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## A TAXONOMIC REVISION OF THE GENUS *PREMNA* L. (VERBENACEAE)\* IN AUSTRALIA

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### Abstract

A taxonomic revision of *Premna* in Australia is presented. The following seven species are recognised: *P. herbacea*, *P. serratifolia*, *P. lignum-vitae*, *P. dallachyana*, *P. hylandiana*, *P. acuminata* and *P. odorata*. *P. hylandiana* (from Queensland) is described as new and *P. odorata* is recorded from Australia for the first time. *P. serratifolia* is reinstated as the oldest valid name for the polymorphic species previously often named *P. integrifolia*, *P. obtusifolia* or *P. corymbosa*. A wide range of material of the non-endemic species has been examined from South-East Asia and Malesia.

The affinities and distribution are considered for the genus and each species. A key to the species is provided and a detailed description of each species is supplemented by a habit sketch of a flowering branch and analytical drawings of the flower.

### Taxonomic History of the Genus

The genus *Premna* was described by Linnaeus (1771) for two species, *P. integrifolia* and *P. serratifolia*, which were collected by Paul Hermann in Ceylon. It was placed in "Didynamia Angiosperma", where it was retained by Murray (1774), Gmelin (1791), Schreber (1791), Persoon (1797), Willdenow (1800), Poiret (1823), Sprengel (1825, 1831), Roxburgh (1832), Blanco (1837), Dietrich (1843) and a few others. Scopoli (1777) placed it in "Personatar" which was later accepted for the genus by Giseke (1792) and Batsch (1802). Gaertner (1788) recorded it in "Centuria Quarta", Jussieu (1789) in "Vitices", Necker (1790) in this "Plasyrgophyta", and Reichenbach (1828) under the tribe "Verbeneae" in the Labiatae. In 1806, de Jussieu referred it to the family Verbenaceae where it has been retained by the majority of botanists.

Bartling (1830) split the Verbenaceae into two sections:- Viticeae and Verbenae, with *Premna* in the section Viticeae. This section was accepted for the genus by Spach (1840). In 1836, Endlicher divided the family into three tribes:- Lippieae, Lantaneae and Aegiphileae, with *Premna* in the tribe Lantaneae. This tribe was accepted for the genus by Meisner (1840), Endlicher (1841), Brongniart (1843), Dietrich (1843) and Walpers (1845). Schauer (1847) classified the Verbenaceae into three new tribes:- Verbenae, Viticeae and Avicenniae, with *Premna* in the tribe Viticeae. The genus was retained in the new tribe by Walpers (1852), Miquel (1858), Bentham (1870), Bentham & Hooker (1876), Bailey (1883, 1901, 1913), Hooker (1885), Durand (1888), King & Gamble (1909), Ewart & Davies (1917), Fletcher (1938), Lemée (1943) and a few others. Schauer (1847) subdivided the tribe Viticeae into three subtribes:- Symphoremeeae, Caryopterideae and Viticeae, with *Premna* in the subtribe Viticeae. He also split the genus into two sections:- *Gumira* and *Premnos*, based chiefly on their calyx being regularly 4- or 5-toothed. The subtribe Viticeae was later accepted for the genus by Miquel (1858) and Bentham (1870), and the division of the genus into two sections was adopted by Miquel (1858), H.J. Lam (1919), Moldenke (1959, 1971) and a few others.

In 1895, Briquet reclassified the Verbenaceae and upgraded the tribe Viticeae to a subfamily Viticoideae. The latter consisted of four tribes:- Callicarpeae, Tectoneae, Viticeae and Clerodendreae, with *Premna* in the tribe Viticeae. This classification was adopted by

\*The present treatment of the genus *Premna* is the second in the series of taxonomic revision in the family Verbenaceae in Australia (See Munir, 1982).

Dalla Torre & Harms (1904), H.J. Lam (1919), Gardner (1931), Junell (1934), Moldenke (1959, 1971) and Melchior (1964). In the same treatment, Briquet (1895) subdivided the genus into five sections:- *Holopremna*, *Odontopremna*, *Gumira*, *Premnos* and *Holochiloma*, each characterised chiefly by the size and number of their calyx-lobes. These sections were adopted by Dalla Torre & Harms (1904). The majority of botanists, however, have not divided the genus into sections, but have retained it in the Verbenaceae without reference to any subfamily or a tribe. In the present work, Briquet's (1895) classification of the Verbenaceae is followed in retaining *Premna* in the tribe Viticeae. The sub-generic sections proposed for the genus, however, are not accepted because of the unreliability of characters used.

### Australian History of the Genus

The first Australian records of *Premna* were made by Robert Brown (1810) from northern Queensland, when he described six new species:- *P. obtusifolia*, *P. attenuata*, *P. media*, *P. ovata*, *P. acuminata*, and *P. cordata*. Of these, *P. cordata* and *P. acuminata* were later identified as one species and the remaining four as synonyms of *P. serratifolia* L. In 1847, Schauer recorded all of Robert Brown's *Premna* species from Australia under "Species denuo recognoscendae". He did not elaborate on their short original descriptions, nor cite any plant collections from Australia. J.D. Hooker (1858) listed *P. serratifolia* L. from tropical Australia, and F. Mueller (1862) recorded three *Premna* species from Queensland, namely *P. glycyococca* F. Muell., *P. acuminata* R. Br. and *P. lignum-vitae* (A. Cunn. ex Schau.) Pieper (= *Vitex lignum-vitae* A. Cunn. ex Schau.). Of these, *P. glycyococca* was described as a new species but it was later found to be conspecific with *P. serratifolia*. In 1870, Benthams published a detailed account of the Australian Verbenaceae, and listed five *Premna* species:- *P. obtusifolia* R. Br., *P. integrifolia* L., *P. limbata* Benth., *P. dallachyana* and *P. acuminata* R. Br. Subsequently, the occurrence of these species in Australia was recorded by F. Mueller (1882, 1889) and Bailey (1883, 1901, 1913). Of these *P. obtusifolia*, *P. integrifolia* and *P. limbata* were later found to be synonymous with *P. serratifolia*. In 1883, F. Mueller described a new genus *Tatea*, based on two collections from Arnhem Land, Northern Territory. The type species was named *T. subacaulis* F. Muell., and the genus was considered allied to *Premna*. The genus *Tatea* and its type species were later found to be synonymous with *Premna* L. and *P. herbacea* Roxb. respectively. Moldenke (1959, 1871, 1980, 1983), however, reduced *Tatea* F. Muell. to *Pygmaeopremna* Merr. which he recognised as valid. He, therefore, transferred *T. subacaulis* F. Muell. to *Pygmaeopremna* making a new combination *Pygmaeopremna subacaulis* (F. Muell.) Mold. Domin (1929) listed from Australia six *Premna* species:- *P. obtusifolia*, *P. benthamiana* Domin, *P. suavis* Domin, *P. minor* Domin, *P. acuminata*, *P. dallachyana* var. *typica* and var. *obtusisepala* Domin. In this list, *P. benthamiana* was described as a new name, *P. minor* and *P. suavis* as new species and *P. dallachyana* var. *obtusisepala* as a new variety. All these taxa described by Domin were later recorded for Australia by Moldenke (1959, 1971, 1980).

In the present treatment, Briquet's (1895) classification of the Verbenaceae is accepted for the genus. *Tatea* and *Pygmaeopremna* are placed in the synonymy of *Premna*. *P. serratifolia* is accepted as the oldest validly published name for the widely distributed polymorphic species, named by others as *P. integrifolia* L., *P. obtusifolia* R. Br. or *P. corymbosa* (Burm. f.) Rottl. & Willd. *P. limbata* Benth. and *P. suavis* Domin are recorded as new synonyms of *P. serratifolia*. Similarly, *P. minor* Domin and *P. tateana* Bail. are found to be the new synonyms of *P. dallachyana*, and *P. dallachyana* var. *obtusisepala* Domin is considered to be identical with the typical variety. Moreover, *P. obtusifolia* R. Br. var. *velutina* Benth., and *Gumira odorata* (Blanco) Kuntze are regarded as new synonyms of *P. odorata* Blanco. In all seven species are recognised of which one from Queensland is newly described.

**PREMNA L., nom. cons.**

**Premna** L., Mant. 2 (1771) 154; Willd., Sp. Pl. 3 (1800) 314, no. 1164; R. Br., Prod. Fl. Nov. Holl. (1810) 512; Blume, Bijdr. Fl. Ned. Ind. (1826) 815; Roxb., Fl. Ind. 3 (1832) 75; Endl., Gen. Pl. 2 (1836) 636, no. 3701; Meisner, Pl. Vasc. Gen. 1 Tab. Diag. (1840) 291; Pl. Vasc. Gen. 2. Comment. (1840) 199; Steudel, Nom. Bot. 2 (1841) 392; Schau. in DC., Prod. 11 (1847) 630; Miq., Fl. Ind. Bat. 2 (1858) 890; Benth., Fl. Aust. 5 (1870) 58; H. Pfeiffer, Nomen. Bot. 2, Part 1 (1874) 832; Benth. & Hook. f., Gen. Pl. 2 (1876) 1152; F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 103; F.M. Bail., Synop. Qld Fl. (1883) 377; C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 571; Briq. in Engl. & Prantl, Pflanzenfam. 4, 3a (1895) 170; F. Muell., Sec. Syst. Cens. Aust. Pl. 1 (1889) 173; F.M. Bail., Qld Fl. 4 (1901) 1175; H.J. Lam, Verbenac. Malay. Arch. (1919) 100; Junell, Symb. Bot. Ups. 4 (1934) 84; Lemée, Dict. Descrip. Syn. Gen. Pl. Phan. 8b (1943) 656; Merr., J. Arn. Arb. 32 (1951) 73-78; Mold., Résumé Verbenac. etc. (1959) 236, 275, 276, 297, 299, 320, 333, 343, 397, 398, 409; N. Burb., Dict. Aust. Pl. Gen. (1963) 243; Backer & Bakh. f., Fl. Java 2 (1965) 602; Mold., Fifth Summary Verbenac. etc. 1 & 2 (1971) 390, 395, 469, 471, 525, 528, 572, 600, 618-620, 642, 741, 742, 758; Farr et al., Index Nom. Gen. Pl. 3 (1979) 1408; Mold., Sixth Summary Verbenac. etc. (1980) 395, 409, 432, 434.

*Type: P. serratifolia* L., Mant. 2 (1771) 253, *typ. cons.*

[*Cornutioides* L., Fl. Zeyl. (1747) 195.]

*Type:* Not specified.

*Gumira* [Rumph., Herb. Amb. 3 (1743) 208, t. 133] Hassk. in Flora 25, Beibl. 2 (1842) 26; Hort. Bogor (1844) 135; Kuntze, Rev. Gen. Pl. 2 (1891) 507.

*Type: G. domestica* Rumph. ex Hassk., Flora 25 (1842) Beibl. 2: 26.

*Scrophularioides* Forst. f., Prod. (1786) 91.

*Type:* Not known.

*Baldingera* Dennst., Schlüssel Hort. Malab. (1818) 31.

*Type:* Not known.

*Holochiloma* Hochst., Flora 24 (1841) 371.

*Type: H. resinosum* Hochst. loc. cit. (1841) 371.

*Phaenicanthus* Thwaites, Enum. Pl. Zeyl. (1861) 242.

*Type: P. zeylanicus* Thwaites, loc. cit. (1861) 242.

*Tatea* F. Muell., Trans. & Proc. Roy. Soc. S. Aust. 6 (1883) 33; Sec. Syst. Cens. Aust. Pl. 1 (1889) 173; Merr., J. Arn. Arb. 32 (1951) 73, pro syn.

*Type: T. subacaulis* F. Muell., Trans. & Proc. Roy. Soc. S. Aust. 6 (1883) 34.

*Pygmaepremna* Merr., Philipp. J. Sc. (Bot.) 5 (1910) 225; H.J. Lam, Verbenac. Malay. Arch. (1919) 160; Merr., J. Arn. Arb. 32 (1951) 73; Mold., Résumé Verbenac. etc. (1959) 341, 353, 409; N. Burb., Dict. Aust. Pl. Gen. (1963) 248, pro syn.; Mold., Fifth Summary Verbenac. etc. 2 (1971) 614, 640, 758; Sixth Summary Verbenac. etc. (1980) 435; Mold. in Dassan. & Fosb., Fl. Ceylon 4 (1983) 344; Munir in Morley & Toelken, Fl. Pl. Aust. (1983) 288.

*Type: P. humilis* Merr., Philipp. J. Sc. (Bot.) 5 (1910) 225.

Shrubs, trees or undershrubs. *Stem* and branches almost terete or obscurely tetragonal, main trunk often with fissured flaky bark. *Leaves* simple, decussate, exstipulate, reticulate-veined, unicostate, petiolate, or sessile. *Inflorescence* cymose, compound and often much branched, terminal, pedunculate. *Flowers* small, complete, zygomorphic, bisexual, hypogynous; bracts small, narrow. *Calyx* of 4-fused sepals, persistent, tubular or somewhat

campanulate, variously toothed or truncate, often more or less 2-lipped, with one lip entire or 2-toothed, the other entire or 3-toothed, not accrescent. *Corolla* of 4-fused petals, deciduous, tubular below, more or less 2-lipped above; upper lip usually entire, rarely 2-lobed; lower one 3-lobed, with the middle lobe larger; tube usually densely villous in the upper half. *Stamens* 4, didynamous, alternate with the corolla-lobes, epipetalous, inserted about the middle of the corolla-tube; filaments filiform, glabrous; anthers dorsifixed, oblong or elliptic, 2-lobed, lobes parallel or divergent. *Ovary* bicarpellary, syncarpous, 4-locular, with one ovule in each cell attached to an axile placenta at or above the middle; style filiform, with 2 short stigmatic lobes. *Fruit* a small globose succulent drupe, with a hard 4-celled undivided kernel. *Seeds* exalbuminous.

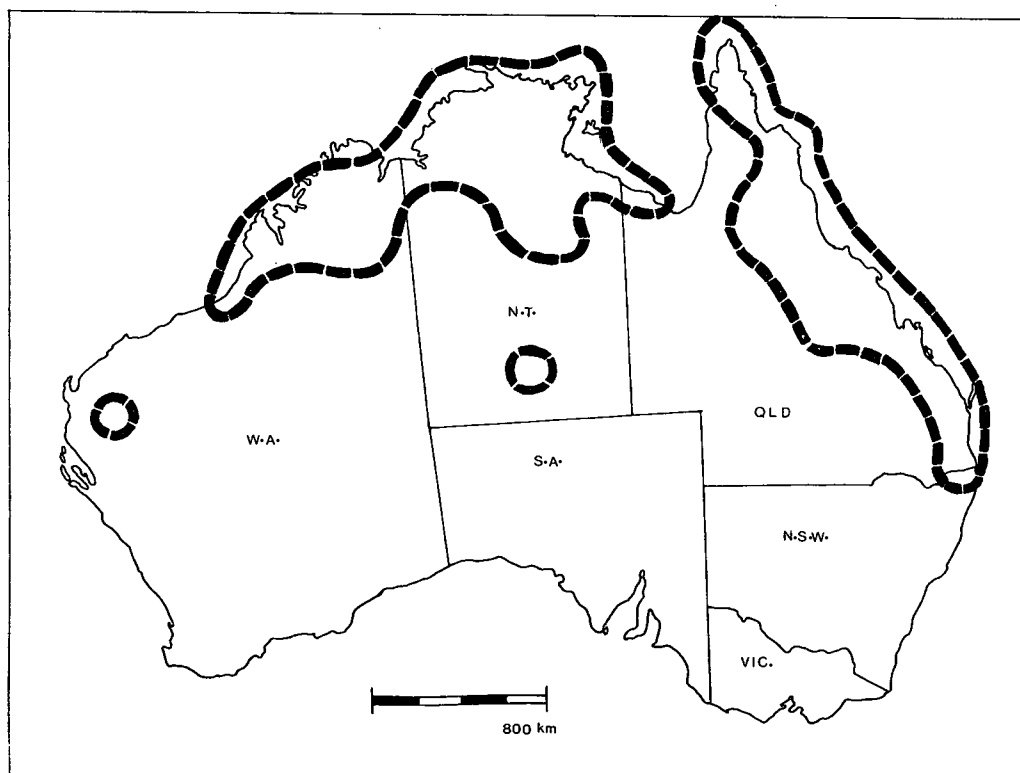
*Number of species*: World:  $\pm$  200; Australia: 7

#### *Derivation of name*

The generic name is derived from the Greek *Premnon*, the stump of a tree; alluding to the dwarf size of the type species.

#### *Distribution (Map 1)*

The genus *Premna* is widely distributed in the tropical and subtropical regions of



Map 1. Distribution of the genus *Premna* L. in Australia.

Australia, Africa and Asia. The main distribution, however, extends from India to Japan, southward to Indochina, Malasia, tropical Australia and eastward to Polynesia. So far, it has not been recorded from Europe, America, New Zealand, Central and Southern Australia, except in cultivation.

Of the seven Australian species three are endemic in Australia and the other four are wide-spread in Malasia. The distribution of at least one of these species (*P. serratifolia* L.) extends to East Africa, India, southern China and Japan. *P. herbacea* Roxb. is the second most wide-spread species occurring from India and Southern China to the Philippines, and extending southwards to Northern Australia.

### Comments

The genus *Premna* was considered by Beer & H.J. Lam (1936) as an "extremely difficult genus, in which flower features are almost as vague and little distinct as those of the extremely variable leaves". Such polymorphic species have been described by botanists under different names. The leaves in particular are found to be highly variable in shape and size, but the flowers and fruits were fairly constant in the species investigated. Regarding the Australian species, Benthams (1870) remarked that:- "there are a number of forms including *P. integrifolia* and *P. serratifolia* of Linnaeus which seem to pass into each other by numerous intermediates, and it would require a much more detailed study of good specimens from different localities . . . .".

Schumann (1889) observed that Schauer (1847) and other authors before him maintained or described a great number of species, which should really be combined with *P. integrifolia*, such as *P. sambucina* and *P. gaudichaudii*. H.J. Lam (1919) agreed with Schumann's (1889) opinion in extending this principle. He also regarded *P. integrifolia* as "a very polymorphic species" and stated that:- "For, examining a large number of specimens, we found, that several other species were unseparably united with one another by all possible intermediate forms and with *P. integrifolia*, such as *P. foetida* Reinw., *P. laevigata* Miq., *P. nitida* Schum., *P. cyclophylla* Miq., *P. abbreviata* Miq., *P. opulifolia* Miq. So we thought to be justified to combine these species into one large and very polymorphic one, being called by the name of the eldest. Probably it will appear that some more species belong to this polymorphic species, such as *P. obtusifolia* R. Br. which has already been mentioned by Schumann". Regarding the separation of species solely on the forms of their calyces, H.J. Lam (1919) observed that:- "we see how impossible it is—as several other authors did—to subdivide the species exclusively basing upon the form of the calyx, which, as in some other species, is often inconstant, and can give rise only to the keeping of Hasskarl's Gumira and Premnos, subgenera, which also are not distinctly separated. This and some other polymorphic species in this family, as *Callicarpa cana* and especially *Avicennia officinalis*, may show once more, how wrong and unscientific it is to try to discover truths of any worth for the systematic botany by the old method, by a mere examination of often individual morphological characteristics, and how necessary to apply the science of genetics to the systematical branch of Botany. In this way we should find a new link between two branches of the sciences of nature; for to arrive at the understanding, based upon scientifically stipulated facts, that there is only one science of the things of Nature, we may consider as one of the highest ambitions of the man of science".

According to Moldenke (1971), there are still many problems, some of them very complex, remaining to be solved before we can claim to have anything like a solid understanding of the several plant families, including Verbenaceae. In his opinion, some genera, like *Premna*, have been over-described, and some of the present subgeneric grouping in *Premna*, *Stachytarpheta* and others of the same rank ought to be raised to generic level.

Briquet (1895) divided the genus into five sections, namely *Holopremna*, *Odontopremna*, *Gumira*, *Premnos* and *Holochiloma*, each characterised chiefly by the size and number of their calyx-lobes. It may be difficult to assign all Australian species entirely to any one section, but it seems that the majority of them would come under the section *Gumira*.

Dalla Torre & Harms (1904) referred the authority of the tribe Viticeae to Briquet (1895). On the other hand, Moldenke (1971) recorded the tribe Viticeae as being based on Bartling's (1830) section Viticea of the Verbenaceae. The upgrading of this section to a tribe, therefore, has been attributed to Bentham. Under an alphabetic list of the accepted "Group names", Moldenke (1971) has recorded it as:- "*Viticeae* (Bartl.) Benth.—a tribe in Verbenaceae J. St.-Hil." According to present investigations, however, the tribe Viticeae was earlier recognised by Schauer (1847) as one of the three tribes of the Verbenaceae.

In 1910, Merrill described a new genus *Pygmaepremna*, based on two collections from Luzon, Philippines. The type species was named *P. humilis* Merr., and the genus was considered allied to *Premna* and *Vitex*, but more especially to the former. It was distinguished from *Premna* only by its very small size. Lam (1919) recognised *Pygmaepremna* as valid, but at the end of his generic description noted: "Without regard to characteristics of less consequence, the genus differs from *Premna* only by its extraordinary small size; therefore perhaps we had better combine it with that genus". Subsequently, Lam and Bakhuizen (1921) expressed the opinion, that "*Pygmaepremna* Merr. could not be distinguished from *Premna* L.", but they erroneously reduced *Pygmaepremna humilis* Merr. to synonymy in *Premna timoriana* Decne. which is a shrub several metres high. After the above publications, Merrill reconsidered the status of his newly described genus *Pygmaepremna* which he had originally placed in the herbarium as *Premna*. In 1923, Merrill not only reduced *Pygmaepremna* to synonymy in *Premna*, but also reduced its type species to synonymy with the Indian *Premna herbacea* Roxb. In spite of Merrill's combining of *Pygmaepremna* Merr. with *Premna* L., Moldenke (1959, 1971, 1981, 1983) retained the former as a distinct genus. Like Merrill (1910) and Lam (1919), Moldenke also distinguished this genus from *Premna* L. only by its small size.

