

A taxonomic revision of *Bridelia* Willd. (Euphorbiaceae) in Australia

Paul I. Forster

Summary

Forster, P.I. (1999). A taxonomic revision of *Bridelia* Willd. (Euphorbiaceae) in Australia. *Austrobaileya* 5(3): 405-419. The genus *Bridelia* Willd. is revised for Australia and contains five species, *B. exaltata* F.Muell., *B. finalis* P.I.Forst. sp.nov., *B. leichhardtii* Baill. ex Muell.Arg., *B. insulana* Hance and *B. tomentosa* Blume. All species are described and a key to distinguish them is provided. Distribution, habitat, typification, phenology and conservation status are outlined for each taxon.

Key words: *Bridelia exaltata*, *Bridelia finalis*, *Bridelia insulana*, *Bridelia leichhardtii*, *Bridelia tomentosa*, Australia, Euphorbiaceae

P.I.Forster, Queensland Herbarium, EPA, Brisbane Botanic Gardens, Mt Coot-tha, Mt Coot-tha Road, Toowong, Qld 4066, Australia

Introduction

The genus *Bridelia* was named by Willdenow in 1806 with three species included in it at that time. The name commemorates S.E.Bridel (“in honorem Clariss S.E. Briedel nominavi” (Willdenow 1806: 979)). As outlined by Dressler (1996a), the name has been commonly spelt as ‘*Bridelia*’ in many accounts ever since Sprengel (1818) ‘corrected’ the spelling. The original spelling ‘*Briedelia*’ was recently re-adopted in important reference works such as Chapman (1991), Greuter et al. (1993) and Webster (1994) and in a number of regional flora accounts and checklists (e.g. Dunlop et al. 1995; Forster & Henderson 1997). The spelling *Bridelia* has now been conserved (Brummitt 1998) and is used hereafter in the current paper.

An excellent overview of the genus *Bridelia* in Malesia and Indochina has recently been published by Dressler (1996c) who provided an extensive review of its taxonomic history and morphological variation. It is unnecessary to repeat here much of the information summarised in that paper, hence this introduction is brief.

Bridelia is included in the Euphorbiaceae subfamily Phyllanthoideae tribe Brideliaceae, together with *Cleistanthus* Hook.f. ex Planch. (Webster 1994) from which it may be

distinguished mainly by the drupaceous fruit and features of leaf venation (Dressler 1996c). Apart from the recent regional work of Dressler (1996b,c), major works on the genus as a whole have been published by Mueller (1866) and Jablonszky (1915).

In the present paper, a revision of the genus in Australia is presented as a precursor to the necessarily concise treatment to be eventually published in Volume 23 of the ‘Flora of Australia’. This revision is necessary for several reasons -

- (1) the account of Airy Shaw (1980b) is outdated and his key to taxa will not necessarily work with all Australian material,
- (2) there are some slight changes needed to circumscription of taxa, especially in the *B. tomentosa* complex, and
- (3) one new species requires description.

The first record of *Bridelia* from Australia was that of Baillon (1858) who published the nomen nudum *B. leichhardtii*. This name was subsequently validated by J. Mueller (1866) based on a type from Moreton Bay in Queensland. Meanwhile, F. Mueller (1862) had published *B. exaltata* F.Muell. for a different species in this genus based on a type from the Clarence River in New South Wales. J. Mueller (1866) in his monograph of the world’s

Euphorbiaceae, indicated *B. exaltata* and *B. tomentosa* Blume as occurring in Australia. Accounts of *B. exaltata*, *B. tomentosa* (with some collections also under the misapplied name *B. ovata*) and *B. leichhardtii* (under the synonymous name *B. faginea* (Baill.) F.Muell. ex Benth.) were included in *Bridelia* by Bentham (1873) who was more or less followed by Bailey (1902) and Jablonsky (1915). Apart from the descriptions of *B. tomentosa* var. *glabrata* Domin (now included in *B. tomentosa* var. *tomentosa*) (Domin 1927), and *B. phyllanthoides* W.V.Fitz. (now considered conspecific with *B. insulana*) (Fitzgerald 1918), little work was undertaken on the Australian representatives until Airy Shaw published his accounts in the 1970's and early 1980's.

In the most recent overall treatment of Australian *Bridelia*, Airy Shaw (1980b) included *B. exaltata*, *B. leichhardtii*, *B. penangiana* Hook.f. (now treated as conspecific with *B. insulana*) and *B. tomentosa*, this latter species including the varieties *B. tomentosa* var. *tomentosa*, *B. tomentosa* var. *glabrifolia* (Merr.) Airy Shaw, *B. tomentosa* var. *trichadenia* Muell.Arg. and *B. tomentosa* var. *eriantha* Airy Shaw. The recent accounts of Malesian species of *Bridelia* by Dressler (1996b,c) followed a paper by Li (1988) that established usage of the name *B. insulana* Hance for the taxon widely known in Australia as *B. penangiana*. Dressler (1996c) also provided detailed descriptions of both *B. insulana* and *B. tomentosa* based on extra-Australian collections.

Materials and Methods

This revision is based on herbarium collections at BRI, CANB, DNA, MEL, NSW, PERTH and QRS, as well as type material from other non-Australian herbaria. Types have been seen unless indicated as n.v. All species have been examined in habitat during the period 1979 to 1999. For species that are not endemic in Australia, only synonymy relevant to Australia is given and further synonyms may be located in Dressler (1996c). The spelling *Bridelia* is used throughout in the bibliographic sections, although in some cases it would have been spelt as *Briedelia*.

All descriptions are based on Australian collections. Floral descriptions were prepared from material preserved in spirit (FAA or 70% alcohol and 5% glycerol) or reconstituted by boiling in water and detergent. Fruit descriptions were prepared from material preserved in spirit or dried. Foliage and inflorescence descriptions were prepared from dried material. Indumentum cover is described using the terminology of Hewson (1988), except that 'scattered' is used instead of 'isolated'. The indumentum in Australian *Bridelia* species comprises uniseriate, multicellular hairs.

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

Taxonomy

Bridelia Willd., Sp. Pl. 4(2): 978 (1806). **Type:** *B. scandens* (Roxb.) Willd. (lecto: fide Webster (1994: 39)). *Briedelia* Spreng., Anleit. Kenntn. Gew. ed. 2, 2: 887 (1818), orth. var. **Type:** not designated.

Shrubs or trees, rarely lianes, evergreen or rarely deciduous, perennial, dioecious or rarely monoecious; stems and foliage without obvious latex. Indumentum of multicellular uniseriate trichomes; stinging hairs absent; glandular hairs absent. Stipules entire or rarely divided, inconspicuous, caducous. Leaves alternate, petiolate, elobate, penninerved, entire or weakly sinuate or dentate, not glandular. Inflorescences axillary, glomerulate, bracteate. Male flowers sessile or shortly pedicellate; calyx lobes 5, valvate, partially connate at base; petals 5, alternate with sepals; disc present between the reproductive parts and the perianth, pulvinate and fleshy; stamens 5, with filaments united into a short column with upper parts free; anthers basifixed or dorsifixed, bilobate, with thecae oblong to ellipsoid, longitudinally dehiscent; pistillode topping the staminal column. Female flowers sessile to shortly pedicellate; perianth and disc as in male flowers but with an additional inner, membranous disc that surrounds the ovary; ovary 2- or 3-locular; locules biovulate; styles 2, free or united at

base, bifid. Fruits drupaceous, ellipsoid to globose, with surface smooth, indehiscent. Seeds 1 or 2 per fruit, ovoid to hemispherical, ecarunculate; testa smooth; albumen fleshy or

membranous; cotyledons broad, flat.

