25), ovulis numerosis (9–16 contra 4 vel 5) petalis extimis crassioribus et latioribus (18–21 mm contra 8–15 mm latus) differt.

T: Font Hills, Bakers Blue Mtn, Qld, 30 Oct. 1988, *G.Sankowsky 957* & *N.Sankowsky*; holo: BRI.

Epithet derived from the Latin *crassus* (thick) and *petalum* (petal), in reference to the thick petals.

Melodorum scabridulum Jessup, *sp. nov.*

Melodorum leichhardtii simulans sed carpellis paucis (5–9 contra 18–25), ovulis numerosioribus (9–16 contra 4 vel 5), staminibus paucioribus (c. 55 contra c. 150) et lamina pagina adaxiali persistenter scaberula, differt.

T: Bamaga, Qld, 29 Jan. 1988, *G.Sankowsky 770* & *N.Sankowsky*; holo: BRI; iso: BRI (spirit).

Named from the Latin *scaber* (rough to touch) and suffix *-ulum* (minutely), in reference to the indumentum on the leaf surface.

Melodorum rupestre Jessup, *sp. nov.*

Melodorum leichhardtii simulans sed carpellis paucioribus (5 contra 18–25), ovulis numerosis (11 non 4 vel 5) et venis secundariis in pagina adaxiali laminae impressis differt.

T: Oenpelli Road, N.T., 12 Dec. 1984, *D.L.Jones 1729*; holo: BRI; iso: DNA.

Named from the Latin *rupes* (rock, cliff) and the suffix *-estris* (place of growth), in reference to the habitat of this species.

Xylopia monosperma Jessup, *sp. nov.*

Xylopia maccraeae simulans sed petalis extimis parvioribus (7.5–8.5 mm contra 28–32 mm longis), ovulo solitario, apocarpiis glabris et lamina costa superne glabra differt.

T: Weipa, near Andoom Creek, matured in cultivation, 17 Sept. 1990, Qld, *G.Sankowsky 1103* & *N.Sankowsky*; holo: BRI.

Named from the Greek *monos* (alone or solitary) and *sperma* (seed), in reference to the single ovule in each carpel.

Haplostichanthus fruticosus Jessup, *sp. nov.*

Differt a speciebus *Haplostichanthi* floribus extra-axillaribus vel contra folia, ovulo in carpello omni solitario et fructibus rubris.

T: Williams Spring, Head of Big Creek, 22.4 km NE of Bamaga, Qld, 17 Feb. 1994, *D.G.Fell DGF3784, J.P.Stanton & C.Roberts*; holotype: BRI.

Named from the Latin *frutex* (shrub) and the suffix *-osus* (development), in reference to the habit.

Haplostichanthus rufescens Jessup, *sp. nov.*

Haplostichanthum johnsonii simulans sed foliis bullatis pilis rufo-brunneis praeditis et fructibus hirsutus differt.

T: Crawford's Lookout to Tchupalla Falls Track, Palmerston Natl Park, N Johnstone R., Qld, 15 Feb. 1982, *L.W.Jessup 471 & J.G.Tracey*; holotype: BRI.

Named from the Latin *rufus* (reddish) and the suffix *-escens* (approaching), in reference to the colour of the indumentum.

Haplostichanthus ramiflorus Jessup, *sp. nov.*

Haplostichanthum johnsonii simulans sed floribus in fasciculis caulinis ramulinis, vel solitariis et axillaribus, et fructibus flavidis differt.

T: Pilgrim Sands, NW of Cape Tribulation, Qld, 29 Nov. 1984, *L.W.Jessup 610*; holotype: BRI; isotype: K, L, U.

Named from the Latin *ramus* (branch) and *flos* (flowers), in reference to the common position of the inflorescence of fasciculate flowers.

Haplostichanthus submontanus Jessup, *sp. nov.*

Haplostichanthum johnsonii simulans sed floribus sessilibus vel pedicellatis, pedicellis c. 1.5 mm latis (circa 0.8 mm in *H. johnsonii*) et petalis exterioribus longioribus (5.2–7.2 mm contra 2.5–4 mm).

T: catchment of Gap Creek NE of Mt Finnigan, Qld, 30 Nov. 1984, *L.W.Jessup 632*; holotype: BRI.

Named from the Latin *sub* (somewhat or almost) and *montanus* (growing on mountains), in reference to the mid altitude habitat.

Haplostichanthus submontanus subsp. **sessiliflorus** Jessup, *subsp. nov.*

Differt a *Haplostichantho submontano* subsp. *submontano* floribus sessilibus vel subsessilibus in pedicellis usque ad 1.5 mm longis et stipitibus apocarpiorum brevioribus (1–3 mm contra 3–5 mm longis).

T: near Curtain Fig tree, c 2 km SSW of Yungaburra, Qld, 5 Dec. 1984, *L.W.Jessup 695*; holotype: BRI.

Named from the Latin *sessilis* (stalkless) and *flos* (flowers), in reference to the sessile flowers.

Fitzalania bidwillii (Benth.) Jessup, Kessler & Mols, *comb. nov.*

Saccopetalum bidwillii Benth., *Fl. Austral.* 1: 53 (1863). T: Wide Bay, Qld, *J.C.Bidwill*; holotype: *n.v.*

Dr Johan B. Mols and Dr Paul J.A. Kessler are gratefully acknowledged for alerting me to the distinctiveness of this species.

Polyalthia patinata* Jessup, *sp. nov.

Differt a *P. michaelii* calycis lobis acutis longioribus, petalis interioribus exterioribus similibus, quoque apocarpio stipite brevior, testa leviter striata a speciebus australianis ceteris apocarpis majoribus.

T: Malbon Thompson Forest Reserve, off Gordonvale–Yarrabah road, Qld, 12 Apr. 2006, *A.Ford AF4811* & *M.Bradford*; holotype: BRI; isotype: BRI (including spirit).

Named from the Latin *patina* (a broad shallow dish or pan), in reference to the calyx shape.

Meiogyne hirsuta* (Jessup) Jessup, *comb. nov.

Ancana hirsuta Jessup, *Austrobaileya* 3(1): 65 (1989). T: Henrietta Creek, Palmerston Highway, Qld, 27 Nov 1982, *L.W.Jessup 512*; holotype: BRI; isotype: BRI, CANB, K, L, MEL, NSW, QRS, U.

The name *Ancana hirsuta* was placed in synonymy by van Heusden (1994) under *Meiogyne stenopetala*, a taxonomic viewpoint that is not accepted here. Therefore a new combination under *Meiogyne* is required for this species.

Meiogyne cylindrocarpa* subsp. *trichocarpa* Jessup, *subsp. nov.

Differt a *M. cylindrocarpa* subsp. *cylindrocarpa* laminis obtusis, late ovatis vel ellipticis, petalis interioribus 9–13 mm longis et 6.5–8.5 mm latibus (in illa, petala 8–8.5 mm longa et 6–6.5 mm lata sunt) et fructibus maturitate indumentibus persistens.

T: 8 km past Pascoe River Crossing on road to Portland Roads, 14 July 1993, Qld, *P.I.Forster PIF13600*, *G.Sankowsky* & *M.C.Tucker*, holotype: BRI; isotype: BRI (spirit).

The subspecific epithet is derived from the Greek *thrix* (hair) and *carpos* (fruit), in reference to the persistently hairy apocarps.

Meiogyne verrucosa* Jessup, *sp. nov.

