

JOURNAL of the ADELAIDE BOTANIC GARDENS

AN OPEN ACCESS JOURNAL FOR AUSTRALIAN SYSTEMATIC BOTANY

flora.sa.gov.au/jabg

Published by the

STATE HERBARIUM OF SOUTH AUSTRALIA

on behalf of the

BOARD OF THE BOTANIC GARDENS AND STATE HERBARIUM

© Board of the Botanic Gardens and State Herbarium,
Adelaide, South Australia

© Department of Environment, Water and Natural Resources,
Government of South Australia

All rights reserved

State Herbarium of South Australia
PO Box 2732
Kent Town SA 5071
Australia



Board of the
Botanic Gardens and
State Herbarium



A TAXONOMIC REVISION OF THE GENUS *VITEX* L. (VERBENACEAE)* IN AUSTRALIA

Ahmad Abid Munir

State Herbarium, Botanic Gardens,
North Terrace, Adelaide, South Australia 5000

Abstract

A taxonomic revision of *Vitex* in Australia is presented. The following eight species are recognised: *V. acuminata*, *V. benthamiana*, *V. glabrata*, *V. helogiton*, *V. melicopea*, *V. rotundifolia*, *V. trifolia* and *V. velutinifolia*. *V. velutinifolia* (from Western Australia) is described as new. *V. melicopea* and *V. helogiton* are reinstated, with *V. helogiton* being recorded from Australia for the first time. *V. rotundifolia* is reinstated as the oldest valid name for the 1-foliolate species previously often named *V. ovata*, *V. trifolia* var. *ovata*, *V. trifolia* var. *unifoliolata*, *V. trifolia* var. *simplicifolia* or *V. trifolia* subsp. *littoralis*. *V. trifolia* var. *bicolor* is placed in synonymy of *V. trifolia* var. *trifolia*. The following four species are typified: *V. acuminata*, *V. benthamiana*, *V. helogiton* and *V. melicopea*. A range of material of the non-endemic species was examined from Malasia.

Affinities and distribution are considered for 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 *Vitex* was described by Linnaeus (1753) with four species, *V. agnus-castus*, *V. trifolia*, *V. negundo* and *V. pinnata*. The syntypes of the first named species came from Sicily and Naples, the second and third from India, and the fourth type from Ceylon. The genus was placed together with *Clerodendrum*, *Gmelina* and a few other genera of present Verbenaceae in "Didynamia Angiospermia", where it was retained by Murray (1774), Reichard (1778), Loureiro (1793), Schreber (1791), Gmelin (1792), Persoon (1797, 1807), Willdenow (1800), Link (1822), Lamarck & Poiret (1823), Sprengel (1825), Roxburgh (1832), Dietrich (1842) and a few others. De Jussieu (1759) placed it in "Verbenae" which was later accepted for the genus by Adanson (1763) and Reichenbach (1828). The latter, however, referred *Vitex* and other related genera to the Labiatae. Gleditsch (1764) recorded it in section "Petalostemonum" and Scopoli (1777) in the tribe "Personatae". The latter was accepted for the genus by Giseke (1792) and Batsch (1802). Gaertner (1788) recorded it in "Centuria Quarta", de Jussieu (1789) in "Vitices", Necker (1790) in his "Chasmatophytum" and Ventenat (1799) under "Pyrenaceae". Ventenat's proposed family was later accepted for the genus by Dumortier (1822). In 1805, Jaume Saint-Hilaire, proposed the family Verbenaceae for *Vitex* and other related genera. The family Verbenaceae was accepted for this genus by de Jussieu (1806), Robert Brown (1810), Kunth (1823), Blume (1826), Lindley (1847), F. Mueller (1862), Bentham (1870), Bentham & Hooker (1876), Briquet (1895), Bailey (1883, 1901), H.J. Lam (1919), Gardner (1931) and by the majority of other botanists.

Dumortier (1829) divided the Verbenaceae into two tribes: Verbeneae and Viticeae, with *Vitex* in the tribe Viticeae. This tribe was accepted for the genus by Bartling (1830), Spach (1840), Schauer (1847), Miquel (1858), Bentham (1870), Bentham & Hooker (1876), Bailey (1883, 1901, 1913), C.B. Clarke (1885), Durand (1888), King & Gamble (1909), Ewart & Davies (1917), Dop (1928), Fletcher (1938), Lemée (1943) and others. In 1838, Endlicher divided the family into three tribes: Lippieae, Lantaneae and Aegiphileae, with *Vitex* in the tribe Lantaneae. This tribe was accepted for the genus by Meisner (1840), Brongniart (1843),

*The present treatment of the genus *Vitex* is the fifth in the series of taxonomic revision in the family Verbenaceae in Australia (See Munir, 1982, 1984a, 1984b, 1985).

Dietrich (1843) and Walpers (1845). Schauer (1847) re-classified the Verbenaceae into three tribes: Verbeneae, Viticeae and Avicenniae, with *Vitex* in the tribe Viticeae. He subdivided the tribe Viticeae into three subtribes: Symphoremeeae, Caryopterideae and Viticeae, with *Vitex* in the subtribe Viticeae. Schauer (1847) also split the genus into three sections: *Euagnus*, *Pyrostoma* and *Chrysomallum*, based chiefly on the shape of their calyces, the presence or absence of calyx-teeth and the type of inflorescence i.e. axillary or terminal. Later, the subtribe Viticeae was accepted for the genus by Miquel (1858) and Bentham (1870). C.B. Clarke (1885) split the genus into two subgenera: *Euagnus* and *Glossocalyx*, and Dop (1928) into two groups: *Terminales* and *Axillares*, with the former group divided into two subgroups: *Longibracteatae* and *Brevibracteatae*.

In 1895, Briquet re-classified the Verbenaceae and upgraded the tribe Viticeae to a subfamily Viticoideae. The latter consisted of four tribes: Callicarpeae, Tectoneae, Viticeae and Clerodendreae, with *Vitex* in the tribe Viticeae. This classification was adopted by 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 *Vitex* into four sections: *Agnus-castus*, *Pyrostoma*, *Chrysomallum* and *Glossocalyx*, each characterised chiefly by the shape of their calyces and the size of calyx-lobes. He further subdivided the section *Agnus-castus* into three subsections: *Terminales*, *Axillares* and *Glomerulosae*. These sections and subsections were adopted by Dalla Torre & Harms (1904). In 1904, Post & Kuntze divided the genus *Vitex* into four sections namely *Lagondium* (Rumpf) Kuntze, *Pyrostoma* (Mey) Schauer, *Chrysomallum* (Thou.) Schauer and *Glossocalyx* C.B. Clarke. He further subdivided the section *Lagondium* into three subsections: *Mailelou* (Adans.) Kuntze, *Limia* Endl. and *Glomerovitex* Kuntze. The majority of botanists, however, have not divided the genus into sections and subsections, but have retained it in the Verbenaceae without reference to any subfamily or a tribe. In the present revision, Briquet's (1895) classification of the Verbenaceae is followed in retaining *Vitex* in the tribe Viticeae. The subgeneric sections and subsections proposed for the genus, however, are not accepted because of the unreliability of the characters used.

Australian History of the Genus

The first Australian records of *Vitex* were made by Robert Brown (1810) from northern Queensland and north of the Northern Territory, when he recognised five species: *V. ovata* Thunb., *V. trifolia* L., *V. acuminata* R. Br., *V. glabrata* R. Br. and *V. macrophylla* R. Br. Of these, *V. acuminata*, *V. glabrata* and *V. macrophylla* were newly described, with *V. macrophylla* later found to be synonymous with *Gmelina dalrympleana* (F. Muell.) H.J. Lam. Of the remaining two species, *V. ovata* was later found to be a synonym of *V. rotundifolia* L.f. In 1847, Schauer recorded all of Robert Brown's new *Vitex* species from Australia under "Species non satis notae". He did not elaborate on their short original descriptions, nor cite any plant collections from Australia. In addition, he described from Australia *V. trifolia* and two new species: *V. cunninghamii* Schauer and *V. lignum-vitae* A. Cunn. ex Schauer. Later, *V. cunninghamii* was found to be conspecific with *V. glabrata* R. Br. and *V. lignum-vitae* as belonging to the genus *Premna* L. F. Mueller (1862) recorded two *Vitex* species namely *V. leichhardtii* F. Muell. and *V. lignum-vitae* A. Cunn. ex Schauer. Of these, *V. leichhardtii* was described as a new species from New South Wales, but it was later found to belong to the genus *Gmelina* L. In 1864, F. Mueller recorded from Queensland two more *Vitex* species: *V. dalrympleana* F. Muell. and *V. macrophylla* R. Br. Of these, *V. dalrympleana* was described as a new species, but this too was later found to belong to the genus *Gmelina*. In fact both *V. macrophylla* and *V. dalrympleana* are now synonyms of *Gmelina dalrympleana* (F. Muell.) H.J. Lam. About a year later, F. Mueller (1865) listed from Australia five *Vitex* species of which *V. melicopea* F. Muell. and *V. tracyana* F. Muell. (= *Premna tracyana* F. Muell.) were newly described from Queensland. The latter was subsequently identified as

Clerodendrum tracyanum (F. Muell.) Benth. F. Mueller (1868, 1875) listed respectively four and three *Vitex* species, previously described from Australia by Robert Brown and F. Mueller himself.

In 1870, Bentham published a detailed account of the Australian Verbenaceae, and listed four *Vitex* species: *V. trifolia* L., *V. lignum-vitae* A. Cunn. ex Schauer, *V. acuminata* R. Br. and *V. glabrata* R. Br. He relegated *V. melicopea* F. Muell. to the synonymy of *V. acuminata* R. Br., and described under *V. trifolia* three new varieties: var. *obovata*, var. *acutifolia* and var. *parviflora*. Subsequently, the occurrence of these species in Australia was recorded by F. Mueller (1882, 1889), Bailey (1883, 1901, 1913) and Ewart & Davies (1917). Maiden (1889) listed *V. acuminata* and *V. lignum-vitae* from Queensland and New South Wales, and Domin (1929) recorded from Queensland four species namely *V. trifolia* L., *V. ovata* Thunb., *V. benthamiana* Domin and *V. petiolaris* Domin. In this list, *V. benthamiana* and *V. petiolaris* were respectively described as a new name and as a new species. The latter species was subsequently found to be synonymous with *V. trifolia* L. Anderson (1947) listed three *Vitex* species from New South Wales namely *V. trifolia*, *V. glabrata* and *V. lignum-vitae*. In this publication the name *V. glabrata* seems to be a misidentification of another taxon because *V. glabrata* does not occur in New South Wales. All above named taxa described by Robert Brown, Schauer, F. Mueller and Domin were later recorded for Australia by Moldenke (1959, 1971, 1980).