During present investigations, the flowers of all available *Pygmaepremna* collections were found to be similar to those of *Premna*. The only differential character that really holds is the dwarf habit of *Pygmaepremna*, and this character is not good enough to recognise the genus. Therefore, following Merrill (1923, 1951) and others, *Pygmaepremna* is regarded here a synonym of *Premna*.

### Affinities

*Premna* is closely related to *Gmelina* L. as its inflorescence is terminal, corolla 2-lipped, fertile stamens 4, didynamous, fruit a drupe with 4-celled pyrene. Nevertheless, it can easily be distinguished by its corolla-tube being short and cylindrical. The corolla-tube in *Gmelina* is large, mostly infundibuliform and greatly amplate above.

There are a few characters common between *Premna* and *Vitex* L. Both have a 2-lipped corolla with a short cylindrical tube, didynamous stamens and drupaceous fruit. However, *Vitex* can be easily identified by its leaves often being digitate with 3-7 leaflets, rarely 2 or 1, and corolla 5-lobed. Amongst other Australian genera of the Verbenaceae, *Callicarpa* L. seems close to *Premna* in having simple leaves, a cymose inflorescence, usually 4-lobed corolla with a short tube, 4 stamens and drupaceous fruit. The latter, however, can readily be identified by its cymes being arranged in a terminal panicle, the calyx and corolla more or less 2-lipped, stamens didynamous and drupe with 4-celled pyrene.

## Key to the Species

- 1a. Undershrub 5-15 (-30) cm high; leaves sessile, with basal pair lying flat on the ground ..... 1. *P. herbacea*
- b. Shrubs or trees more than 1 m high; leaves distinctly petiolate, with basal pair always high above the ground ..... 2
- 2a. Leaves densely pubescent-tomentose, especially on the lower surface ..... 5
- b. Leaves glabrous, sometimes pubescent only on the principal veins ..... 3
- 3a. Lamina oblong or oval-elliptic, cuneate at the base, adaxially shining or dull but often drying black; petiole often pubescent; pedicel usually more than 1 mm long; corolla purplish-red, pinkish-mauve or greenish-cream; fresh ripe fruit dark purple, reddish-purple or pink to pale red ..... 4
- b. Lamina broadly ovate, obovate or almost orbicular, rounded, obtuse or cordate at the base, often dull-brownish when dry; petiole mostly glabrous; pedicel up to 1 mm long; corolla greenish-white; fresh ripe fruit always green ..... 2. *P. serratifolia*
- 4a. Lamina coriaceous, adaxially shining; pedicel 5-12 (-14) mm long; corolla tomentose outside, purplish-red or pinkish-mauve, 9-13 (-15) mm long; fruit (5-) 8-15 (-20) mm diam., pink, pale-red or reddish-purple when ripe ..... 3. *P. lignum-vitae*
- b. Lamina chartaceous, dull, often drying black; pedicel 1-2.5 mm long; corolla glabrous outside, greenish-cream, 4-7 mm long; fruit 3-5 mm diam., dark purple when ripe ..... 4. *P. dallachyana*
- 5a. Lamina ovate-cordate, pubescent-tomentose with dendriform-stellate hairs; pedicel (1.5-) 2-3 (-5) mm long; corolla lobes creamy or pale yellow, tube almost equal to the calyx, glabrous outside; ovary glabrous, glandular on top ..... 5. *P. hylandiana*
- b. Lamina deltoid, rhomboid or ovate-subcordate, pubescent with unbranched simple hairs; pedicel 0.5-1.5 mm long; corolla lobes reddish, brick-red, greenish-white or pinkish-white, tube twice the length of the calyx, pubescent or nearly glabrescent outside; ovary glabrous, not glandular ..... 6
- 6a. Lamina deltoid-rhomboid, much acuminate, entire or coarsely and irregularly dentate; inflorescence very lax; corolla 5-7 mm long, lobes reddish or brick-red; style 5-6 mm long ..... 6. *P. acuminata*
- b. Lamina ovate-rotundate, shortly cuspidate-acuminate, rounded or subcordate at the base, entire, rarely serrulate-denticulate in the upper; inflorescence not lax; corolla 3.5-5.5 mm long, lobes greenish- or pinkish-white; style 3-5 mm long ..... 7. *P. odorata*

1. *Premna herbacea* Roxb., Hort. Beng. (1814) 46, *nom. nud.*; Fl. Ind. edn 2, 3 (1832) 80; Walp., Repert. Bot. Syst. 4 (1845) 96; Schau. in DC., Prod. 11 (1847) 736; Brand., For. Fl. N.W. Centr. Ind. (1874) 368; Gamble, Man. Ind. Timb. (1881) 535; C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 581; Brand., Ind. Trees (1906) 511; Craib, Kew Bull. (1911) 443; Duthie, Fl. Upper Ganget. Plain 2 (1911) 233; Dop, Bull. Soc. Bot. France 70 (1923) 830; Merr., Enum. Philipp. Fl. Pl. 3 (1923) 390; Pei, Mem. Sc. Soc. China 1 (1932) 71; Dop in Lecomte, Fl. Gen. Indochine 4 (1935) 815; Fletcher, Kew Bull. (1938) 404, 421; Merr., J. Arn. Arb. 32 (1951) 75; Haines, Bot. Bihar & Orissa 2, reprint edn (1961) 753; Prain, Beng. Pl. 2, reprint edn (1963) 620.

*Type:* Dr William Carey s.n., collected from Dinagepore, Bengal, now Bangladesh, in 1801 and cultivated as "Bhoomi Jambooka" in the Botanical Gardens at Calcutta (K, n.v.).

*P. sessilifolia* H.J. Lam, Verbenac. Malay. Arch. (1919) 133; Beer & H.J. Lam, Blumea 2 (1936) 228; H.J. Lam, Blumea 5 (1945) 617.

*Type:* Schlechter 18303, near Kenegia River, alt. 150 m, New Guinea, 29.ix.1908 (BR, syntype!).

*P. obovata* Merr., J. Arn. Arb. 32 (1951) 77.

*Type:* T.T. Yü 16431, Yunnan Province, Shunning, Hila, China, 23.vi.1938 (A, holotype!).

*P. acaulis* (F. Muell.) Merr., J. Arn. Arb. 32 (1951) 75, based on *Tatea subacaulis* F. Muell. (1883). The original epithet was mis-spelt by F. Mueller as "*T. acaulis*" in his Syst. Cens. Suppl. 1 (1884) 3.



*P. timoriana* auct non Decne. (1834), non H. Hallier (1942): H.J. Lam in Merr., Enum. Philipp. Pl. 3 (1923) 390, pro syn.

*P. humilis* Merr. ex Mold., Résumé Suppl. 15 (1967) 22.

Type: As for *Pygmaeopremna humilis* Merr. (1910) 225.

*Tatea acaulis* F. Muell., Preprints Trans. Roy. Soc. S. Aust. April 1883. (The name *Tatea acaulis* F. Muell. first appeared in the preprints of F. Mueller's protologue of this species which were distributed in April 1883. The specific epithet altered to *T. subacaulis* F. Muell. was published in the Transactions of the Royal Society of South Australia in December 1883; F. Muell., Syst. Cens. Suppl. 1 (1884) 3; Sec. Syst. Cens. Aust. Pl. 1 (1889) 173; Ewart & Davies, Fl. N. Terr. (1917) 239; Junell, Symb. Bot. Ups. 4 (1934) 85; Merr., J. Arn. Arb. 35 (1951) 73-75, pro syn.

Type: *R. Tate s.n.*, along the route from Bridge Creek to McKinley River at twelve mile, on alluvial soil, Arnhem Land, Northern Territory, Australia, March 1882 (AD, K-syntypes!). *Foelsche s.n.*, near Yam Creek, Arnhem Land, Northern Territory, Australia, December 1882 (K, MEL-syntypes!).

*T. subacaulis* F. Muell., Trans. Roy. Soc. S. Aust. 6 (1883) 34.

Type: as for *T. acaulis* F. Muell. April 1883.

*T. herbacea* (Roxb.) Junell, Symb. Bot. Ups. 4 (1934) 85, based on *Premna herbacea* Roxb.; Meeuse, Blumea 5 (1942) 71.

*T. humilis* (Merr.) Junell, Symb. Bot. Ups. 4 (1934) 85, based on *Pygmaeopremna humilis* Merr.; Meeuse, Blumea 5 (1942) 71.

*Gumira herbacea* (Roxb.) Kuntze, Rev. Gen. Pl. 2 (1891) 507, based on *Premna herbacea* Roxb.

*Pygmaeopremna humilis* Merr., Philipp. J. Sc. (Bot.) 5 (1910) 225; H.J. Lam, Verbenac. Malay. Arch. (1919) 161; Meeuse, Blumea 5 (1942) 71; Merr., J. Arn. Arb. 32 (1951) 73-76, pro syn.; Mold., Résumé Verbenac. etc. (1959) 185, 339, 353.

Type: *Ramos B. Sc. 7841*, Province of Cagayan, Piat, Luzon, Philippines, 2.iv.1909 (A, K, US, syntypes!). *Ramos B. Sc. 8124*, Province of Isabella, Ilagan, Luzon, Philippines, 29.iv.1909 (K, NY, syntypes!; PNH, syntype, n.v., possibly destroyed during the War).

*P. herbacea* (Roxb.) Mold., Phytologia 2 (1941) 54, based on *Premna herbacea* Roxb.; Résumé Verbenac. etc. (1959) 160, 164, 174, 176, 178, 198, 202, 338, 339, 353; Sexena, Bull. Bot. Surv. India 12 (1970) 56, sphalm. "*Pygmaeopremna herbacea*"; Mold., Fifth Summary Verbenac. etc. 1 & 2 (1971) 270, 271, 278, 292, 297, 302, 318, 327, 330, 337, 607, 610, 611, 614, 640, 970, 971, 973; Phytologia 31 (1975) 399; Sixth Summary Verbenac. etc. (1980) 257, 258, 265, 273, 279, 282, 287, 290, 308, 317, 321, 339, 360, 386, 410, 432-435, 444; Mold. in Dassan & Fosb., Fl. Ceylon 4 (1983) 345.

Type: As for *Premna herbacea* Roxb. (1832) 80.

*P. subacaulis* (F. Muell.) Mold., Phytologia 2 (1941) 54, based on *Tatea subacaulis* F. Muell.; Résumé Verbenac. etc. (1959) 210, 353; Fifth Summary Verbenac. etc. 1 & 2 (1971) 348, 640; Green, Cens. Vasc. Pl. West. Aust. (1981) 89.

Type: As for *Tatea subacaulis* F. Muell. (1883) 34.

*P. sessilifolia* (H.J. Lam) Mold., Known Geogr. Distr. Verbenac. & Avicenniac. (1942) 78; Résumé Verbenac. etc. (1959) 195, 202, 339.

Type: As for *Premna sessilifolia* H.J. Lam (1919) 133.

*P. obovata* (Merr.) Mold., Sixth Summary Verbenac. etc. (1980) 433.

Type: As for *Premna obovata* Merr. (1951) 77.

### Description (Fig. 1)

A low-growing perennial herb or a dwarf undershrub 5-15 (-30) cm high. *Stem* mostly underground with creeping woody rhizome, the above ground part simple or dichotomously once branched, terete, slender, the branchlets pale or dark-brown, puberulous. *Leaves* opposite, sessile or subsessile, with basal leaves lying flat on ground,  $\pm$  forming a

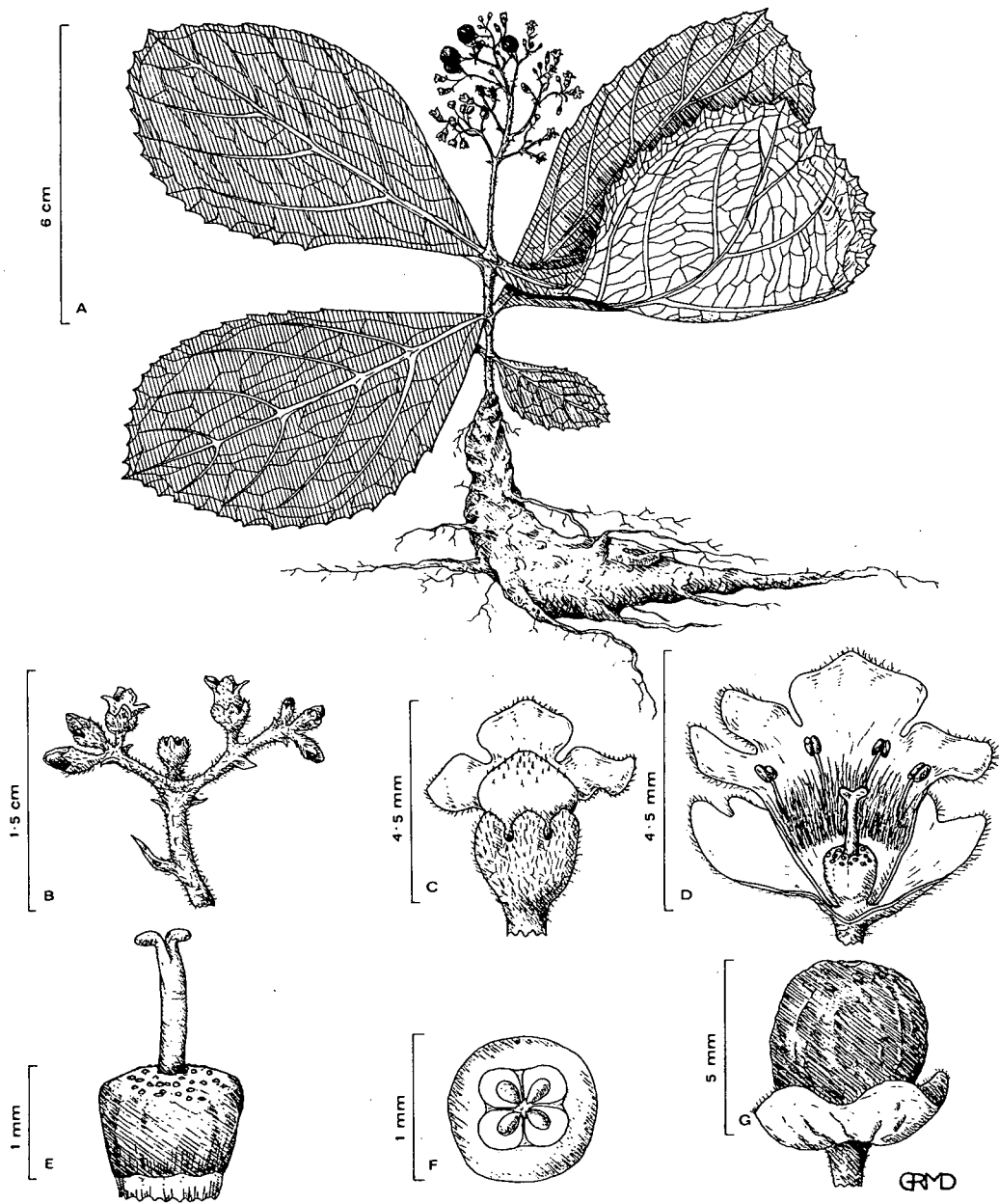


Fig. 1. *Premna herbacea* Roxb. (A-G, Adams 849: CANB). A, habit sketch; B, cyme; C, flower; D, flower vertically cut open to show androecium and gynoecium; E, ovary; F, transverse section of ovary; G, fruit with persistent calyx.

rosette, obovate, obtuse, gradually narrowing towards the base, dentate or crenate-undulate in the upper half, entire in the lower (cuneiform) half, (3-) 5-12 (-14) cm long, (2-) 3-7 (-10) cm broad, membranaceous or subchartaceous, bright green and glabrous above, with some hairs on the nerves and along the margins, paler beneath, sometimes somewhat puberulous on the nerves, often with minute glands, the pairs of nerves 5-6; petiole absent or 0-4 mm long, puberulous. *Inflorescence* terminal, cymose, corymbiform, densely glandular and puberulous; primary peduncle (1-) 2-4 (-7) cm long, glandular and puberulous; cymes in anthesis 1-2 cm long and wide with a secondary peduncle of 0.2-1 cm long. *Flowers* bracteate, pedicellate; pedicels glandular and puberulous, 1.5-2 mm long; bracts small and narrow, scarcely 1 mm long. *Calyx* tubular, with 5 minute subequal teeth at the top, becoming 2-lipped in fruit, glandular and puberulous outside, glabrous inside, 1.5-2.5 mm long, accrescent and persistent, spreading under the fruit to about 5 mm in diameter; teeth  $\pm$  ovate, obtuse, 0.5-1 mm long, nearly as broad at the base; tube 1-1.5 mm long. *Corolla* white or greenish-white, 2-lipped, 4 lobed at the top, glabrous outside or sparsely puberulous on the outside of lobes, villous inside the throat, 3.5-4.5 (-5) mm long; upper lip one-lobed, entire, rounded, 1.5-2 (-2.5) mm in diameter; lower lip 3-lobed, the middle lobe larger than the rest, almost rounded in outline, reflexed, 1.5-2 mm in diameter, the lateral lobes 1-1.5 mm long, 1-1.5 (-1.8) mm broad; tube almost cylindrical, straight, scarcely exceeding the calyx, 1.5-2 mm long,  $\pm$  1.5 mm broad at the top. *Stamens* 4, included, inserted in the corolla-tube, more or less didynamous; filaments filiform, glabrous, the anterior pair (1-) 1.2-1.3 mm long, the lateral pair 0.8-1 mm long; anthers  $\pm$  elliptic-orbicular in outline, 0.4-0.5 mm long, lobes parallel, free and slightly divergent in the lower half. *Ovary* ovoid-globose, glabrous, glandular,  $\pm$  1 mm in diameter, 2-celled, each cell 2-ovuled, or by false septum 4-celled each with one ovule; style included, filiform, glabrous, 0.7-1.2 mm long, stigma shortly 2-lobed. *Fruit* obovoid-globose, glabrous, glossy, 5-8 mm long, 4-8 mm in diameter, green when fresh, turning black when mature and dry, fleshy, glossy.

*Representative specimens* (collections seen: Australian 18, non-Australian 65)

AUSTRALIA: NORTHERN TERRITORY: *Adams* 849, Stuart Hwy, c. 2 miles N of 125 mile peg, 27.i.1964 (BRI, CANB, K, L, NSW, NT); *Adams* 2991, c. 12 km ENE of Oenpelli Mission, 17.ii.1973 (CANB); *Byrnes* 1199, Green Ant Creek East Spring, 28.xi.1968 (DNA, NT); *Byrnes* 1244, Daly River Road, Foster Block, 19.xii.1968 (DNA, L, NT); *Collins* BC 134, Kapalga, 4.xii.1976 (CANB); *Cousins* 41, Milne Rock Pool, 29.xi.1978 (CANB, DNA); *Foelsche* s.n., McKinley River, Yam Creek, Arnhem Land, -xii.1882 (K, MEL—syntypes of *Tatea subacaulis* F. Muell.); *Gardner* s.n., Katherine, -i.1953 (PERTH); *Gunn* 5, 12 miles from Stuart Highway along Edith Fall Road, 24.x.1971 (CANB, NT); *Lazarides* 7019, Mt Pleasant, 25 miles S of Adelaide River Township, 5.iii.1964 (CANB, L, NT); *Parker* 285, Tortilla Flats, 21.xi.1973 (CANB, DNA, NT); *Spencer* s.n., Darwin, 1913 (NSW145252-54); *Tate* s.n., along the route from Bridge Creek to McKinlay River at twelve mile, Arnhem Land, -iii.1882 (AD, K—syntypes of *Tatea subacaulis* F. Muell.).

WESTERN AUSTRALIA: *Gardner* 9981, Kunmunya Air Field near Augustus Waters, 3.vii.1951 (PERTH); *George* 14467, 22 km N of Mitchell Plateau Mining Camp, North Kimberley, 22.iv.1977 (PERTH); *Kenneally* 6620, Mitchell Plateau, West Kimberley, 16.v.1978 (PERTH).

PAPUA NEW GUINEA (16 collections seen): *Barrett* NGF 4220, Mageri near Sogeri, Central Division, Papua, 15.viii.1951 (BRI, CANB, L, LAE); *Brass* 6007, Dagwa, Oriomo River, Western Division, Papua, -ii-iii.1934 (A, BO, BRI, L, NY); *Craven* & *Schodde* 890, near Malalaua, Gulf District, Papua, 1.iii.1966 (A, BRI, CANB, K, L, LAE); *Harley* 13081, below Red Hill, along Lae—Bulolo Road, about 18 miles W of Lae, 3.ix.1964 (A, CANB, K, L); *Henty* 16665, Lake Wanum, subdistrict Lae, 13.iii.1963 (A, BRI, CANB, K, L, LAE); *Hoogland* & *Macdonald* 3451, c. 3 km inland from Gona, Northern Division, Papua, 27.vii.1953 (A, CANB, L, LAE); *Hoogland* 3759, c. 3 km S of Soputa Crossing, 2.ix.1953 (A, BM, BO, BRI, CANB, K, L, LAE, MEL, US); *Hoogland* 4762, near Madino Village, Milne Bay District, Papua, 16.ix.1954 (A, BM, BRI, CANB, K, L, LAE); *Pajmans* 892, S. coast, NE of Hood Bay, Rigo subdistrict, Papua, 21.vi.1969 (CANB); *Robbins* 2221, near Teringi, Wewak-Maprik Road, 21.viii.1959 (CANB); *Streitmann* NGF 39074, Red Hill, Oomsis, Lae subdistrict, 13.vi.1968 (A, BRI, BO, CANB, K, L, LAE, SING, SYD).