Differt a *M. stenopetala* petalis 1–2-plo longioribus quam latioribus (in illa 6–12-plo) et a *M. cylindrocarpo* apocarpis verrucosis vel rugosis, et petalis interioribus maturitate conniventibus non divergentibus.

T: near Shoteel Creek, tributary of Clohesy River, Qld, 27 Nov. 1984, *L.W.Jessup 591*; holotype: BRI.

Named from the Latin *verruca* (wart), in reference to the surface of the fruit.

MYRISTICACEAE

L.W.Jessup

Myristica insipida* var. *cimicifera* (Sol. ex R.Br.) Jessup, *comb. et stat. nov.

Myristica cimicifera Sol. ex R.Br., *Prodr.* 1: 400 (1810). T: Endeavour River, [Qld], 1770, *J.Banks* & *D.Solander*; holotype: K n.v. (photo BRI); isotype: BM n.v. (photo BRI).

MONIMIACEAE

*T. Whiffin & D. Foreman**Mollinedia loxocarya* Benth., *Fl. Austral.* 5: 287 (1870)

T: Rockingham Bay, Qld, *J. Dallachy*; lecto (here chosen): K; possible isolecto: MEL 2050651; remaining syn: MEL 2050652.

All the syntype material is in fruit and matches the protologue well. We have selected as the lectotype the sheet at K which bears a label in the bottom left corner annotated "Mollinedia loxocarya Rockingham Bay Dallachy F. Mueller 1870". Apart from Benthham, who would have undoubtedly seen this sheet, it has also been annotated by W.D. Francis and most recently by J. Jérémie. MEL 2050651 appears to be a good match for the K sheet and is possibly an isolectotype although there is no indication Benthham saw it. A second sheet at MEL (MEL 2050652) collected from "Coast Range, 8 Feb. 1866" has been annotated by Benthham and may have been part of the basis of his description of this species but is here regarded as a remaining syntype.

Mollinedia acuminata F. Muell., *Fragm.* 5: 155 (1866)

T: Sea View Range, Qld, 9 Nov. 1864, *J. Dallachy*; lecto (here chosen): MEL 2052268.

Of the 5 probable syntypes at MEL, only the sheet chosen here as the lectotype has a label attached to it that is in Dallachy's handwriting. The label reads "Sea-view Range, small tree with pale yellow flowers dark green foliage, November 9th 1864." Beneath this Mueller has annotated the label "Mollinda". All the MEL sheets have male flowers at the same stage of development but it is uncertain if they are all part of a single gathering.

Wilkiea pubescens (Benth.) Whiffin & Foreman, *comb. nov.*

Kibara pubescens Benth., *Fl. Austral.* 5: 290 (1870); *Tetrasyandra pubescens* (Benth.) Perkins, *Bot. Jahrb. Syst.* 25: 569 (1898); *Mollinedia pubescens* (Benth.) F. Muell., *Syst. Census Austral. Pl.* 3 (1883). T: Rockingham Bay, Qld, *J. Dallachy*; lecto (here chosen): K.

The sheet selected as the lectotype corresponds well with the protologue, having 2 pieces in fruit and 2 pieces with female flowers. There are 12 sheets at MEL (MEL 2050655, 2050656, 2050658, 2050661, 2050664, 2050667, 2050669, 2050670, 2050672, 2050673, 2050678, 2050943) and another sheet at K which should probably all be regarded as remaining syntypes.

Wilkiea rigidifolia (A.C. Sm.) Whiffin & Foreman, *comb. nov.*

Kibara rigidifolia A.C. Sm., *J. Arnold Arbor.* 22: 243 (1941). T: Lower Fly River, East bank opposite Sturt Island, Papua New Guinea, Oct. 1936, *L. J. Brass* 8216; holo: *n.v.*; iso: BRI.

Wilkiea longipes (Benth.) Whiffin & Foreman, *comb. nov.*

Kibara longipes Benth., *Fl. Austral.* 5: 289 (1870); *Mollinedia longipes* (Benth.) F. Muell., *Syst. Census Austral. Pl.* 3 (1883); *Tetrasyandra longipes* (Benth.) Perkins, *Bot. Jahrb. Syst.* 25: 569 (1898). T: Rockingham Bay, Qld, *J. Dallachy*; syn: MEL 2050660, 2050662, 2050663, 2050666 (male flowers); 2050654, 2050657 (fruit).

Steganthera laxiflora (Benth.) Whiffin & Foreman, *comb. nov.*

Kibara laxiflora Benth., *Fl. Austral.* 5: 289 (1870); *Tetrasynandra laxiflora* (Benth.) Perkins, *Bot. Jahrb. Syst.* 25: 569 (1898); *Mollinedia laxiflora* (Benth.) F.Muell., *Syst. Census Austral. Pl.* 3 (1883). T: Rockingham Bay, Qld, *J.Dallachy*; lecto (here chosen): K.

The specimen at K selected is the one with 2 fruiting pieces mounted on the top half of the sheet and a flowering twig underneath. A second sheet has 2 flowering twigs, the lower twig has one inflorescence of mature flowers some with the calyptra dehiscent. All the material at MEL should be regarded as remaining syntypes.

Palmeria scandens F.Muell., *Fragm.* 4: 152 (1864)

Palmeria scandens var. *typica* Domin, *Biblioth. Bot.* 22(89): 674 (1926), *nom. inval.* (type variety). T: Rockingham Bay, Qld, *J.Dallachy*; lecto (here chosen): MEL 2050674 (male flowers).

The protologue refers to a plant with male flowers and the specimen selected here is the only one at MEL which is consistent with this description. Several other sheets have either young fruits or female flowers. These include MEL 2050968 (in young fruit), MEL 2050680 (in young fruit), MEL 2050677 (in young fruit) and MEL 2050671 (female flowers). MEL 2050668 (with female flowers) was collected 1 July 1864. The label on this sheet in Dallachy's handwriting makes mention of the fragrance, saying "This is beautiful climber the flowers are very fragrant. I can smell it all through the scrub". Mueller makes no mention of this in his protologue and it is uncertain whether or not he saw this specimen before November 1864 when the relevant part of *Fragmenta* was published.

Morinda hypotephra F.Muell., *Victorian Naturalist* 6: 55 (1889)

T: Mt Bellenden-Ker, c. 5,200 feet, Qld, 1887, W.A.Sayer; lecto (here chosen): MEL 274868 (young fruit).

Of the four syntype specimens at MEL the sheet selected here combines all the features described in the protologue with the most complete label information. All the specimens are in young fruit but it is impossible to tell if they are all part of a single collection since none have the same label information. MEL 274869 and MEL 274870 both have the number 93 on them; presumably this is Sayer's collecting number but it does not appear on the other sheets. MEL 274869 has the altitude given as 5000 feet and the collector as Sayer whereas MEL 274870 has the date 1887 but no indication of altitude and the collector as W.Sayer. The remaining sheet MEL 274871 lacks any indication of altitude, date or collector.

MONIMIACEAE

T. Whiffin

Hemmantia Whiffin, *gen. nov.*

Frutex vel arbor parva ut videtur dioecia. Folia distincte et regulariter dentata, tenuia et chartacea. Flores masculi urceolati ad campanulati; tepala 4, binatim 2, distincta, longitriangulata; stamina 2; antherae cum rimis 2 ut fiant supra confluentibus. Flores feminei et fructus ignotus.