VITEX L.

Vitex L., Sp. Pl. 2 (1753) 638; Gen. Pl. edn 5 (1754) 285; Lour., Fl. Cochinch. 2 (1790) 389; Willd., Sp. Pl. edn 4, 3 (1800) 390; R. Br., Prod. Fl. Nov. Holl. (1810) 511; Spreng., Syst. Veg. 2 (1825) 756; Blume, Bijdr. Fl. Ned. Ind. (1826) 812; Bartling, Ord. Nat. Pl. (1830) 180; Roxb., Fl. Ind. edn 2, 2 (1832) 69; Endl., Gen. Pl. 1 (1838) 635; Walp., Rep. Bot. Syst. 4 (1845) 82; Schauer in A. DC., Prod. 11 (1847) 682; Miq., Fl. Ned. Ind. 2 (1858) 858; Seemann, Fl. Viti. (1866) 190; Benth., Fl. Aust. 5 (1870) 66; Benth. & Hook. f., Gen. Pl. 2 (1876) 1135, 1154; F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 103; Bailey, Synop. Qld Fl. (1883) 379; C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 583; F. Muell., Sec. Syst. Cens. Aust. Pl. 1 (1889) 173; Briq. in Engl. & Prantl, Pflanzenfam. 4, 3a (1895) 170; Bailey, Qld Fl. 4 (1901) 1179; Bailey, Comp. Cat. Qld Pl. (1913) 386; H.J. Lam, Verbenac. Malay. Arch. (1919) 164; Bull. Jard. Bot. Ser. 3, Vol. 3 (1921) 47; Ridley, Fl. Mal. Penin. 2 (1923) 630; C. Gardner, Enum. Pl. Aust. Occ. 3 (1931) 112; Lecomte, Fl. Gén. Indo-Chine 4 (1935) 820; Lémée, Dict. Gen. Pl. Phan. 8b (1943) 656; Mold., Résumé Verbenac. etc. (1959) 232, 233, 248, 250, 251, 276, 285, 302, 309, 319, 321, 335, 341, 342, 355, 356, 379, 393, 395-399, 409, 424; N. Burb., Dict. Aust. Pl. Gen. (1963) 306; Backer & Bakh. f., Fl. Java 2 (1965) 604; Mold., Fifth Summary Verbenac. etc. 1 & 2 (1971) 6, 7, 10, 385, 386, 420, 423, 426, 469, 472, 491, 534, 548, 549, 570, 572, 573, 602, 603, 614, 615, 617, 644, 648, 709, 710, 735, 739-744, 758, 789, 791, 794; Baines, Aust. Pl. Gen. (1981) 395; Mold., Phytologia 48 (1981) 413; Phytologia 49 (1981) 161; Phytologia 51 (1982) 212, 246 p.p. excl. syn. *Viticipremna* H.J. Lam; Phytologia 52 (1982) 132; Mold. in Dassan. & Fosberg, Fl. Ceylon 4 (1983) 348.

Lectotype: *V. agnus-castus* L., Sp. Pl. 2 (1753) 638 (vide N.L. Britten et P. Wilson, Scient. Surv. Porto Rico 6 (1925) 149).

Allasia Lour., Fl. Cochinch. edn 2, 1 (1793) 107.
Type: *A. payos* Lour., loc. cit. (1793) 107.

Nephandra Willd. in Cothen., Disp. Veg. (1790) 8.
Type: *N. dubia* Willd. loc. cit. (1790) 8.

Tripinna Lour., Fl. Cochinch. edn 2, 2 (1793) 476.
Type: *T. tripinnata* Lour. loc. cit. (1793) 476.

Chrysomallum Thouars, Gen. Nov. Madag. (1806) 8.

Type: *C. madagascariense* Thou. ex Steud., Nom. Bot. edn 1 (1821) 194.

Tripinnaria Pers., Synop. Pl. 2 (1806) 173.

Type: *T. cochinchinensis* Pers., loc. cit. (1806) 173.

Pyrostoma G.F.W. Mey., Prim. Fl. Esseq. (1818) 219.

Type: *P. ternatum* G.F.W. Mey. loc. cit. (1818) 220.

Walrothia Roth, Nov. Pl. Sp. (1821) 317, nom. illeg., non Spreng (1815); Bocq., Rev. Verbenac. (1863) 181, sphalm. "Walrothia".

Syntypes: *W. articulata* Roth loc. cit. (1821) 317; *W. leucoxydon* Roth loc. cit. (1821) 319.

Ephialis Banks & Sol. ex Cunn., Ann. Nat. Hist. Ser. 1, 1 (1838) 461.

Type: *E. pentaphylla* Banks & Sol. ex Cunn. loc. cit. (1838) 461.

Ephiélis Banks & Sol. ex Angely, Cat. Estat. Gen. Bot. Fan. 17 (1956) 6, nom. illeg., orthographical variant.

Type: as for *Ephialis* Banks & Sol. ex Cunn.

Psilogyne A. DC., Biblioth. Univers. Génév. 17 (1838) 132.

Type: *P. viticifolia* A. DC. loc. cit. (1838) 132.

Casarettoa Walp., Rep. Bot. Syst. 4 (1845) 91.

Syntypes: *C. mollissima* Walp. loc. cit. (1845) 91; *C. diversifolia* Walp. loc. cit. (1845) 92.

?*Macrostegia* Nees in A. DC., Prod. 11 (1847) 218, non Turcz.

Type: *M. ruiziana* Nees loc. cit. (1847) 218.

Agnus-castus Carr., Rev. Hort. 42 (1871) 415.

Syntypes: *A. incisa* Carr. loc. cit. (1871) 415; *A. negundo* Carr. loc. cit. (1871) 415.

Shrubs or trees. *Stem* and branches almost terete or obscurely tetragonal, main trunk often with fissured flaky bark. *Leaves* opposite, usually of 3-5 digitate leaflets, rarely reduced to 2 or a single leaflet as in *V. rotundifolia* L., exstipulate, reticulate-veined, unicostate, petiolate or sessile. *Inflorescence* cymose, compound and often much branched, terminal or axillary, usually pedunculate. *Flowers* small, complete, zygomorphic, bisexual, hypogynous; bracts small, narrow. *Calyx* of 5 fused sepals, persistent, tubular or somewhat campanulate, variously toothed or truncate, accrescent. *Corolla* of 5 fused petals, deciduous, tubular below, 2-lipped above, 5-lobed; upper lip 2-lobed, lower 3-lobed, the middle lobe of the lower lip larger and longer than the others; tube usually villous within, often pubescent without. *Stamens* 4, didynamous, exserted, alternate with the corolla-lobes, epipetalous, inserted about the middle of the corolla-tube; filaments filiform, usually villous towards the base; anthers dorsifixed, oblong or elliptic, 2-lobed, lobes parallel or divergent. *Ovary* bicarpellary, syncarpous, 4-celled, with one ovule in each cell, attached to an axile placenta at or about the middle; style filiform, glabrous, with 2 short stigmatic lobes. *Fruit* a small succulent drupe, with endocarp separating into 4 hard one-seeded pyrenes. *Seeds* exalbuminous.

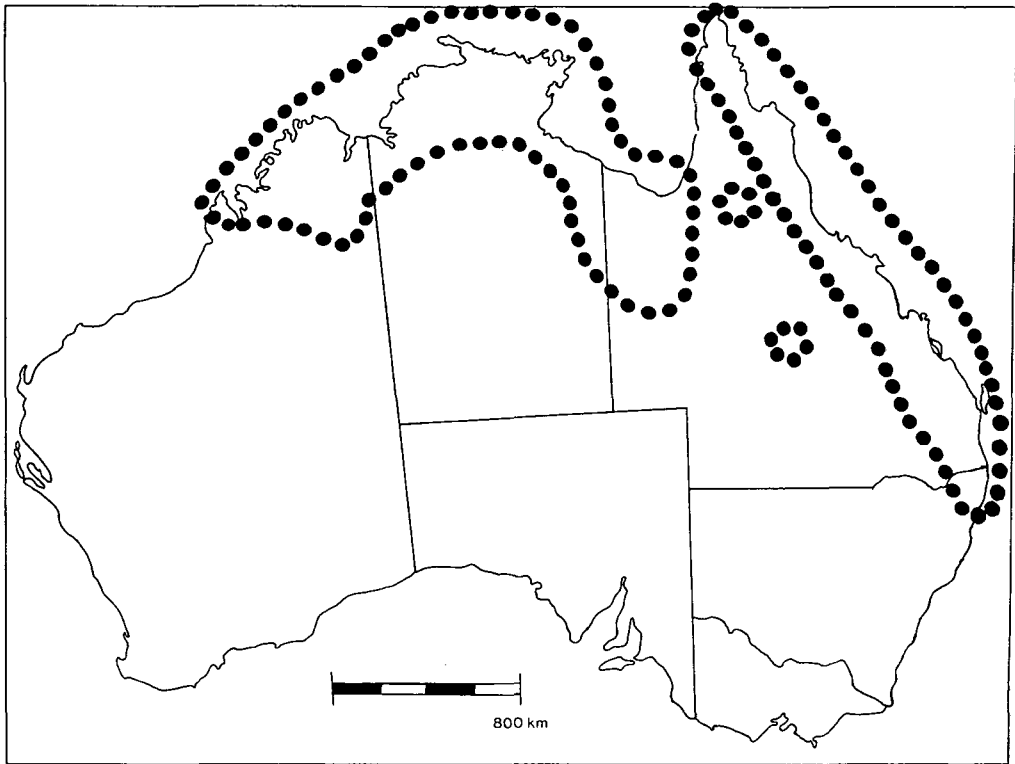
Number of species: World: ±250; Australia: 8.