A paleotropical genus of 50–60 species; five species in Australia.

Key to *Bridelia* species in Australia

1. Mature foliage with velutinous indumentum on lower surface **2. B. finalis**
Mature foliage without velutinous indumentum on lower surface 2
2. Leaf petiole black and tessellated; fruit 1-locular **3. B. insulana**
Leaf petiole green or brownish, smooth; fruit 2-locular 3
3. Leaf petiole rounded adaxially; sepals < 1.8 mm long **5. B. tomentosa**
Leaf petiole grooved adaxially; sepals 1.8–2 mm long 4
4. Leaf lamina with 13–18 lateral veins each side of midrib;
fruit 8–13 mm diameter **1. B. exaltata**
Leaf lamina with 10–12 lateral veins each side of midrib;
fruit 3–7 mm diameter **4. B. leichhardtii**

1. *Bridelia exaltata* F.Muell., Fragm. 3: 32 (1862);
B. ovata var. *exaltata* (F.Muell.)
Muell.Arg. in DC., Prodr. 15(2): 495 (1866).
Type: New South Wales. Clarence River,
Beckler (holo: G-DC n.v. [fiche at BRI]).

[*Amanoa ovata* auct. non (Decne.) Baill.;
Baillon, *Adansonia* 6: 336 (1866)].

Illustrations: Francis (1981: 224, 225); Stanley (1983: 425, fig. 66A); Floyd (1989: 139); James & Harden (1990: 393); Hauser (1992: 128); Nicholson & Nicholson (1994: 17).

Shrub or small tree to 35 m high. Stems without prop roots, not buttressed. Bark ridged and fissured with corky plates although initially flat and nondescript, dark brown. Indumentum ferruginous to straw-coloured, generally deciduous. Young stems with sparse indumentum, soon glabrescent and lenticellate. Stipules linear, 3–4.5 mm long, 0.5–1 mm wide, usually deeply bifid, with sparse to dense indumentum. Leaves petiolate; petioles 5–10 mm long, 1.3–1.6 mm wide, grooved adaxially, same colour as lamina, with scattered indumentum; lamina elliptic, oblanceolate or obovate, up to 170 mm long and 60 mm wide with margins sinuate to weakly dentate and with distinct marginal vein; venation comprising 13–18 lateral veins per side of midrib and reticulate interlaterals; tip acute to shortly acuminate;

base cuneate to rounded; upper surface glossy green, glabrescent, with lateral veins distinct and interlateral veins indistinct; lower surface glaucous green, with scattered indumentum mainly on veins or glabrescent and with lateral veins and midrib prominent and raised and interlateral veins prominent. Inflorescence with 1–5 flowers in clusters; bracts lanceolate to triangular, 0.8–1.5 mm long, 0.5–1 mm wide, with scattered indumentum. Male flowers pedicellate; pedicels 1.2–1.5 mm long, glabrous; sepals lanceolate-ovate, 1.8–2 mm long, 0.8–1 mm wide, glabrous; disc circular with a slightly undulating margin, 1.5–1.8 mm diameter; petals spatulate, c. 0.8 mm long and 0.7 mm wide; staminal column c. 0.5 mm long, with filaments 1.4–1.5 mm long, anthers ± ellipsoid, 0.6–0.7 mm long, c. 0.5 mm wide; pistillode 1–1.2 mm long, shortly bilobed. Female flowers not seen. Fruits 2–5 per cluster; 2-seeded, ellipsoid, 8–13 mm long, 8–13 mm wide, slightly pedicellate, white or yellow when immature, black or brown when fully ripe. *Brush Ironbark, Scrub Ironbark, Grey Birch, Brown Birch*. Fig. 1B.

Selected additional specimens: Queensland, WIDE BAY DISTRICT: Bidwill, between Teddington & Maryborough, 25°36'S, 152°41'E, May 1994, *Smyrell* [AQ627901] (BRI); Pie Creek, Gympie district, Nov 1912, *Swain* 232 (BRI); Imbil, Jan 1918, *Weatherhead* 396 (BRI). MORETON DISTRICT: Brisbane River, Dec 1908, *Bailey* [AQ201664] (BRI); Hyne Estate road, SE of Kandanga, 26°24'S, 152°42'E, Apr 1995, *Bean*

8526 (BRI, MEL, NSW); 4.5 km WSW of Mt Alford, 28°05'S, 152°33'E, Apr 1986, *Bird* [AQ399846] (BRI, CANB); Toowong - Indooroopilly, Brisbane, Mar 1932, *Blake & Everist* [AQ201669] (BRI); Beenleigh, s.dat., *Michael* 1822 (BRI); Indooroopilly, Jun 1889, *Simmonds* [AQ201665] (BRI); Flinders Peak, May 1961, *Smith* [AQ201670] (BRI); Myer's Ferry, Southport, Mar 1932, *White* [AQ201666] (BRI); Mt Alford, Apr 1949, *White* 13004 (BRI); Pine Mt, 12 km N of Ipswich, 27°32'S, 152°45'E, Jun 1978, *Williams* 78079 & *Bird* (BRI). **New South Wales.** Tumbulgum, Apr 1898, *Baker* (NSW); Ballina, Dec 1892, *Bauerlen* 943 (NSW); Rivertree area, c. 38 miles [63.3 km] E of Liston, 25 miles [41.7 km] NW of Tabulam, Jul 1969, *Clark* 1788 *et al.* (BRI, NSW); Mallangamee, Richmond River, Apr 1936, *de Beuzeville* (NSW); Casino, Mar 1917, *Irby* (NSW).

Distribution and habitat: *B. exaltata* is endemic to Australia and occurs in south-eastern Queensland and north-eastern New South Wales (Map 1). The most northerly recorded locality for the species is at Teddington Weir and the most southerly locality at the Manning River (Floyd 1989). The species is to be found in notophyll vineforests (often with *Araucaria cunninghamii*) on a variety of soil types of volcanic or alluvial origins. Francis (1981), Floyd (1989), Hauser (1992) and Nicholson & Nicholson (1994) state that the fruit are eaten by birds.

Phenology: Flowers have been recorded in May, November and December, and fruits from January to June.

Notes: The type collection of *B. exaltata* was made by H. Beckler on the Clarence River in north-eastern New South Wales and was probably collected only a few years before Mueller described the species (F. Mueller 1862). The precise locality of the type collection cannot be determined, but there are modern collections from within this general area.

This species is poorly collected and I have not seen female flowers. It is often confused by collectors with large oblanceolate-leaved forms of *B. leichhardtii*. The two species may easily be distinguished by the number of lateral veins in the leaf lamina and the fruit size (see key to species). *B. exaltata* also grows in wetter vineforests than those where *B. leichhardtii* is found. Some localities given in Forster *et al.* (1991) for *B. exaltata* are referable to *B. leichhardtii* because they are

based on misidentification of juvenile plants of the latter species.

Uses: The wood of *B. exaltata* is suitable for building and turnery (Bailey 1888, 1902; Swain 1928; Francis 1981; Floyd 1989). Foliage of regrowth stems contains a prussic-acid yielding glycoside ("glucoside") that is poisonous to cattle (Francis 1981).

Conservation status: The majority of collections of this species are more than 20 years old and it is rarely encountered in the remnants of vineforest that still exist in its known range. Despite this, it should not be regarded as a threatened species at this stage. It is present in at least seven conservation reserves in Queensland (Forster *et al.* 1991) and eight conservation reserves in New South Wales (Floyd 1989).