T: *Hemmantia webbii* Whiffin

A monotypic genus, named after the single locality (Mt Hemmant) where it is found. Gender: feminine.

Hemmantia webbii Whiffin, *sp. nov.*

Frutex vel arbor parva usque ad 2m alta. Folia distincte et aequaliter serrata, moderate pubescentia cum pilis patentibus longis. Inflorescentia mascula et flores dense pubescentes cum pilis patentibus longis. Flores masculi urceolati ad campanulati; tepala 4, binatim 2; stamina 2 in pari unico. Flores feminei et fructus ignoti.

T: Mt. Hemmant, "shallow gully head on metamorphics", 16°06'S, 145°26'E, alt. 800 m, July 1973, *L.J.Webb & J.G.Tracey 10908*; holotype: BRI 174119; isotype: BRI 174117, 174118, 174120.

Named in honour of L.J. (Len) Webb, in recognition of his contributions to Australian tropical rain forest ecology and conservation.

Wilkiea smithii Whiffin, *sp. nov.*

Frutex vel arbor parva ad 1.8–8m alta. Folia integra, dense pubescentia ubi juventute, in senectute glabrescentia. Inflorescentia et flores dense pubescentes. Flores masculi plus minusve globosi a clavati, dense pubescentes; stamina plerumque 4, in paribus 2; filamenta plus minusve glabra. Flores feminei plus minusve globosi, dense pubescentes; carpella 20–40, ovarium dense pubescens.

T: State Forest 607, Shoteel Logging Area, Qld, 16°55'S, 145°36'E, alt. 460 m, 23 Feb. 1995, *B.Gray 6001*; holotype: QRS.

Named in honour of L.S. (Lindsay) Smith, who first recognised this as representing a distinct species, in recognition of his botanical contributions to Queensland rain forests.

Wilkiea hylandii Whiffin, *sp. nov.*

Frutex vel arbor parva ad 1.5–5 m alta. Folia integra vel manifeste dentata in dimidium distale, pubescentia ubi juventute, in senectute plus minusve glabrescentia. Inflorescentia et flores dense pubescentes. Flores masculi angulati-globosi, dense pubescentes; stamina (6) 8 (10) binatim; filamenta plus minusve glabra. Flores feminei depresso-globosi; carpella circa 40, ovarium pubescens.

T: Timber Reserve 14, Massy, Qld, 13°52'S, 143°23'E, alt. 400 m, 9 Nov. 1980; *B.Hyland 10898*; holotype: QRS; isotype: LTB.

Named in honour of B.P.M. (Bernie) Hyland, longtime colleague and friend, in recognition of his outstanding contributions to Australian tropical rain forest systematics.

Wilkiea cordata Whiffin, *sp. nov.*

Frutex vel arbor parva ad 1–4 m alta. Folia serrata ad plus minusve integra, distincte cordata basi glabra. Inflorescentia et flores glabri. Flores masculi angulati-globosi; stamina 4, in paribus 2; filamenta glabra. Flores feminei globosi ad depresso globosi; carpella circa 25, ovarium glabrum.

T: State Forest Reserve 607, Emerald Logging Area, Mt Haig, Qld, 17°06'S 145°36'E, alt. 1240 m, 19 Feb. 1981, *B.Gray 1913*; holotype: QRS; isotype: LTB.

Named for the distinctive cordate leaf base.

Stegantthera cooperorum Whiffin, *sp. nov.*

Arbor ad 3–10 m alta. Folia integra vel interdum dentibus paucis parvis, glabra. Inflorescentiae et flores glabri. Flores masculi turbinati; stamina 4, in paribus 2; filamenta plus minusve glabra. Flores feminei turbinati; carpella circa 50, ovarium pubescens.

T: Timber Reserve 1230, Boonjie Logging Area, 17°23'S, 145°45'E, alt. 720 m, 4 Dec. 1972; *B.Hyland 2766* (RFK); holotype: QRS; isotype: LTB.

Named in honour of W. and W. (Bill and Wendy) Cooper, in recognition of their artistic and botanical works on Australian tropical rain forests; their own species on their own property.

Stegantthera laxiflora subsp. **lewisensis** Whiffin, *sp. nov.*

A subspecie typica statura brevior, foliis parvis, et inflorescentiis parvis floribus paucioribus differt.

T: State Forest Reserve 143, Kanawarra, Carbine Logging Area, 16°29'S, 145°26'E, alt. 1100 m, 6 June 1988, *B.Hyland 13748*; holotype: QRS; isotype: LTB.

Named for the Mt Lewis area, where the subspecies is found.

Endressia Whiffin, *gen. nov.*

Arbor probabiliter monoica. Folia crenata plus minusve subcarnosa. Inflorescentiae et flores glabri, ex floribus paucis femineis vel multis masculis constantes. Flores masculi globosi ad clavati; stamina numerosa, super parietibus inferioribus et lateribus receptaculi dispersa; antherae triangulares, plus minusve sessiles. Flores feminei calyptrati ut videtur sine hyperstigmatibus.

T: *Endressia wardellii* (F.Muell.) Whiffin

Named in honour of P.K. (Peter) Endress, in recognition of his contributions to the morphology and systematics of primitive angiosperms. Gender: feminine.

This genus is distinct in the male flowers, with the \pm sessile stamens scattered over the lower and side walls of the receptacle. In addition, the sole species (*E. wardellii*) differs from all other north Queensland species examined (except for *Austromatthaea elegans*) in having hypogeal rather than epigeal germination.

Endressia wardellii (F.Muell.) Whiffin, *comb. nov.*

Mollinedia wardellii F.Muell., *Fragm.* 5: 155 (1866); *Wilkiea wardellii* (F.Muell.) Perkins, *Bot. Jahrb. Syst.* 25: 570 t. VI e, 1–4 (1898). T: Coast Range, Qld, 17 Nov. 1865, *J.Dallachy*; lectotype (here chosen): MEL 2050659, piece with male flowers mounted on left hand side of sheet.

This sheet has two pieces of plant material mounted on it and it is the left hand piece with leaves and male flowers that is here chosen as the lectotype. This is in agreement with the protologue which describes both these features and notes that the female flowers and fruits have not been seen. The origin of the piece mounted on the right side of the sheet is problematical but could have been derived from the material now mounted on two sheets as MEL 2050941 and MEL 2050942 both in fruit and both at the same stage of development as the piece mounted on MEL 2050659.

Palmeria foremanii Whiffin, *sp. nov.*

A *Palmeriam scandenti* in ramulis, foliorum pagina inferiore, inflorescentiis et floribus pilis dense aureo-stellatis obtectis differt.

T: The Head, near source of Teviot Creek, Qld, 4 May 1978, *K.A.W. Williams 78049*; holotype: BRI; isotype: CANB, K, NSW.

Named in honour and remembrance of D.B. (Don) Foreman, in recognition of his contributions to Australian tropical rain forest systematics.

ATHEROSPERMATACEAE

*R.Schodde****Doryphora sassafras* Endl., *Iconogr. Gen. Pl.* t. 10 (1837)**

T: Illawarra District, N.S.W., Aug. 1824, *A.Cunningham* [6]; lecto (here chosen): K; isolecto: A?, K, SING; Five Islands [Illawarra District] N.S.W., Nov. 1818, *A.Cunningham* [179]; remaining syn: BM, K.