Derivation of name

The generic name is derived from a name used by Pliny for the chaste tree or Abraham's balm (*V. agnus-castus* L.), the type species of the genus.

Distribution (Map 1)

The genus *Vitex* is widely distributed in the tropical and subtropical regions of Australia, Asia, Africa, with a few South American species, and at least one species extending to southern Europe. So far, it has not been recorded from northern Europe, North America, central and southern Australia, except in cultivation.



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

Of the eight Australian species, five are endemic in Australia and the other three are widespread in Malesia and other parts of Asia. The distribution of at least two of these species (*V. trifolia* L. and *V. rotundifolia* L.f.) extends to East Africa, India, southern China, Japan and the Hawaiian Islands. *V. helogiton* is the third most widespread species occurring from Papua New Guinea and Indonesia to the Philippines, and extending southwards to northern Australia.

Comments

Very few botanists have attributed the name *Vitex* to Tournefort, rather than to Linnaeus, who merely adopted it. In some publications, Briquet's (1895) division of *Vitex* into sections and subsections has been erroneously attributed to Dalla Torre & Harms (1904), who simply adopted Briquet's classification of the Verbenaceae.

Affinities

Vitex is closely related to *Viticipremna* in its leaves being digitate; calyx persistent, accrescent; corolla-tube short and cylindrical, villous inside; stamens didynamous; style with short bifid stigma; fruit a drupe with one 4-celled pyrene. Nevertheless, *Vitex* can easily be identified by its 5-lobed corolla and calyx often 5-toothed. *Vitex* is also closely allied to *Premna* in having cymose inflorescence, zygomorphic flowers, 2-lipped corolla with a short cylindrical tube, didynamous stamens and drupaceous fruit. However, *Premna* can readily be distinguished by its leaves being simple and corolla 4-lobed.

There are a few characters common to *Vitex* and *Gmelina*. Both have a persistent accrescent calyx, 2-lipped corolla with 5 lobes and a short cylindrical tube, didynamous stamens and drupaceous fruit. The latter, however, may easily be distinguished by its leaves being simple and stigma unequally 2-lobed. In Australia, the flowers and fruit in *Gmelina* are much larger than those of *Vitex*.

Key to the Species

- 1a. Leaves densely hairy below or on both surfaces 5
- b. Leaves glabrous excepting a few hairs on nerves 2
- 2a. Inflorescence axillary towards the ends of branches; cymes lax, arranged in a dichotomously branched thyrses; calyx and corolla not glandular outside; filaments glandular, villous towards the base 4
- b. Inflorescence terminal; cymes arranged in a pyramidal thyrses; calyx and corolla glandular outside; filaments not glandular, glabrous in the upper half, villous towards the base 3
- 3a. Leaflets dark-brown to orange-brown when dry, densely glandular-dotted underneath; calyx brownish when mature and dry; ovary glandular and hairy at the top (Qld) 1. *V. melicopea*
- b. Leaflets greenish-grey or dull brownish-grey when dry, not glandular; calyx dull brownish-grey when mature and dry; ovary not glandular, glabrous (north Qld, N.T. & W.A.) 2. *V. acuminata*
- 4a. Leaflets broadly elliptic or subrotund, obtuse or retuse, obliquely rounded at the base; ovary glabrous (west Qld, N.T., W.A. & extra Austral.) 3. *V. glabrata*
- b. Leaflets narrowly elliptic-lanceolate, narrowing towards both ends; ovary villous at the top (north Qld & extra Austral.) 4. *V. helogiton*
- 5a. Procumbent shrub on sandy sea-shores; stem creeping, rooting at nodes; leaves mostly 1-foliolate, rotund or rotund-obovate, pubescent-tomentulose all over, usually sessile, sometimes with a petiole 1-5 (-10) mm long (Qld, N.T., W.A. & extra Austral.) 5. *V. rotundifolia*
- b. Erect shrubs or small trees along the coast or inland; stems neither creeping nor rooting at nodes; leaves mostly 3-5-foliolate, sometimes 1-2-foliolate; leaflets lanceolate, elliptic-lanceolate, ovate or oblanceolate, glabrescent or greyish-velutinous above, petiole, petiole 10-60 mm long 6
- 6a. Leaflets greyish-velutinous all over; ovary villous at the top, not glandular (north W.A.) 6. *V. velutinifolia*
- b. Leaflets glabrescent above, greyish-tomentose or pubescent beneath; ovary glabrous, glandular 7
- 7a. Leaflets narrow-lanceolate, rostrate-acuminate, narrowing towards the base, mostly up to 2 cm broad; lateral nerves on ventral surface hidden by dense indumentum; fruit 3-4 mm diameter (west Qld) 7. *V. benthamiana*
- b. Leaflets oblong-elliptic, ovate-lanceolate or oblanceolate, up to 5 cm broad; lateral nerves on ventral surface distinct; fruit 4-6 mm diameter (north-east N.S.W., Qld, N.T., W.A. & extra Austral.) 8. *V. trifolia*
- 8a. Tall shrub or a tree; leaves 3-5-foliolate; leaflets (all or at least the terminal one) always petiolulate, oblong-elliptic or ovate-lanceolate, acute or subacuminate (north-east N.S.W., Qld & extra Austral.) 8a. *V. trifolia* var. *trifolia*
- b. Dwarf, erect or subprostrate shrub; leaves mostly 3-foliolate, sometimes 1- and 3-foliolate; leaflets always sessile, elliptic to oblanceolate, obtuse or subacuminate (Qld, N.T., ?W.A. & extra Austral.) 8b. *V. trifolia* var. *subtrisecta*

1. *Vitex melicopea* F. Muell., *Fragm. Phyt. Aust.* 5 (1865) 35, 213; *Fragm. Phyt. Aust.* 6 (1868) 152; Bailey, *Qld Fl.* 4 (1901) 1180, pro syn.; Mold., *Fifth Summary Verbenac. etc.* 2 (1971) 722, pro syn.

Lectotype: J. Dallachy 314, Rockhampton, Queensland, Australia, 7.vii.1863 (K, lectotype designated here!; MEL 97900, MEL 97912 — isolectotypes!).

V. acuminata R. Br.: Benth., *Fl. Aust.* 5 (1870) 67, p.p. quoad descr. of leaves & fruit, and spec. J. Dallachy from Rockhampton, Qld; Bailey, *Qld Fl.* 4 (1901) 1180, p.p. quoad descr. of leaves & fruit, and spec. J. Dallachy from Rockhampton, Qld; Francis, *Aust. Rain-For. Trees* (1951) 373, p.p. quoad descr. leaves & fruit, and loc. Gympie, Qld.

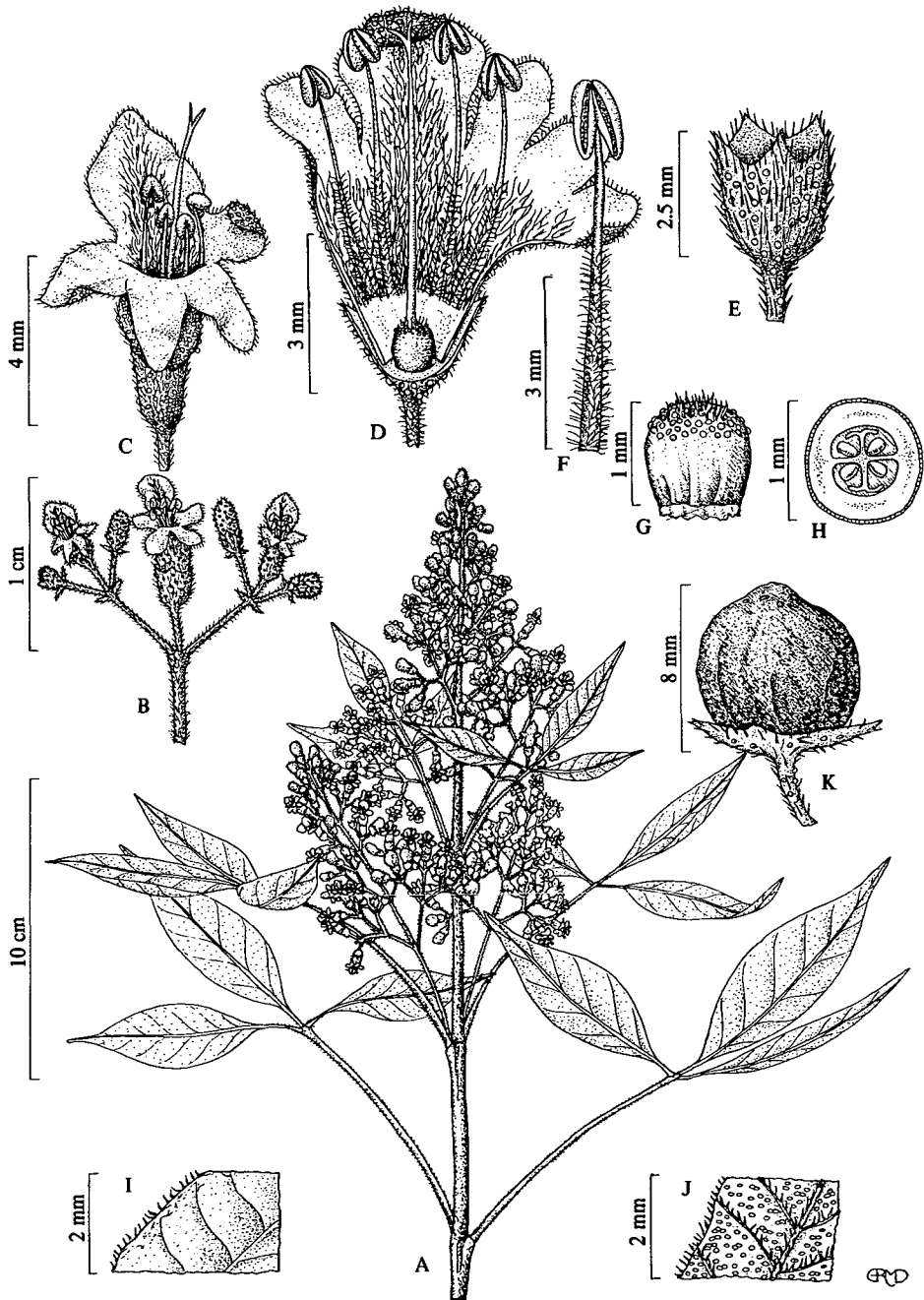


Fig. 1. *Vitex melicopea* F. Muell. (A-J, T. Stanley & E. Ross 78114: BRI; K, A. Thozet 74: MEL)

Typification

V. melicopea is based on three (syntype) collections, one by J. Dallachy (no. 314) and two by A. Thozet (nos 74 & 347), all from Rockhampton, Queensland. The collection by J. Dallachy consists of at least three duplicates, and both the collections by A. Thozet comprise at least two duplicates. With the exception of one Dallachy's duplicate at Kew, all other syntypes are in Herb. MEL. Since the author did not choose a type, it is, therefore, proposed to select a lectotype for this species. Annotations by F. Mueller indicate that he did examine all syntypes. Of these, the one in Herb. K is the only specimen annotated in F. Mueller's handwriting as "*Vitex melicopea* F. Mueller". The specimen is particularly complete and well preserved and is selected here as the lectotype.