INDONESIA: *de Froidesville* 1946, Sumba, 1.vi.1950 (BO); *Voogd* 2253, Soemba, 8.xi.1935 (A, BO, L); *Noerkas* 245, van Vuuren Exped. Celebes, Lapankanrae, 20.v.1919 (BO—2 spec.).

PHILIPPINES: *Ramos & Edano B.Sc.* 38489, Maluko and vicinity, Bukidnon sub-province, Mindanao, -vi-vii.1920 (A, BO—2 spec., K, US).

THAILAND: *Kostermans* 1267, Khwae Noi River Basin Exped., 1946, Ku-Jae, about 150 km NW of Kanburi, alt. 100-150 m., 21.iii-viii.1946 (A, BO).

BURMA: *Dickason* 1175, Kalaw, -v.1932(A); *Dickason* 5943, Maymyo, -v.1932(A); *Shaik Mokim s.n.*, Kochin Hills, Upper Burma, -1897 (Z).

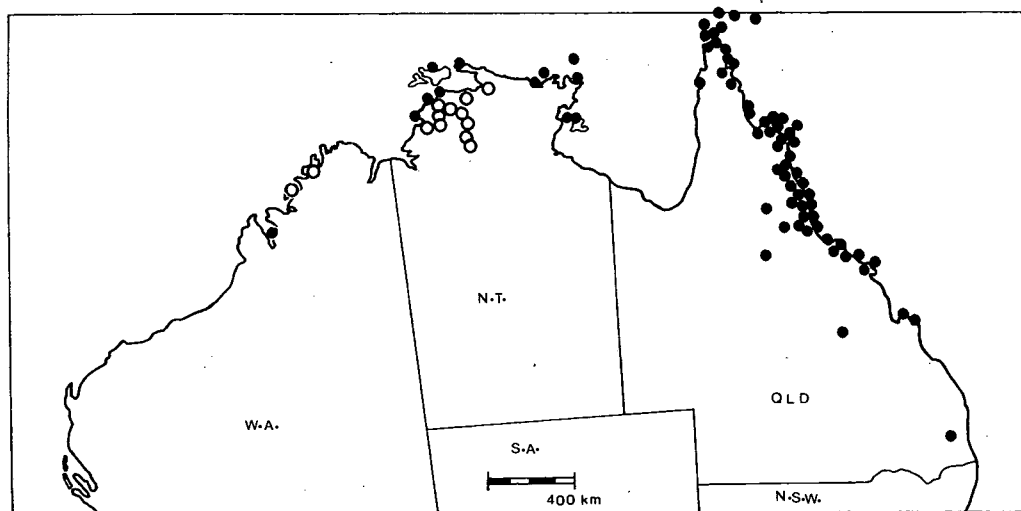
INDIA: *Strachey & Winterbottom s.n.*, near Bagerao, Kumaon, undated (A, BRI, K). *Thompson & Brandis* 87, North Oudh, Jan. 1873(K).

CHINA: *McClure s.n.*, *Cant. Christ. College No.* 9262, on hillside enroute Nga Wan to Yik Tsok Mau, Hainan, 23.iv.1922 (A,K,Z).

### Distribution (Map 2)

In Australia, *P. herbacea* is known to occur in the tropics of the Northern Territory and Western Australia. In the Northern Territory, it is known mainly from west of Arnhem Land between 12° and 15°S and between 130° and 134°E. Most localities are to the south and south-east of Darwin along the Stuart Highway. In Western Australia, the distribution is in the western coastal areas of Kimberley.

Collections from overseas have been examined from Papua New Guinea, Indonesia, Indochina, Philippines, Thailand, Burma, India and China. Lam (1919) gave its distribution as being from New Guinea and Luzon, and Merrill (1951) extended its occurrence to Lesser Sunda Islands, Philippine, Hainan, Indochina, Burma and India. According to Moldenke (1983): "This controversial plant appears to spread quite widely from northern Pakistan, Nepal, and Bhutan, through much of India, eastward through Burma, Thailand, and Indo-China to the Philippines, Indonesia, and New Guinea, north to southern China and south to Australia. It is said to be (or to have been) cultivated in India and Ceylon".



Map 2. Distribution of *P. serratifolia* ● *P. herbacea* ○

### Comments

Several names referred to herbaceous taxa of the genus are found to be synonymous. A recent example is that of Merrill (1951) who tentatively recognised a conspecific Australian species *Premna acaulis* (F. Muell.) Merr. (= "*Tatea acaulis* F. Muell.") as distinct, but he was by no means certain that this would prove to be the case when it would be possible to make a really critical comparison of representative Asiatic and Australian collections of *P. herbacea* Roxb. and *P. acaulis* (F. Muell.) Merr. Merrill (1951) admitted that he had not seen any specimen of *P. acaulis* from Australia. After examining the type of *P. acaulis*, this species has now been found to be synonymous with *P. herbacea* Roxb.

This species is the only dwarfed and herbaceous *Premna* in Australia, and is known to occur in most parts of Malesia and India. The reason for its dwarf size is attributed by some to its exposure to periodic fires. According to Duthie (1911), this species is "a good example of a plant belonging to a genus mostly represented by trees and shrubs, and which has become permanently dwarfed by continuous exposure to periodical fires". Merrill (1951) endorsed this view and said: "This is what it does in the Philippines where it is found only in open grasslands which are normally burned over each year in the dry season". He further states, that "immediately following a fire, short, practically herbaceous shoots appear which quickly produce leaves and flowers, the internodes being practically non-existent so that the young leaves appear to be in a whorl of four. Soon, however, the shoot becomes lignified and more or less elongated internodes develop. By the time the fruits are mature the plant has the aspect of a greatly dwarfed, simple, or occasionally slightly branched undershrub, up to about 10cm high". In support of this, van Steenis (pers. commun. 6th Sept. 1983) states that "*Pygmaepremna* (1 sp.) differs only from *Premna* in  $\pm$  herbaceous habit and so-called rhizome. It is merely the pyrogenous form of *Premna herbacea* which is outside fire a small subshrub". Such views were also expressed by Parker (1924), and with notes of *P. herbacea* collections from New Guinea.

Merrill (1910) and Lam (1919) described its leaf apex as being acute or shortly acuminate, and margin entire. Amongst the many specimens examined, the leaf-margin at least in the upper half or two-thirds, may be dentate, denticulate, crenate or undulate-crenate, with the basal cuneate part mostly entire.

Moldenke (1959) transferred *Premna angustiflora* H.J. Lam to *Pygmaepremna* Merr. making a new combination *P. angustiflora* (H.J. Lam) Mold. Subsequently, in his "A Fifth Summary of Verbenaceae etc. 1971", he maintained his new combination, but later in his "A Sixth Summary of Verbenaceae etc. 1980", he reversed his decision by placing it back under the genus *Premna*. According to the protologue, *P. angustiflora* H.J. Lam differs from all known *Pygmaepremna* by its leaf-petioles being longer, 1.2-5.5cm long; corolla-tube relatively long and narrow, 0.45-0.55cm long; stamens exserted; style 0.7-0.8cm long, which is relatively much longer and obviously exserted. In view of these characters, *P. angustiflora* H.J. Lam is considered a distinct species.

### Affinities

*P. herbacea* does not seem closely related to any single *Premna* species in Australia. It differs from all the rest by its very dwarf size, stem mostly underground with creeping rhizome; leaves sessile, obovate, with basal pair lying flat on ground; stamens and style included. In Australia, the dwarfed *P. herbacea* seems to belong to a section different from tall shrubs or tree species of the genus. Schauer (1847) placed *P. herbacea* in the section *Premnos* Hassk. and the other Australian *Premna* in the section *Gumira* Hassk.

2. *Premna serratifolia* L., Mant. 2 (1771) 253; Spreng., Syst. 2 (1825) 756; Blume, Bijdr. Fl. Ned. Ind. (1826) 815; Walp., Rep. Bot. Syst. 4 (1845) 96; Schau. in DC., Prod. 11 (1847) 632; Thwaites, Enum. Pl. Zeyl. (1861) 242; F. Muell., Fragm. Phyt. Aust. 6 (1868) 158; Baker, Fl. Maurit. & Seych. (1877) 254; Maxim., Bull. Acad. Sc. St. Petersb. 31 (1887) 79; Trimen, Handb. Fl. Ceylon 3 (1895) 352; Fletcher, Notes Roy. Bot. Gard. Edinb. 19 (1936) 177-178; Fosb., Taxon 2 (1953) 88-89.

Type: *Hermann s.n.*, from Ceylon (LINN holotype, microfiche!).

[*Folium hircinum* Rumph., Herb. Amb. 3 (1743) 208, t. 133].

[*Gumira litorea* Rumph., loc. cit. (1743) 209, t. 134].

[*Cornutioides* L., Fl. Zeyl. (1747) 195]. This is the basis for *Cornutia corymbosa* Burm. f. (1768) and *Premna integrifolia* L. (1771).

*Cornutia corymbosa* Burm. f., Fl. Ind. (1768) 132, t. 41, f. 1, basionym of *P. corymbosa* (Burm. f.) Merr., Interp. Rumph. Herb. Amb. (1917) 451; Fletcher, Notes Roy. Bot. Gard. Edinb. 19 (1936) 177; Fosb., Taxon 2 (1953) 88-89; Lourt., Taxon 15 (1966) 30.

Type: *Hermann s.n.*, from Ceylon (Institute de France, Paris, n.v.).

*Premna integrifolia* L., Mant. 2 (1771) 252, *nom. illeg.*, based on the type of *Cornutia corymbosa* Burm. f. (1768); Blume, Bijdr. Fl. Ned. Ind. (1826) 815; Wight, Ic. Pl. Ind. Or. (1849) t. 1469; Miq., Fl. Ind. Bat. 2 (1858) 894; Benth., Fl. Aust. 5 (1870) 59; F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 103; F.M. Bail., Synop. Qld Fl. (1883) 378; C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 574; F. Muell., Sec. Syst. Cens. Aust. Pl. 2 (1889) 173; Briq. in Engl. & Prantl, Pflanzenfam. 4, 3a (1895) 170; F.M. Bail., Qld Fl. 4 (1901) 1176; Comp. Cat. Qld Pl. (1913) 386; Ewart & Davies, Fl. N.-Terr. (1917) 237; H.J. Lam, Verbenac. Malay. Arch. (1919) 140, excl. syn. *P. serratifolia* Blanco; C. Gardner, Enum. Pl. Aust. Occ. 3 (1931) 112; Fosb., Taxon 2 (1953) 88-89; Specht, Rec. Amer.-Aust. Sc. Exped. Arnhem Land, 3 (1958) 292, 470; Beard, Descrip. Cat. W. Aust. Pl. (1965) 93; Chippendale, Proc. Linn. Soc. N.S.W. 96 (1972) 256.

Type: As for *Cornutia corymbosa* Burm. f. (1768).

*P. obtusifolia* R. Br., Prod. Fl. Nov. Holl. (1810) 512; Schau. in DC., Prod. 11 (1847) 637; Benth., Fl. Aust. 5 (1870) 58; F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 103; F.M. Bail., Synop. Qld Fl. (1883) 378; Qld Woods (1888) 91, (1899) 104; Maiden, Usef. Nat. Pl. Aust. (1889) 591; F. Muell., Sec. Syst. Cens. Aust. Pl. 1 (1889) 173; F.M. Bail., Cat. Indig. Natur. Pl. Qld (1890) 35; Qld Fl. 4 (1901) 1175; Comp. Cat. Qld Pl. (1913) 386; Ewart & Davies, Fl. N.-Terr. (1917) 237; Merr., Interpr. Rumph. Herb. Amb. (1917) 451; Enum. Philip. Fl. Pl. 3 (1923) 392; C. White, Proc. Roy. Soc. Qld 34 (1923) 50; Domin, Bibl. Bot. 89 (1929) 556; Fosb., Taxon 2 (1953) 88-89; Specht, Rec. Amer.-Aust. Sc. Exped. Arnhem Land, 3 (1958) 470; Mold., Résumé Verbenac. etc. (1959) 202-207, 210, 221, 257, 275, 297, 298, 337-340, 379; Fifth Summary Verbenac. etc. 1 & 2 (1971) 337-344, 348, 435, 470, 526, 605-612, 709; Chippendale, Proc. Linn. Soc. N.S.W. 96 (1972) 256; Mold., Sixth Summary Verbenac. etc. (1980) 327-340, 409-411.

Type: *R. Brown s.n.*, (J.J. Bennett no. 2324), Prince of Wales Island, Queensland, Australia, xi.1802 (BM 2 syntypes!).

*P. corymbosa* Rottl. & Willd. in Ges. Naturf. Fr. Berl. Neue Schr. 4 (1803) 187-188; Miq., Fl. Ind. Bat. 2 (1858) 894; C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 573; Trimen, Fl. Ceylon 3 (1895) 352; H.J. Lam, Verbenac. Malay. Arch. (1919) 117, non (Burm. f.) Merr. (1917).

Type: *Rottler s.n.*, between Madras and Tranquebar, Southern India, 1799 (B-W, microfiche!; possible duplicate in J.E. Smith herbarium in LINN).

*P. attenuata* R. Br., Prod. Fl. Nov. Holl. (1810) 512; Schau. in DC., Prod. 11 (1847) 637.

Type: *R. Brown s.n.*, northern Australia, 1802-1805 (BM, n.v.).

*P. media* R. Br., Prod. Fl. Nov. Holl. (1810) 512; Schau. in DC., Prod. 11 (1847) 637.

Type: *R. Brown s.n.*, northern Australia, 1802-1805 (BM, n.v.).

*P. ovata* R. Br., Prod. Fl. Nov. Holl. (1810) 512; Schau. in DC., Prod. 11 (1847) 637.

Type: *R. Brown s.n.*, (J.J. Bennett no. 2325), northern Australia, 1802-1805 (BM!).

*P. foetida* Reinw. ex Blume, Bijdr. Fl. Ned. Ind. (1826) 816; Schau. in DC., Prod. 11 (1847) 630; Miq., Fl. Ind.

Bat. 2 (1858) 891; Bnq. in Engl. & Prantl. Pflanzenfam. 4, 3a (1895) 170; Junell, Symb. Bot. Ups. 4 (1934) 84; Résumé Verbenac. etc. (1959) 195-197, 199, 202, 204, 206, 210, 297, 339; Fifth Summary Verbenac. etc. 1 & 2 (1971) 326, 330, 332, 337-339, 342, 349, 384, 526, 608, 610; Sixth Summary Verbenac. etc. (1980) 327-330, 332, 338, 410.

Type: *Reinwardt s.n.*, in sylvis montosis Nederlandsch Indie, loc. incert. (L, n.v.).

*P. spinosa* Roxb., Fl. Ind. 3, 2nd edn (1832) 77, *nom. illeg.* Roxburgh cited with the description the validly published *Gumira litorea* Rumph., Herb. Amb. 3 (1743) t. 134.

Type: near Calcutta, India (K, n.v.).

*P. sambucina* Wall., Cat. no. 1775 (1829), *nom. nud.*; Schau. in DC., Prod. 11 (1847) 631; S. Moore, J. Linn. Soc. Bot. 45 (1921) 375.

Type: *Wallich 1775*, at Moalmy, India Orient, 1827 (K, G-DC, microfiche!).

*P. gaudichaudii* Schau. in DC., Prod. 11 (1847) 631; Bnq. in Engl. & Prantl. Pflanzenfam. 4, 3a (1895) 170; Mold., Résumé Verbenac. etc. (1959) 186, 195, 199, 202, 204, 207, 221, 226, 338; Fifth Summary Verbenac. etc. 1 & 2 (1971), 319, 320, 326, 332, 334, 337-341, 343, 376, 608.

Type: *Gaudichaud s.n.*, in Archipelago Mariannae, 1830 (G-DC, microfiche!; duplicates possibly in P & PC).

*P. nitida* Schumann, Fl. Kaiser Wilh.-Land (1889) 120; Merr., Philip. J. Sc. Bot. 1, Suppl. 1 (1906) 234; Gibbs, Contrib. Pl. New Guinea (1917) 218; Merr., Interpr. Rumph. Herb. Amb. (1917) 451; C. White, Proc. Roy. Soc. Qld 34 (1923) 50; Mold., Résumé Verbenac. etc. (1959) 199, 202-205, 221, 294; Fifth Summary Verbenac. etc. 1 & 2 (1971) 326, 332, 337-341, 519; Sixth Summary Verbenac. etc. (1980) 327-331, 359, 405, 410.

Type: *Hollrung 679*, Augusta Station, Papua New Guinea, August, 1887 (L, n.v.).

*Gumira integrifolia* (L.) Kuntze, Rev. Gen. Pl. 2 (1891) 507, based on *P. integrifolia* L. (1771).

*G. nitida* (Schumann) Kuntze, Rev. Gen. Pl. 2 (1891) 508, based on *P. nitida* Schumann (1889).

*G. serratifolia* (L.) Kuntze, Rev. Gen. Pl. 2 (1891) 507, based on *P. serratifolia* L. (1771).

*Premna corymbosa* (Burm. f.) Merr., Interpr. Rumph. Herb. Amb. (1917) 450-451, non Rottl. & Willd. (1803), *nom. illeg.*; Fletcher, Notes Roy. Bot. Gard. Edinb. 19 (1936) 177-178; Kew Bull. (1938) 418; A.D.J. Meeuse, Blumea 5 (1942) 72; Fosb., Taxon 2 (1953) 88-89.

Type: *Hermann s.n.*, from Ceylon (Institute de France, Paris, n.v.).

*P. integrifolia* L. subsp. *truncatolabium* H.J. Lam, Verbenac. Malay. Arch. (1919) 142.

Type: Several syntypes are cited from Indonesia, Philippines and Papua New Guinea. Most of these are preserved in Herb. L (n.v.).

*P. abbreviata* Miq., Fl. Ind. Bat. 2 (1858) 892.

Type: in fruticetis circa Bataviam (Possibly at U or L, n.v.).

*P. laevigata* Miq., Fl. Ind. Bat. 2 (1858) 895 ex descr.

Type: Sumatra in Priaman (Possibly at U or L, n.v.).

*P. glycyococca* F. Muell., Fragm. 3 (1862) 36.

Type: *F. Mueller s.n.*, in locis arenosis insularum, Howick's Group, Aug. 1855 (MEL 582170!).

*P. subcordata* Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (2) (1863) 216, ex descr.

Type: "Java, Zoll. No. 2742 . . . Coll. Zeylanica Gardneriana sub. descr. No. 673", n.v.

*P. truncata* Turcz., Bull. Soc. Imp. Nat. Mosc. 36 (2) (1863) 215, ex descr.

Type: "Terra Canara Indiae orientalis, coll. a Hohenackero editae No. 701", n.v.

*P. limbata* Benth., Fl. Aust. 5 (1870) 59, *syn. nov.*; F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 103; F.M. Bail., Synop. Qld Fl. (1883) 378; F. Muell., Sec. Syst. Cens. Aust. Pl. 1 (1889) 173; F.M. Bail., Cat. Indig. Natur. Pl. Qld (1890) 35; Qld Fl. 4 (1901) 1176; Comp. Cat. Qld Pl. (1913) 386; Domin, Bibl. Bot. 89 (1929) 556, sub. obs. *P. suavis*, Mold., Résumé Verbenac. etc. (1959) 210; Fifth Summary Verbenac. etc. 1 (1971) 348; Sixth Summary Verbenac. etc. (1980) 338, 410.

Type: *Dallachy s.n.*, Rockingham Bay, Herbert River, 7.xii.1867 (MEL!).

*P. integrifolia* L. var. *angustiore* C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 574.

Type: Griffith in Kew Distr. no. 6030, Malacca (K, n.v.).

*P. suavis* Domin, Bibl. Bot. 89 (1929) 556, syn. nov.; Mold., Résumé Verbenac. etc. (1959) 210; Fifth Summary Verbenac. etc. (1971) 348; Sixth Summary Verbenac. etc. (1980) 338.

Type: Domin 8126, Harveys Creek, district Cairn, xii.1909 (PR, syntype!).

*P. integrifolia* L. var. *obtusifolia* (R. Br.) Pêi, Mem. Sc. Soc. China 1, no. 3 (1932) 75, based on *P. obtusifolia* R. Br. (1810).

*P. corymbosa* (Burm. f.) Merr. var. *angustiore* (C.B. Clarke), Fletcher, Notes Roy. Bot. Gard. Edinb. 19 (1936) 178; Kew Bull. (1938) 419, based on *P. integrifolia* L. var. *angustiore* C.B. Clarke (1885).

*P. corymbosa* (Burm. f.) Merr. var. *obtusifolia* (R. Br.) Fletcher, Notes Roy. Bot. Gard. Edinb. 19 (1936) 178; Kew Bull. (1938) 419.

Type: As for *P. obtusifolia* R. Br. (1810).

*P. obtusifolia* R. Br. var. *gaudichaudii* (Schau.) Mold., Phytologia 27 (1973) 69, based on *P. gaudichaudii* Schau. (1847); Sixth Summary Verbenac. etc. (1980) 327-331, 333, 334, 340, 433, 435.