2. *Bridelia finalis* P.I. Forst. sp. nov. affinis *B.*

erapensi S. Dressler sed foliis ellipticis, oblanceolatis vel obovatis (adversum folia ovata), folii lamina subtus brunneo-viridi, indumento velutino, sparso vel denso, stramineo vel ferrugineo (adversum folii laminam subtus griseo-viridem vel glaucam, indumentum puberulum sparsum brunneum) et bracteis inflorescentiae longioribus (2–3 mm adversum c. 1.3 mm longum) ab ea differens. **Typus:** Queensland. COOK DISTRICT: c. 7 km S of Stone Crossing & 18 km E of Myerfield, 12°27'S, 142°09'E, 23 April 1991, *J.R. Clarkson* 9032 & *V.J. Neldner* (holo: BRI; iso: QRS).

Bridelia sp. (Stone Crossing *J.R. Clarkson*+ 9032), Forster & Henderson (1994: 109); Forster & Henderson (1997: 71)]

Small tree to 10 m high. Stems not buttressed and lacking prop roots at base. Bark nondescript, becoming tessellated, cream. Indumentum ferruginous to straw-coloured, generally deciduous. Young stems with dense indumentum, soon glabrescent and lenticellate. Stipules lanceolate, 2–4 mm long, 1–1.2 mm wide, entire, with dense indumentum. Leaves petiolate; petioles 3–6 mm long, 1.5–2 mm wide, rounded adaxially, same colour as lamina, with dense indumentum; lamina elliptic, oblanceolate

or obovate, up to 170 mm long and 95 mm wide with margins entire and slightly sinuate and with distinct marginal vein; venation comprising 9–15 lateral veins per side of midrib and reticulate interlaterals; tip shortly acute to rounded; base rounded or weakly cordate; upper surface glossy green, with scattered indumentum on veins or glabrescent, with lateral veins distinct and interlateral veins indistinct; lower surface brown-green, with velutinous, sparse to dense indumentum all over, with lateral veins and midrib prominent and raised and interlateral veins prominent. Inflorescence with numerous flowers in clusters; bracts lanceolate-ovate to triangular, 2–3 mm long, 1–2 mm wide, with dense indumentum. Male flowers subsessile to 0.5 mm long, the pedicels with dense indumentum; sepals lanceolate, 2–2.8 mm long, 0.8–1 mm wide, glabrous; disc circular with a slightly undulating margin, 2–2.2 mm diameter; petals spatulate, c. 0.8 mm long and 0.6 mm wide; stamens and pistillode not seen. Female flowers pedicellate to 0.5 mm; sepals and petals same as for male flowers; inner disc deeply lobed with irregular erose tips, 1–1.5 mm long; ovary not seen; styles 2, c. 1 mm long, bifid once. Fruits 2 or 3 per cluster, 2-seeded, \pm globose, 5–6 mm long, 4–6 mm wide, pedicellate to 2 mm, pink-red when immature, red when fully ripe. Fig. 1E.

Additional specimens: Queensland. COOK DISTRICT: Airstrip Scrub, 1.2 km SE of Kalpowar Homestead, Kalpowar Pastoral Holding, 14°53'S, 144°10'E, Nov 1992, *Fell* DGF2717 & *Stanton* (BRI); Browns Peak, 75 km ENE of Lakefield Homestead, Starcke Pastoral Holding, 14°37'S, 144°49'E, May 1993, *Fell* DGF3240 *et al.* (BRI, CANB); Upper Howick River, 49 km ENE of Lakefield Homestead, Kalpowar Pastoral Holding, 14°42'S, 144°35'E, May 1993, *Fell* DGF3252 (BRI, MEL); Schram Scrub, 16 km NW of Moreton Telegraph Station, Bertiehaugh Holding, 12°20'S, 142°32'E, Apr 1994, *Fell* DGF4251 & *Pritchard* (BRI, CANB, DNA, QRS); 'Equina Scrub', 42 km W of Coen, Holroyd Pastoral Holding, 13°59'S, 142°48'E, Jun 1994, *Fell* DGF4402 & *Buck* (BRI, QRS); Bathurst Range, 19 km SSE of Bathurst Head, 14°25'S, 144°15'E, Jul 1994, *Fell* DGF4486 *et al.* (BRI, DNA, QRS); Possum Scrub, Weipa to Stones Crossing road, 12°27'S, 142°09'E, Jul 1993, *Forster* PIF13518A *et al.* (BRI, QRS); ditto, Jun 1994, *Forster* PIF15269 & *Tucker* (BRI, QRS); Mary Valley Scrub, 15°02'S, 143°45'E, Jul 1993, *Forster* PIF13441 *et al.* (BRI, QRS); Mt White, Coen, Jun 1996, *Forster* PIF19447 (BRI, QRS).

Distribution and habitat: *B. finalis* is endemic to Cape York Peninsula, Queensland (Map 3). The species grows in deciduous vine thicket on rocky slopes derived from quartzitic granites or on hard, red lateritic ridges.

Phenology: Flowers at anthesis have not been seen and they are probably present from December to February. Plants at Possum Scrub were examined in late November after extensive storm rain but still had only buds present. Ripe (or nearly so) fruit have been collected in April.

Notes: This new species was first collected in 1991 by J.R. Clarkson and V.J. Neldner and there have been few subsequent collections made.

B. finalis is superficially similar to the recently described *B. erapensis* S. Dressler from Morobe Province in Papua New Guinea and will key to that species in Dressler's key (Dressler 1996b). Both taxa are poorly known with complete morphological data for the flowers of both species lacking. Based on the available material, *B. finalis* differs from *B. erapensis* in its leaves being elliptic, oblanceolate or obovate (rather than ovate), the undersurface of its leaf lamina being brown-green, with velutinous, sparse to dense, straw to ferruginous coloured indumentum (rather than the undersurface of the leaf lamina being grey-green to glaucous, with puberulous, sparse, brown coloured indumentum), and longer inflorescence bracts (2–3 mm rather than c. 1.3 mm). *B. finalis* also has coriaceous leaves (pers. obs. of live plants) whereas *B. erapensis* is described by Dressler as having chartaceous to subcoriaceous leaves. It is difficult to determine from the two herbarium collections of *B. erapensis* available to me (duplicates at BRI of Hartley 12224 and Henty NGF10692) whether this is a genuine additional distinction, but the New Guinean species does seem to be a less robust plant in terms of its foliage. The two species are undoubtedly closely allied and further collections may well reveal that they are conspecific.

The localities recorded for *B. erapensis*, although encompassing "lowland monsoon or rain forests" (cf. Dressler 1996c) (notophyll vineforests), are not subjected to the extremes

of dry-season water deficiency found where *B. finalis* grows on Cape York Peninsula. The vineforests where *B. erapensis* occurs have a well-developed ground and epiphyte flora (pers. obs. 1992). By contrast, habitats for *B. finalis* have little in the way of a ground flora and epiphytes are few.

Uses: No uses have been recorded for this species. It grows large enough in some situations to produce millable timber and could be useful for turnery.

Conservation status: *B. finalis* is widespread on Cape York Peninsula but infrequently collected. It is superficially similar to *Cleistanthus peninsularis* Airy Shaw and some taxa of Annonaceae and is likely to be overlooked by the majority of collectors. No conservation coding is considered necessary at this stage.

Etymology: The specific epithet is formed from the Latin *finalis* (of the end) and reflects the author's concept of species delimitation in the Australian taxa of *Bridelia*.

3. *Bridelia insulana* Hance, J. Bot. 15: 337 (1877). **Type:** Cochinchina, in ins. Phukok, Feb 1874, *Pierre* 19762 (holo: BM n.v. (fide Dressler (1996c: 315); iso: K n.v. (fide Dressler (l.c.), P n.v. [photo at BRI]).