Description (Fig. 1)

Tall shrub or tree (3-) 5-18 (-24.5) m tall. *Stem* 15-50 cm diameter, bark yellowish-brown, finely cracked longitudinally; branchlets densely greyish-pubescent. *Leaves* 3- or rarely 5-foliolate; leaflets shortly petioluled or the laterals sometimes almost sessile, lanceolate or narrowly elliptic-lanceolate, entire, acuminate, tapering at both ends, (2.5-) 4-10 (-14) cm long, (1-) 2-4 (-5.5) cm broad, chartaceous, dark-brown to orange-brown above, paler and densely glandular-dotted underneath, glabrous excepting puberulous midrib and main veins underneath and a few sparse hairs on margins; pairs of nerves 8-12 (-14); petioles greyish-pubescent, (2-) 3-6 (-9) cm long; petiolules greyish-pubescent, (2-) 5-10 (-14) mm long, sometimes absent. *Inflorescence* terminal, cineraceous-pubescent, 8-18 cm long, 7-20 cm wide; cymes pedunculate, in loosely branched thyrses, arranged in more or less pyramidal-shaped outline; lateral primary peduncles pubescent, 1.5-3 cm long. *Flowers* shortly pedicellate; pedicels pubescent, 1-2 mm long; bracts linear-lanceolate, \pm 1 mm long. *Calyx* brownish, tubular, minutely 5-toothed at the top, pubescent and glandular outside, glabrous within, lobes distinct, \pm 0.5 mm long; tube cylindrical, 1.5-2.5 mm long, 1.5-2 mm diam. *Corolla* "bluish-mauve", 5-lobed in the upper half, tubular below, pubescent and densely glandular outside, villous inside the tube with hairs extending to the large anterior lobe of the lower lip; the anterior lobe broadly elliptic or almost orbicular in outline, 3-4 mm long, 3-5 mm broad; the lateral lobes ovate or broadly oblong-ovate, 2.5-3 mm long, 1.5-2.5 mm broad at the base; the two lobes of the upper lip ovate, 2-2.5 mm long, 1.5-2 mm broad at the base; tube more or less cylindrical, enlarging gradually upwards, about twice the length of the calyx, 3.5-4.5 mm long, 2-3 (-3.5) mm broad at the top. *Stamens* exserted, connate to the lower half of the tube; filaments filiform, glabrous above, villous in the lower half, the anterior pair 5-6.5 mm long, the lateral pair 4-5.5 mm long; anthers more or less elliptic-oblong or almost orbicular in outline, \pm 1 mm long, nearly as broad, lobes oblong, free and divergent in the lower half. *Ovary* globose, glandular at the top, often with a few hairs between the glands, glabrous in the lower half, 1-1.5 mm diam.; style exserted, glabrous, filiform, 7-9 mm long; stigma 2-fid. *Fruit* globular or somewhat ellipsoid, glabrous, sometimes with a few glands and hairs at the top, 4-9 (-10) mm long, (3.5-) 4.5-10 (-12) mm diam., shining, brick-red to brown when fresh, turning black when mature and dry; accrescent calyx expanding 4-5 mm diam.

Representative specimens (collections seen: Australian 36, non-Australian 0)

AUSTRALIA: QUEENSLAND: *Anderson 2101*, 25 km N of Rockhampton, 11.xi.1980 (BRI); *Bailey s.n.*, Bundaberg, undated (BRI 267604); *Bailey s.n.*, Rockhampton, undated (BRI 267608); *Bailey 301*, loc. cit., undated (BRI 267610); *Bailey 715*, Mt Perry, undated (BRI 267607); *Cameron 2215*, Horn Island, Torres Strait, 27.vii.1975 (QRS); *J. Dallachy 314*, Rockhampton, 7.vii.1863 (K, lectotype, MEL 2 spec., isolectotypes); *Dietrich 701 & 1773*, loc. cit., undated (MEL); *Fitzalan s.n.*, Mount Dryander, undated (MEL 97901); *Fitzalan s.n.*, Port Denison, undated (MEL 97902); *Fitzalan s.n.*, Mt Elliot, undated (MEL 97903); *Flecker 6562*, Fairyland, 13.i.1940 (QRS); *Helms 10*, Childers, 7.vi.1899 (BRI); *Henderson H2624*, Glastonbury, ca 25 km WSW of Gympie, 1.v.1978 (BRI); *Hyland 2771*, Claudie River, 2.i.1973 (QRS); *Hyland 10222*, near Lockerbie, 31.i.1980 (AD, QRS); *Jones 881*, The Caves, 25 km N of Rockhampton, 7.xi.1957 (JCT); *Kajewski s.n.*, Mt Bauple, 43 km N from Brisbane, -xii.1922 (MEL 890); *Kajewski 55*, loc. cit. 19.i.1928 (BRI); *Michael 3013*, East Wooroolin, -ii.1947 (BRI); *O'Shanesy 22*, Rockhampton,

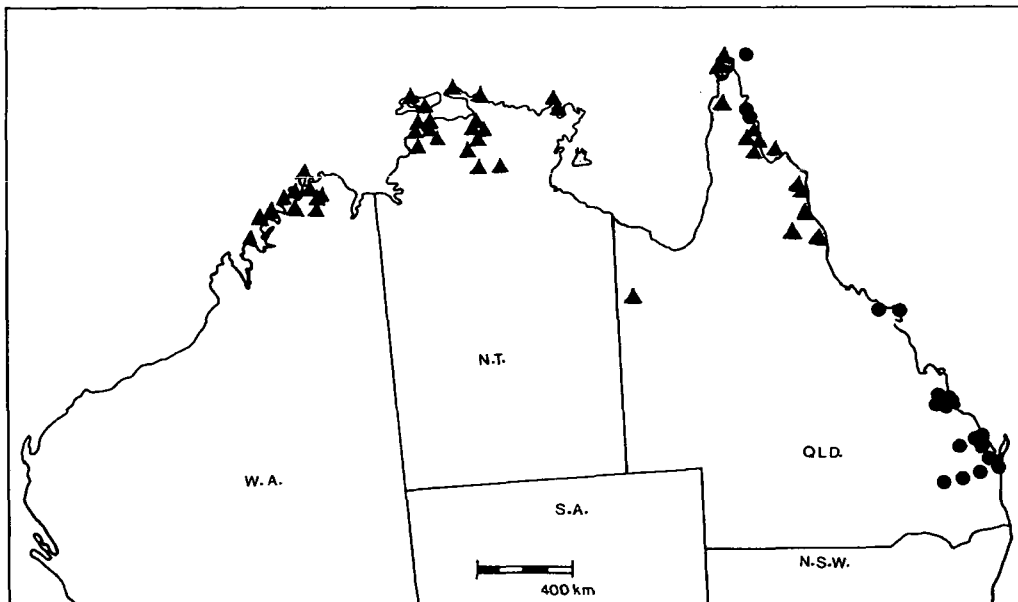
15.vii.1867 (MEL); *Smith 4117*, Bingera, 26.x.1948 (BRI, L); *Smith 12561*, Red Island Point, ca 25 km SW of Cape York, 28.x.1965 (BRI, L, LAE 2 spec.); *Stanley & Ross 78114*, ca 2 km from Dundowan Beach on road to Harvey Bay, 14.xi.1978 (BRI); *Thozet 74*, Rockhampton, undated (MEL 2 spec., syntypes). *Thozet 347*, loc. cit., undated (MEL 2 spec., syntypes); *?Thozet s.n.*, loc. cit., undated (L 402530, MEL 97895-MEL 97899, MEL 97908, MEL 97909, possible syntypes); *Webb 435*, loc. cit., 27.xii.1944 (JCT); *Webb s.n.* (bulk sample no. 5362), Milman, undated (CANB); *White 1191*, Red Island Point, Cape York, xi.1955 (BRI).

Distribution (Map 2)

V. melicopea is endemic to Australia where it is known to occur chiefly in the tropical region of Queensland. The main distribution is along the east-coast mainly in the area between Brisbane and Townsville, and further north between McIlwraith Range and the tip of Cape York Peninsula. It has also been recorded from at least two off-shore islands in the Torres Strait. From inland, a few localities are reported from about 300 km north-west of Brisbane. In Cape York area, the distribution is found overlapping with *V. acuminata* R. Br.

Comments

Bentham (1870) erroneously recorded *V. melicopea* as a synonym of *V. acuminata* R. Br., in spite of distinct differences in their leaves and flowers. This was later accepted by F. Mueller (1875, 1882, 1889), Bailey (1883, 1890, 1901, 1913), Francis (1951) and others. Since the reduction of *V. melicopea* to a synonym, all collections belonging to this species have been misidentified as *V. acuminata* R. Br. It seems that Bentham did not give much importance to the distinctive characters in the leaves and flowers of these species. As a result, his description of *V. acuminata* is found to include some characters which are distinctive of *V. melicopea*. During present investigations, therefore, *V. melicopea* is found to differ from *V. acuminata* by its brownish leaves being always gland-dotted underneath, filaments much more prominently villous in the lower half and ovary distinctly glandular and hairy on top. In view of these differences, *V. melicopea* is resurrected here to its distinct specific status. Superficially, both these species have more or less the same aspect, but the above mentioned characters can easily distinguish between the two. From a distribution view point, *V. melicopea* occurs chiefly in



Map 2. Distribution of *V. melicopea* ●, *V. acuminata* ▲.

southern Queensland while *V. acuminata* is found in northern Queensland, extending westwards to the tropics of the Northern Territory and Western Australia.