The species was described by Endlicher from material collected by A.Cunningham and held in W. Those collections having been lost during World War II, collections consistent in form and annotations to the protologue were sought in other herbaria, and material located in K, BM, SING and possibly A.

There is a sheet at K, with both flowering and fruiting material collected by Cunningham, and a single label carrying full details for both collections. The collection with flowers has been selected as the lectotype because Endlicher's original description of *Doryphora* and the illustration of *D. sassafras* are based mainly on the flowering material.

***Atherosperma repandum* F.Muell., *Fragm.* 10: 105 (1877)**

T: Dalrymple Gap, Rockingham's Bay, Qld, 10 May, 1868, *J.Dallachy*; lecto (here chosen): MEL 3181; Trinity-Bay, 1877, *F.M.Bailey*; remaining syntype: MEL 3182.

Mueller cited two collections: *Dallachy*, Rockingham Bay, and *Bailey*, Trinity Bay, in his original description. *Dallachy*'s collection from Rockingham Bay has been chosen as the lectotype because sheet 3181 bearing this collection in MEL carries annotations on floral characters by Mueller, whereas *Bailey*'s collection from Trinity Bay comprises discordant flowering and fruiting elements that are obviously from different trees.

***Daphnandra dielsii* J.R.Perkins in H.G.A.Engler (ed.), *Pflanzenr.* Heft 49: 46 (1911)**

T: "Ober-Barron", Qld, May 1902, *L.Diels* 8401; holo: B (destroyed); Wongabel Forest Reserve, c. 7 miles south of Atherton, Atherton Tableland, Qld, 7 Aug. 1963, *R.Schodde* 3258; neo: CANB; isoneo: A, AD, B, BRI, CANB, G, L, P, QRS, SING, WELT.

The type of *D. dielsii* was destroyed in B in World War II and no duplicate has been traced. The collection *R.Schodde* 3258 has been selected as neotype on account of its rather dense hispid pubescent hairs on the lower face of the leaves, the inflorescence, and ultimate branchlets, and its flowering condition which is consistent with Perkins' original description. Its collection locality, Wongabel, is in the same region as "Ober Barron", the locality of the Diels collection.

Daphnandra apatela* Schodde, *sp. nov.

Arbor altitudinis mediae (10–) 15–25 (–30) m alta, cortex interior lignumque in vivo luteo-eburneum vel luteolum, folia matura in sicco plerumque subgriseo-viridia costis supra pallidis, peranguste prominulis, raro fere plani, et marginibus vadose crenato-serratis, raro fere crenulati, flores relative parvi, cum hypanthiis subtiliter strigilloso-tomentosulis, et tepalis interioribus (2–) 2.5–3 (–4) mm longis, viridi-albis, margine subtiliter fimbriatis, raro integris, et hypanthia fructificantia urceolata vel raro subcylindrica, (7–) 8–15 (–20) mm longa, (1.5–) 2–4 (–6) mm lata, ad basim cum parietibus ligneis, (0.25–) 0.33–0.66 (–0.75) mm crassis. Ab omnibus speciebus *Daphnandrae* combinatione horum characterum differt.

T: Doyles River State Forest, c. 50 miles [80.5 km] W of Wauchope, 2400 ft [c. 730 m], N.S.W., 20 Oct. 1966, *R.Schodde* 5123; holo: CANB; iso: CANB.

The epithet alludes to the fact that the species has previously been mistaken for *Daphnandra micrantha*.

Daphnandra melasmene* Schodde, *sp. nov.

Arbor mediocris 10–20 m alta, cortex interior lignumque in vivo sulphureum, folia matura relative parva, (3–) 4–8 (–10) cm longa, (1.25–) 1.75–3 (–4) cm lata, in sicco plerumque olivaceo-vel fusco-nigrescentia, cum costis supra vadose impressis, raro fere plani, nervis gracilibus, et marginibus crenulatis, flores relative parvi, hypanthiis glabris, et tepalis interioribus (2.5–) 2.75–3 (–3.5) mm longis, viridi-albis, ad margines subtiliter fimbriatis, et hypanthia fructificantia (cylindrico-) urceolata, (5–) 9–20 mm longa, (1–) 3–6 (–6.5) mm crassa, ad basim cum parietibus ligneis, (0.25–) 0.5–0.75 (–1) mm crassis. Ab omnibus speciebus *Daphnandrae* combinatione horum characterum differt.

T: Red Scrub, Whian Whian, c. 12 miles [19 km] NNE of Lismore, N.S.W., 27 Oct. 1969, *R.Schodde 5629*; holo: CANB; iso: A, AD, BAB, CANB, K, L, LIL, MA, NSW, P, TO.

The epithet alludes to the marked blackening of the stems and leaves when the species is dried. Mature trees also appear relatively dark in the field.

Daphnandra johnsonii* Schodde, *sp. nov.

Arbor parva mediocris, (2–) 5–20 m alta, cortex interior in vivo sulphureus, folia matura relative parva, (4–) 5–8 (–12) cm longa, (1.5–) 2–4 (–6) cm lata, rectinervia, in sicco plerumque subcinerascenti- vel subinfusato-viridia, cum costis supra peranguste prominulis, raro fere plani, et marginibus profunde grosseque crenato-serratis, flores relative parvi, cum hypanthiis parce strigillosis, et tepalis interioribus 2.5–3 mm longis, viridi-albis, margine integris et hypanthia fructificantia globosa (4–) 5–7 (–8) mm longa, (3–) 4–5 (–6) mm crassa, cum parietibus tenuiter ligneis, 0.25–0.33 mm crassis, et nuculis parvis, pilis brevibus, et stylis 2.5–3 mm longis. Ab omnibus speciebus *Daphnandrae* combinations horum characterum differt.

T: Spring Ck, 1 mile [1.6 km] W of Kiama, N.S.W., 7 Sept. 1960, *H.C.Hayes, L.A.S.Johnson & E.F.Constable s.n.*; holo: CANB; iso: CANB, CFSHB, L, NSW.

Named after Lawrence Alexander Sidney Johnson (1925–1997), Australian botanist and former Director of the Royal Botanic Gardens, Sydney.

The isotypes were distributed by the collectors individually, and not all of them record the name of all three collectors, however Laurie Johnson (pers. comm.) confirmed that all the collections were made at the same time, from the same tree.

Dryadodaphne trachyphloia* Schodde, *sp. nov.

Arbor magna gracilisque 35–45 m alta, cortex asperissimus cum fissuris profundis, lignum eburneum cum annulis conspicuis, folia sine reticulata venationum, inflorescentiae floresque minores, pedicelli comparate crassi pedunculis aequantesque, rostra staminalia linguiformia, anguste obtusa, 0.5 mm longa, 0.3 mm lata, columnae stigmaticae infra staminodia immersae, et pila cavitatum hypanthium fructificantium versus basim confertissima.

T: Mt Spurgeon, Qld, 1080 m, 16 Apr. 1968, *B.P.M.Hyland & R.F.Grimes RFK 1496*; holo: BRI; iso: BRI, CANB, QRS.

The specific epithet alludes to the characteristically rough, brown bark of this species.

Atherosperma moschatum* subsp. *integrifolium* (A.Cunn. ex Tul.) Schodde, *comb. et stat. nov.

Atherosperma integrifolium A.Cunn. ex Tul., *Arch. Mus. Hist. Nat.* 8: 421 (1855). T: Blue Mountains, N.S.W., Apr. 1826, *A.Cunningham*; iso: K, P?, SING.