Bridelia penangiana Hook.f., Fl. Brit. India 5: 272 (1887). **Type:** Malaysia. Penang, Government Hill, 1885, *C. Curtis* 527 (holo: K n.v. [photo at BRI]).

Bridelia minutiflora Hook.f., Fl. Brit. India 5: 273 (1887). **Type:** Burma. Tenasserim, Mergui, *Griffith* 867 (holo: K n.v. [photo at BRI]).

Illustrations: Christophel & Hyland (1993: 98, plate 36h); Cooper & Cooper (1994: 59).

Shrub or small tree to 10 m high. Stems buttressed with prop roots at base, often with 'spines' (immature prop roots) on lower trunk. Bark nondescript, becoming tessellated and flaky, cream. Indumentum ferruginous to straw-coloured, generally deciduous. Young stems with sparse to dense indumentum, soon

glabrescent and lenticellate. Stipules linear-oblong to lanceolate, 2.5–5.5 mm long, 1–1.2 mm wide, entire, with dense indumentum. Leaves petiolate; petioles 6–9 mm long, 1–1.8 mm wide, rounded adaxially, black & tessellated, with scattered indumentum; lamina elliptic to obovate, up to 230 mm long and 90 mm wide with margins entire and slightly sinuate and with distinct marginal vein; venation comprising 10–13 lateral veins per side of midrib and reticulate interlaterals; tip shortly acuminate to obtuse; base cuneate to rounded; upper surface glossy green, glabrescent, with lateral veins distinct, interlateral veins indistinct; lower surface pale brownish-green and with scattered indumentum mainly on veins, lateral veins and midrib prominent and raised and interlateral veins prominent. Inflorescence with numerous flowers in clusters; bracts lanceolate-ovate, c. 1.5 mm long and 1 mm wide, with sparse indumentum. Male flowers pedicellate, to 0.5 mm long, with sparse to dense indumentum; sepals lanceolate-ovate to triangular, 1–1.5 mm long, 0.7–1 mm wide, glabrous; disc circular with a slightly undulating margin, 1–1.6 mm diameter; petals spatulate to suborbicular with the tip crenate, 0.4–0.5 mm long, 0.3–0.5 mm wide; staminal column 0.6–0.7 mm long with filaments 0.7–0.9 mm long, anthers \pm ellipsoid, 0.4–0.5 mm long, 0.4–0.5 mm wide; pistillode 0.3–0.4 mm long, shortly bilobed. Female flowers \pm sessile, sepals and petals same as for male flowers; inner disc of irregular lobing c. 0.5 mm long; ovary ellipsoid, c. 0.5 mm long, 0.3–0.5 mm wide, glabrous; styles 2, 1.2–1.5 mm long, bifid. Fruits 5–12 per glomerule, 1-seeded, ellipsoid, 5–10 mm long, 3–6 mm wide, subsessile, pink-green when immature, red to purple-black when fully ripe. Fig. 1C.

Selected additional specimens: Queensland. COOK DISTRICT: Rocky River Scrub, Silver Plains, 13°48'S, 143°28'E, Jul 1993, *Forster* PIF13644 *et al.* (BRI, MEL, QRS); S.F.R. 310, Parish of Gadgarra, Goldsborough L.A., 17°13'S, 145°46'E, Jan 1985, *Gray* 3853 (QRS); Eubenangee Swamp, near Babinda, 17°20'S, 145°55'E, Oct 1969, *Hyland* [AQ201719] (BRI); Claudie River, between the camp & the airport, 12°50'S, 143°20'E, Oct 1972, *Hyland* RFK2711 (BRI, NSW, QRS); Claudie River, 12°45'S, 143°15'E, Oct 1973, *Hyland* 7003 (BRI, QRS); ditto, Oct 1974, *Hyland* 7801 (BRI, QRS); Cairns Botanic Gardens, Red Arrow Walk, 16°54'S, 145°45'E, Jun 1976,

Hyland RFK3437 (BRI, QRS); Porn. 195 Parish of Clerk, Nov 1983, *Hyland* 12908 (QRS); NE side of Lamond Hill, Iron Range, 12°43'S, 143°18'E, Nov 1986, *Jessup* 783 (BRI); Cairns, Currunda Creek, 16°56'S, 145°41'E, Jan 1992, *Lyons* 107 (BRI); South Mossman River, 16°29'E, 145°23'E, Sep 1987, *Sankowsky* 645 (BRI); Mossman River, 1886, *Sayer* [AQ201717] (BRI); Oliver Creek, Cape Tribulation area, 16°06'S, 145°27'E, May 1972, *Webb & Tracey* 11583 (BRI); Between Stony Point & Mosquito Point, 12°25'S, 143°16'E, Dec 1977, *Webb & Tracey* 13848 (BRI); Little Mulgrave, 17°08'S, 145°42'E, Jan 1954, *White* [AQ201722] (BRI). NORTH KENNEDY DISTRICT: Mission Beach, 17°52'S, 146°07'E, Oct 1967, *Hyland* 1182 (BRI).

Distribution and habitat: *B. insulana* occurs in north-eastern Queensland in a number of disjunct localities in the Wet Tropics and on Cape York Peninsula (Map 2). It is also widespread in Malasia and the Indian subcontinent (Dressler 1996c). Plants grow in notophyll or mesophyll vineforest on alluvium or volcanic soils.

Phenology: Flowers have been recorded mainly from October to December, but there are occasional records from other months. Fruits have been recorded mainly from December to April, but there are occasional records from other months.

Notes: This species was first recorded for Australia as *B. minutiflora* Hook.f. by White (1936) based on collections by Sayer from the Mossman River area and Ladbrooke from the Johnstone River area. Airy Shaw (1976, 1980a,b) included the species under *B. penangiana* Hook.f. Dressler (1996b,c), following a paper by Li (1988), included both *B. minutiflora* and *B. penangiana* in synonymy with *B. insulana* Hance.

Dressler (1996b), in his key to New Guinean *Bridelia* species, stated that *B. insulana* lacks a distinct marginal vein in its leaves. All of the Australian and extra-Australian material I have seen of this taxon definitely has a marginal vein in the leaves, hence this character should be deleted from Dressler's key.

Uses: The species rarely grows large enough to produce millable timber. There are no uses recorded for it.

Conservation status: Common and widespread.

4. *Bridelia leichhardtii* Baill. ex Muell. Arg. in DC., Prodr. 15(2): 499 (August 1866) [as '*Bridelia leichhardi*']. **Type:** Queensland. MORETON DISTRICT: nr Camerons brush, Moreton Bay, 1844, *Leichhardt* (holo: P n.v. [photo at BRI]).

Amanoa faginea Baill., *Adansonia* 6: 336 (Sept 1866); *Bridelia faginea* (Baill.) Benth., Fl. Austral. 6: 120 (1873). **Type:** Queensland. PORT CURTIS DISTRICT: Rockhampton, 1863, *Dallachy* 17 (syn: MEL); Frenchmen Creek, 1863, *Dallachy* 259 (syn: MEL); Rockhampton, *Thozet* 76 & 172 (syn: MEL).

Bridelia melanthesoides var. *australiensis* Gehrm., Bot. Jahrb. 91, Beibl. 95: 35 (1908). **Type:** not designated.

Bridelia leichhardtii var. *glabrata* Domin, Biblioth. Bot. 89: 325 (1927) [as '*Bridelia leichardtii*']. **Type:** Queensland. PORT CURTIS DISTRICT: "Emu Park bei Rockhampton", Mar 1910, *Domin* (holo: ?PR n.v.).