The following collections from Rockhampton, now preserved in Herb. L and MEL, have no collector's number, collection number or collecting date. It seems, that they possibly belong to A. Thozet's type collections of this species. They match more closely the type material than any other collection at hand. All these unnumbered specimens are recorded here as possible syntypes: L402530, MEL97895-MEL97899, MEL97908 and MEL97909.

The leaves in *V. melicopea* are mostly 3-foliolate, rarely 5-foliolate. In the latter situation, the leaflets are almost always sessile.

Affinities

V. melicopea is closely allied to *V. acuminata* in its leaves being glabrous and more or less similarly shaped; inflorescence terminal, pyramidal; calyx and corolla glandular and pubescent outside; stamens and style exerted, and filaments villous towards the base. However, *V. melicopea* may easily be distinguished by its bark of the stem being yellowish-brown; leaflets dark-brown to orange-brown when dry, densely gland-dotted underneath; calyx brownish when mature and dry; ovary glandular and with a few hairs at the top.

2. *Vitex acuminata* R. Br., Prod. Fl. Nov. Holl. (1810) 512; Walp., Rep. Bot. Syst. 4 (1845) 86; Schauer in A. DC., Prod. 11 (1847) 695; F. Muell., Fragm. 5 (1865) 34; Fragm. 6 (1868) 153; Benth., Fl. Aust. 5 (1870) 67, p.p., excl. syn. *V. melicopea* F. Muell., & Dallachy Coll. Rockhampton; F. Muell., Fragm. 9 (1875) 5; Syst. Cens. Aust. Pl. 1 (1882) 103; Bailey, Synop. Qld Fl. (1883) 379; F. Muell., Sec. Syst. Cens. Aust. Pl. 1 (1889) 173; Bailey, Cat. Indig. Nat. Pl. Qld (1890) 35; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4, 3a (1895) 172; Bailey, Qld Fl. 4 (1901) 1180, p.p., excl. syn. *V. melicopea* F. Muell., & Dallachy Coll. Rockhampton; Comp. Cat. Qld Pl. (1913) 386, fig. 362; Ewart & O.B. Davies, Fl. N. Terr. (1917) 237; C. Gardner, Enum. Pl. Aust. Occ. part 3 (1931) 112; Francis, Aust. Rain-For. Trees (1951) 373, p.p., exclud. description of leaves & fruit, and locality Gympie; Mold., Résumé Verbenac. etc. (1959) 211; Mold., Phytologia 16 (1968) 491; Beard, Descrip. Cat. W. Aust. pl. edn 2 (1970) 113; Mold., Fifth Summary Verbenac. etc. 1 (1971) 349; Phytologia 34 (1976) 280, excl. syn.; Phytologia 44 (1979) 223; Sixth Summary Verbenac. etc (1980) 339; Phytologia 45 (1980) 479.

Lectotype: R. Brown s.n., "North coast" (possibly Cape York Peninsula), Queensland, Australia, 1802-1805 (MEL582922, lectotype designated here!; BM (J.J. Bennett no. 2320), CANB251255, K — isolectotypes!).

Typification

V. acuminata is based on Robert Brown's collection from "North coast" of Queensland consisting of at least 4 duplicates. All duplicates were annotated by Robert Brown and certainly used by him in preparing the original diagnosis of this species. Since he did not choose any one specimen as a type, it is, therefore proposed to select a lectotype for this name. Of all the syntypes, a duplicate in Herb. MEL (MEL582922) is particularly complete and well preserved and chosen here as the lectotype of this species.

Description (Fig. 2)

Tall shrub or tree (2-) 4-18 (-25) m high. *Stem* 10-60 cm diameter, with outer bark pale or light grey, fissured and flaky; branchlets more or less quadrangular, hoary-pubescent. *Leaves* 3- or rarely 5-foliolate; leaflets mostly petiolulate, the lateral sometimes sessile, elliptic-lanceolate, elliptic-ovate or oblong-ovate, entire, mostly acuminate, cuneate at the base, (3-) 5-10 (-15) cm

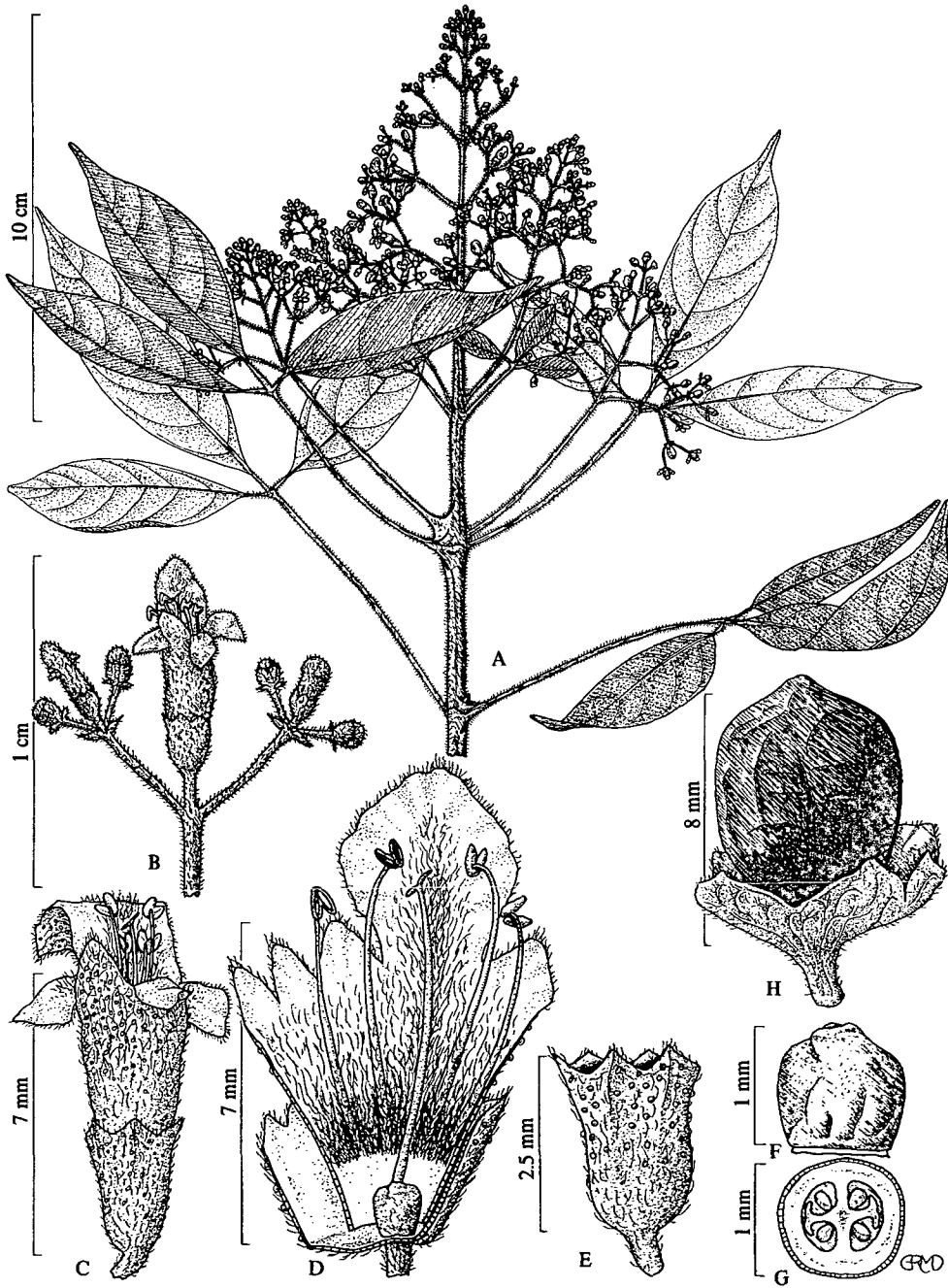


Fig. 2. *Vütex acuminata* R. Br. (A-G, N. Byrnes 2813 & P. Martensz. L.; H, J. Must 1329: DNA).

long, (2-) 3-5 (-6.5) cm broad, chartaceous, greenish-grey or dull brownish-grey and glossy above, glabrous excepting some hairs on and near the midrib; pairs of nerves 8-12; petioles minutely pubescent, (3-) 4-10 (-14) cm long; petiolules greyish-pubescent, (3-) 5-15 (-20) mm long. *Inflorescence* terminal or in the upper axils, hoary-pubescent, 6-12 (-15) cm long, 8-10 (-14) cm wide; cymes pedunculate, in loose thyrse, more or less pyramidal in outline; lateral primary peduncles (1-) 2-5 cm long; flowers pedicellate; pedicels pubescent, 1-2 mm long; bracts linear-lanceolate, about 1 mm long. *Calyx* tubular, more or less cylindrical, minutely 5-toothed at the top, pubescent and sparsely glandular outside, glabrous within, 2-3 mm long, 1.5-2 mm diam. *Corolla* blue or pale mauve with a creamy throat, 5-lobed in the upper half, tubular below, pubescent and glandular outside, villous inside the tube, with hairs extending to the large anterior lobe of the lower lip; the anterior lobe broadly ovate, elliptic-oblong or almost orbicular in outline, 3-5 mm long, 2.5-5 (-6) mm broad; the two lateral lobes more or less oblong-ovate, 2.5-3.5 (-4) mm long, 2-3.5 mm broad at the base; the two lobes of the upper lip oblong-ovate, 2-3 mm long, 1.5-2.5 mm broad at the base; tube more or less cylindrical with gradual dilation upwards, about twice as long as the calyx, 5-6.5 mm long, 3-4.5 mm broad at the top end. *Stamens* exerted, connate to about the middle of the corolla-tube; filaments filiform, glabrous above, villous in the lower half, the anterior pair 6.5-8 (-9) mm long, the lateral pair 6-7 (-7.5) mm long; anthers more or less elliptic-oblong or almost orbicular in outline, about 1 mm long, nearly as broad, lobes oblong, free and divergent in the lower half. *Ovary* globular, glabrous, non-glandular, about 1 mm diam.; style exerted, glabrous, filiform, 8-11 mm long; stigma distinctly 2-fid. *Fruit* globular-ellipsoid or somewhat obovoid, glabrous, 4.5-8 (-10) mm long, (3-) 4-7 (-8) mm diam., "dark purple when ripe", turning black when mature and dry.