APPENDIX

LAURACEAE

CASSYTHA

J.Z. Weber

Cassytha candida (J.Z. Weber) J.Z. Weber, *stat. nov.*

Cassytha aurea var. *candida* J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 241 (1981). T: Meda-Oobagooma Rd, c. 65 km N of Gibb River Rd, W.A., 12 July 1976, A.C. Beauglehole 52710; holo: AD; iso: MEL, PERTH.

Cassytha pomiformis Nees in J.G.C. Lehmann, *Pl. Preiss.* 1: 620 (1845)

T: Prope oppidulum Fremantle, W.A., *L. Preiss* 1625, Dec. 1838; lecto (here chosen): MEL; isolecto: MEL, NY.

Cassytha flindersii (J.Z. Weber) J.Z. Weber, *stat. nov.*

Cassytha peninsularis var. *flindersii* J.Z. Weber, *J. Adelaide Bot. Gard.* 3: 235 (1981). T: slopes of Mt Remarkable, S.A., 6 Dec. 1973, J.Z. Weber 3682; holo: AD; iso: BRI, CANB, G, HO, K, MEL, NSW, NY, OXF, PERTH.

CRYPTOCARYA

J. Le Cussan & B. Hyland

Cryptocarya whiffiniana Le Cussan & B. Hyland, *sp. nov.*

Differt a *C. triplinervis* et speciebus affinis laminis foliorum subtus glaucus leviter, radícula lateralis, ovarium et stylus glaber, stylus 0.9–1.1 mm longus.

T: State Forest Reserve 310, Parish of Gadgarra, Qld, 24 Feb. 1988, *B. Gray* 4760; holo: QRS; iso: to be distributed.

Named in honour of Dr Trevor Whiffin, co-author of the electronic interactive key to Australian tropical rainforest plants and lecturer at La Trobe University, who has had a long-standing interest in rainforest species.

PIPERACEAE

T.M. Spokes

Piper fungiforme Spokes, *sp. nov.*

Liana glabra dioecia; spicae masculae cylindraceae; stamina 3 fungiformia unumquidque antheris 2 bilocularibus praeditum; spicae femineae obloideae-ovoideae; stigmata 4 sessilia; fructus ruber carnosus erectus semina numerosa continens.

T: Timber Reserve 14, Leo Ck Rd, Qld, 19 Sept. 1972, *B. Hyland* 6367; holo: BRI; iso: NSW, QRS.

Named from the Latin *fungiforme* (mushroom-headed), in reference to the shape of the connective in stamens of the male spikes.

Piper hederaceum var. **longiorispicum** Spokes, *var. nov.*

A *Pipere hederaceum* var. *hederaceum* spica feminea antequam florenti pilos erectos auricolores ferenti et fructibus robustis conspicue mucronatis, differt.

T: Windsor Tableland, Qld, 5 Oct. 1971, *B.Hyland 5538*; holo: BRI; iso: NSW, QRS.

Named from the Latin *longior* (longer) and *spica* (spike), in reference to the fruiting spikes being generally longer than those of the type variety.

ARISTOLOCHIACEAE

E.M.Ross

Aristolochia pubera var. **aromatica** E.M.Ross, *var. nov.*

A. puberam R.Br. var. *puberam* similans, sed laminis foliorum pilis multicellulosis (non simplicibus) et pagina inferiore glandibus numerosis sessilibus, differt.

T: Stannary Hills, Qld, 16 Feb. 1975, *R.Collins 20108*; holo: QRS.

The name is derived from the Latin *aromaticus* (aromatic), in reference to the aromatic odour emitted from the leaves when crushed (as recorded on the label of *Hyland 10484*).

Aristolochia meridionalis E.M.Ross, *sp. nov.*

A. puberam R.Br. simulans, sed lamina folii sagittata vice lyrata vel oblongo-ovata; superficie glabra, differt.

T: D'Aguilar Range, 12 km NE of Mt Crosby, Qld, 22 Dec. 1991, *L.H.Bird & J.Collins s.n.*; holo: BRI.

Named from the Latin *meridionalis* (southern), in reference to its southern distribution.

Aristolochia meridionalis subsp. **centralis** E.M.Ross, *subsp. nov.*

A. meridionalem subsp. *meridionalem* simulans, sed foliis semper angustioribus, differt.

T: Rockhampton, Qld, 5 Mar. 1937, *S.T.Blake 12713*; holo: BRI.

From the Latin *centralis* (central), in reference to its central Qld distribution.

NYMPHAEACEAE

S.W.L.Jacobs

Nymphaea subg. **Confluentes** S.W.L.Jacobs, *subg. nov.*

Subgenere *Anecphyia* similis, sed spatio manifesto inter petala staminaque destituto, petalis sensim staminibus transientibus, seminis multo minoribus, foliis margine sinuato non dentato differt.

Type: *N. violacea* Lehm.

A subgenus of 4 species, *N. violacea*, *N. elleniae*, *N. hastifolia* and *N. alexii* from tropical Australia and New Guinea.

The name *Confluentes* refers to the gradual passing of the petals into stamens, unlike in subg. *Anecphyia*.

RANUNCULACEAE

Hj.Eichler

Psychrophila (DC.) Bercht. & J.Presl, *Prir. Rostlin* 79 (1823)

Lecto (here chosen): *Caltha appendiculata* Pers. = *Psychrophila appendiculata* (Pers.) Bercht. & J.Presl

Psychrophila has generally been regarded as a section within *Caltha* L. The first to make combinations in *Psychrophila* at the generic level were Berchtold and J.Presl (i.e. in *Prir. Rostlin* 80, 1823), the first taxon treated being *P. appendiculata* from the Andes of S America. As this taxon is typical of the group as a whole, and since it was the first one treated, it is here selected as the lectotype of the genus name.

Psychrophila differs from *Caltha* in its peculiar basal leaf appendages, solitary flowers that are usually predominantly white, pinkish or pale yellow in colour (bright yellow in *Caltha*), leafless peduncles and long-persistent, narrow, more or less acute tepals. Furthermore, *Psychrophila* is ecologically distinct, always being found in snowbed sites in the mountains of the Southern Hemisphere.

Psychrophila phylloptera (A.W.Hill) H.Eichler, *comb. nov.*

Caltha phylloptera A.W.Hill, *Ann. Bot. (London)* 32: 433, fig. 7 (1918). T: Western Mtns, Tas., *Archer*; holo: K.

Clematis blanda Hook., *J. Bot. (Hooker)* 1(3): 241 (1834)

Clematis aristata var. *blanda* (Hook.) Benth., *Fl. Austral.* 1: 6 (1863). T: Van Diemens Land [Tas.], 1832, *Gunn* 54; lecto (here chosen): K (photo CANB); syn; *Dr Scott, Mr Lawrence* (n. 106, 1831.- n. 147.).

The name *C. blanda* Hook. is now regarded as a synonym of the earlier *C. clitorioides* DC. The herbarium sheet at K has several collections mounted on it labelled *Gunn* 54, all of them good specimens. The male material is chosen as the lectotype because anther characters are most useful in distinguishing this species from the closely related *C. aristata*.

Clematis aristata var. *occidentalis* Benth., *Fl. Austral.* 1: 6 (1863)

T: West Australia; lecto (here chosen): holotype of *C. discolor* Steud.