Illustrations: Williams (1987: 47); Hauser (1992: 129).

Shrub or small tree to 6 m high. Stems without prop roots, not buttressed. Bark ridged and fissured, with corky plates, blackish. Indumentum ferruginous to straw-coloured, generally deciduous. Young stems with sparse to dense indumentum, soon glabrescent and lenticellate. Stipules linear, 1–1.5 mm long, 0.2–0.3 mm wide, entire, with sparse to dense indumentum. Leaves petiolate; petioles 2–5 mm long, 0.3–0.5 mm wide, grooved adaxially, same colour as lamina, with scattered to sparse indumentum; lamina elliptic, oblanceolate, obovate or rarely suborbicular, up to 100 mm long and 45 mm wide with margins entire to weakly dentate and without distinct marginal vein; venation comprising 10–11 lateral veins per side of midrib and reticulate interlaterals; tip acute to rounded; base cuneate to rounded; upper surface glossy green, glabrescent, with lateral veins distinct and interlateral veins indistinct; lower surface pale brownish-green,

with scattered indumentum mainly on veins, lateral veins and midrib prominent and raised and interlateral veins prominent. Inflorescence with 1 or 2 flowers in clusters; bracts lanceolate to triangular, 0.5–0.7 mm long, 0.5–0.7 mm wide, with sparse indumentum. Male flowers subsessile or pedicellate; pedicels to 1 mm long, glabrous; sepals lanceolate, 1.5–2 mm long, 0.8–1 mm wide, glabrous; disc circular with a slightly undulating margin, c. 1.5 mm diameter; petals spatulate with the tip crenate, 0.5–0.8 mm long, 0.5–0.8 mm wide; staminal column 1–1.2 mm long with filaments 0.5–0.8 mm long, anthers roughly ellipsoid, 0.4–0.6 mm long, 0.3–0.5 mm wide, pistillode 0.5–0.8 mm long, shortly bilobed. Female flowers \pm sessile, sepals and petals same as for male flowers; inner disc of 4 or 5 lobes 0.8–1 mm long that almost totally enclosing the ovary with margins irregularly erose; ovary ellipsoid, 1.8–2 mm long, 1.5–2 mm wide, glabrous; styles 2, 0.4–0.5 mm long, bifid. Fruits 1 or 2 per cluster; 2-seeded, globose, 3–7 mm long, 3–7 mm wide, slightly pedicellate, red when immature, black or purple-black when fully ripe. *Scrub Ironbark*, *Small-leaved Brush Ironbark*. Fig. 1A, F–J.

Selected additional specimens: Queensland. NORTH KENNEDY DISTRICT: NW of Pentland near "Lowholm", Jul 1954, *Blake* 19372 (BRI); Forty Mile Scrub, S of Mt Garnet, 18°07'S, 144°49'E, Jan 1992, *Forster* PIF9642 (A, B, BRI, DNA, K, L, MEL, QRS); Barrabas Scrub, 20°05'S, 146°55'E, May 1972, *Stocker* 863 (BRI, QRS). LEICHHARDT DISTRICT: Melaleuca Creek Scrub, "Rookwood", 23°12'S, 149°46'E, Apr 1991, *Forster* PIF7927 & *McDonald* (BRI, MEL, QRS); 3 km S of Cracow Station Homestead, 25°24'S, 150°18'E, Jul 1990, *Forster* PIF7063 (BRI, MEL, QRS); Mt Zamia E.P., Springsure, 23°33'S, 148°05'E, Mar 1990, *Melzer* 6 (BRI). BURNETT DISTRICT: Along Barambah Creek, Mar 1952, *Blake* 18821 (BRI); Coalstoun Lakes N.P., 25°35'S, 151°54'E, Mar 1991, *Forster* PIF7827 (BRI, MEL, QRS). WIDE BAY DISTRICT: 10 km NNE of Booyal, Cordalba S.F. 832, Jan 1988, *Forster* PIF3340 *et al.* (BRI); Utopia, 14 km SSE of Biggenden, 25°38'S, 152°06'E, Dec 1991, *Forster* PIF9217 (BRI, K, L, MEL, QRS); Dundowran, Jul 1928, *Tyron* [AQ201707] (BRI); Mary Creek, c. 20 km S of Glastonbury, 26°22'S, 152°22'E, Apr 1978, *Sharpe* 2337 (BRI). DARLING DOWNS DISTRICT: "Browns Scrub", Meringandan, 27°26'S, 151°55'E, May 1985, *McKenzie* [AQ398285] (BRI). MORETON DISTRICT: NW slopes of Mt French, 28°00'S, 152°37'E, Jul 1983, *Bird & Williams* [AQ399327] (BRI); Mt Russel, 16 miles [26.7 km] SW of Oakey, Apr 1963, *Hockings* 3 (BRI); Kalbar, Jan 1936, *Smith* [AQ201690] (BRI); Pine Mt, 12 km N of Ipswich,

27°32'S, 152°45'E, Jun 1978, *Williams* 78101 (BRI); Splyard Creek dam, 27°21'S, 152°40'E, Dec 1983, *Williams* 83084 (BRI, NSW).

Distribution and habitat: *B. leichhardtii* is endemic to Australia and occurs in central and southern Queensland in coastal and subcoastal areas (Map 2). Plants grow in vineforests and vinethickets on a variety of soil types usually of volcanic or alluvial origins. The statement by Stanley (1983) that the species grows in open woodland is incorrect.

Phenology: Flowering has been recorded between October to February. Fruiting has been recorded between January and August.

Typification: The type collection (perhaps the first herbarium collection) of *B. leichhardtii* was collected by Ludwig Leichhardt in his traverse of the Moreton Bay area in 1844. Annotations on the sheet state that the specimen was collected at "Camerons Scrub" which is thought to be near Fassifern in the Lockyer Valley west of Brisbane (R.J.F. Henderson, pers. comm. 1998). The name *B. leichhardtii* (as *B. leichardi*) was first proposed by Baillon (1858) but as a nomen nudum, and was subsequently validated by J. Mueller (1866). Publication of J. Mueller's account predates that of Baillon (1866) where the name *Amanoa faginea* Baill. is validly published (Henderson 1992).

Gehrmann (1908) described *B. melanthesoides* var. *australiensis* Gehrm. but did not explicitly mention a type. The name was reduced without comment to the synonymy of *B. leichhardtii* by Jablonsky (1915), although he did cite a representative specimen at B under the account of *B. leichhardtii* (cited as 'J.M. Bailey' from 'Brisbane'). It is possible that this is the specimen upon which Gerhmann based his name, but without location and examination of the actual sheet (now probably destroyed) resolution of the precise status of the name is not possible. At BRI there is a 'F.M. Bailey' specimen from 'Main Range' [AQ201715] and this may be a duplicate of the collection once at B. The Bailey specimen is *B. leichhardtii*.

Notes: There is considerable phenotypic variation in leaf size and shape in different populations of *B. leichhardtii*. Juvenile or

shaded foliage is often oblanceolate in shape and approaches both the leaf size and shape commonly encountered in *B. exaltata*. Exposed foliage, particularly that from subcoastal vine-thicket populations, is extremely microphyll in size and may be almost orbicular in shape.

Uses: The species rarely grows large enough to produce millable timber but its wood may have potential for cabinet making and turnery as it is reputed to be easily worked (Bailey 1888, 1902). The foliage contains a prussic acid yielding glycoside (“glucoside”) that is poisonous to cattle (Francis 1981).

Conservation status: Widespread and not rare or threatened. Present in at least 15 conservation reserves in Queensland (Forster et al. 1991).