Representative specimens (collections seen: Australian 66, non-Australian 0)

AUSTRALIA: QUEENSLAND: *R. Brown s.n.*, north coast, loc. incert., 1802-1805 (BM J.J. Bennett no. 2320, CANB251255, K, MEL582922); *Cameron 20265*, Prince of Wales Island, Torres Strait, 8.ii.1975 (QRS); *Hyland 3768*, Claudie River, 20.vii.1978 (QRS); *Hyland 7515*, Oliver River, 14.ix.1974 (BRI, QRS); *Perry 1052*, near Undilla Station, 28.iv.1948 (NT); *Persieh 1001 & 1002*, Endeavour River, -1883 (MEL); *Webb 3112*, Dinner Creek on Coen-Port Stewart Rd, -xi.1956 (BRI); *Webb & Tracy 6644*, Miriwinni near Mt Bartle Frere, -1962 (BRI, CANB); *Webb & Tracy 6992*, Bamaga, tip of Cape York Peninsula, -1962 (BRI, CANB); *Webb & Tracy 9052*, Shipton Flat between Roseville & Mt Finnegan, SW of Cooktown, 15.v.1969 (BRI, CANB); *Webb & Tracy 11183*, Sweet Creek on Cook Highway between Cairns and Mossman, undated (BRI, CANB).

NORTHERN TERRITORY: *Bleeser 533*, Darwin, -xi.1929 (MEL, NSW); *Byrnes 556*, Lee Point, Darwin, 13.ii.1968 (DNA, NT); *Byrnes 2813 & Martensz s.n.*, Cannon Hill, 1.xi.1972 (CANB, DNA, K, L, NT); *Craven 2344*, N side of Mt Brockman, 21.ii.1973 (A, CANB, L, LAE, NT); *Dunlop 3101*, Wagait Reserve, 16.i.1973 (CANB, DNA, FRI-DWN, NT); *Dunlop 3836*, Warangaiyu Lagoon, Elcho Island, 3.vii.1975 (CANB, DNA, NT); *Lazarides & Adams 282*, 9 miles NNE of Darwin, 2.iii.1965 (B, BRI, CANB, E, K, L, NSW, NT, P, US); *Macnochie 549*, East Point, Darwin, 13.ii.1968 (NT); *Martensz & Schodde AE354*, Koolpin Creek Gorge, S of El Sharana, 16.i.1973 (BRI, CANB, K, L, MO, NT); *McKean B829*, Deaf Adder Creek, 18.xi.1972 (CANB, DNA, K, NT); *Must 1329*, Berry Creek, 9.xii.1974 (BRI, CANB, DNA, NT); *Stocker 267*, Banjo Beach, Melville Island, -i.1966 (BRI, DNA, NT); *Swinbourne 686*, Canopy Rock, Mountain Valley Station, 25.iii.1963 (CANB, NT); *Telford 7987 & Wrigley*, Kakadu National Park, Deaf Adder Gorge, 22.iv.1980 (CBG); *Webb & Tracy 12541*, near Cahills Crossing, East Alligator River, -v.1978 (BRI).

WESTERN AUSTRALIA: *Beard 7034*, Mitchell Plateau, N Kimberley, xii.1974 (DNA, PERTH); *Crawford 12*, Kalumburu, 31.xii.1973 (PERTH); *George 12701*, Mt Trafalgar, Prince Regent River, 26.viii.1974 (PERTH); *George 14131*, Forest Creek near Drysdale River, 21.viii.1975 (PERTH); *Wilson s.n.*, Careening Bay, S of Coronation Island, 25.v.1972 (PERTH); *Wilson 10856*, Augustus Island, Bonaparte Archipelago, 18.v.1972 (PERTH).

Distribution (Map 2)

V. acuminata is endemic to Australia where its main distribution is in the tropics of northern Queensland, Northern Territory and Western Australia. In Queensland, it is known chiefly from the eastern and northern coastal areas of Cape York Peninsula. From offshore islands, it has been recorded from Horn Island and Prince of Wales Island in the Torres Strait. One collection, reportedly from near Undilla Station, is outside the main distribution area.

In the Northern Territory, the main distribution is in the Darwin area extending southwards to Daly River and eastwards to Mary River. A fair number of collections have also come from the area between Oenpelli Mission Station and El Shirana Mining township. It has also been reported from at least three different locations along the north coast of Arnhem Land. Other than the mainland, it is known to occur only on Melville Island.

Distribution in Western Australia is in the Kimberley region where it seems restricted between latitude 13° and 17°S and longitude 123° and 127°E. It has mainly been recorded from along Drysdale River extending westwards to the coastal areas. The only offshore records of this species have come from Augustus Island and Koolan Island.

Comments

Bentham (1870) described the leaflets of this species as “paler and usually glandular-dotted underneath”. In fact these are not characters of *V. acuminata* because the leaflets in this species are free of glands and similar in colour above and below. It appears from the specimens cited, that Bentham erroneously incorporated into this species a few specimens belonging to *Vitex melicopea* F. Muell. and *Viticipremna queenslandica* Munir. The leaflets of both these species are found to be densely covered underneath with yellowish glands that give them a paler look. Of the two Dallachy collections cited by Bentham under the species, the one from Rockhampton is the type of *Vitex melicopea* and the other from Rockingham Bay belongs to *Viticipremna queenslandica*. Apparently Bentham disregarded the leaf and flower-characters while reducing *V. melicopea* to synonymy with *V. acuminata*.

Francis (1951) recorded this species from Gympie, Queensland. In fact, *V. acuminata* does not occur anywhere south of the Atherton Tableland. From the description provided and the specimens annotated by Francis himself, it seems that he too considered *V. acuminata* and *V. melicopea* as one species. The records of *V. acuminata* from Rockhampton, Gympie and Brisbane areas, therefore, have been based on the misidentification of *V. melicopea* specimens as this species. In fact, *V. melicopea* is known to occur commonly around Rockhampton and other south-eastern parts of Queensland. Francis (1951) described the fruit as “red, globose, about half an inch in diameter”. This seems to have been taken from *V. melicopea* or *V. glabrata* R. Br. The fruit in *V. acuminata* is dark purple, globular-ellipsoid, 4.5-8 (-10) mm long, (3-) 4-7 (-8) mm in diameter.

A collection by P.G. Wilson 10856 (PERTH) from Augustus Island, Western Australia is reported to have “pale yellow” flowers. The collection has been correctly identified as *V. acuminata* but the given flower-colour seems unusual. The flower-colour recorded by most other collectors is blue or pale mauve.

The largest leaves are noticed in the collections from areas receiving high rainfall averaging 1.7-4 m annually. The leaves in some juvenile specimens are found to be irregularly toothed or lobed.

Some overseas collections, without flowers or fruit, have been identified as this species. In general appearance they seem nearer to *Viticipremna* but due to lack of flowers they cannot be positively identified. Material of *V. acuminata* has also been misidentified and distributed in some herbaria as *V. glabrata* R. Br.

Bailey (1888) described this species as having close-grained brown wood suitable for cabinet-work. According to Webb (1948) this species is suspected of causing mortalities in dairy stock at Kingaroy.

Affinities

V. acuminata is closely related to *V. melicopea*. For details see “Key to the Species” and “affinities” under the latter. *V. acuminata* has also several characters common with *V. glabrata*. Both species have glabrous leaves, exserted stamens and style, and a glabrous ovary. However,

V. glabrata can easily be identified by its leaflets being broadly elliptic or subrotund, obtuse or retuse, obliquely rounded at the base; inflorescence axillary, lax, dichotomously branched; calyx and corolla not glandular outside and filaments distinctly glandular.

3. *Vitex glabrata* R. Br., Prod. Fl. Nov. Holl. (1810) 512; Benth., Fl. Aust. 5 (1870) 68, p.p., excl. spec. Qld; F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 103, p.p. quoad spec. N. Aust.; Sec. Syst. Cens. Aust. Pl. 1 (1889) 173, p.p., quoad spec. N. Aust.; Schumann in Schumann & Hollr., Fl. Kais.-Wilh. Land (1889) 121, p.p., excl. *Hollrung* 672 & 708; Briq. in Engl. & Prantl, Pflanzenfam. 4, 3a (1895) 172; Bailey, Qld Fl. 4 (1901) 1180, p.p., excl. spec. Qld; Ewart & O.B. Davies, Fl. N. Territory (1917) 238; W. Fitzg., Journ. & Proc. Roy. Soc. W.Aust. 3 (1918) 202; H.J. Lam, Verbenac. Malay. Arch. (1919) 203, p.p., quoad syn. *V. cunninghamii* Schauer, & Distrib. N. Aust. & W. Aust.; H.J. Lam & Bakh., Bull. Jard. Bot. Ser. III, 3 (1921) 62, p.p., quoad spec. N. & W. Aust.; Dop, Fl. Gen. Ind-Chine 4 (1935) 840, p.p., quoad spec. N. & W. Aust.; Specht in Specht & Mountford, Recd Amer.-Aust. Sc. Exped. (Bot.) Arnhem Land (1958) 292, p.p., excl. Qld & N.G.; Mold., Résumé Verbenac. etc (1959) 211, p.p., excl. pl. Qld; Mold., Fifth Summary Verbenac. etc. 1 (1971) 349 & 716, p.p., excl. Qld; Mold., Phytologia 44 (1979) 493, p.p., quoad spec. N & W. Aust.; Sixth Summary Verbenac. etc (1980) 339, p.p., excl. Qld; Phytologia 45 (1980) 483, p.p., quoad spec. N. & W. Aust.; Mold., Phytologia 48 (1981) 458, p.p., quoad *Lazarides* 7986 ex N.T.; Phytologia 49 (1981) 166, p.p., excl. spec. ex Qld & N.S.W.; Phytologia 51 (1982) 254, p.p., quoad spec. ex N.T.