In the protologue *C. pubescens* Hügel ex Endl., *C. elliptica* Endl., *C. indivisa* Steud. (*non* Willd.), *C. discolor* Steud., *C. cognata* Steud. and *C. gilbertiana* Turcz. are quoted by Benthams as synonyms. Type material was located for all of these names except *C. elliptica* and *C. gilbertiana*. All of the type material, except of *C. discolor*, was from female plants. Since the anther appendages are critical in distinguishing the taxa in Australian trifoliate *Clematis* the holotype of *C. discolor* is chosen as the lectotype.

Clematis aristata R.Br. ex Ker Gawl., *Bot. Reg.* 3: t. 238 (1817)

T: 'The drawing was taken at the nursery of Messrs. Whitley, Brames, and Milne, at Fulham, where it was cultivated in the greenhouse'; lecto (here chosen): the illustration cited above (i.e. *Bot. Reg.* 3: t. 238, 1817).

The illustration is of a male plant in flower and is clearly attributable to this species.

Clematis coriacea DC., *Syst. Nat.* 1: 146 (1817)

Clematis aristata var. *coriacea* (DC.) Benth., *Fl. Austral.* 1: 6 (1863). T: near Port Jackson [Sydney], N.S.W., *coll. unknown*; lecto (here chosen): specimen labelled 'var. acuta', '♀ in h. Lamb', G-DC.

Clematis leptophylla (F.Muell.) H.Eichler, *stat. nov.*

Clematis microphylla var. *leptophylla* F.Muell., *Pl. Victoria* 1: 4 (1862); *C. hexapetala* subsp. *leptophylla* (F.Muell.) Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 108 (1885). T: Snowy River and Mitta Mitta, *F.Mueller*; lecto (here chosen): K; syn: MEL.

This taxon can be distinguished readily from *C. microphylla* DC. by its flammuliform leaves, usually with 18 to 36 leaflets that are considerably smaller and broadest beyond the middle. It has also been confused with *C. decipiens* H.Eichler ex Jeanes, but that species generally has leaves with only about 15 leaflets that are larger and broadest below the middle.

Clematis fawcettii F.Muell., *Fragm.* 10: 1 (1876)

Clematis hexapetala var. *fawcettii* (F.Muell.) Kuntze, *Verh. Bot. Vereins Prov. Brandenburg* 26: 108 (1885); *C. microphylla* var. *fawcettii* (F.Muell.) F.M.Bailey, *Queensland Fl.* 1: 6 (1899). T: Richmond R., *Fawcett*; lecto (here chosen): MEL 626784; isolecto: MEL, NSW; syn: MEL, NSW, ?AD n.v.

The lectotype was chosen from amongst the several probable type collections because the plants are consistent with the protologue, are well-pressed, well-preserved and there is fertile material from both males and females.

Ranunculus rivularis var. *major* Benth., *Fl. Austral.* 1: 14 (1863)

T: not cited (*R. inundatus* R.Br. ex DC., *R. glabrifolius* Hook. and *R. incisus* Hook.f. are quoted by Benthham as synonyms of this name); lecto (here chosen) *R. glabrifolius* Hook.

Of Benthham's listed synonyms, *R. incisus* is rejected as it is based on a New Zealand type and is regarded as endemic in that country. The brief description provided by Benthham accords better with the type and current concept of *R. glabrifolius* than that of *R. inundatus*.

Ranunculus plebeius R.Br. ex DC., *Syst. Nat.* 1: 288 (1817)

T: Hunters River, N.S.W., *R. Brown s.n.*; lecto: (here chosen): G-DC (photo CANB); ?remaining syntype: Kingstown, N.S.W.; BM (photo CANB), K (photo CANB).

Although Melville (1955) and Briggs (1960) give the type provenance as 'in paludos prope Kingstown, *R. Brown*, Oct.-Nov, 1804' (*R.Br. iter Austral.* 5253), based on a specimen at BM, the protologue gives 'ad Hunters River, Hawkesbury etc., *R. Brown*'. There is a sheet at G with locality exactly as for the protologue and a label 'Ranunculus plebeius' in Brown's hand. It is almost certainly the specimen cited by de Candolle and is chosen as the lectotype. The Kingstown (= Newcastle, N.S.W.) specimens at K and BM may comprise all or part of the 'etc.' in the protologue (or may even be part of the same gathering, differently labelled, as the G sheet). They are tentatively treated here as remaining syntypes.

Ranunculus lappaceus var. *subsericeus* Benth., *Fl. Austral.* 1: 13 (1863), *p.p.*

T: Hampshire Hills and Western Mountains, Tas., *R. Gunn* 634 *p.p.*; lecto (here chosen): K.

Benthham cited 2 collections in the protologue for *R. lappaceus* var. *subsericeus*, one a Mueller collection from 'summits of the Australian alps [probably Vic.]', and the other a collection of Gunn's from the Hampshire Hills and Western mountains [Tas.]. The Mueller specimen has not been found. The Gunn (# 634) sheet at K, annotated by Benthham, consists of apparently separate gatherings from 'Hampshire Hills' and 'Marlborough'. The Hampshire Hills material is selected here as the lectotype.

Ranunculus millanii F.Muell., *Defin. Austral. Pl.*: 21 (1855); *Trans. Philos. Soc. Victoria* 1: 97 (1855).

T: Mt Wellington, Vic., Nov. 1854, *F.Mueller*; lecto (here chosen): MEL (photo CANB); remaining syntypes: Bogong Ranges, *F.Mueller*, Dec. 1854; MEL, K (photo CANB); summit of the Australian Alps, Mt LaTrobe [Mt Loch], *collector unknown* (collections mounted on same sheet): G, K (photo CANB).

Although Melville (1955) and Briggs (1960) give the type provenance as 'Mt Wellington', in the protologue Mueller cited 'gravelly places on most of the summits of the Austalian Alps'.

Mueller noted later that he named the plant after A.McMillan ‘who ... named and first ascended Mount Wellington’ where Mueller ‘became originally acquainted with this plant’. To continue the association of the species with Mt Wellington, the MEL sheet is chosen as the lectotype, and other specimens annotated by Mueller prior to 1855 are regarded as residual syntype material.

Ranunculus setaceus Rodway, *Proc. Roy. Soc. Tasmania* 1900–1901: 107 (1902)

T: Ironstone Ra., alt. 3000 ft, Tas., *collector unknown*; lecto (here chosen): NSW 83180 (photo CANB); ?islecto: HO (2 sheets); MEL (photo CANB).

NSW 83180 is dated Dec. 1899, and is apparently the earliest collection of this species, and the one from which Rodway most likely formed his concept of it. The 2 sheets at HO and the MEL sheet are annotated with the same locality but dated 1900. There are other examples of Rodway having confused dates on specimens, and it is quite possible that the HO and MEL sheets are from the same gathering as NSW 83180, so they are tentatively regarded as isolectotypes.

Ranunculus anemoneus F.Muell., *Defin. Austral. Pl.* 20 (1855)

T: summit of the Mungyang mountains, Australian Alps, N.S.W., *F.Mueller*; lecto (here chosen): MEL (photo CANB); isolecto: K (photo CANB), MEL (photo CANB).

Ranunculus parviflorus var. *australis* Benth., *Fl. Austral.* 1: 14 (1863), *p.p.*

T: *Ranunculus sessiliflorus*, *R. collinus*, *R. pumilio*, *R. leptocaulis* and *R. pilulifer* are quoted as synonyms and specimens from Qld, N.S.W., Vic., Tas. and W.A. are cited; lecto (here chosen): holotype of *R. sessiliflorus* R.Br. ex DC.