4. *Bridelia tomentosa* Blume, Bidjr. 597 (1826); *Amanoa tomentosa* (Blume) Baill., Adansonia 6: 336 (1866). **Type:** Java, *Blume s.n.* (lecto: L n.v. [photo at BRI]; iso: BM, BR, NY (all n.v.), fide Dressler 1996c: 298).

Bridelia tomentosa var. *glabrescens* Benth., Hook. J. Bot. 6: 8 (1854). **Type:** Hongkong, East Point, Hedges, *Champion s.n.* (holo: n.v.).

Bridelia glabrifolia Merr., Enum. Philipp. Flow. Pl. 2: 422 (1923); *B. tomentosa* var. *glabrifolia* (Merr.) Airy Shaw, nom. illeg., Kew Bull. 31: 383 (1976); *B. tomentosa* var. *lancifolia* Muell. Arg. in DC., Prodr. 15(2): 502 (1866) as “*lanceaefolia*”, non *B. lancifolia* Roxb. **Type:** Philippines, Manila, *Gaudichaud* (holo: G n.v. [photo at BRI]).

Bridelia tomentosa var. *trichadenia* Muell. Arg. in DC., Prodr. 15(2): 501 (1866). **synon. nov. Type:** Northern Territory, Arnhemland, *F. Mueller s.n.* (holo: G-DC n.v. [fiche at BRI]).

Bridelia tomentosa var. *ovoidea* Benth., Fl. Austral. 6: 120 (1873). **Type:** Northern Territory, Wood Island, *Gulliver s.n.* (holo: K n.v. [photo at BRI]; iso: MEL [515966, 515967]).

Bridelia phyllanthoides W. Fitz., J. Proc. Roy. Soc. W. Aust. 3: 163 (1918). **Type:** Western Australia, base of Mt Broome, 1905, *W.V. Fitzgerald* 823 (holo: NSW).

Bridelia tomentosa var. *eriantha* Airy Shaw, Kew Bull. 31: 384 (1976). **synon. nov. Type:** Northern Territory, c. 6 miles [10 km] N of Pine Creek township, 6 March 1965, *M. Lazarides* 145 & *L.G. Adams* (holo: K n.v.; iso: BRI, CANB, DNA, NSW).

[*Bridelia ovata* auct. non Decne.; Bentham (1873: 120)].

Illustrations: Levitt (1981: Plate 18); Brock (1988: 102); Dunlop et al. (1995: 211).

Shrub to 4 m high. Stems without prop roots, not buttressed. Bark lightly fissured, cream. Indumentum ferruginous to straw-coloured, generally deciduous. Young stems with dense indumentum, soon glabrescent and lenticellate. Stipules linear to linear-lanceolate, 2–3.5 mm long, 0.3–1 mm wide, entire, with scattered to dense indumentum. Leaves petiolate; petioles 2.5–4 mm long, 0.5–1 mm wide, rounded adaxially, brownish, with sparse to dense indumentum; lamina elliptic, oblong, oblanceolate, obovate or orbicular, up to 90 mm long and 55 mm wide, with margins entire and sinuate, and with distinct marginal vein; venation comprising 9–11 lateral veins per side of midrib and reticulate interlaterals; tip acute, obtuse or rounded; base cuneate to rounded; upper surface matt green, with scattered indumentum or glabrescent, with lateral veins distinct and interlateral veins indistinct; lower surface glaucous pale blue-green, with scattered to dense indumentum mainly on veins or glabrescent, lateral veins and midrib prominent and raised, and interlateral veins prominent. Inflorescence with numerous flowers in clusters; bracts lanceolate to triangular, 0.5–0.7 mm long, 0.4–0.5 mm wide, with scattered indumentum. Male flowers pedicellate; pedicels to 1.5 mm long, glabrous; sepals lanceolate-ovate, 0.8–1.6 mm long, 0.7–0.8 mm wide, glabrous; disc circular with a slightly undulating margin, 1–1.2 mm diameter; petals spatulate to obovate with the tip crenate, 0.5–0.8 mm long, 0.4–0.5 mm wide;