*P. obtusifolia* R. Br. var. *serratifolia* (L.) Mold., Phytologia 28 (1974) 403, based on *P. serratifolia* L. (1771); Phytologia 31 (1975) 390; Sixth Summary Verbenac. etc. (1980) 395, 433, 434.

### Description (Fig. 2 & 3)

Shrub or small tree (1-) 3-6 (-10) m tall. *Stem* brownish-grey with fissured flaky bark, trunk generally about 20 cm or more in diameter; young branches reddish-brown, glabrous. *Leaves*: lamina broadly ovate, obovate or almost orbicular, rounded or cordate at base, broadly obtuse or shortly acuminate at apex, mostly entire, rarely with somewhat serrulate or undulate margin, (4-) 8-15 (-21) cm long, (3-) 5-10 (-16) cm broad, more or less membranous, glabrous, sometimes pubescent along principal veins underneath; petiole somewhat thick, glabrous, (0.5-) 1.5-4 (-7) cm long. *Inflorescence* of terminal, trichotomous, corymbose panicles, with minute pubescence on the young flower-bearing parts, (7-) 10-20 (-25) cm in diameter; primary peduncles thick, glabrous, 2-5 (-7) cm long. *Flowers* greenish-white, almost sessile or shortly pedicellate; pedicels puberulous, 0.5-1 mm long; bracts small and narrow, scarcely 1 mm long. *Calyx* obscurely and irregularly 2-lipped or rather shortly and broadly 3-lobed, upper lip broader than the others and entire or obscurely 3-toothed, lower lip with two obtuse teeth or lobes, 2-2.5 mm long, almost glabrous or obscurely puberulous outside, glabrous inside, spreading open under the fruit but not otherwise enlarged; tube 1-1.5 mm long, about as broad at top; lobes 0.5-1 mm long. *Corolla* greenish-white, somewhat 2-lipped, with distinct 4 lobes at top, glabrous or somewhat puberulous outside, densely villous inside throat, 4-5 mm long; tube almost cylindrical with somewhat broader top end, 2-3 mm long, 1.5-2 mm broad at top; lobes obtuse, almost orbicular in outline, with the anterior or mid-lobe of lower lip larger than the rest, 1.5-2 mm long, almost as broad, with the other lobes 1.3-1.7 mm long, 1.3-1.5 mm broad. *Stamens* exserted, inserted in corolla throat, more or less didynamous; filaments filiform, villous near base, otherwise glabrous, with anterior pair 2-2.5 mm long, with lateral pair 1.5-2 mm long; anthers  $\pm$  orbicular in outline, with lobes free and divergent in the lower halves,  $\pm$  0.5 mm long. *Ovary* more or less globose, glabrous, 1-1.3 mm in diameter; style exserted, filiform, glabrous, 3-4.5 mm long; stigma shortly 2-lobed. *Fruit* obovoid-globose, glabrous, 3-6 mm long, 3-5 mm in diameter, green when fresh, turning black when mature and dry.

*Representative specimens* (collection seen: Australian 156, non-Australian 147).

AUSTRALIA: QUEENSLAND: (134 collections seen): *Bailey* 79, Somerset Dam, vi.1897 (BRI); *Bailey* 138, Hammond Island, vi.1897 (BRI); *Banks & Solander s.n.*, Cape Grafton, 1770 (BM, 2 spec., probably syntypes of *P. obtusifolia* R. Br.); *Bäuerlen* 48, Thursday Island, i.vii.1885 (MEL); *Birch* S2424, Dampier Creek, S of



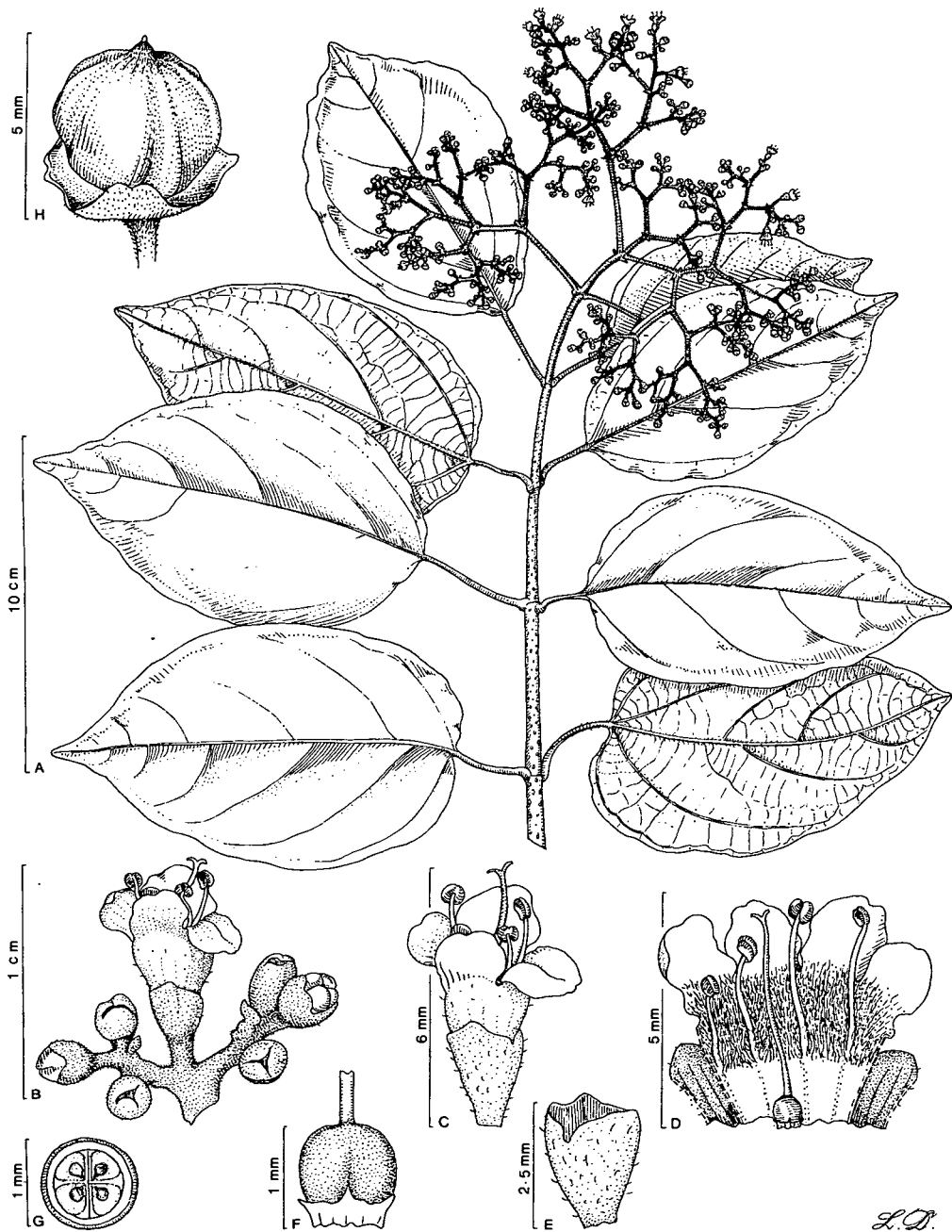


Fig. 2. *Premna serratifolia* L. (A-G, L.J. Webb 2420: CANB; H, B. Hyland 9258: QRS). A, flowering branch; B, cyme; C, flower; D, flower with calyx and corolla cut open to show androecium and gynoecium; E, 2-lipped calyx-tube; F, ovary; G, transverse section of ovary; H, fruit with persistent calyx.

Cardwell, 6.xii.1965 (JCT); *Brass* 19188, Iron Range, 15.vi.1948 (CANB, L); *R. Brown* s.n., (J.J. Bennett no. 2324), Prince of Wales Island, xi.1802 (BM, syntype!); *R. Brown* s.n., (J.J. Bennett no. 2325), loc. cit. 1802-5 (BM, type of *P. ovata*!); *Cameron* 20312, Prince of Wales Island, Big Creek, Torres Strait, 12.ii.1975 (QRS); *Cowley* 36, Thursday Island, undated (BRI); *Cribb* s.n., Low Island, v.1963 (BRI); *Dallachy* s.n., Rockingham Bay, Herbert River, 7.xii.1867 (BM, MEL 582176-79, syntypes of *P. limbata*, Benth.); *Domin* 8124, Russell River, i.1910 (PR); *Domin* 8126, Harveys Creek, Dec. 1909 (PR, syntype of *P. suavis* Domin); *Elsol & Stanley* 541, Howick Island, 5.v.1979 (BRI); *Flecker* 3316, Edge of Campbell's Creek, 16.v.1937 (QRS); *Heatwole* s.n., Hannah Island, near Prince Charlotte Bay, 26.vii.1969 (BRI 149188); *Hyland* 3862, Claudie River, 25.vii.1978 (QRS); *F. Mueller* s.n., Lord Howick Island, viii.1855 (MEL 582170, holotype of *Premna glycycoeca* F. Muell.); *Persieh* s.n., Endeavour River, 1882 (BRI 267295, MEL 582824); *Scarth-Johnson* 915A, very tip of Cape York Peninsula, 20.x.1979 (BRI); *Smith* 12566, Red Island Point, ca. 25 km SW of Cape York, 28.x.1965 (BRI); *R. L. & A. Specht* 240, Lizard Island, 24.xii.1974 (BRI 202691); *Stoddart* 4138, Newton Island, 5.viii.1973 (BRI); *Stoddart* 4928, Pelican Island, 27.x.1973 (BRI); *Telford* 2028, Forrest Beach, E. of Ingham, 25.v.1970 (CBG); *Webb* 957, Edge Hill, 21.ix.1945 (CANB, JCT).

NORTHERN TERRITORY: (21 collections seen): *Barlow* 509, Rapid Creek, Darwin, 3.i.1963 (JCT, NT); *R. Brown* s.n., "North Coast", 1802-05 (MEL 582760, MEL 582766, NSW 145256); *Dunlop* 3825, Warangaiyu Lagoon, Elcho Island, 3.vii.1975 (CANB, DNA, NT); *Latz* 3278, Wessell Islands, 28.ix.1972 (CANB, DNA, NT); *Stocker* 302, Karlslake Point, Melville Island, i.1966 (NT); *Waddy* 459, Mud Cod Bay, Groote Eylandt, 16.xi.1975 (DNA).

WESTERN AUSTRALIA: *Hughan* s.n., "Kings Sound", undated (MEL 582820).

PAPUA NEW GUINEA: (116 collections seen): *Craven & Schodde* 818, Apiopie, mouth of eastern branch of Purari delta, Gulf District, 14.ii.1966 (A, BRI, CANB, K, L, LAE); *Brass* 21922, Menapi, Cape Vogel Peninsula, Milne Bay District, 15.iv.1953 (CANB).

NEW BRITAIN: (9 collections seen): *Croft NGF* 41433, Kakolan Island off Nantambu Forest Station, 2.vi.1973 (A, BRI, CANB, L, LAE).

NEW IRELAND: (4 collections seen): *Croft & Lelean* LAE 65388, Cape entrance, North Coast, Lavongai, 30.ix.1974 (A, BRI, CANB, E, K, L, LAE, M).

MOLUCCAS: *Pleyte* 81, Ternate, east coast, 6.ix.1951 (BO, BRI).

MALAYSIA: (7 collections seen): *Henderson* SING 20233, Tanjong Suka, Siantan, 3.iv.1928 (BRI, SING).

PHILIPPINES: (8 collections seen): *Merrill* 1363, Palawan, v.1913 (BRI, PNH).

### *Distribution* (Map 2).

In Australia, *P. serratifolia* is chiefly distributed in the tropical areas of Queensland and Northern Territory. In Queensland, most localities are in the coastal parts from Rockhampton northwards to the tip of Cape York Peninsula. It has also been recorded from several off-shore islands of the State. From inland, a few localities are reported on the Atherton Tableland, and some collections are known from the eastern end of Gregory Range and along the upper part of Brisbane River. In Northern Territory, it has been recorded from northern and north-western coastal areas and its off-shore islands. So far, its occurrence deep inland in the Northern Territory or along the coast of the Gulf of Carpentaria is not known. A few localities, however, are reported from Groote Eylandt in the Gulf of Carpentaria. It is possible that this species may be found in the remote tropics of Western Australia, but so far it has been recorded only once from near Kings Sound.

Collections from overseas have been examined from Papua New Guinea, New Britain, New Ireland, Java, the Moluccas, Malaysia, Philippines, Samoa, Fiji, Indochina and Japan. Lam (1919) gave distribution of the species as being from Madagascar, Mauritius, India to Malacca and Thailand, East Bengal, Ceylon, Andamans, Nicobar, Hong Kong, Malaya, Philippines and Polynesia.

In addition to the above localities, Moldenke (1971) recorded it from East Africa, Southern China, Hainan, Taiwan, Ryukyu Archipelago and Melanesia. According to him, the fossilised records of this species were found from "Recent of Mariana Islands".

### *Comments*

The nomenclature and identity of this widespread and very polymorphic species has

been discussed among others by Merrill (1917), Fletcher (1936), Meeuse (1942) and Fosberg (1953). Names frequently employed in this species complex are:- *Premna integrifolia* L., *P. serratifolia* L., *P. corymbosa* Rottl. & Willd., *P. corymbosa* (Burm. f.) Merr. and *Cornutia corymbosa* Burm. f. Of all these, *P. integrifolia* L. is the most widely used name, the type of which was collected by Paul Hermann in Ceylon. It was first described by J. Burman (1737) under the name "*Sambucus zeylanica odorata aromatica*", and later given by Linnaeus (1747) the single name "*Cornutioides*". Subsequently, N.L. Burman (1768) for the first time used a binomial for this plant and renamed the Ceylon material *Cornutia corymbosa*.

Following these, Linnaeus (1771) considered the Ceylon material a mixture of more than one taxon and thus split this into two species, *P. integrifolia* and *P. serratifolia*, characterised respectively by their leaf-margin being entire and serrate. He cited under *P. integrifolia* Burman's validly published binomial *Cornutia corymbosa* thus making *P. integrifolia* an illegitimate name (Art. 67, Int. Code Bot. Nom. 1978). Under *P. serratifolia*, Linnaeus cited his invalid single name "*Cornutioides* Fl. Zeyl. 416". In his opinion, the serrate-leaved plant in Hermann's Ceylon material was different from Burman's *Cornutia corymbosa*. Since the serrate-leaved segregate of the Ceylon material, on which *P. serratifolia* was based, did not involve the entire-leaved type material of *Cornutia corymbosa* Burm. f., it would seem that *P. serratifolia* is a legitimate name. According to Lourteig (1966), the type of *Cornutia corymbosa* Burm. f., on which *P. integrifolia* was based, is preserved at the Institute de France, Paris. I have seen on microfiche the presumed holotype of *P. serratifolia* (LINN) on which Linnaeus wrote not only the name "*serratifolia*" but also a generic description of the genus *Premna*. Taxonomically, *P. integrifolia* and *P. serratifolia* are the same species, but nomenclaturally they are based on two different types, segregated from Paul Hermann's Ceylon material. That they are synonymous was first pointed out by Schauer (1847) who united these species under the name *P. serratifolia* L. Subsequent authors mostly followed Schauer in uniting the two species, but have used the illegitimate name *P. integrifolia* L. instead of the name *P. serratifolia* L.

In 1803, Rottler & Willdenow described one of Rottler's collection from Madras, India, as a new *Premna* species, *P. corymbosa*. In the protologue, they clearly mentioned this as "*Premna corymbosa* Nob.", making no reference to *Cornutia corymbosa* Burm. f. In fact, the word "Nob." (i.e. "we" in Latin) clearly shows that they were describing a new species. Rottler contrasted his plant with *P. integrifolia* L. and in a footnote to his paper, Willdenow contrasted three other species of *Premna* with *P. corymbosa*, without mentioning Burman's *Cornutia corymbosa*. Here also, taxonomically *P. corymbosa* Rottl. & Willd. and *Cornutia corymbosa* Burm. f. are identical, but nomenclaturally *P. corymbosa* Rottl. & Willd. was based on a specimen from India and *Cornutia corymbosa* Burm. f. on a specimen from Ceylon. Therefore, the combination of *P. corymbosa* (Merrill, 1917) based on *Cornutia corymbosa* Burm. f. would be a later homonym and illegitimate.

Miquel (1858) used the name *P. corymbosa* Rottl., citing *Cornutia corymbosa* Burm.f. in synonymy. By inference, it may be supposed that he thought Rottler had made a new combination based on *Cornutia corymbosa* Burm. f. In fact, neither Rottler nor Miquel made any combination, the latter simply regarding Burman's name as synonymous with Rottler's.

Confusion about the nomenclature of this complex first arose when Merrill (1917) erroneously assumed that *P. corymbosa* Rottl. & Willd. (1803) was based on *Cornutia corymbosa* Burm. f. He mentioned clearly that "*Premna corymbosa* (Burm. f.) Rottl. & Willd., in Gesell. Nat. Freunde Neue Schr. 4 (1803) 187, 188, is the correct name for the plant that Linnaeus named *Premna integrifolia*". He stressed this point further, that "all

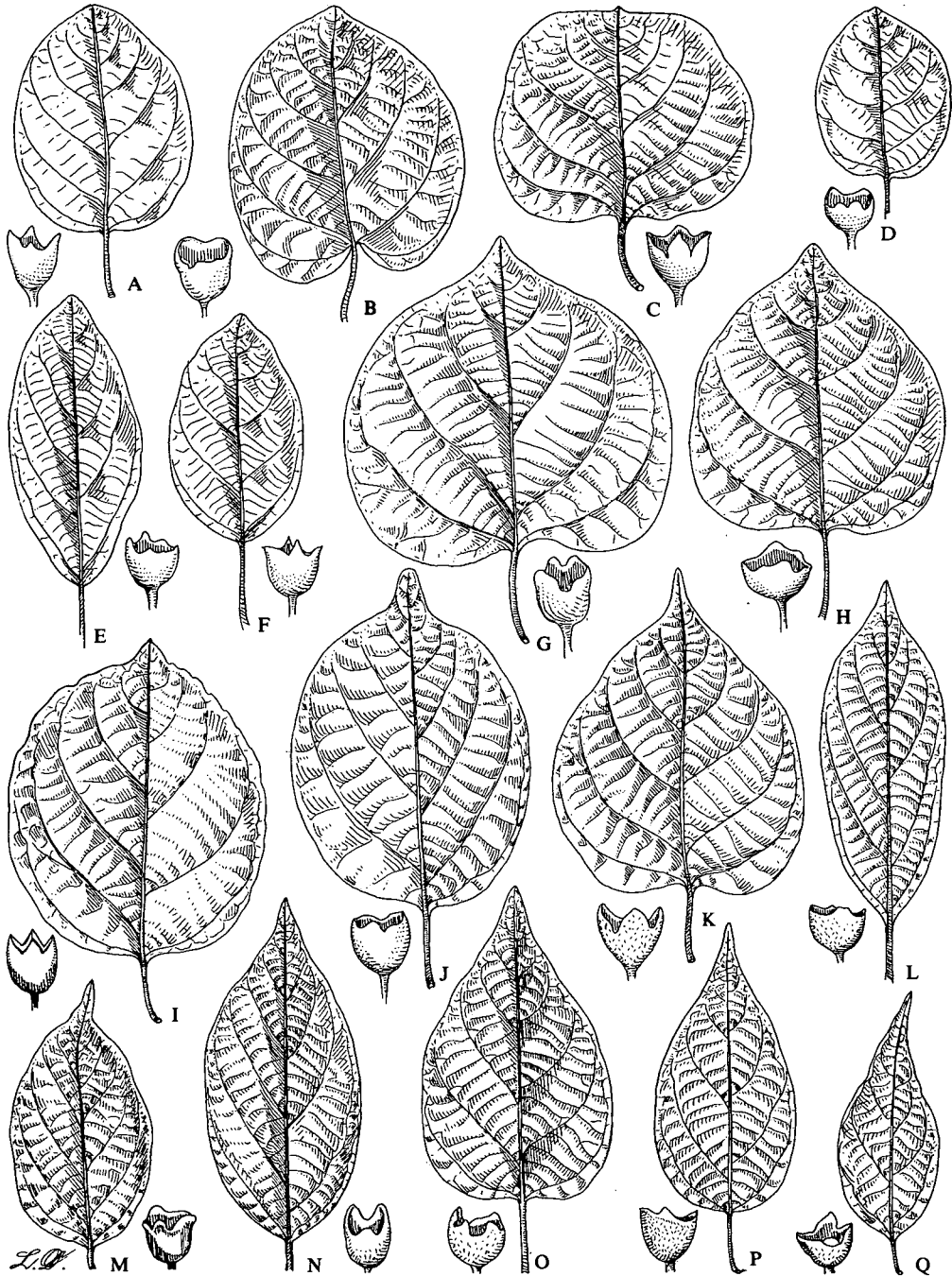


Fig. 3. Range of variation in leaf form and calyces of *Premna serratifolia* L. A, R. Schodde 2688 (BRI); B, D. R. Pleyte 81 (BRI); C, B. Hyland 9692 (QRS); D, J.A. Elsol 541 & T.D. Stanley s.n. (BRI); E, J. McKean B724 (CANB); F, H.M. Burkill 161 & M. Shah s.n. (BRI); G, T. Done s.n. (BRI 149458); H, J.R. Croft et al. NGF 41433 (LAE); I, B. Hyland 3862 (QRS); J, G.C. Stocker 1347 (QRS); K, R.G. Robbins 2437 (CANB); L, M. Ramos PNH 34706 (BRI); M, L.J. Webb 2420 (CANB); N, C.T. White 346 (BRI); O, P. van Royen 5292 (CANB); P, D. Sayers NGF 18980 (CANB); Q, J.R. Croft et al. NGF 41386 (LAE).

three", (i.e. *P. integrifolia*, *P. serratifolia* and *P. corymbosa*) "are typified by the same material". This view was later accepted by Fletcher (1936), Meeuse (1942) and some others. It was, however, rejected by Fosberg (1953) who clearly pointed out that *P. corymbosa* Rottl. & Willd. (1803) was described as a new species from India, and it was not based on *Cornutia corymbosa* Burm. f., the type of which came from Ceylon. Nevertheless, Fosberg (1953) did not appreciate the fact that Paul Hermann's Ceylon material, on which *Cornutia corymbosa* Burm. f. was based, had been treated by Linnaeus (1771) as a mixed collection; he considered that both names were based on the type of *Cornutia corymbosa* Burm. f., and were, therefore, illegitimate. The fact that *P. serratifolia* was differently typified and therefore legitimate seems to have been missed by Fosberg (1953), Moldenke (1959, 1971, 1980) and others. They, therefore, accepted *P. obtusifolia* R. Br. (1810) which they considered to be the next available name for this species.