Ranunculus sessiliflorus, *R. pumilio* and *R. collinus* are the first described annual species of those given by Benthham in synonymy under *R. parvifolius* var. *australis*. *R. collinus* (a perennial) clearly does not belong with the others and is rejected as a candidate. Of the other two species, *R. sessiliflorus* is the most widespread and is chosen as the lectotype of *R. parvifolius* var. *australis*.

Myosurus australis F.Muell., *Trans. Philos. Soc. Victoria* 1: 6 (1854)

Myosurus minimus var. *australis* (F.Muell.) Huth, *Bot. Jahrb. Syst.* 16: 284 (1892). T: Avoca R., Dec. 1853, *F.Mueller*; lecto (here chosen): MEL (photo CANB); ?isolectos: MEL; remaining syns: MEL.

The lectotype was chosen from amongst the several probable type collections because the label on the sheet and the plants are consistent with the protologue.

RANUNCULACEAE

J.J.Jeanes

Clematis decipiens H.Eichler ex Jeanes, *sp. nov.*

C. microphylla DC. affinis foliis flammuliformis, foliolis 12–15 (vel plus) plerumque angustioribus compositis differt.

T: c. 15 km W of Inverell on northern roadside of Gwydir Highway, N.S.W., 17 Oct. 1989, *H.Eichler* 24047; holo: CANB; iso: CHR, G, LAE, MEL, NSW.

Named from the Latin *decipio* (to beguile), in reference to the cryptic nature of the species, which has often been confused with other similar taxa, particularly *C. microphylla* DC., but also *C. leptophylla* (F.Muell.) H.Eichler.

APPENDIX

RANUNCULACEAE

N.G. Walsh

Ranunculus pentandrus var. **platycarpus** (F.Muell.) H.Eichler, *Suppl. J.M. Black's Fl. S. Australia* edn 2, 149 (1965)

Ranunculus sessiliflorus var. *platycarpus* F.Muell., *Rep. Pl. Babbage's Exped.* 7 (1859). T: Murray River, s.d., F.Mueller; neo (here chosen): MEL; isoneo: MEL.

In naming this taxon, Mueller cited a specimen collected at Wonnomulla during Babbage's 1858 expedition into the interior of South Australia. Babbage's collection was donated to MEL, but the type has not been seen at that or other Australian herbaria, or at K or BM. It appears to have been lost. Four sheets representing three collections of *Ranunculus sessiliflorus* var. *platycarpus* identified by Mueller have been found, all at MEL and all collected by Mueller. The duplicated specimen with the more mature fruit agrees well with Mueller's description and is chosen as the neotype.

MENISPERMACEAE

L.L. Forman

Tinospora esiangkara (F.M.Bailey) Forman, *comb. nov.*

Limacia esiangkara F.M.Bailey, *Queensland Fl.* 6: 1997 (1902). T: Mapoon, Qld, 22 Jan. 1901, J.F.Bailey s.n.; holotype: BRI.

Tinospora angusta Forman, *Kew Bull.* 36: 383 (1981), *nom. superfl.* T: Nourlangie Creek, N.T., 28 Feb. 1973, L.A.Craven 2452; holotype: CANB; isotype: BRI, DNA, K.

The type is a poor specimen with incomplete female flowers and broken fruits, but the characteristic narrow leaves confirm that it is conspecific with *Tinospora angusta* Forman, which therefore becomes a later synonym.

Parapachygone Forman, *gen. nov.*

Pachygone Miers affinis, a qua foliis penninerviis haud ad basin trinerviis, leviter peltatis; petalis florum masculorum planis et carnosius, haud stamina opposita amplectentibus; staminibus c. 18–20; staminodiis in floribus femineis absentibus; stigma lobulata; endocarpio lateraliter imperforato; condylo plano, bilamellato, haud cavo.

T: *P. longifolia* (F.M.Bailey) Forman

A monotypic genus occurring in coastal regions of NE Qld in rainforest, mesophyll palm forest and mixed mesophyll vine forest.

Named from the Greek *para* (near) and the generic name *Pachygone*, referring to the affinity to that genus. Gender: feminine.

The affinity with *Pachygone* is confirmed by the pollen, which is of Menispermaceae Pollen Type 1 (M.M.Harley, *pers. comm.*, and see M.M.Harley & I.K.Ferguson, *Kew Bull.* 37: 360, 1982).

Parapachygone longifolia (F.M.Bailey) Forman, *comb. nov.*

Pachygone longifolia F.M.Bailey, *Queensland Fl.* 1: 34, pl. 3 (1899). T: Mourilyan Harbour, Qld, W.Mugford 37; holotype: BRI.

Stephania tuberosa Forman, *sp. nov.*

Planta omnino glabra. Caules scandentes ?annui succum aurantio-brunneum continentes e tubere grandi orientes. Lamina late ovata vel triangulari-ovata, basi rotundata vel truncata, apice rotundato-obtusa, 6–21 cm longa, 6–16 cm lata, infra glauca, in sicco membranacea. Inflorescentia mascula gracilis, bis umbellata, 4–8 cm longa, glabra. Flores masculi pedicellis 3–4 mm longis; sepala glabra; 3 externa quam 3 interiora angustiora; synandrium apice leviter convexum. Flores feminei et fructus ignoti.

T: cultivated in Stafford, Brisbane, originally from Cape York, Qld, 1 Dec. 1971, *D.Smith s.n.*; holo: K; iso: BRI, CANB, MEL.

Named from the Latin *tuberosus* (producing tubers).

Stephania renifolia Forman, *sp. nov.*

Frutex scandens gracilis, omnino glaber. Petiolus 3–10 cm longus, c. 1–4 mm a margine basali laminae affixus; lamina reniformi-ovata, basi leviter cordata, apice late rotundata, 5–9 cm longa, 5.5–11 cm lata, tenuiter papyracea. Inflorescentia mascula ex umbella cymorum composita, 2–6 cm longa. Flores masculi pedicellis 1–3 mm longis; sepala aequalia; synandrium apice planum et leviter depressum. Flores feminei et fructus ignoti.

T: 13 miles [21 km] SE of Lawgi, Port Curtis District, Qld, 30 Oct. 1963, *N.H.Speck 1936*; holo: CANB; iso: BRI, K.

Named from the Latin *renes* (kidneys) and *folium* (leaf), referring to the shape of the leaves.

SUPPLEMENTARY GLOSSARY

blaze: the longitudinal section of the bark of a tree which is revealed by making a \pm vertical, tangential cut.

caulescent: having a well-developed aboveground stem.

condyle: a ventral intrusion into the seed cavity around which the seed is curved.

ferruginous: rust-coloured.

fungiform: having the form of a fungus or mushroom.

obpyriform: a 3-dimensional shape resembling a pear, attached at the narrower end
cf. pyriform.

osmophore: a scent-producing gland.

pulpa: a fleshy inward extension of the fruit wall.

pyriform: a 3-dimensional shape resembling a pear, attached at the broader end
cf. obpyriform.

Abbreviations and Contractions

Literature

Author abbreviations follow R.K.Brummitt & C.E.Powell, *Authors of Plant Names* (Royal Botanic Gardens, Kew, 1992).

Journal titles are abbreviated in accordance with G.D.R.Bridson, *BPH-2, Periodicals with botanical content, constituting a second edition of Botanico-Periodicum-Huntianum* (Hunt Institute for Botanical Documentation, Pittsburgh, 2004).