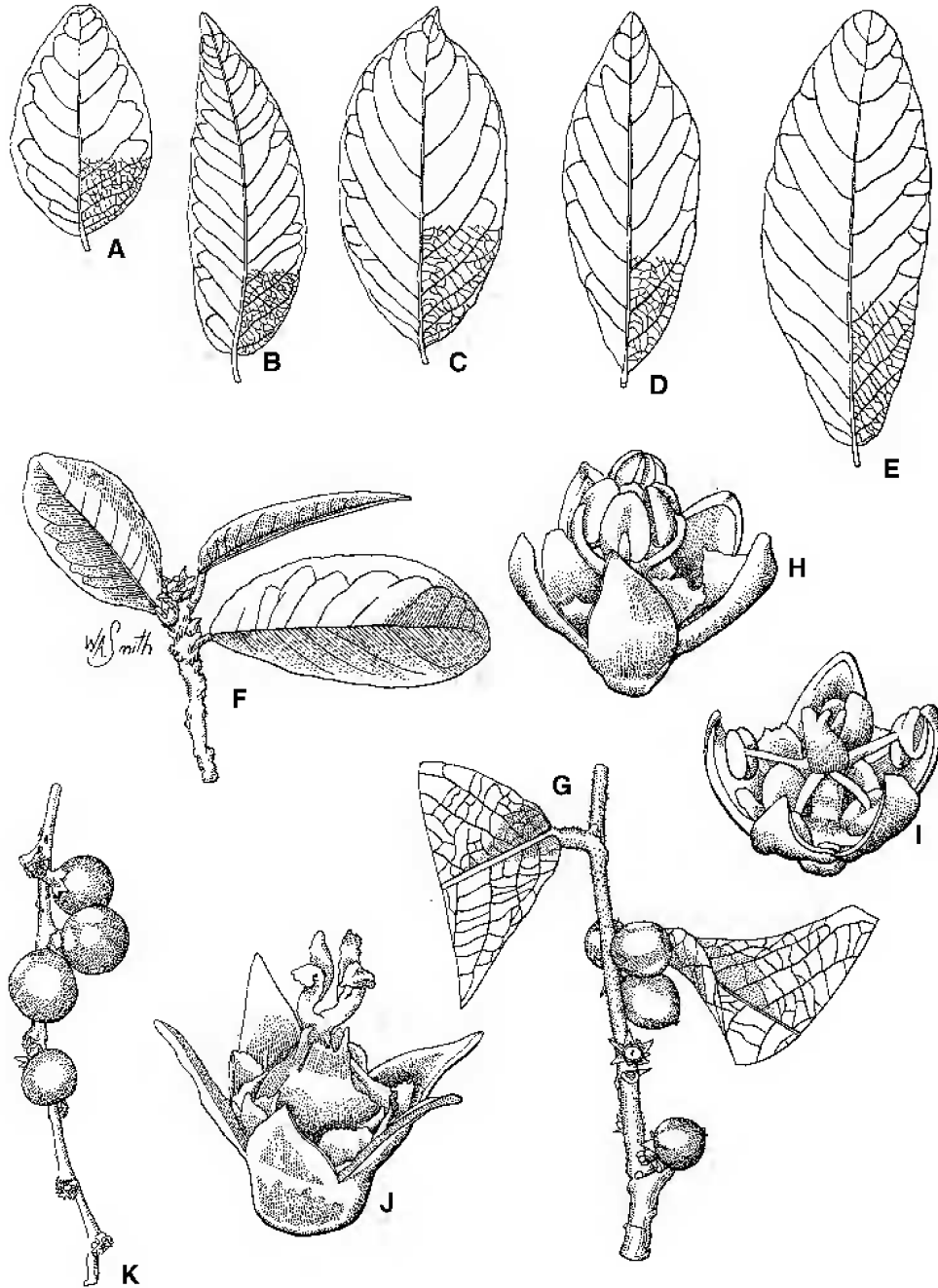


Fig. 1. *Bridelia*. A,F-J. *B. leichhardtii*, B. *B. exaltata*, C. *B. insulana*, D,K. *B. tomentosa*, E. *B. finalis*. A-E. undersurface of mature leaf showing lateral and interlateral venation. x 0.5. F. flowering twig. x. 1.5. G. fruiting twig. x. 1.5. H. male flower with stamens inflexed around pistillode. x 12. I. male flower with stamens reflexed and pistillode obvious. x 12. J. female flower. x 12. K. fruiting twig. x 1.5. A from Forster 14863 (BRI); B from Bean 8526 (BRI); C from Hyland 7801 (BRI); D from Forster 13555 (BRI); E from Fell DGF4251 (BRI); F & J from Forster 9642 (BRI); G from Forster 13297 (BRI); H & I from Forster 3304 (BRI); K from Clarkson 9643 (BRI). Del. W. Smith.

staminal column 0.4–0.5 mm long with filaments 0.2–0.5 mm long, anthers roughly ellipsoid, 0.3–0.5 mm long, 0.2–0.3 mm wide, pistillode 0.4–0.5 mm long, shortly bilobed. Female flowers pedicellate to 1.5 mm, sepals and petals same as for male flowers; inner disc irregularly lobed, lobes to 0.5 mm long; ovary ellipsoid, c. 0.8 mm long, 0.5–0.6 mm wide, glabrous; styles 2, 0.4–0.6 mm long, bifid. Fruits 1–10 cluster; 2-seeded, globose to ellipsoid, 3.5–5 mm long, 2–6 mm wide, slightly pedicellate, red-brown when immature, black when fully ripe. Fig. 1D,K.

Selected additional specimens: Western Australia. Bougainville Peninsula, 2 km SW of August Pool, Vansittart Bay, 14°05'S, 126°11'E, May 1984, *Forbes* 2200 (CANB, MEL, PERTH); Lone Dingo between Mitchell Plateau Mining Camp & Port Warrender, 14°35'S, 125°43'E, May 1981, *Tracey* 15024 (BRI); Walsh Point-Port Warrender, 14°34'S, 125°45'E, May 1981, *Tracey* 15185 (BRI). **Northern Territory.** Douglas Hot Springs, 13°45'S, 131°27'E, Feb 1989, *Clark* 1705 (BRI, DNA); Nhulunbuy, Gove Peninsula, 12°10'S, 136°52'E, Apr 1982, *Hinz* 155 (BRI, DNA); Wunya Beach, Aurari Bay, Arnhem Land, 11°43'S, 133°13'E, Jun 1988, *Munir* 6160 (AD, BRI); Little Lagoon, Groote Eylandt, May 1948, *Specht* 400 (BRI, PERTH); Bauhinia Downs Station, Alligator Stockyard waterholes, 16°04'S, 135°23'E, May 1985, *Wightman* 1843 & *Leach* (BRI, CANB, DNA). **Queensland.** COOK DISTRICT: South Island, near Lizard Island, 14°42'S, 145°28'E, Jul 1990, *Batianoff* 12196 & *Hegerl* (BRI); Lockerbie, 10 miles WSW of Somerset, Apr 1948, *Brass* 18485 (BRI); 5 km WSW of Bertiehaugh Homestead, 12°12'S, 142°28'E, Jul 1988, *Dalliston* CC181 (BRI); c. 3.5 km WSW of Lamond Hill, middle of Claudie River, 12°43'S, 143°46'E, Apr 1990, *Fell* 2054 (BRI, QRS); Peach Creek, 19 km along road to Leo Creek mine, Mellwraith Range, 13°42'S, 143°13'E, Jun 1992, *Forster* PIF10066 *et al.* (BRI, QRS); Garraway Creek Crossing, Iron Range road, 12°43'S, 143°09'E, Jul 1993, *Forster* PIF13555 & *Tucker* (BRI, K, MEL, QRS); Robber Tree Scrub, Iron Range area, 12°44'S, 143°15'E, Jun 1994, *Forster* PIF15398 (BRI, QRS); Foot of Byerstown Range, 16°00'S, 144°50'E, Mar 1975, *Hyland* 8137 (BRI, QRS); between Weipa turnoff on Telegraph Line & York Downs, Apr 1980, *Morton* 726 (BRI). NORTH KENNEDY DISTRICT: Elliot Toe, Bowling Green Bay N.P., 9 km NNE of Woodstock, 19°31'S, 146°52'E, May 1991, *Forster* PIF8353 & *Bean* (BRI, K, MEL, QRS); Bennett Road, Strathdickie, Feb 1988, *Perry* [AQ437033] (BRI).

Distribution and habitat: *B. tomentosa* is widespread in northern Australia in Western Australia, the Northern Territory and Queensland (Map 1). The species is also widespread in Asia, Malesia and Indochina

(Dressler 1996c). In Australia, *B. tomentosa* grows in open woodland and in, or along the margins of, deciduous vine thickets, on a variety of substrates.

Phenology: Flowers have been recorded from February to May and fruits from May to August.

Typification: *B. tomentosa* (as *B. tomentosa* var. *trichadenia* Muell.Arg.) was first recorded for Australia by J. Mueller (1866) based on material collected by F. Mueller in the Northern Territory. Bentham (1873) referred to material of this species as both *B. tomentosa* and *B. ovata*, this latter name being a misapplication to the Australian material.

Dressler (1996c) stated that Airy Shaw lectotypified the name *B. tomentosa* with a Blume collection at BO and that other specimens of apparently the same collection at BM, BR, L and NY are isolectotypes. Airy Shaw (1980) stated "Type: Java, 'in montanis Bantam et Buitenzorg', *Blume* (BO)". This is probably wishful thinking on Airy Shaw's part as, according to A. Kostermans (pers. comm. 1992) he never visited that institution nor obtained material on loan from it. Despite this, he often indicated specimens as being present at BO without definite evidence (cf. Forster 1997). There are many collections of Blume's at BO with the majority not in type folders and often difficult to locate (Forster 1994; Forster & Liddle 1994). I could not locate the Blume collection of *B. tomentosa* at BO in 1992; however, this should not be construed as definite evidence that it does not exist. Regardless of its existence or otherwise, I believe that Airy Shaw did not lectotypify the name in 1980, rather he was indicating where he thought the collection might be. If this is the case then the three sheets of this collection at L (L903155-234, L903155-231 and L903155-238) should be regarded as lectotype of the name, and the remaining sheets at other herbaria as isolectotypes.

A similar situation is associated with typification of *B. glabrifolia* Merr. which is a renaming of *B. tomentosa* var. *lancifolia* Muell.Arg. (non *B. lancifolia* Roxb.). Dressler (1996c) once again copied Airy Shaw (1980b)

and stated that the type, *Gaudichaud* s.n., is in G-DC and that lectotypification was undertaken by Airy Shaw. This specimen is not in G-DC but was located by L.W. Jessup in the undetermined Euphorbiaceae holdings in G in 1994.

Notes: *B. tomentosa* is a variable species in Australia, mainly with regard to leaf shape and indumentum density. Airy Shaw (1980b) recognised four varieties for the Australian material of this species, although he did not provide a key to distinguish them. Dressler (1996c) recognised two varieties of this species, based on leaf indumentum density.