It is quite clear from the above discussion, that *P. serratifolia* L. (1771) is the oldest legitimate name in *Premna* for this complex and, therefore, adopted here.

In Bentham's *Flora Australiensis* 5 (1870) 58-60, he recorded five *Premna* species from Australia, with *P. limbata* as new. Of these, *P. obtusifolia* R. Br., *P. integrifolia* L. and *P. limbata* Benth. are found to be conspecific with *P. serratifolia* L. Bentham (1870) distinguished these taxa chiefly on the shape of calyx-lobe, leaf-tip and the comparative length of calyx- and corolla-tube. All these characters are too variable to be used in the taxonomy of this complex. As a result of previous use of these and other similarly variable characters, the list of synonymy of the taxon is the largest of any *Premna* species in Australia, and possibly in the genus. There are several more plant names referred to this species, but only a selection are recorded here.

Some authors have described its wood as having a pleasant sandal-like fragrance, but not so aromatic.

#### Affinities

Amongst Australian *Premna* species, *P. serratifolia* is closely related to *P. dallachyana* Benth. and *P. lignum-vitae* in its leaves being glabrous, sometimes pubescent only on the principal veins beneath, the calyx pubescent outside, the stamens and style exserted and ovary glabrous. However, *P. serratifolia* may readily be identified by its lamina being mostly broadly ovate, obovate or almost orbicular, obtuse, cordate at the base, often dull-brownish when dry, the petiole glabrous and pedicels up to 1 mm long, the corolla greenish-white and fruit always green when fresh. Fruits in *P. dallachyana* and *P. lignum-vitae* are dark purple or reddish-purple when fresh.

#### Note

In view of limited information about the non-Australian *Premna* species, the affinities of *P. serratifolia* and most other Australian species are not discussed with the non-Australian species.

3. *Premna lignum-vitae* (A. Cunn. ex Schau.) Pieper, Bot. Jahrb. 62, Beibl. 141 (1928) 80; Mold., Résumé Verbenac. etc. (1959) 210, 383-385; Anderson, Trees N.S.W., 4th edn (1968) 255; Mold., Fifth Summary Verbenac. etc. 1 & 2 (1971) 348, 718, 721; Mold., Sixth Summary Verbenac. etc. (1980) 338; Jacobs & Pickard, Pl. N.S.W. (1981) 209; Baines, Aust. Pl. Gen. part 1 (1981) 303.

*Lectotype*: A. Cunningham s.n., Brisbane River, Moreton Bay, Queensland, Australia, 2.viii.1829 (G-DC, lectotype designated here!; BM, K, MEL 97941, MEL 583394, MEL 583395,—isolectotypes!).

*Vitex lignum-vitae* A. Cunn. ex Schau. in DC., Prod. 11 (1847) 692, *basionym*; F. Muell., Fragm. 3 (1862) 58; Benth., Fl. Aust. 5 (1870) 67; F. Muell., Fragm. 9 (1875) 5; Syst. Cens. Aust. Pl. 1 (1882) 103; F.M. Bail., Synop. Qld Fl. (1883) 379; Qld Woods (1888) 92; Maiden, Useful Nat. Pl. Aust. (1889) 612; F. Muell., Sec. Syst. Cens. Aust. Pl. 1 (1889) 173; F.M. Bail., Cat. Indig. & Natur. Pl. (1890) 35; Qld Fl. 4 (1901) 1179; Dixon, Pl. N.S.W. (1906) 235; F.M. Bail., Comp. Cat. Qld Pl. (1913) 386; Maiden & Betche, Cens. N.S.W. Pl. (1916) 176; Anderson, Trees N.S.W. 1st edn (1947) 273; Francis, Aust. Rain-For. Trees (1951) 372, figs 233 & 234.

Type: As for *Premna lignum-vitae* (A. Cunn. ex Schau.) Piper.

### Typification

*P. lignum-vitae* is based on Allan Cunningham's collection from Queensland consisting of at least 5 duplicates. It was identified by him as belonging to *Vitex* and he therefore proposed for it the name *V. lignum-vitae*. The manuscript name was later validly published by Schauer (1847) who cited A. Cunningham's collection from Australia, but did not designate any type. It is, therefore, necessary to select a type for this name. Of the known five syntypes, the one in Herb. G-DC was seen by Schauer and almost certainly used by him in preparing the original description of this species. The specimen is particularly complete and well preserved, and is, therefore, selected here as the lectotype for this species.

### Description (Fig. 4)

A tree 4-30 m tall. *Stem* 23-100 cm diameter, outer bark whitish, shallowly longitudinally fissured; young branches rusty-tomentose or rusty-pubescent. *Leaves*: lamina oblong or oval-elliptic, shortly acuminate, narrowed towards base, (4-) 6-10 (-13.5) cm long, (1.5-) 2-4.5 cm broad, somewhat coriaceous, shining green adaxially, paler and glandular abaxially, conspicuously veined, glabrous or with slight pubescence on their midrib underneath, entire, those of barren branches sometimes broadly and unequally lobed or with a few short angles; petiole rusty-tomentose or pubescent, (0.5-) 1-2 cm long. *Inflor-escence* of small, loose, axillary cymes, rusty-tomentose, sprinkled with scattered glands; primary peduncle arising from leaf-axil, 5-10 (-15) mm long. *Flowers* dingy-red, distinctly pedicellate; pedicels rusty-tomentose, glandular, 5-12 (-14) mm long; bracts minute, about 1 mm long, rusty-tomentose. *Calyx* persistent, accrescent, tube truncate, (2.5-) 3-4 mm long, about same in diameter at top, densely glandular and rusty-pubescent outside, glabrous inside. *Corolla* purplish-red to pinkish-mauve, 4-lobed, glandular and tomentose outside, glabrous inside except for dense villous inner face of large anterior-lobe and sparsely villous hairy band at level with base of filaments, 9-13 (-15) mm long; tube broad and incurved, twice as long as calyx or more, more or less cylindrical in upper half, narrowed at base, 6.5-10 mm long, 3-5 mm in diameter at top; lobes broadly elliptic-ovate or almost orbicular, with the anterior- (i.e. lower-) lobe larger than others, usually orbicular, 3-4 mm long, 3.5-5 mm broad, with posterior and lateral lobes broadly elliptic-ovate, 2-3 mm long, 2.5-3.5 mm broad at base. *Stamens* exserted, more or less didynamous; filaments slender, glabrous above, villous in lower third, with anterior pair 8-11 mm long, lateral pair 7-10 mm long; anthers  $\pm$  orbicular in outline, lobes oblong, free and somewhat divergent in lower halves,  $\pm$  1 mm long. *Ovary*  $\pm$  globose, glabrous, 1-2 mm diameter; style exserted, more or less slender, glabrous, (9-) 11-15 mm long; stigma shortly 2-lobed. *Fruit* obovoid-globose, glabrous, (5-) 7-14 (-18) mm long, (5-) 8-15 (-20) mm diameter, pink to paly red or reddish-purple when fresh, turning black on drying.

### Representative specimens (52 collections seen)

AUSTRALIA: QUEENSLAND: J.F. Bailey s.n., Bunya Mountains, ix.1897 (BRI 267482-83); Blake 2115, Dayboro, 49 km NW of Brisbane, 8.i.1931 (BRI); Blake 15488, McPherson Range, Mt Roberts, 26.iii.1945 (BRI); A. Cunningham s.n., Brisbane River, Moreton Bay, 2.viii.1829 (G-DC, lectotype!; K 3 spec!, BM!, MEL 3 spec! —isolectotypes); Floyd s.n., Kalpowee, 3.ix.1949 (LAE 16908). Grove 106, 113, Nanango, v.1918 (BRI);

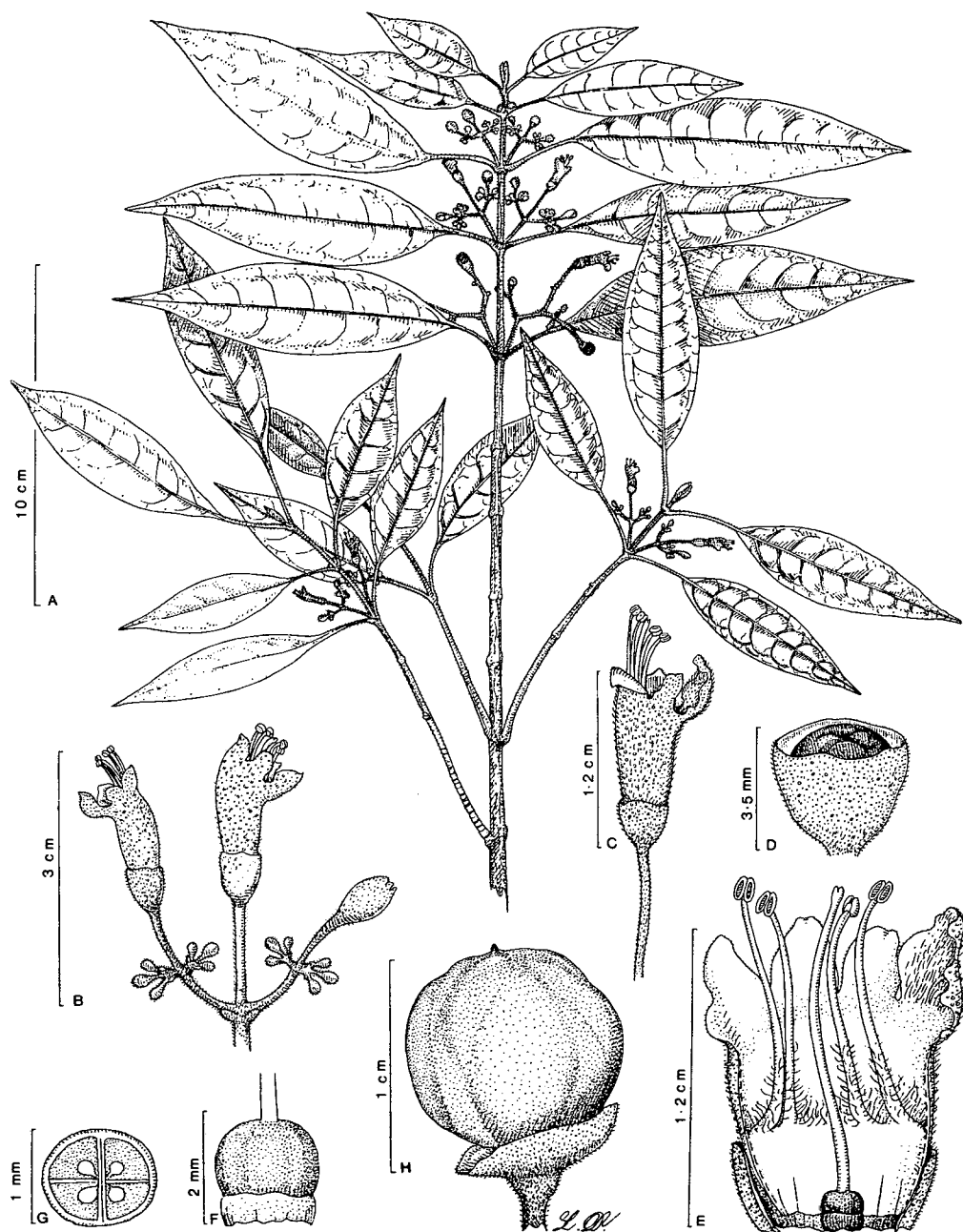


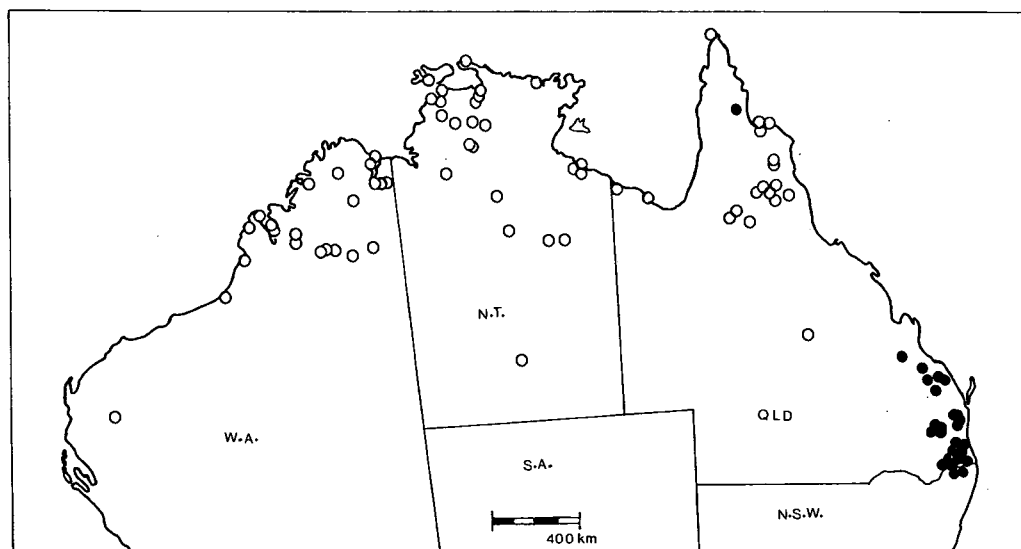
Fig. 4. *Premna lignum-vitae* (A. Cunn. ex Schau.) Pieper. (A-G, I.R. Telford 3508: CBG; H, N. Michael 3024: BRI). A, flowering branch; B, cyme; C, flower; D, truncate calyx-tube with ovary inside; E, flower with calyx and corolla cut open to show androecium and gynoecium; F, ovary, G, transverse section of ovary; H, fruit with persistent calyx.

*Hargreave s.n.*, Mt Tamborine, ix.1910 (BRI 114802); *Hyland 4296*, Lamington National Park, 3.vii.1976 (LAE, QRS); *Jessop & McDonald 92*, Benarkin State Forest, 4.iv.1978 (BRI); *Jessop & McDonald 101*, S.F. 289 Neumgna  $\pm$  16km W. of Yarraman, 5.iv.1978 (BRI, CANB); *McDonald & Stanton 2361*, S.F. 67 Bulburin, 22.vii.1978 (BRI); *Michael 2155*, Kents Pocket, Fossifern district, 19.i.1935 (BRI); *Michael 3024*, Haly Creek Road near Kingaroy, 29.vii.1947 (BRI, NSW); *Simmonds 379*, Brisbane River, 25.viii.1888 (BRI); *Simmonds s.n.*, Ashgrove, Brisbane, 19.i.1889 (BRI 275462, BRI 267477); *Smith & Webb 3694*, Marburg Range, 27.v.1948 (BRI); *Staer s.n.*, Mt Cooroy, ix.1911 (NSW 145242); *Telford 585*, McPherson Range, track to West Cliff, 18.v.1969 (CBG); *Telford 1644*, Skyring Creek, south of Gympie, 15.v.1970 (CBG); *Telford 3508*, Cotswold, foot of Mt Maroon, 4.x.1973 (CBG); *Webb & Tracy 7370*, McIlwraith Range, NE of Coen, 1962 (BRI); *White 11145*, One Tree Hill Dam near Brisbane, 14.vi.1937 (BRI); *White s.n.*, Woogaroo Creek, x. 1916 (BRI 267472); *White & Francis s.n.*, Bulimba near Brisbane River, viii. 1919 (BRI 267471, NSW 145247); *Williams s.n.*, Canungra, 24.i.1971 (BRI 114024); *Williams & Bird 78058*, Haigslea, ca. 16 km W of Ipswich, 21.v.1978 (BRI).

NEW SOUTH WALES: *Floyd 142*, Mt Dourigan Spur, Limpinwood, 25.xi.1976 (NSW); *Floyd 531*, Sawpit Creek, Roseberry, 2.viii.1977 (NSW).

### Distribution (Map 3)

*P. lignum-vitae* seems to be endemic in Australia where the main distribution is in the south-eastern part of Queensland and in the north-eastern tip of New South Wales. It occurs chiefly in coastal areas and seems to extend westward only to about 160 km inland. Its distribution is restricted between latitude 23° and 29° S, and longitude 150° and 154° E. A majority of collections, however, are known from the rain-forest area of the "MacPherson-Macleay Overlap". Outside this distribution area, only one doubtful collection (without flowers or fruit) from northern Queensland has come from McIlwraith Range in the Cape York Peninsula.



Map 3. Distribution of *P. acuminata* ○ *P. lignum-vitae* ●



### Comments

Of all the Australian *Premna* species, *P. lignum-vitae* seems the tallest (up to 30 m), with leaves somewhat coriaceous and glossy on the adaxial surface. It also has the largest flowers and fruits, the latter measuring up to 18 x 20 mm. According to C.T. White (6053: BRI), "the fruit is up to 2 cm diameter and has usually some white specks and bright shiny red all over when ripe".

According to Francis (1951), "the presence of channelled stem is a frequent feature of larger trees of this species. As the timber is more durable than most of the scrub timbers, it is occasionally used for fencing posts. It is suitable for flooring, chisel handles and other small turnery, piano sharps (stained), rules, scantlings". Bailey (1888) states that it has close-grained brown wood with darker streaks suitable for cabinet-work. Maiden (1889) described its wood: hard, close-grained, of blackish colour and a useful timber for cabinet-maker.

The occurrence of *P. lignum-vitae* in New South Wales was first recorded by Benthams (1870) who based it on a sample of "Sydney woods", displayed in a Paris Exhibition during 1855. Subsequently, this species was recorded from this state by F. Mueller (1882, 1889), Maiden (1889) and others without reference to any collections. During present investigations, however, no old collection of *P. lignum-vitae* from New South Wales was found in any Australian herbarium. It is not known on what material the presence of this species in the state was based in the early literature. The only available collections from New South Wales are A.G. Floyd's collections (nos. 142 & 531: NSW) gathered during 1976 and 1977. A large tree of this species grows in the Adelaide Botanic Gardens.

According to collector's field notes, the flowering period seems to be irregular. Both flowers and fruits are often available at various times of the year.

### Affinities

*P. lignum-vitae* is closely allied to *P. dallachyana* in its leaves being glabrous, the lamina cuneate at the base, petiole pubescent, pedicels more than 1 mm long, corolla-tube at least twice as long as the calyx, stamens and style exserted, ovary glabrous and ripe fruits always purplish. Nevertheless, *P. lignum-vitae* may readily be distinguished by its lamina being coriaceous and adaxially shining, the pedicels much longer (5-12 (-14) mm long), corolla tomentose outside, purplish-red or pinkish-mauve and 9-15 mm long, and the fruit pale-red or reddish-purple when ripe, (5-) 8-15 (-20) mm diameter. *P. lignum-vitae* is also related to *P. serratifolia* L. For distinguishing characters see under the latter.

4. ***Premna dallachyana*** Benth., Fl. Aust. 5 (1870) 59; F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 103; F.M. Bail., Synop. Qld Fl. (1883) 378; Proc. Roy. Soc. Qld 1 (1884) 70; F. Muell., Sec. Syst. Cens. Aust. Pl. 1 (1889) 173; F.M. Bail., Cat. Indig. & Natur. Pl. Qld (1890) 35; Qld Fl. 4 (1901) 1176; Comp. Cat. Qld Pl. (1913) 386; Domin, Biblioth. Bot. 89 (1929) 556; Mold., Résumé Verbenac. etc. (1959) 210, 297, 337; Fifth Summary Verbenac. etc. 1 & 2 (1971) 348, 525, 526, 607; Sixth Summary Verbenac. etc. (1980) 338; Baines, Aust. Pl. Gen. Part 1 (1981) 303.

*Lectotype*: *Dallachy s.n.*, Port Denison, Queensland, Australia, undated (MEL 582175, lectotype designated here!; K, MEL 582172, MEL 582174—isolectotypes!).

*P. dallachyana* Benth. var. *obtusiseipala* Domin, Repert. Spec. Nov. Regni Veg. 12 (1913) 133; Biblioth. Bot. 89 (1929) 556; Mold., Résumé Verbenac. etc. (1959) 210; Fifth Summary Verbenac. etc. 1 (1971) 348; Sixth Summary Verbenac. etc. (1980) 338, syn. nov.

*Type*: *Dallachy s.n.*, Edgumbe Bay, Queensland, Australia, undated (MEL 582173!).

*P. tateana* F.M. Bail., Bot. Bull. Dept. Agric. Qld 13 (1891) 15; Qld Fl. 4 (1901) 1176; Comp. Cat. Qld Pl. (1913)

386, fig. 361; Mold., *Résumé Verbenac. etc.* (1959) 210; Fifth Summary Verbenac. etc. 1 (1971) 348; Baines, Aust. Pl. Gen. Part 1 (1981) 303, syn. nov.