Other literature is abbreviated in accordance with F.A.Stafleu & R.S.Cowan, *Taxonomic Literature*, 2nd edn (Bohn, Scheltema & Holkema, Utrecht, 1976–1987), except that upper case initial letters are used for proper names and significant words. The *Flora of Australia* is abbreviated to *Fl. Australia*.

Herbaria

Abbreviations of herbaria are in accordance with P.K.Holmgren, N.H.Holmgren & L.C.Barnett, *Index Herbariorum* Part I, 8th edn (New York Botanical Garden, 1990). Those most commonly cited in the *Flora* are:

AD	State Herbarium of South Australia, Adelaide
BM	The Natural History Museum, London
BRI	Queensland Herbarium, Brisbane
CANB	Australian National Herbarium, Canberra
DNA	Northern Territory Herbarium, Darwin
HO	Tasmanian Herbarium, Hobart
K	Royal Botanic Gardens, Kew
MEL	National Herbarium of Victoria, Melbourne
NSW	National Herbarium of New South Wales, Sydney
PERTH	Western Australian Herbarium, Perth
QRS	Australian National Herbarium, Atherton

States, Territories

Abbreviations of Australian States and Territories as used in statements of distribution and citation of collections are:

A.C.T.	Australian Capital Territory
N.S.W.	New South Wales
N.T.	Northern Territory
Qld	Queensland
S.A.	South Australia
Tas.	Tasmania
Vic.	Victoria
W.A.	Western Australia

Abbreviations and Contractions

General abbreviations

add.	addendum
alt.	altitude
app.	appendix
auct.	<i>auctoris/auctorum</i> (of an author or authors)
auct. mult.	<i>auctorum multorum</i> (of many authors)
auct. non	<i>auctorum non</i> (of authors [but] not....), used for misapplied names
c.	<i>circa</i> (about)
Ck	Creek
cm	centimetre
coll.	collector
colln	collection
comb.	<i>combinatio</i> /combination
cons.	<i>conservandus</i>
cult.	cultivated
cv.	cultivar
d.b.h.	diameter at breast height
Dept	Department
descr.	<i>descriptio</i>
diam.	diameter
E	east
ed./eds	editor/editors
edn	edition
e.g.	<i>exempli gratia</i> (for example)
et al.	<i>et alii/et aliorum</i> ; and others/and of others
f.	<i>forma</i> /form
fam.	<i>familia</i> /family
fig./figs	figure/figures (in other works)
Fig.	Figure (referring to a Figure in this volume of the <i>Flora</i>)
gen.	<i>genus</i> /genus
gen. nov.	<i>genus novus</i> (new genus)
Gt	Great
holo	holotype
hort.	<i>hortus</i> (garden) or <i>hortensis</i> (of a garden)
HS	Homestead
Hwy	Highway
i.e.	<i>id est</i> (that is)
ined.	<i>ineditus</i> (unpublished)
in litt.	<i>in litteris</i> (in correspondence)
in obs.	<i>in observatio</i> (in observation)
Is.	Island/s
iso	isotype
isolecto	isolectotype
km	kilometre
L.	Lake
L.A.	Logging Area
lat.	latitude
lecto	lectotype
loc. cit.	<i>loco citato</i> (in bibliographic citations: in the same work and page as just cited)
loc. id.	<i>loco idem</i> (in specimen citations: in the same place as just cited)
long.	longitude
L.S.	longitudinal section
l:w	length to width ratio
m	metre

Abbreviations and Contractions

mm	millimetre
Mt/Mts	Mount/Mounts
Mtn/Mtns	Mountain/Mountains
N	north
<i>n</i>	haploid chromosome number
<i>2n</i>	diploid chromosome number
Natl	National
n.d.	no date
NE	north-east (ern)
<i>nom. cons.</i>	<i>nomen conservandum</i> (conserved name)
<i>nom. cons. prop.</i>	<i>nomen conservandum propositus</i> (proposed conserved name)
<i>nom. illeg.</i>	<i>nomen illegitimum</i> (illegitimate name)
<i>nom. inval.</i>	<i>nomen invalidum</i> (name not validly published)
<i>nom. nov.</i>	<i>nomina nova</i> (new name)
<i>nom. nud.</i>	<i>nomen nudum</i> (name published without a description or reference to a published description)
<i>nom. prov.</i>	<i>nomen provisorium</i> (provisional name)
<i>nom. rej.</i>	<i>nomen rejiciendum</i> (rejected name)
<i>nom. superfl.</i>	<i>nomen superfluum</i> (superfluous name)
<i>nov.</i>	<i>novus</i> /new
n. ser.	new series
<i>n.v.</i>	<i>non vidi</i> (not seen)
NW	north-west (ern)
<i>op. cit.</i>	<i>opere citato</i> (in the work cited above)
opp.	opposite
orth.	orthography, orthographic
p./pp.	page/pages
penin.	peninsula
pers. comm.	by personal communication
pl./pls	plate/plates
<i>p.p.</i>	<i>pro parte</i> (in part)
<i>p.p. max.</i>	<i>pro parte maxima</i> , the larger part
<i>p.p. min.</i>	<i>pro parte minore</i> , the smaller part
<i>q.v.</i>	<i>quod vide</i> (which see)
R.	River
Ra.	Range
Rd	Road
rly	railway
S	south
SE	south-east (ern)
sect.	<i>sectio</i> /section
SEM	Scanning Electron Micrograph
ser.	series
S.F.R.	State Forest Reserve
<i>s. lat.</i>	<i>sensu lato</i> (in a wide sense)
<i>s. loc.</i>	<i>sine loco</i> (without locality)
<i>s.n.</i>	<i>sine numero</i> (without number)
<i>s. str.</i>	<i>sensu stricto</i> (in a narrow sense)
sp./spp.	species (singular/plural)
<i>sp. aff.</i>	<i>species affinis</i> (species related to)
<i>sp. nov.</i>	<i>species nova</i> (new species)
specim.	specimen
St	Saint/Street
<i>stat.</i>	<i>status</i> /status
Stn	(pastoral) Station

Abbreviations and Contractions

subg.	subgenus
subsp./subsp.	subspecies (singular/plural)
<i>subsp. nov.</i>	<i>subspecies nova</i> (new subspecies)
suppl.	supplement
SW	south-west (ern)
syn	syntype
synon.	synonym
T	Type (collection)
t./tt.	<i>tabula/tabulae</i> (plate/plates)
T.R.	Timber Reserve
trib.	<i>tribus</i> /tribe
trig.	trigonometric station
T.S.	transverse section
<i>typ. cons.</i>	<i>typus conservandus</i> (conserved type)
var.	<i>varietas</i> /variety
<i>viz.</i>	<i>videlicet</i> (namely)
UV	ultraviolet
W	west
<i>x</i>	basic chromosome number

Symbols

†	taxon included in key but not treated further in text
*	naturalised taxon, not originally native
#	native taxon now naturalised in Australia beyond its natural range
[]	misapplied name or <i>nomen invalidum</i> ; also, in localities, denotes a place name later than that originally cited or on the herbarium sheet
±	<i>in species descriptions</i> , more or less
±	<i>in lichen chemistry</i> , with or without
<	less than
≤	less than or equal to
>	more than
≥	more than or equal to
μm	micrometre
♀	female
♂	male

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