What may seem to be distinct variants to the herbarium-based worker are often demonstrated to be merely extremes or examples of phenotypic expression. Examination of many populations of *B. tomentosa* revealed that indumentum density (and also leaf shape) is quite variable depending on leaf age, shading and substrate. Plants from localities that have high insolation and severe seasonal water deficit stress tend to have small leaves with denser indumentum. Good examples of this may be seen in the populations of *B. tomentosa* from the limestone karsts near Chillagoe in Queensland. All of these plants have quite a dense indumentum. As with other taxa at Chillagoe, this indumentum is often lost or is not as dense when the plant is grown elsewhere (cf. Forster 1995). Hence, leaf indumentum density in *B. tomentosa* appears to vary continuously and is therefore, no basis whereupon varieties can be formally recognised.

Uses: The fruit of *B. tomentosa* are eaten by aboriginal people in the Northern Territory and known by various local names (Brock 1988; Levitt 1981; Russell-Smith 1985).

Conservation status: Common and widespread.

Acknowledgements

W. Smith (BRI) provided the illustrations. Field collections were facilitated or made with the assistance on different occasions of A.R. Bean, L.H. Bird, D. Fell, G. Kenning, D. & I. Liddle, C. Lyons, R. Jensen, G. & N. Sankowsky,

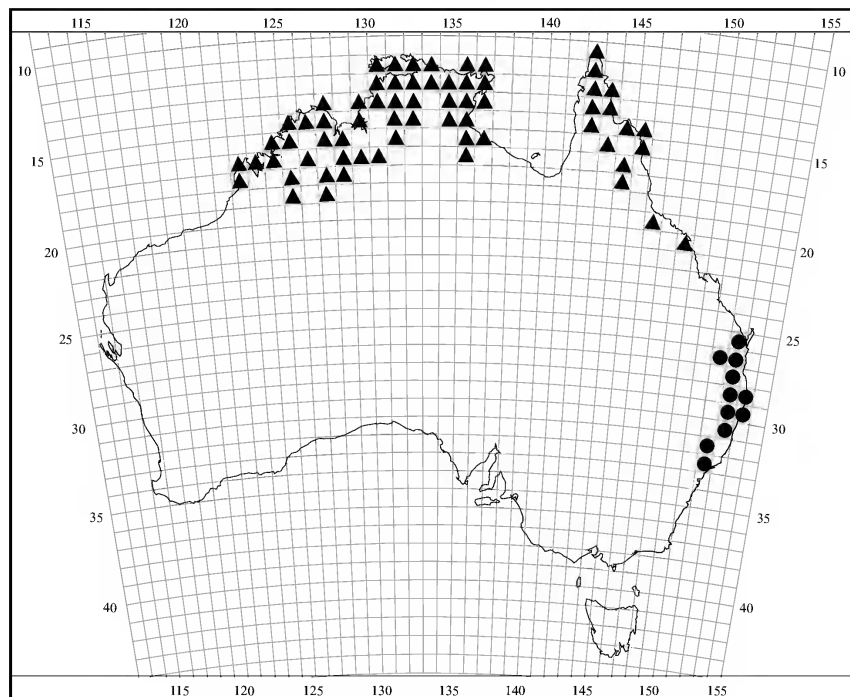
G. Smyrell and M.C. Tucker. Translation of the diagnosis into Latin was undertaken by P.D. Bostock who also commented on the manuscript. Various specimens in European herbaria were located and photographed by L.W. Jessup and D.B. Forman during their respective tenures as Australian Botanical Liaison Officer at Kew, U.K. This work was part of a preferred objective project funded by the Australian Biological Resources Study during 1992-1995.

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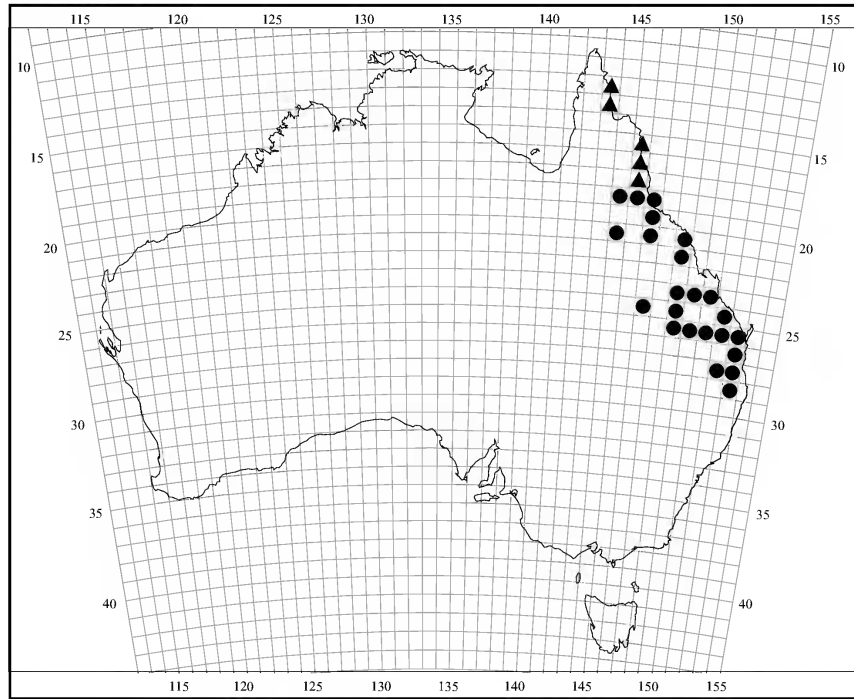
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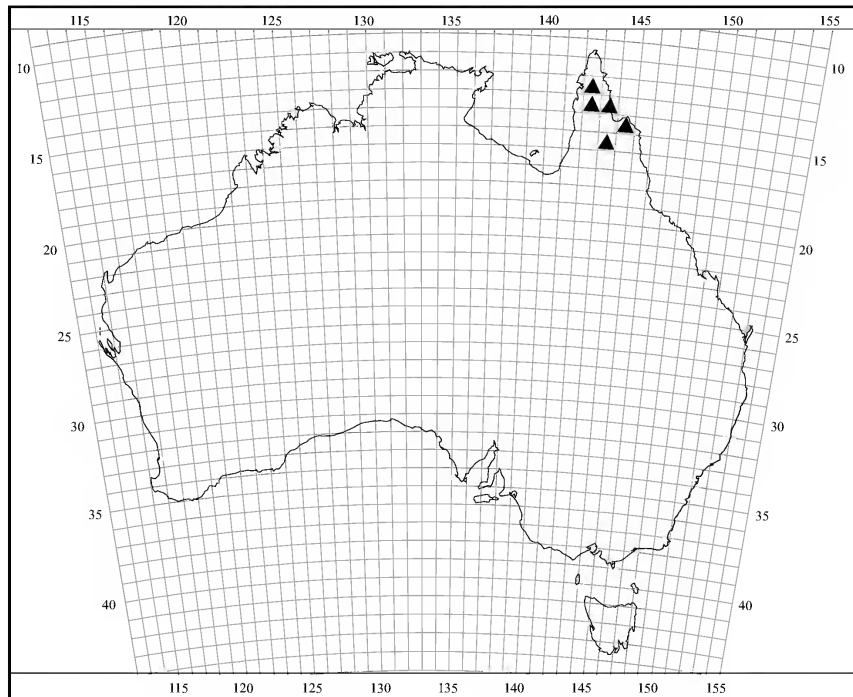
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Map 1. Distribution of ●*Bridelia exaltata* and ▲*B. tomentosa*.



Map 2. Distribution of ● *Bridelia insulana* and ▲ *B. leichhardtii*.



Map 3. Distribution of ▲ *Bridelia finalis*.