Type: *Barcley-Millar s.n.*, Walsh River, Queensland, Australia, v.1891 (BRI 019365, holotype!; K, isotype!).

*P. minor* Domin, *Biblioth. Bot.* 89 (1929) 556; Mold., *Résumé Verbenac. etc.* (1959) 210; Fifth Summary Verbenac. etc. 1 (1971) 348, syn. nov.

Type: *Domin 8129-8132*, near Chillagoe & Mungana, Queensland, Australia, ii.1910 (PR, syntypes!).

*Gumira dallachyana* (Benth.) Kuntze, *Rev. Gen. Pl.* 2 (1891) 507, based on *P. dallachyana* Benth. (1870).

### Typification

*P. dallachyana* Benth. is based on two of Dallachy's collections and one of Bowman's, all from northern Queensland. These collections comprise altogether at least eight duplicates which were certainly used by Bentham in preparing the protologue of this species. Since he did not choose any one specimen as a type, it is therefore necessary to select a type for this name. Of all the syntypes, a duplicate of Dallachy's Port Denison collection preserved in Herb. MEL is particularly complete and well preserved and chosen here as the lectotype of this species.

### Description (Fig. 5)

A shrub or small tree 2-5 m tall. *Stem* and branches cylindrical, glabrous, bark light-greyish, often shortly longitudinally furrowed and more or less covered with scattered warts. *Leaves*: lamina bright-green, narrowly elliptic or ovate, acuminate, entire, obtuse or more often cuneate towards base, (4.5-) 6-12 (-15) cm long, (1.5-) 2.5-6 (-7.5) cm broad, glabrous, scarcely pubescent along principal veins underneath, usually drying black; petiole pubescent, (1-) 2-4 (-5.5) cm long. *Inflorescence* lax; cymes in corymbose panicle. *Flowers* "white" or "greenish-cream", pedicellate; pedicel pubescent, glandular, 1-2.5 mm long; bracts small and narrow, pubescent. *Calyx* accrescent, obscurely 2-lipped, usually 5-toothed, sometimes 4-toothed, 1.5-2 mm long, puberulous and densely glandular outside when young, later almost glabrous; tube glabrous inside, 1-1.5 mm long; lobes acute or obtuse, not deltoid,  $\pm 0.5$  mm long. *Corolla*  $\pm 2$ -lipped, 4-lobed, glabrous outside, densely villous inside tube and on inner face of lobes, 4-7 mm long; tube  $\pm$  cylindrical, almost twice as long as calyx, (2.5-) 3-3.5 (-4) mm long, 1-2 mm in diameter; lobes broadly elliptic-oblong or almost orbicular, upper lobe comprising posterior lip larger than others. *Stamens* exserted, inserted in corolla throat,  $\pm$  didynamous; filaments glabrous, filiform, lateral pair (3-) 4-5 mm long, anterior pair (2-) 3-4 mm long; anthers  $\pm$  orbicular in outline, lobes free and divergent in lower halves,  $\pm 0.5$  mm long. *Ovary* globose, glabrous,  $\pm 1$  mm diameter; style exserted, filiform, glabrous, 4-6 mm long; stigma 2-lobed. *Fruit* globular, glabrous, verrucose, 3-5 mm diameter, dark purple when ripe, drying black.

### Specimens examined

AUSTRALIA: QUEENSLAND: *Barcley-Millar s.n.*, Walsh River, v.1891 (BRI 019365, holotype of *P. tateana* Bial.; K); *Bowan 221*, Fort Cooper, undated (K, MEL 582171, syntypes); *Dallachy s.n.*, Port Denison, undated (MEL 582175, lectotype; K, MEL 582172 & MEL 582174—isolectotypes); *Dallachy s.n.*, Edgumbe Bay, undated (K, MEL 582173, syntypes of *P. dallachyana* Benth. and var. *obtusisepala* Domin); *Domin 8129, 8130, 8131*, near Chillagoe, ii.1910 (PR, syntypes of *P. minor* Domin); *Domin 8132*, near Mungana, ii.1910 (PR, syntype of *P. minor* Domin); *Dietrich 2826*, Brisbane River, 1863-1865 (PR 2 spec., HBG n.v.); *Godwin C922*, Donna bluff, Chillagoe, v.1980 (BRI); *Michael 1204*, Edgumbe Bay, undated (BRI); *Persieh 835*, Endeavour River, 1886 (MEL); *Persieh 133*, loc. incert. 1882-1886 (MEL); *Sayer 54*, Russell River, 1886 (MEL); *Webb 646*, Chillagoe, 16.vi.1945 (CANB, JCT); *Webb & Tracy 10910*, Dowlings Hill on Mt Amos road, vi.1973 (BRI 3 spec.).

PAPUA NEW GUINEA: *Hartley 10217*, Markham River valley near Nadzale, Morobe district, 23.v.1962 (CANB); *Henty NGF 11513*, loc. cit. 4.viii.1959 (CANB, LAE); *Pullen 3553*, between Kaiye and Dumana, NW of Hisiu, Kairuke subdistrict, 20.viii.1962 (CANB); *Turner s.n.*, Rigo district, Papua, undated (BRI 267360).

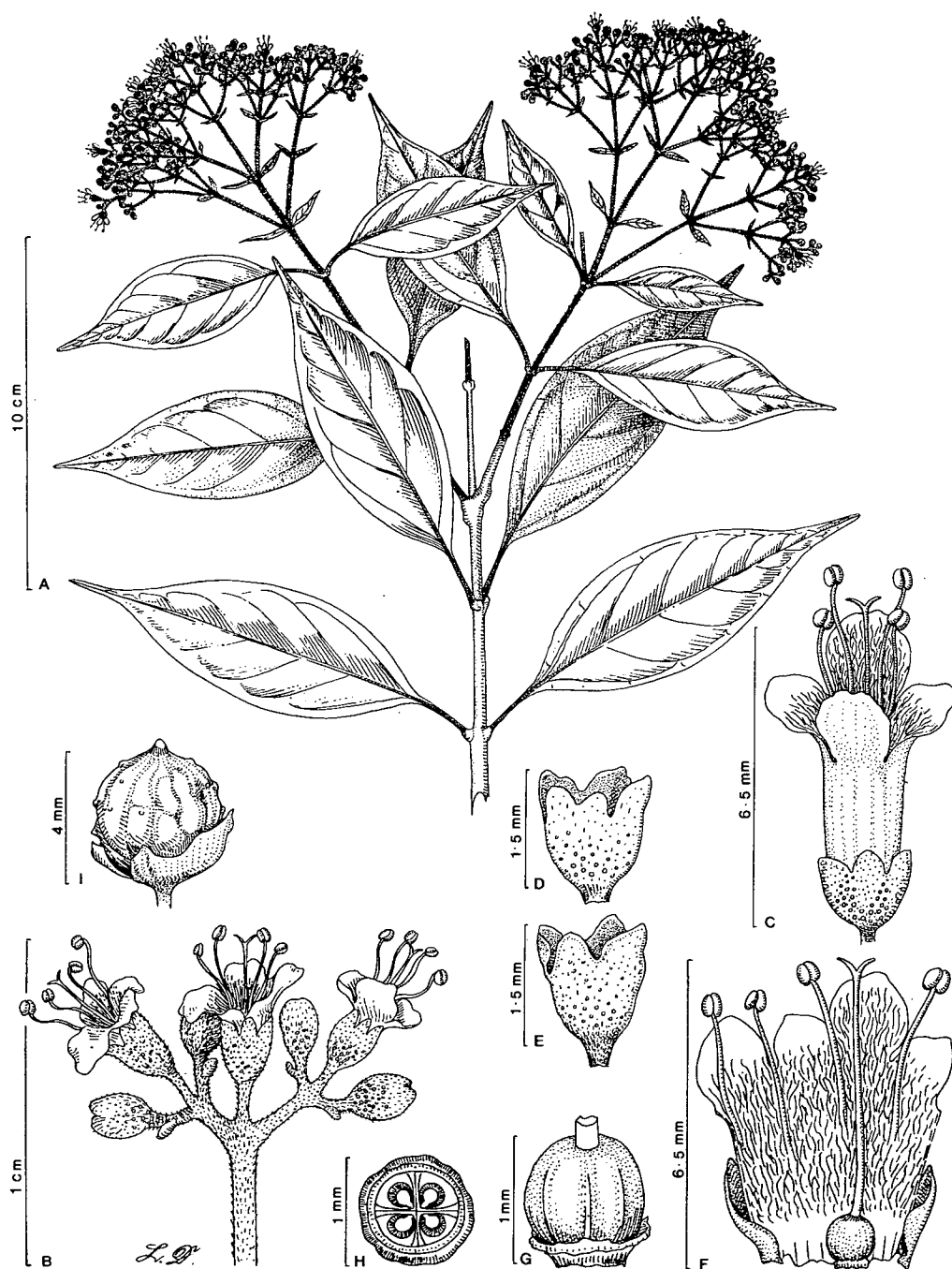


Fig. 5. *Premna dallachyana* Benth. (A-H, *Dallachy* s.n.: MEL 582175; I, *M. Godwin* C922: BRI). A, flowering twig; B, portion of inflorescence; C, flower; D, calyx with five lobes; E, calyx with four lobes; F, flower with calyx and corolla cut open to show androecium and gynoecium; G, ovary; H, transverse section of ovary; I, fruit with persistent calyx.

PHILIPPINES: *Curran* 13211, Island of Corregidor, ix.1911 (BRI); *Ramos* 1894, Province of Batangas, Luzon, viii.1914 (BM, BRI, PNH).

#### Distribution (Map 4)

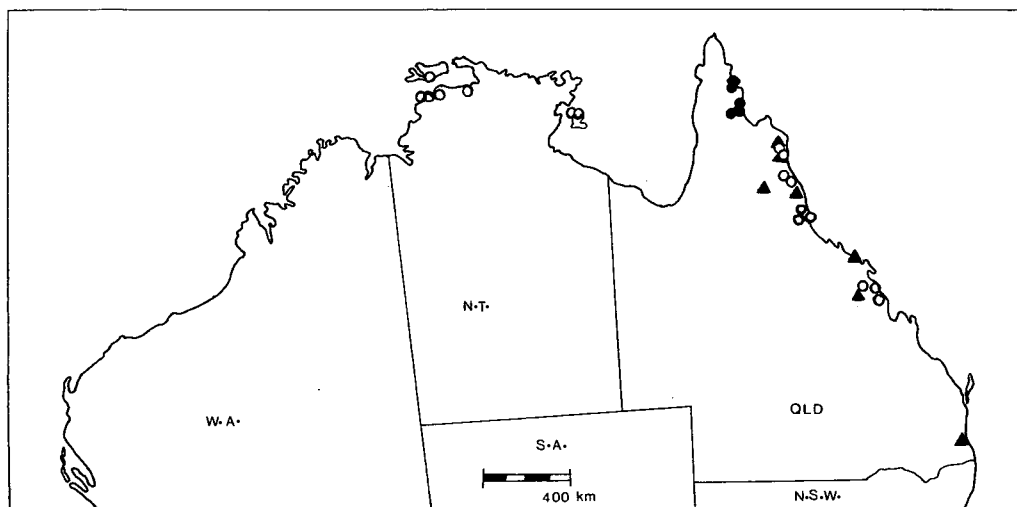
In Australia, *P. dallachyana* is found only in Queensland, where it occurs chiefly in the north-eastern coastal region between Cooktown and Port Mackay. Within this area, the major distribution is on the Atherton Tableland and around Edgumbe Bay. The only other known locality is near the Brisbane River.

Bentham (1870), F. Mueller (1882, 1889), Moldenke (1959, 1971) and other botanists regarded this species as being endemic in Queensland. During present investigations, however, specimens of this species have been examined from Papua New Guinea and the Philippines.

#### Comments

Baily (1891) distinguished *P. tateana* Bail. from *P. dallachyana* chiefly by its verrucose fruit. Incidentally, this character is not mentioned by Bentham (1870) in the original description of *P. dallachyana* which led Bailey to believe that such a character is not present in this species. According to Bailey (1891), "Bentham would never have escaped detection of verrucose fruit in drawing up the diagnosis of *P. dallachyana*". Apparently, Bailey himself did not examine the type of *P. dallachyana* which also has verrucose fruits. During present investigation, the type of *P. tateana* was found to have fruits similar to those of *P. dallachyana*, as are the leaves and flowers. There seems no justification, therefore, in regarding them as different species. This fruit surface character is more or less variable and has never been used by anyone else in the identification of *Premna* species.

Domin (1929) recognised *P. dallachyana*, *P. minor* Domin and *P. tateana* as being closely related species, but stressed that these should be retained separately. In drawing up



Map 4. Distribution of *P. dallachyana* ▲, *P. hylandiana* ●, *P. odorata* ○.

his new species, *P. minor*, he distinguished it from *P. dallachyana* by its leaves being much shorter, oblong or oblong-elliptic (not ovate), puberulous underneath, inflorescence much more compact and fruiting-calyx at least half the size of the latter. During present investigations, however, the types of *P. minor* and *P. dallachyana* were found to be taxonomically identical. The emphasis on the size and shape of leaves and calyces seems unjustified, for such variation is also found in other species of this genus. Similarly, *P. dallachyana* var. *obtusisepala* Domin is distinguished from the typical variety by its sepals being obtuse and lateral leaves broadly ovate. These characters are not found exclusively in var. *obtusisepala* because such sepals and leaves are also present in the typical variety.

Bentham (1870) placed this species in the group having a 5-toothed calyx, but the type specimens are found to have both 4- and 5-toothed calyces. The 5-toothed calyces are generally more markedly 2-lipped than the 4-toothed ones. In the type material of *P. minor*, a few flowers are found to have 5 stamens.

Bentham (1870), Moldenke (1959, 1971) and others have considered this species as being endemic in Queensland. During present studies, however, some of its collections from Queensland, Papua New Guinea and the Philippines were found to have been identified as *P. nauseosa* Blanco. According to Merrill (1906, 1923), *P. nauseosa* is endemic in the Philippines, but Moldenke (1959, 1971) recorded it from the Archipelago of Ryukyu, the Philippines, the Celebes, Java, Kangean, Sumatra, Timor and Christmas Island. The type of *P. nauseosa* could not be traced for examination, but the specimens identified as this species by other authorities are certainly not different from *P. dallachyana*. According to Merrill (1905), "the types of all Blanco's species have been destroyed. It is certain that Blanco had at least a working herbarium, but unfortunately, after his death, the value of his collection was not recognised. Accordingly, today we are dependent entirely on his imperfect descriptions for the identification of his species". In spite of this shortcoming, Merrill (1918) considered *P. nauseosa* as a valid species. Previously, Schauer (1847) and Miquel (1858) recorded this as a doubtful species, and each gave it a short and imperfect description. In the protologue and all other available descriptions, the leaves of *P. nauseosa* are said to be somewhat cordate. But the leaves in all available collections, identified as *P. nauseosa*, are generally cuneate towards the base. In view of this, the true identity of *P. nauseosa* is somewhat doubtful and, therefore, the name *P. dallachyana* is retained here. If ever *P. nauseosa* and *P. dallachyana* could be shown to be conspecific, then the name *P. nauseosa* (1837) should be adopted.

Most specimens of this species dry black, which is a useful character in distinguishing it from others. According to Bailey (1891), however, "the notice given of the leaves of various *Premnas* drying black is not worthy of note, for if dried quickly they retain a green colour, but if allowed to become damp will turn black". In his view, "the wood of this species is used for making fire-sticks".

### Affinities

*P. dallachyana* is nearest to *P. lignum-vitae* in its lamina being cuneate at the base, the petiole pubescent, pedicels more than 1 mm long and fresh fruit with a purplish tinge. However, *P. dallachyana* may easily be identified by its lamina being chartaceous, dull, turning black when dry, pedicels 1-2.5 mm long, the corolla glabrous outside, greenish-cream, 4-7 mm long, and fruit dark purple when ripe. For its relationship with *P. serratifolia*, see under that species. Bailey (1891) considered its nearest ally to be the Indian species, *P. latifolia* Roxb.

### 5. *Premna hylandiana* Munir, sp. nov.

Arbor circa 15 m alta. *Caulis* 20-40 cm diametro, cortice fissurato lamelliformis pallido; surculi juvenes tomentoso ferrugineo pilis dendriformibus vel stellatis dense tecti. *Folia* petiolata; lamina ovato-cordata, integra vel late undulata, (8-) 12-20 (-25) cm longa, (5-) 8-15 (-18) cm lata, chartacea, pubescento-tomentosa pilis stellatis abaxillariter. *Inflorescentia* terminalis laxa. *Flores* pedicellata; pedicelli (1.5-) 2-3 (-5) mm longi. *Calycis* tubus fere truncatus, extra sparsim glandulifer et stellato-pubescent. *Corolla* dilute flavida, profunde 4-lobata in parte superiori, extra glabra, lobis dorsaliter sparsim glanduliferis in fauce dense villosa; tubus fere aequans calycem. *Stamina* exserta. *Ovarium* globosum, glabrum, ad apicem glandulosum; stylus exsertus, glaber, filiformis, 3.5-5 mm longus; stigma breviter 2-fida. *Fructus* globosus.

Type: *B. Hyland* 10232, near Lockerbie, lat. 10°, 47'S, long. 142°, 28'E, Queensland, Australia, 1.ii.1980 (QRS, holotype; AD, QRS, 2 spec.—isotypes).

#### *Descriptions* (Fig. 6)

At tree  $\pm$  15 m tall. *Stem*: trunk 20-40 cm diameter, fluted, with fissured and flaky pale bark; young branches densely clothed with ferruginous pubescent-tomentum of dendriform-stellate hairs. *Leaves*: lamina more or less ovate, cordate at base, shortly narrowed at apex, entire or broadly undulate, (8-) 12-20 (-25) cm long, (5-) 8-15 (-18) cm broad, chartaceous, sparsely pubescent adaxially, densely pubescent-tomentose abaxially with stellate hairs, the first and often second pair of primary veins starting from base of midrib; petiole slender, densely covered with rusty indumentum of stellate hairs, 3.5-6.5 (-8) cm long. *Inflorescence* terminal, somewhat lax, rusty tomentose, 1-2.5 cm long. *Flowers* pedicellate; pedicels ferruginous-pubescent with close stellate hairs, (1.5-) 2-3 (-5) mm long; bracts minute, rusty-pubescent. *Calyx* almost truncate or with 4 short obtuse lobes at top, sparsely glandular and stellate-pubescent outside, glabrous inside; tube cylindrical, 2-3 mm long, 1.5-2 mm diameter at top; lobes short, rounded at top,  $\pm$  0.5 mm long, about 1 mm broad at base. *Corolla* cream or pale yellow, deeply 4-lobed in upper part, tubular below, glabrous outside with a few glands on back of lobes, densely villous inside throat,  $\pm$  6 mm long; tube cylindrical, almost equal to calyx, 2-3 mm long,  $\pm$  1.5 mm diameter; lobes narrowly elliptic-oblong, rounded or obtuse at apex, 3-4 mm long, 1.5-2.3 mm broad, upper lobe somewhat larger than others. *Stamens* exserted, almost equal or anterior pair slightly longer; filaments glabrous, very slender or filiform, anterior pair 3-3.5 mm long, lateral pair 3 mm long; anthers oblong, lobes free and divergent in lower halves, 0.5-1 mm long. *Ovary* globose, glabrous, glandular,  $\pm$  1 mm diameter; style exserted, filiform, glabrous, 3.5-5 mm long; stigma minutely 2-fid. *Fruit*: young fruit globular, glabrous, glandular at top; mature fruit not seen.

#### *Specimens examined*

AUSTRALIA: QUEENSLAND: *Hyland* 10232, near Lockerbie, 1.ii.1980 (QRS, holotype; AD, QRS 2 spec.); *Hyland* 2530 R.F.K., near Timber Reserve 9, Lankelly Creek-Pandanus Creek, 9.ix.1971 (QRS); *Hyland* 2721 R.F.K., Alligator Creek Catchment on the Pascoe River Rd, 16.x.1972 (QRS 3 spec.); *Hyland* 2849 R.F.K., T.R. 14, Rocky River Catchment, 10.ix.1973 (AD, QRS); *Hyland* 3400 R.F.K., Lankelly Creek Road, 6.iv.1976 (AD, QRS); *Hyland* 3765 R.F.K., Claudie River, 20.vii.1978. (QRS 2 spec.).

#### *Distribution* (Map 4)

*P. hylandiana* seems to be endemic in Australia where it is known only from the northern part of Queensland. The presently known distribution is in the northern half of the Cape York Peninsula with most localities to the north of Lat. 14°S along the east coast. Further exploration may reveal its occurrence in other parts of the Peninsula.

#### *Comments*

This species is named after Mr B.P.M. Hyland of C.S.I.R.O., Division of Forest Research, Atherton, Queensland, who gathered all six known collection of this species.