Lectotype: R. Brown s.n. (J.J. Bennett no. 2319), Groote Eylandt, Northern Territory, Australia, -1803 (MEL97917, lectotype designated here!; BM, MEL97916 — isoelectotypes!).

V. cunninghamii Schauer in A. DC., Prod. 11 (1847) 691; Briq. in Engl. & Prantl, Pflanzenfam. 4, 3a (1895) 172; F. Muell., Fragm. 6 (1968) 153, p.p., excl. spec. ex Qld.

Type: A. Cunningham 256, Careening Bay, north-west coast, Western Australia, -ix.1820 (G-DC!, K 2 spec.!, MEL 2 spec.!) — syntypes).

Typification

V. glabrata is based on Robert Brown's collection (s.n., J.J. Bennett no. 2319) from Groote Eylandt consisting of at least 3 duplicates. All duplicates were possibly used by Robert Brown in preparing the protologue of this species. Since he did not choose any one specimen as a holotype, it is proposed to select a lectotype for this name. Of all the available syntypes, a duplicate preserved in Herb. MEL (MEL97917) is the only one annotated by the author himself. The specimen is particularly complete and well preserved and chosen here as the lectotype for this species.

Description (Fig. 3)

A tall shrub or tree (3-) 5-9 (-12) m high. *Stem* 15-40 cm diameter, bark brownish-grey, finely fissured; branchlets obtusely quadrangular, more or less fulvous-pubescent, becoming glabrescent. *Leaves* 3-5-foliolate; leaflets broadly elliptic, subobovate or sometimes subrotund, obtuse or retuse at the apex, sometimes obtusely acuminate, obliquely rounded at the base, (3-) 5-16 (-21) cm long, (2-) 3.5-8 (-13) cm broad, chartaceous or membranous, brownish or somewhat blackish-brown when dry, glabrous excepting minute pubescence on the midrib and main nerves underneath, glossy above, dull below; pairs of nerves 6-15 (-17); petioles glabrous or somewhat pubescent when young, (3-) 5-10 (-15) cm long; petiolules glabrous, somewhat pubescent when young, 1-3 (-5) cm long, rarely absent. *Inflorescence* axillary, lax, almost always shorter than the leaf, minutely pubescent, (8-) 10-18 (-23) cm long, 8-18 cm wide; cymes slender, very loose and dichotomously branched, primary peduncle puberulous but becoming glabrous, (2-) 3-7 (-9.5) cm long. *Flowers* pedicellate, rather small; pedicels

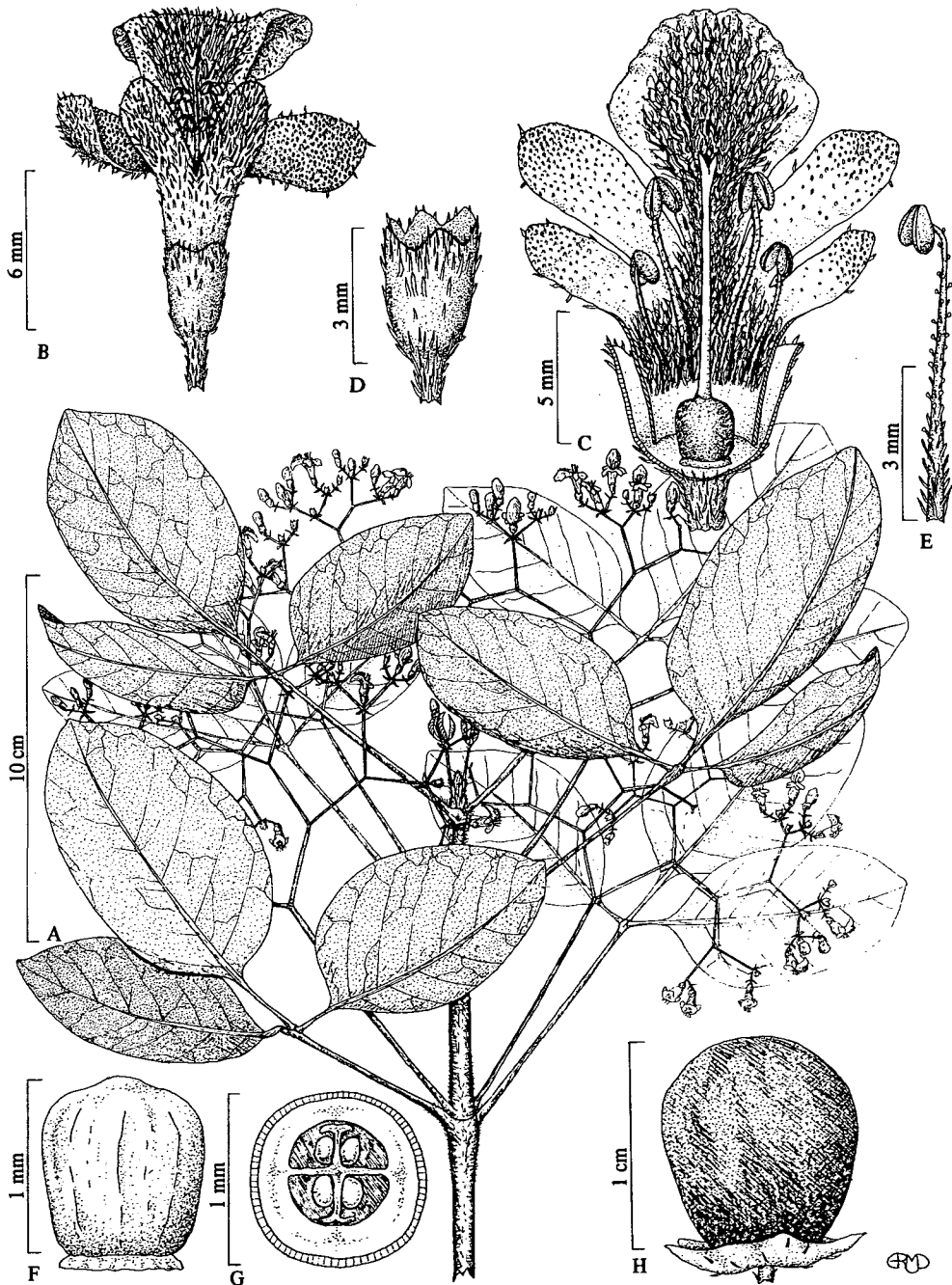


Fig. 3. *Vitex glabrata* R. Br. (A-G, C. Dunlop 3598: NT; H, C. Dunlop & G. Wightman 322: DNA).

pubescent, 1-3 mm long; bracts small, caducous, 2-3 mm long; bracteoles 2, minute, lanceolate, \pm 0.5 mm long. *Calyx* cupuliform, tubular, with 5 minute teeth at the top, minutely and appressedly pubescent outside, glabrous within; lobes \pm 0.5 mm long; tube more or less cylindrical, 2-3 mm long, 1.5-2 mm diam. *Corolla* cream-white with a purple tinge especially on the inside of the mid-lower lobe, 5-lobed (2-lipped) in the upper half, tubular below, pubescent but non-glandular outside, glabrous within near the base of the tube, otherwise densely villous within the tube with hairs extending to the large anterior lobe of the lower lip, the smaller lobes papillose within; the large anterior lobe pink, nearly as long as the tube, broadly elliptic-obovate or almost orbicular in outline, 3.5-6 (-8) mm long, 3-4.5 (-5) mm broad; the lateral lobes of the lower lip elliptic-ovate or oblong-ovate, 2.5-3 (-4) mm long, 2-3 (-3.5) mm broad at the base; the two lobes of the upper lip more or less broadly ovate or almost orbicular in outline, 2-3 (-3.5) mm long, 1.5-2 (-3) mm broad at the base; tube more or less cylindrical, about twice as long as the calyx, 4-6 mm long, 1.5-2.5 mm diam. at the top. *Stamens* exerted, connate to the tube; filaments filiform, villous in the lower half, glandular in the upper half, somewhat broadened below, the anterior pair 5-7.5 mm long, the lateral pair 3.5-5.5 mm long; anthers more or less orbicular in outline, \pm 0.5 mm long, nearly as broad, lobes free and divergent in the lower half. *Ovary* globose, glabrous, 1-1.5 mm diam.; style exerted, glabrous, filiform, 5-8 mm long, stigma shortly 2-fid. *Fruit* obovoid or somewhat ellipsoid, glabrous, 5-10 (-13) mm long, 5-9 mm diam., dark purple when mature, turning black when dry; accrescent calyx expanding, 5-7 (-9) mm diam.