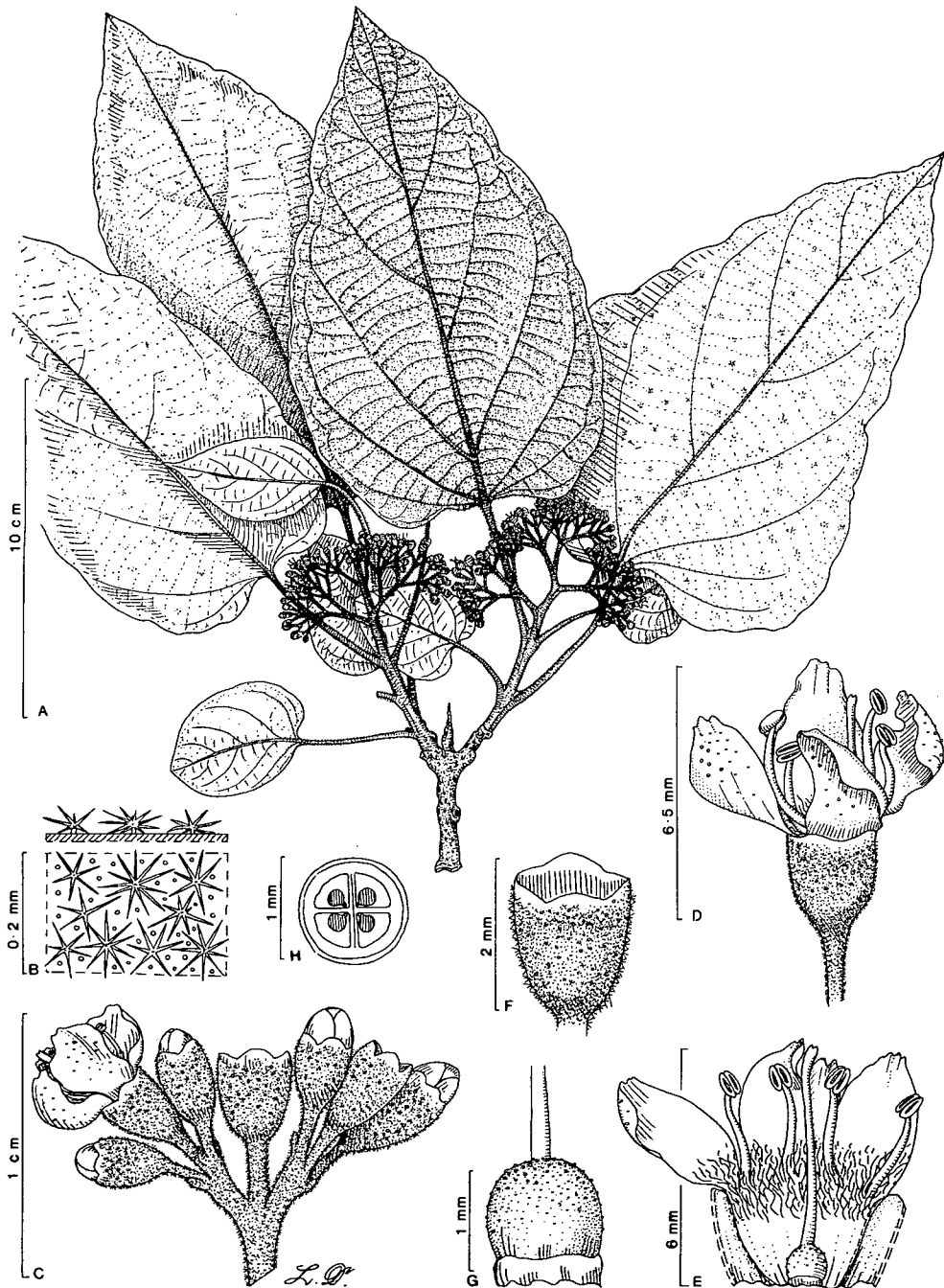


Fig. 6. *Premna hylandiana* Munir, sp. nov. (A-H, B. Hyland 10232: QRS, holotype). A, flowering branch; B, enlarged portion of leaf showing stellate hairs on the abaxial surface; C, cyme; D, flower; E, flower with calyx and corolla cut open to show androecium and gynoecium; F, calyx with four short lobes; G, ovary; H, transverse section of ovary.

Of these collections, only *Hyland 10232* has a fully developed inflorescence, which is chosen here as the type. The other collections have well developed leaves but are without any flowers.

### Affinities

*P. hylandiana* has previously been identified as *P. cumingiana* Schau. and is closely related to it in its young shoots and inflorescence being densely clothed with a ferruginous indumentum of dendriform-stellate hairs, the leaves almost identical in shape and size, lamina cordate, entire, stellately tomentose abaxially, sparsely pubescent adaxially, and corolla-tube scarcely exceeding the calyx. Nevertheless, *P. hylandiana* is easily distinguished by its floral bracts being minute, to 0.5 mm long; pedicels much longer, 1.5-3 (-5) mm long, the calyx-tube almost truncate, not 2-lipped, the corolla glabrous outside and lobes more or less similar, not bilabiate, and the ovary glabrous and glandular. In *P. cumingiana*, the bracts are 1-2 mm long, pedicels up to 1 mm long only, calyx-tube distinctly 5-toothed, 2-lipped, the corolla densely pubescent outside and bilabiate, with the ovary and fruit stellately pubescent.

Amongst the other Australian *Premna* species, *P. hylandiana* is closely related to *P. acuminata* R. Br. and *P. odorata* Blanco in its leaves being pubescent-tomentose with a somewhat chartaceous lamina. However, *P. hylandiana* may easily be distinguished by the hairs being dendriform-stellate, the corolla glabrous outside and ovary glandular at the top. The hairs in *P. odorata* and *P. acuminata* are always simple and the corolla pubescent outside.

6. *Premna acuminata* R. Br., Prod. Fl. Nov. Holl. (1810) 512; Schau. in DC., Prod. 11 (1847) 637; F. Muell., Fragm. 3 (1862) 36; Benth., Fl. Aust. 5 (1870) 60; F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 103; F.M. Bail., Synop. Qld Fl. (1883) 378; F. Muell., Sec. Syst. Cens. Aust. Pl. 1 (1889) 173; F.M. Bail., Cat. Indig. & Natur. Pl. Qld (1890) 35; Qld Fl. 4 (1901) 1177; Comp. Cat. Qld Pl. (1913) 386; Ewart & Davies, Fl. N. Terr. (1917) 237; Domin, Biblioth. Bot. 89 (1929) 557; Gard., Enum. Pl. Aust. Occ. 3 (1931) 112; Specht in Specht & Mountford, Rec. Amer.-Aust. Sc. Exped. Arnhem Land 3, Bot. & Ecol. (1958) 470; Mold., Résumé Verbenac. etc. (1959) 174, 201, 210, 211, 221, 337, 338; Beard, Descrip. Cat. W. Aust. Pl. (1965) 93; *ibid.* 2nd edn (1970) 113; Mold., Fifth Summary Verbenac. etc. 1 & 2 (1971) 292, 337, 348-49, 367, 606, 607; Chipp., Proc. Linn. Soc. N.S.W. 96 (1972) 256; Mold., Sixth Summary Verbenac. etc. (1980) 338; Green, Cens. Vasc. Pl. W. Aust. (1981) 89; Baines, Aust. Pl. Gen. Part 1 (1981) 303.

*Lectotype*: R. Brown s.n., (J.J. Bennett no. 2328) northern coast of Queensland, loc. incert., Australia, 1802-1805 (BM, lectotype designated here!; BM, MEL—isotypes!).

*P. cordata* R. Br., Prod. Fl. Nov. Holl. (1810) 512; Schau. in DC., Prod. 11 (1847) 637.

*Type*: R. Brown s.n., loc. incert., the coast of Queensland and the Northern Territory, Australia, 1802-1805 (BM, K, isotypes).

*Gumira acuminata* (R. Br.) Kuntze, Rev. Gen. Pl. 2 (1891) 507, based on *P. acuminata* R. Br. (1810); Mold., Phytologia 31 (1975) 398, pro syn.

### Typification

*P. acuminata* R. Br. is based on a Robert Brown collection from the northern coast of Queensland, Australia. It consists of at least three duplicates of which one is preserved in the National Herbarium of Victoria at Melbourne (MEL) and two in the British Museum Natural History (BM), London. One of the syntypes in the BM (J.J. Bennett no. 2328) has a range of leaves and more complete inflorescence, and is selected here as the lectotype for this species.



*Description* (Fig. 7)

Shrub or small spreading tree 2-5 m tall. *Stem and branches* ± hoary when young, almost glabrous when mature; bark light grey, longitudinally fissured. *Leaves*: lamina dark-green above, ± paler beneath, broadly cordate-ovate, deltoid or almost rhomboidal, acuminate, entire or coarsely and irregularly dentate, (5-) 7-13 (-16) cm long, (3-) 5-9 (-11.5) cm broad, somewhat chartaceous, ± pubescent or tomentose on both sides, the first and often second pair of primary veins starting from base of midrib; petiole slender, pubescent, (3-) 5-7 (-8) cm long. *Inflorescence* of very lax pale green panicles, primary branches trichotomous, remote ones dichotomous, panicle 10-20 cm long, 13-25 (-30) cm broad. *Flowers* greenish-cream, nearly sessile or shortly pedicellate; pedicels pubescent, ± 1 mm long; bracts lanceolate, pubescent ± 1 mm long. *Calyx* mostly 5-toothed, sometimes 4-toothed, ± 2-lipped, pubescent and often somewhat rugose outside, glabrous within, 1.5-2 (-2.5) mm long; tube 1-1.5 mm long; lobes obtuse or of posterior lobe sometimes almost truncate, 0.5-1 mm long, 1-1.5 mm broad at base. *Corolla* reddish or dull brick-red on lobes, pale greenish-cream on tube, 4-lobed, scarcely 2-lipped, pubescent outside, densely villous inside tube, 5-6 (-7) mm long; tube ± cylindrical, almost twice length of calyx, 3-4 mm long, ± 2 mm diameter at top end; lobes broadly elliptic-ovate, shorter than tube, 1.5-2 (-3) mm long, 1.5-2 mm broad, upper one scarcely different from others. *Stamens* exserted, didynamous; filaments glabrous, filiform, anterior pair 2.5-3 mm long, lateral pair 3.5-4 mm long; anthers ± orbicular in outline, lobes free and divergent in lower halves, ± 0.5 mm long. *Ovary* depressed globose, glabrous, ± 1 mm diameter; style exserted, filiform, glabrous, 5-6 mm long; stigma shortly 2-lobed. *Fruit* obovoid or ± globose, glabrous, 4-5 (-6) mm long, 3.5-4 (-5) mm diameter, pale green, drying black.

*Representative specimens* (91 collections seen)

AUSTRALIA: QUEENSLAND: *Armit* 978, Etheridge River, undated (MEL); *Blake* 13550, Chilagoe, 30.iii.1938 (BRI); *R. Brown* s.n., north coast, loc. incert., 1802-1805 (BM, lectotype; BM, MEL—isolectotypes); *Dockrill* 661, Stannary Hills, 9.ii.1973 (QRS); *Domin* 8133, Mungana, ii.1910 (PR); *Hyland* 5215, Byerstown Range, 10.vi.1971 (BRI, CANB, LAE, QRS); *Moriarty* 1449, Almaden-Chillagoe Rd., 24.viii.1973 (BRI); *White* 1422, Georgetown, ii.1922 (BRI—2 spec., NSW).

NORTHERN TERRITORY: *Adams* 823, 13 miles S.E. of Katherine, 19.xii.1963 (BRI, CANB, K, L, MEL, NSW, NT, US); *Craven* 2343, Mt Brockman, 21.ii.1973 (A, BRI, CANB, L, LAE, NT); *Flint* s.n., north of Alice Springs, 1882 (MEL 582837); *Fox* 1023, Smith Point, 27.xi.1975 (DNA); *Hulls* s.n., Escape Cliff, undated (MEL 582743); *Lazarides* 6846, Katherine River, Katherine Research Station, 15.iii.1963 (CANB, NT); *Lazarides* 7955, 7 miles W of Mt Gilruth, 2.iii.1973 (BRI, CANB, NT); *Maconochie* 2294, 17 km W Stuart Highway along Top Spring Road, 10.i.1978 (CANB, NT); *McDoual Stuart Exped.* s.n., North Australia loc. incert., 1861-62 (MEL 582752); *McKee* 8335, Humpty Doo, Darwin area, 10.ii.1961 (L, NSW, NT); *Martensz & Schodde* AE 365, vicinity of El Sharana, 16.i.1973 (BRI, CANB, DNA, NT); *Martensz & Schodde* AE 777, Cannon Hill turnoff, Oenpelli Rd, 8.ii.1973 (BRI, CANB, DNA, NSW, NT); *F. Mueller* s.n., Victoria River, x.1855, (MEL 582754, MEL 582753); *Parker* 324, Tortilla Flats, 17.i.1974 (DNA, MO); *Perry* 1593, 20 miles ENE of Rockhampton Downs Station, 4.vii.1948 (BRI—2 spec., CANB, NT); *Tate* 33, Adelaide River, 1882 (MEL 582737); *Travers* 9063, Wearyan River, Manangoora, 2.vi.1962 (NT); *Webb & Tracy* 12260, western gully of Mt Douglas, v.1978 (BRI).

WESTERN AUSTRALIA: *Byrnes* 1822, Reynolds Creek, 10.iii.1970 (DNA, MEL, NT); *Fitzgerald* 527, near junction of Lennard & Barker Rivers, v.1905 (PERTH); *A. Forrest* s.n., 1879 (MEL 582840); *George* 12275, Prince Regent River Reserve, 14.viii.1974 (PERTH); *Hartley* 14585, Vicinity of Faith Hill, Cape Dussejour, 14.iii.1978 (CANB, PERTH); *Hughan* s.n., Beagle Bay, 1869 (MEL 582821-22); *Kenneally* 4407, Carson River at junction with Woorakin Creek, Drysdale River National Park, 17.viii.1975 (PERTH); *Royce* 7037, Brooking Spring, 18.v.1962 (PERTH); *Rust* 62, Karunjie Kimberley Research Station, 7.iii.1950 (CANB); *Tepper* 532, Roebuck Bay, i.1890 (PERTH); *Vasek* 690317-10, West Edge Derby, 17.iii.1969 (CANB); *Walden* s.n., Kununurra, 16.iii.1972 (PERTH).

*Distribution* (Map 3)

*P. acuminata* seems to be endemic in Australia where it is known to occur in the tropics of Queensland, Northern Territory and Western Australia. In Queensland, it is

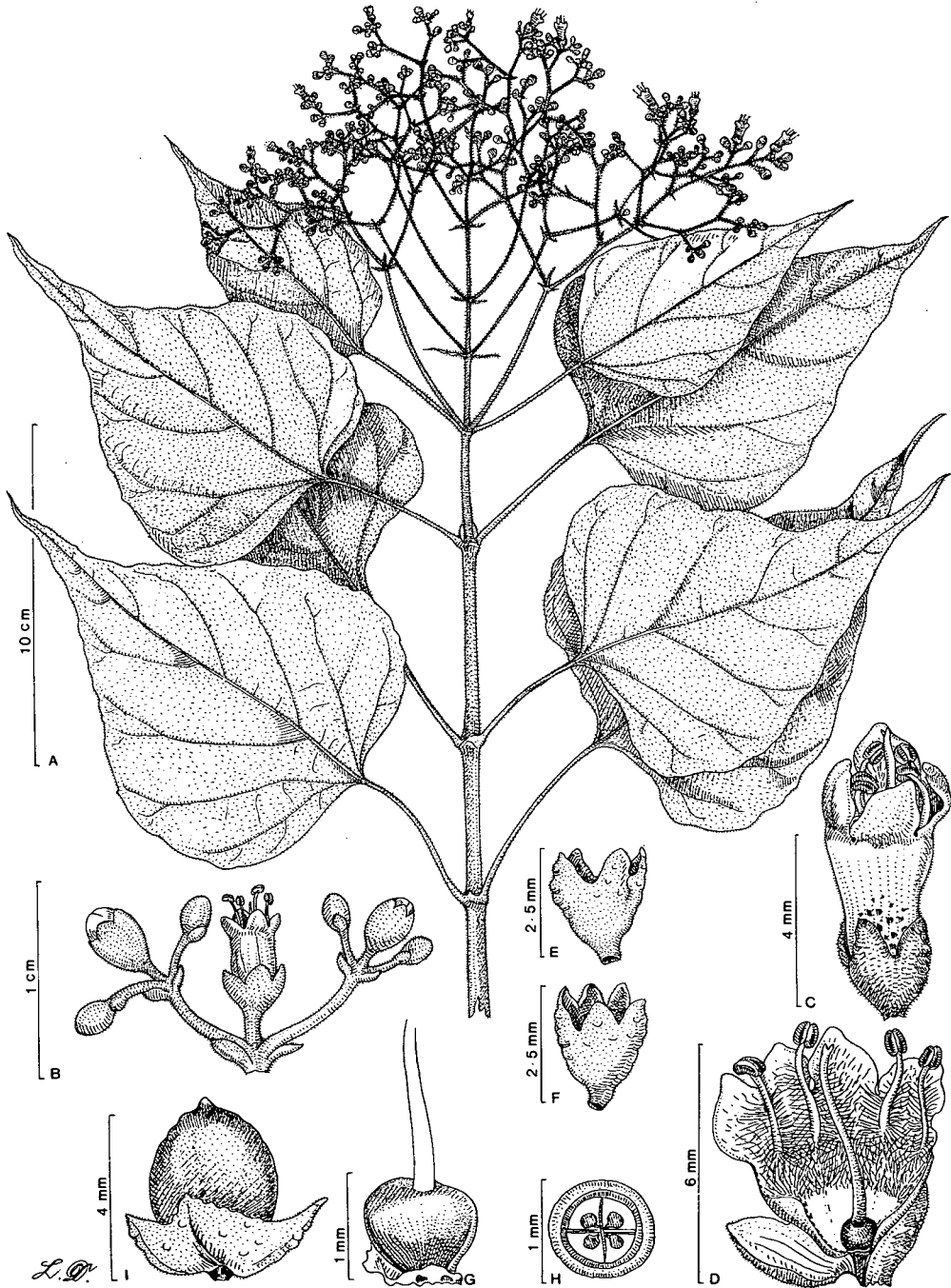


Fig. 7. *Premna acuminata* R. Br. (A-H, L.A. Craven 3778: CANB; I, L.A. Craven 2343: CANB). A, flowering branch; B, cyme; C, flower; D, flower with calyx and corolla cut open to show androecium and gynoecium; E, calyx with four lobes; F, calyx with five lobes; G, ovary; H, transverse section of ovary; I, fruit with persistent calyx.

known mainly from Cape York Peninsula, and Sweers Island in the Gulf of Carpentaria. The northern-most locality is on Thursday Island in the Torres Strait and the southern-most near Dunrobin west of Clermont. The only other place of its occurrence in Queensland is along Settlement Creek near the border of Northern Territory.

In Northern Territory, the main distribution is in Arnhem Land with a few scattered localities on the Barkley Tableland. Some collections are also known from the Sir Edward Pellew Group of islands in the Gulf of Carpentaria. One odd collection, reportedly from north of Alice Springs, is probably from the Barkley Tableland region. According to present investigations, the southern-most locality of this species is to the north of 19°S latitude. There is no other collection to confirm its occurrence anywhere south of Tennant Creek or the Barkley Highway.

Distribution in Western Australia is chiefly in the Northern botanical Province of Beard (1970). The only locality outside is reported from about 240 km south-east of Onslow near Reynolds Creek. This locality being so far away from the main distribution area needs further investigation to confirm the presence of this species there.

Moldenke (1959, 1971) recorded this species from Papua and Hainan, but so far no *P. acuminata* collection is known to me from these areas.

### Comments

This species is readily distinguished by its long, acuminate, pubescent foliage and the largest and most loose inflorescence of all Australian *Premna*.

Notes with D.F. Thomson's collection no. 23 (BRI) and Reeve & Baku's collection no. 137 (CANB) state that the wood of this species is used for firesticks by aborigines.

Bentham (1870) cited under this species a collection from McDoual Stuart's Expedition into northern Australia. It consists of two herbarium sheets numbered MEL 582751 and MEL 582752. The former (MEL 582751) comprises parts of only two damaged leaves which are glabrous, about 17 x 16 cm and more or less circular in outline. These characters do not agree with the leaves of *P. acuminata*. This herbarium sheet is, therefore, being excluded from this species. The other herbarium sheet, MEL 582752, is without an inflorescence, but its leaves match well with the foliage of other *P. acuminata* collections.

The hand-written label no. "397" of an unknown collector on the herbarium sheet MEL 582734 seems to agree with that on the label of MEL 582842. The former was collected during 1886 and latter in 1884.

According to Moldenke (1971), this species is cultivated in California and Java. Previously, Dakkus (1957) listed it in the catalogue of plant species cultivated in the Botanic Gardens, Bogor, Java.

### Affinities

*P. acuminata* is closely related to *P. odorata* Blanco in its leaves being pubescent with simple hairs, the flowers subsessile, calyx and corolla pubescent outside, stamens and style exserted, and ovary glabrous without glands. Nevertheless, *P. acuminata* may readily be distinguished by its Poplar-like leaves with lamina much acuminate, cordate-ovate, deltoid or almost rhomboidal in profile, with entire or coarsely and irregularly dentate margins, the inflorescence is very lax, 15-25 (-30) cm broad, the corolla reddish or brick-red, 5-7 mm long and the style 5-6 mm long. In *P. odorata*, the leaves are never deltoid or rhomboidal, the inflorescence is not lax, the corolla greenish- or pinkish-white and style 3-5 mm long. *P. acuminata* is also related to *P. hylandiana*. For details see under the latter.

7. ***Premna odorata*** Blanco, Fl. Filip. edn 1 (1837) 488; ibid. edn 2 (1845) 341; ibid. edn 3, 2 (1878) 268; Walp., Rep. Bot. Syst. 4 (1845) 96; Schau. in DC., Prod. 11 (1847) 638; Miq., Fl. Ind. Bat. 2 (1858) 900; Merr., Rev. Sp. Blanco Fl. Filip. (1905) 68; Philip. J. Sc. 1 (1906) Suppl. 121, 123; Fl. Manila (1912) 405; Sp. Blancoanae (1918) 331; Enum. Philip. Fl. Pl. 3 (1923) 392; Hallier f., Meded. Rijks-Herb. Leid. no. 37 (1918) 39; Mold., Résumé Verbenac. etc. (1959) 172, 185, 188, 190, 195, 199, 202, 221, 337-340; Fifth Summary Verbenac. etc. 1 & 2 (1971) 278, 281, 283, 290, 297, 302, 306, 311, 318, 326, 330, 333, 337, 412, 607-611, 972.

*Neotype*: *J. Tadena* PNH 9602, Mt Makiling, Laguna Prov. 28.ii.1949 (BRI 267491, neotype; PNH, isoneotype).

*P. serratifolia* auct. non L.: Blanco, Fl. Filip. edn 2 (1845) 342; ibid. edn 3, 2 (1878) 269; Merr., Rev. Sp. Blanco Fl. Filip. (1905) 68.

*Type*: *Blanco s.n.*, Luzon, Philippines (Location unknown).

*P. vestita* Schau. in DC., Prod. 11 (1847) 631; Miq., Fl. Ind. Bat. 2 (1858) 292; F.-Vill., Novis App. (1880) 159; Merr., Dic. Pl. Philip. (1903) 178; For. Bur. Bull. no. 1 (1903) 51.

*Type*: *Cuming* 599, in insulis Philippinis (B, n.v.).

*P. obtusifolia* R. Br. var. *velutina* Benth., Fl. Aust. 5 (1870) 59, syn. nov., F.M. Bail., Synop. Qld Fl. (1883) 378; Cat. Pl. Qld (1890) 35; Qld Fl. 4 (1901) 1176; Comp. Cat. Qld Pl. (1913) 386; Mold., Résumé Verbenac. etc. (1959) 427; Fifth Summary Verbenac. etc. 1 & 2 (1971) 348, 606, 609.

*Type*: *Dallachy s.n.*, Rockingham Bay, Queensland, undated (BM, K, MEL 582180, MEL 582810, syntypes!).

*P. foetida* auct. non Reinw. ex Blume: F.-Vill., Novis App. (1877) 159.

*P. tomentosa* auct. non Willd.: F.-Vill., Novis App. (1877) 159.

*Gumira odorata* (Blanco) Kuntze, Rev. Gen. Pl. 2 (1891) 508, syn. nov., based on *P. odorata* Blanco.

*Premna curranii* H.J. Lam, Verbenac. Malay. Arch. (1919) 116; Bull. Jard. Bot. Buitenz. III, 3 (1921) 37; Mold., Fifth Summary Verbenac. etc. 2 (1971) 607, pro syn.

*Type*: *Curran* 19022, Manila, Philippines (n.v., probably at L or PNH).

*P. oblongata* Miq. var. *puberula* H.J. Lam, Verbenac. Malay. Arch. (1919) 217; Mold., Résumé Verbenac. etc. (1959) 338, pro syn. *P. odorata* Blanco; Fifth Summary Verbenac. etc. 2 (1971) 609, pro syn.

*Type*: *Elmer* 9388, Lucban, Tayabas Prov., Luzon, Philippines (L, PNH).

*P. pubescens* Blume var. *odorata* (Blanco) H.J. Lam, Verbenac. Malay. Arch. (1919) 153; Bull. Jard. Bot. Buitenz. III, 3 (1921) 44, excl. syn. *P. subscandens* Merr.; Mold., Résumé Verbenac. etc. (1959) 339, pro syn.; Fifth Summary Verbenac. etc. 2 (1971) 610, pro syn.

*Type*: As for *P. odorata* Blanco.

*P. benthamiana* Domin, Bibl. Bot. 89 (1929) 556; Mold., Résumé Verbenac. etc. (1959) 210; Fifth Summary Verbenac. etc. 2 (1971) 606, pro syn.

*Type*: *A. Dietrich* 2628, Port Mackay, Queensland, 1863-1865 (MEL, PR syntypes!).

*P. inaequilateralis* E. Beer & H.J. Lam, Blumea 2 (1936) 226, syn. nov.; Mold., Résumé Verbenac. etc. (1959) 202; Fifth Summary Verbenac. etc. 1 (1971) 337.

*Type*: *L.J. Brass* 5536, Mafulu, Central Division, Papua, ix.-xi.1933 (BRI, isotype!; L).

### Typification

*P. odorata* was described by Blanco (1837) from the island of Luzon in the Philippines. At the end of the protologue, he mentioned a few native names but did not cite any collection, collector's name or number. Enquiries for the type have been made in Herb. B, BM, FI, G, K, L, LAE, MA, PNH, SING and U, but none seems to have the specimen. It has not been cited by any botanist dealing with the Verbenaceae of the Philippines region.

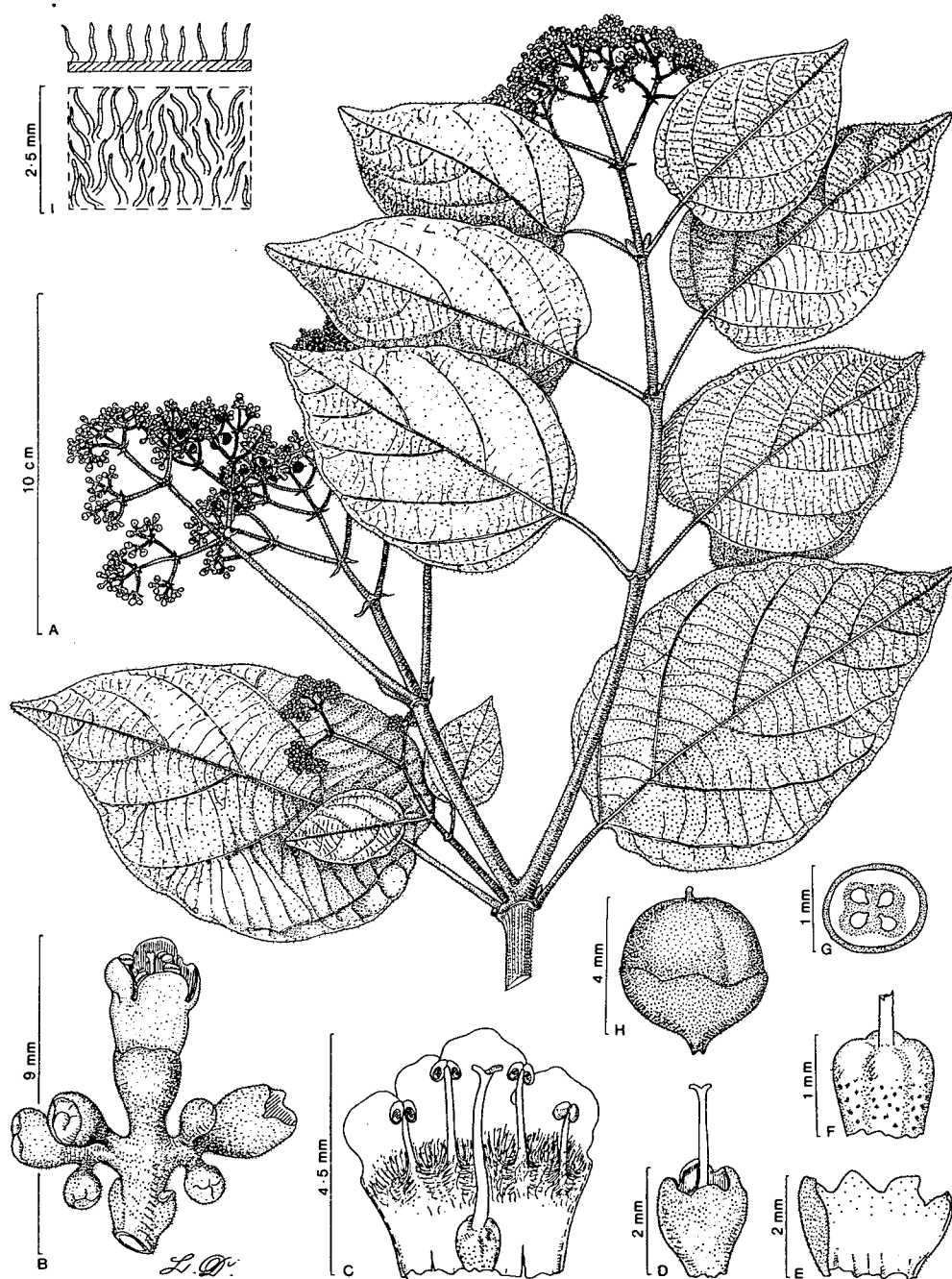


Fig. 8. *Premna odorata* Blanco (A-I, R. Schodde 2922: CANB). A, flowering branch; B, cyme; C, flower cut open showing androecium and gynoecium; D, calyx enclosing ovary with exserted style; E, calyx cut open vertically showing glabrous inside; F, ovary; G, transverse section of ovary; H, fruit with persistent calyx; I, enlarged portion of leaf showing simple hairs on abaxial surface.

According to Merrill (1905), "the types of all Blanco's species have been destroyed", therefore, it became necessary to select a neotype for this species.

Of all the authentically named *P. odorata* specimens from the Philippines the collection by J. Tadena (No. PNH 9602) is very typical of this species. It came from the type area, conforms in all details with Blanco's description, and is, therefore, designated here as the neotype.

#### Description (Fig. 8)

Shrub or small tree (2.5-) 3-10 (-12) m high. *Stem* 15-25 (-30) cm diameter; bark finely flaky fissured; branchlets densely brownish-pubescent; hairs simple. *Leaves*: lamina ovate or ovate-rotundate, sometimes ovate-lanceolate, base rounded, subcordate or oblique, sometimes subcuneate, apex cuspidate-acuminate or  $\pm$  shortly acuminate, margins entire or sometimes somewhat serrulate-denticulate in upper half, (5-) 6.5-16 (-20) cm long, 4-10 (-13.5) cm broad, membranous or subchartaceous, pubescent all over, especially beneath and on nerves, sometimes glabrate except on nerves, dark-green above, pale or yellowish-green below; hairs simple; pairs of nerves 3-7, often the lowest two pairs starting from base; petiole pubescent, (1-) 2-6 (-7) cm long. *Inflorescence* of many-flowered corymbose panicle, pubescent, 5.5-13 (-15) cm long, 4-15 (-20) cm diameter; primary peduncles 1-4 (-5) cm long, pubescent. *Flowers* almost sessile or shortly pedicellate; pedicels pubescent, 0.5-1.5 mm long; bracts linear, pubescent. *Calyx* rather variable, usually 2-lipped, upper lip entire or shortly 3-lobed, lower with 2 rounded lobes, sometimes lobes subacute, whole calyx 1.5-2.5 mm long, densely pubescent outside, glabrous inside, spreading open under fruit but otherwise not accrescent; tube 1-1.5 mm long, 1-1.5 mm diameter at top; lobes 0.5-1 mm long. *Corolla* "greenish-white" or "pinkish-white", 2-lipped, upper half of tube outside of lobes somewhat pubescent, glabrescent later, densely villous within upper half of tube, 3.5-5.5 mm long; tube almost cylindrical, nearly twice as long as calyx, 2-3 mm long, 1.5-2 mm broad at top; upper lip entire, lower 3-lobed, midlobe of lower lip larger, ovate-orbicular in outline, obtuse, 1.5-2 mm long, nearly as broad, glabrous, lateral lobes 1-1.5 mm long, 1-1.2 (-1.5) mm broad, glabrous. *Stamens* exserted, inserted in corolla throat, subdidymous; filaments filiform, glabrous with a few villous hairs near base, anterior pair 1.5-3 mm long, lateral pair 1-2 mm long; anthers  $\pm$  orbicular in outline, lobes free and divergent in lower halves, about 0.5 mm long. *Ovary*  $\pm$  globose, glabrous,  $\pm$  1 mm diameter; style exserted, filiform, glabrous, 3-5 mm long, stigma shortly 2-fid. *Fruit* obovoid, glabrous, 3-5 mm long, 3-4.5 mm diameter above middle, green and smooth when fresh, black when dry, sometimes somewhat verrucose.

#### Representative specimens (collection seen: Australian 18; non-Australian 32)

AUSTRALIA: QUEENSLAND: (10 collections seen): *Dallachy s.n.*, Rockingham Bay, undated (K, MEL 582180, MEL 582810, syntypes of *P. obtusifolia* R. Br. var. *velutina* Benth.); *Dietrich* 2628, Port Mackay, 1863-1865 (MEL, PR—syntypes of *P. benthamiana* Domin.); *Flecker* 14250, Helenvale, 25.vii.1952 (QRS); *Persieh* 817, Endeavour River, undated (MEL); *Thorsborne* 14, North bank of Dalrymple Creek, 5 & 10 km from Dalrymple Gap, 16.ii.1975 (BRI); *White* 1839, Kuranda, 28.ii.1922 (BRI 267296-97).

NORTHERN TERRITORY: (8 collections seen): *Byrnes* 294, Rapid Creek, 11.ii.1968 (AD, NT); *Dunlop* 3995, Poonali Beach, Melville Island, 18.xii.1975 (DNA, NT); *Macnochie* 538, Rapid Creek, 12.ii.1968 (BRI—2 spec., NT); *McKean* B944, Myilly Point, Darwin, 9.ii.1973 (BRI, CANB, DNA, NT); *Specht* 355, Hempel Bay, Groote Eylandt, 4.v.1948 (AD, BRI, L, LAE, MEL); *Story* 8410, 250 km ENE of Darwin, 26.vi.1978 (CANB); *Waddy* 622, Bardalumba, Groote Eylandt, 11.i.1977 (DNA).

PAPUA NEW GUINEA: (16 collections seen): *Brass* 5536, Mafulu, Central Division, ix.-xi.1933 (BRI, isotype of *P. inaequilateralis* Beer & H.J. Lam); *Carr* 11305, Kanosia, 12.ii.1935 (CANB, 2 spec.); *Craven & Schodde* 690, near Kerema, Gulf District, Papua, 10.i.1966 (CANB, L, LAE); *Henty NGF* 14392, Lake Wanum, 22.i.1962 (CANB 2 spec.); *Millar & Wandenberg NGF* 35220, near Mission Baiyer River, 30.ix.1967 (BRI, CANB, L); *Pullen* 1344, Ningererp, Bairrh, 20.vii.1959 (CANB 2 spec., A, L, LAE); *Ridsdale NGF* 30395, Kilenge, West New Britain, 14.xii.1966 (LAE); *Schodde* 2922, ca. 3 miles W. of Sogeri, Central District, Papua, 6.ix.1962 (A, BO, BR, BRI, CANB 2 spec., K, L, LAE, US); *Schodde & Craven* 4686, west bank of Tauri River, 2 miles S. of junction

with Kapu River, 15.iii.1966 (A, BRI, CANB, K, L, LAE, US); *White* 608 & 609, Mafulu, Papua, vii.-viii.1918 (BRI, 2 spec.); *White, Dadswell & Smith* NGF 1624, Morobe District, Yalu area, vii.1944 (BRI, LAE).

PHILIPPINES: (16 collections seen): *Alvarez* PNH 22378, Prov. of Nueva Ecija, Luzon, ii.1911 (BRI, PNH); *Celestino* PNH 4433, Mt Pulong, Mountain Province, Luzon, iii.1948 (PNH); *Curran* PNH 17683, Mt Aryat, Prov. of Pampanga, Luzon, iii.1910 (BM, BRI); *Esteve* PNH 35382, Mt Makiling, Laguna Prov., Luzon., 17.ii.1955 (CANB); *Federico* PNH 40361, loc. cit. 17.ii.1955 (PNH); *Guinto* PNH 41334, Mt Makiling, Laguna Prov., Luzon, 5.x.1954 (PNH); *Madulid & Hamoy* 886, National Forage Park, Damortis, La Union, 24.v.1972 (PNH); *Tadena* PNH 9602, Mt Makiling, Laguna Prov., 28.ii.1949 (BRI, neotype; PNH); *Villafior* PNH 37536, Infanta, Quezon Prov., Luzon, i.1955 (PNH); *Vidal* 846, 847, Unisan, Pr. Tayabas, undated (MA).

### Distribution (Map 4)

In Australia, *P. odorata* is chiefly known from the tropical parts of Queensland and Northern Territory. In Queensland, the distribution is mainly in the coastal parts from Mackay northwards to Cooktown. In several places, the distribution overlaps with that of *P. serratifolia*. In Northern Territory, it has been recorded from around Darwin and Oenpelli Mission areas. From off-shore parts of the State, one collection has come from Melville Island and two from Groote Eylandt. So far, it has not been recorded from any area far inland.

From overseas, collections have been examined from Papua New Guinea, New Britain, Java and the Philippines. Lam (1919) gave its distribution as being from Java, Celebes and Philippines. In addition to the above distribution, Moldenke (1971) recorded it from Florida (U.S.A.), Nepal, southern China, Taiwan, Japan, southern India, upper Burma, Thailand, Indochina, Malaya, Sumatra, the Moluccas and Timor. The above record from Florida (U.S.A.) is very much outside the distribution range of this species and it may have come from a cultivated plant. According to Moldenke (1971), this species is under cultivation in Florida, India, Java, Philippines and Trinidad.

### Comments

*P. odorata* has often been mistaken as *P. pubescens* Blume because both of them have similar looking pubescent leaves and inflorescence. The types of these species are not to be found in any major herbarium in the Malesian region or Europe. Their original descriptions are not very detailed, and the current identifications of these species seem to be based chiefly on their published descriptions. In some institutions they are regarded as one and the same species, while in others they are kept separate. For instance, in Herb. K, all material (about 20 sheets) referred to *P. pubescens* and *P. odorata* is filed under the name *P. pubescens*, while in the BM, virtually all material (10 sheets) is under the name *P. odorata*. In Herb. L, however, both species are filed separately. Fernandez-Villar (1880) reduced *P. odorata* to the synonymy of *P. pubescens*, and Lam (1919) regarded it as a variety of the latter. Both species are rather variable but the type of indumentum is similar, except for degrees in density which apparently overlap. For easy identification of these closely related species, some distinguishing characters are cited here.

#### *P. pubescens*

(As described in the literature)

- (1) Liana or climbing shrub
- (2) Leaves usually serrate-dentate-crenate in the upper part, rarely entire, somewhat glandular beneath
- (3) Calyx pubescent and glandular outside
- (4) Corolla-tube pubescent and glandular outside; lobes pubescent outside and on the inside
- (5) Ovary glabrous with some scattered hairs and glands at the top
- (6) Fruit "3-10 mm diameter" (usually 3-6 mm diameter)

#### *P. odorata*

- (1) Shrub or small tree
- (2) Leaves usually entire in the upper part, occasionally shallowly crenate, not glandular beneath
- (3) Calyx pubescent outside but without glands
- (4) Corolla-tube pubescent outside but becoming glabrescent later, not glandular, lobes glabrous all over
- (5) Ovary glabrous, without hairs or glands at the top
- (6) Fruit 3-4.5 mm diameter

The largest fruit (up to 1 cm diam.) recorded in the literature for *P. pubescens* is not matched in any collection. In the specimens examined, I have seen fruits only up to 6 x 6 mm.

After examining the isotype of *P. inaequilateralis* Beer & H.J. Lam and syntypes of *P. obtusifolia* R. Br. var. *velutina* Benth., both taxa are found to be conspecific with *P. odorata*, and are, therefore, recorded here as new synonyms. In the protologue of *P. inaequilateralis*, the species was distinguished from other species chiefly by its oblique leaf-base. The authors described this to be a constant character within the type material. Moreover, oblique leaf-bases seems to be no peculiarity because from the 3rd or 4th pair below the inflorescence, leaves in *P. odorata* are generally oblique at the base. A good example of oblique leaf-base is seen in J. McKeen's collection (No. B944) from Darwin, preserved in Herb. BRI, CANB, DNA and NT.

Moldenke (1971) recorded *P. goeringii* Turcz. in the synonymy of *P. odorata*. I have not seen the type of *P. goeringii*, but from its original description it seems to be a distinct species. It differs from *P. odorata* by its leaves being densely stellate-hairy beneath, the petiole about 15 cm long (which is more than double the length of *P. odorata*), the calyx equally and obtusely 5-toothed and corolla-lips densely pubescent within. The pubescence on the inside of corolla-lips places *P. goeringii* nearer to *P. pubescens*, but the stellate hairs beneath the lamina are different.

The type of *P. regularis* H.J. Lam has several characters in common with *P. odorata*. However, *P. regularis* differs in having fairly small flowers and strongly cordate-based leaves.

#### Affinities

*P. odorata* is closely related to *P. acuminata* R. Br. in having pubescent leaves, sessile flowers, pubescent corolla on the outside, exserted stamens and style, and a glabrous and non-glandular ovary. However, *P. odorata* may easily be identified by its leaves being mainly ovate-rotundate, shortly cuspidate-acuminate, rounded or subcordate at the base, entire, the inflorescence not lax, 4-15 (-20) cm broad, the corolla greenish-white or pinkish-white and 3.5-5.5 mm long, the style 3-5 mm long. *P. odorata* is also close to *P. hylandiana* in having pubescent leaves, exserted stamens and style and a glabrous ovary. The latter species may easily be distinguished by its leaves being covered with dendriform-stellate hairs, the pedicels 1.5-3 (-5) mm long, the corolla creamy or pale yellow, glabrous outside, and ovary glandular on top. Both *P. acuminata* and *P. hylandiana* are endemic in Australia whereas *P. odorata* is widespread in the Malesian region.

#### Acknowledgements

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