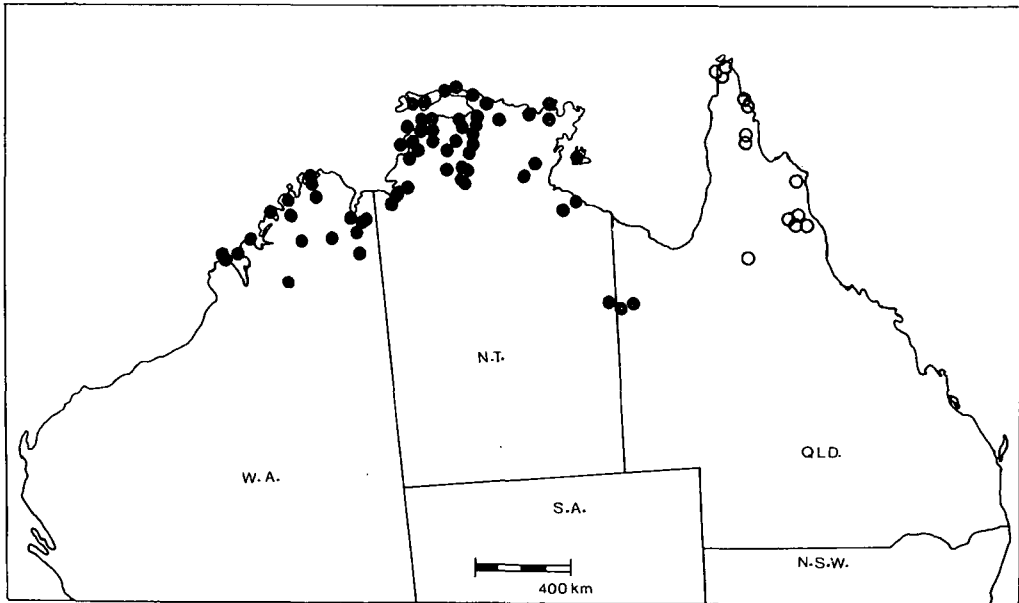
Representative specimens (collections seen: Australian 104, non-Australian 0)

AUSTRALIA: NORTHERN TERRITORY: *Adam* 872, Wyndham Road, ca 13 miles SW of Katherine, 7.ii.1974 (BRI, CANB, K, L, NT, NSW, US); *Blake* 17100, South Alligator River, 30.ix.1946 (BRI); *R. Brown* s.n. (J.J. Bennett no. 2319), Groote Eylandt, 1803 (BM, MEL 2 spec., syntypes of *V. glabrata*); *Craven* 3887, McArthur River Area, 12.ii.1976 (CANB); *Dittrich* s.n., from Herbert River to Carpentaria, 1886 (AD, MEL); *Dunlop* 3980, Melville Island, 15.xii.1975 (DNA, NT); *Holtze* s.n., Port Darwin, 1883 (MEL97918); *Latz* 3298, Wessel Island, 30.ix.1972 (BRI, CANB, NT, PERTH); *Lazarides* 7946, ca 7 miles W of Mt Gilruth, 2.iii.1973 (CANB, L, NT); *Lazarides* 282, 9 miles NNE of Darwin, 20.iii.1965 (B, BRI, CANB, E, K, L, NSW, NT, P, US); *Martensz* AE717, ca one mile WSW of Cannon Hill, 4.ii.1973 (CANB, K, NT); *Martensz* & *Schodde* AE380, El Sharana Mining Camp vicinity, 17.i.1973 (CANB, L, NT); *F. Mueller* s.n., Fitzmaurice River, x.1855 (MEL97931); *F. Mueller* s.n., Liverpool River, 2.x.1867 (MEL97935); *Must* 1097, Lookback Billabong, Elizabeth Downs, 19.x.1972 (CANB, DNA, K, L, NT); *Parker* 529, Yarrowonga area, 7.xi.1974 (DNA, K, L, NE, NT); *Rankin* 1531, Whitestone Creek area, 18.x.1978 (CANB, DNA, NE, NSW); *Schodde* AE18, Harrys Cave, S Mt Brockman Range, 3.xi.1971 (CANB, DNA, K, NT); *Specht* 1076, Oenpelli, 27.ix.1948 (AD, BRI, CANB, L, MEL, PERTH); *Webb* & *Tracey* 12538, Woolaning-Channel Pt Road, N of Daly River, -v.1978 (BRI); *Webb* & *Tracey* 12549, western gully of Mt Douglas west, -v.1978 (BRI); *Webb* & *Tracey* 12556, Ginger Palmer's Camp, Fright Point, E of Darwin, -v.1978 (BRI); *Wightman* 1115, Murgarella, 10.ii.1984 (DNA); *Wightman* & *Dunlop* 322, Channel Point, 25.xi.1982 (DNA); *Wilson* 180, Maude Creek, Goldfield area, 12 miles E of Katherine, 23.i.1965 (CANB, K, L, NSW, NT, US).

WESTERN AUSTRALIA: *Beard* 8357, W of Mitchell River, near Mitchell Plateau, north-western Kimberley, 22.ii.1978 (PERTH); *Crawford* 13, Kalumburu, 31.xii.1973 (PERTH); *Cunningham* 256, Careening Bay, NW coast -ix.1820 (G-DC, K 2 spec., MEL 2 spec., syntypes of *Vitex cunninghamii* Schau.); *Fitzgerald* 1649, Dillon Springs, E Kimberley, -x.1906 (NSW145233, PERTH); *Froggat* s.n., Kings Sound, 1888 (MEL97922); *Kenneally* 6649, on western side of Mitchell Plateau, 17.v.1978 (CANB, PERTH); *Mackenzie* 691101, between King River Pumping Stn and Kununurra, 1.xi.1969 (CANB); *Rust* 46K, Karunjie Stn, -x.1954 (CANB, PERTH); *Speck* 4858, 48 miles SSE of Kalumburu Mission, 1.ix.1954 (CANB); *Telford* & *Bulter* 6183, Carson Escarpment, 36km E of new Theda Homestead Gorge near Wonjaring, Glider Gorge, 27.vii.1977 (CBG).

Distribution (Map 3)

V. glabrata is known chiefly from the tropics of the Northern Territory and Western Australia. In the Northern Territory most localities are to the north of latitude 15°S where the majority of collections came from the areas around Darwin, Katherine, the Alligator River and from within Arnhem Land. A few localities from south of latitude 15°S are reported from near the Victoria and McArthur Rivers. One collection from between the Herbert River and the Gulf of Carpentaria was collected by Lieut. Dittrich during 1886. Since then, this species has never been recollected from that area. From offshore islands of the State, it has been recorded from Groote Eylandt in the Gulf of Carpentaria and from Melville Island, north of Darwin.



Map 3. Distribution of *V. glabrata* ●, *V. helogiton* ○.

In Western Australia, the main distribution is in the Kimberley region, mostly to the north of the Fitzroy and Ord Rivers. Within this region, the northern-most locality is near Kalumburu Mission Station and the southern-most near Oscar Range along the Northern Highway. Outside the Kimberlies, this species has been recorded from Lombadina Mission and the coastal areas of King Sound Bay.

The occurrence of *V. glabrata* in Queensland has not been confirmed by any collection. It was recorded from that State by Bentham (1870), F. Mueller (1882, 1889), Bailey (1901, 1913), H.J. Lam (1919), Moldenke (1959, 1971, 1980) and others. All these records were based on misidentification of the closely related species *V. helogiton* which has similar lax axillary inflorescences and several flower-characters in common with *V. glabrata*. Almost all collections from Queensland and several from Papua New Guinea, Indonesia and the Philippines hitherto misidentified by others as "*V. glabrata*" are being referred here to *V. helogiton*.

It seems that *V. glabrata* R. Br. is endemic to the northern part of Northern Territory and Western Australia, although it may occur in the border region of northern Queensland. The following two collections, gathered just across the border from Queensland, may possibly belong to *V. glabrata*: *Listang 336* (BRI) from near Camooweal and *Perry 1052* (BRI, CANB) from Undilla Station. These specimens are without flowers or fruits, but the shape and texture of their leaflets are nearest to *V. glabrata*.

Comments

Bentham's concept of *V. glabrata* and its distribution range was accepted by F. Mueller (1882, 1889), Bailey (1901, 1913) and others. F. Mueller (1865) recorded it from New South Wales by misidentification of a cultivated specimen of the New Zealand *V. lucens* T. Kirk as *V. glabrata*. For the first time, Schumann (1889, 1901) reported *V. glabrata* from New Guinea by identifying two Hollrung's collections (nos. 672 & 708) as *V. glabrata*. Subsequently,

however, Schumann (1905) recognised both the above Hollrung's collections as distinct from *V. glabrata* and thus described them as a new species *V. helogiton* Schumann.

H.J. Lam (1919, 1921) recorded *V. helogiton* and a few other names as synonyms of *V. glabrata*, and gave its distribution from northern Australia to all over Malesia, Indochina and India. Lam's (1919) distribution range for *V. glabrata* was accepted by Merrill (1923), Burkill (1966) and Moldenke (1959, 1971, 1980). He regarded *V. glabrata* and *V. helogiton* as conspecific because superficially both species appear to be one and the same taxon. They have similar axillary inflorescences, and apart from the villous ovary apex in *V. helogiton*, all flower-characters of both the species are almost the same. Apparently, H.J. Lam (1919, 1921) did not examine the type of *V. glabrata* nor any Australian collection of this species from Northern Territory or Western Australia.

In the course of present investigations, *V. helogiton* was found to be a distinct species, differing from *V. glabrata* by its leaflets being generally lanceolate, acuminate, cuneate towards the base and ovary always hairy (villous) on top. The leaflets of *V. helogiton* often turn from deep dark-brown to almost black when dry. H.J. Lam's (1919) description of *V. glabrata* and the specimens cited by him mostly belong to *V. helogiton*. His concept of *V. glabrata*, which in fact mainly comprises *V. helogiton*, was widely accepted by others. Since 1919 the name *V. glabrata* has therefore been often misapplied to all non-Australian and Queensland material of *V. helogiton*.

Anderson (1947) recorded *V. glabrata* from the northern subdivision of New South Wales, but the author admits that he has seen no specimens of this species. It is not clear whether this record was based on a misidentification of a different species or perhaps on F. Mueller's records of *V. glabrata*.

The present author has seen no cultivated *V. glabrata* from outside Australia. However, the reported cultivation of this species in Java, Madagascar and Mauritius possibly refers to *V. helogiton*.

Material of *V. glabrata* has been misidentified and distributed in some herbaria as *V. acuminata* R. Br. and/or *V. quinata* (Lour.) F.N. Will.

Affinities

V. glabrata is nearest to *V. helogiton* in its leaves being glabrous; inflorescence axillary, lax and dichotomously branched; calyx and corolla not glandular outside and filaments distinctly glandular, villous towards the base. Nevertheless, *V. glabrata* may readily be distinguished by its leaflets being broadly elliptic, subrotund, obtuse or retuse, obliquely rounded at the base, and ovary glabrous all over. The leaflets in *V. helogiton* are elliptic-lanceolate, gradually narrowing towards both ends and ovary villous at the top. There are several characters in common between *V. glabrata* and *V. acuminata* (for details see "affinities" under the latter and "key to the species" as well).

4. *Vitex helogiton* Schumann in Schumann & Lauterb., Nachtr. Fl. D. Südsee (1905) 369.

Type: M. Hollrung 672, Augusta Station, Kaiser Wilhelms Land (i.e. Papua New Guinea), -viii.1887 (B, holotype n.v., and probably destroyed). See typification.

V. pentaphylla Merr., Philipp. J. Sci. (Bot.) 4 (1909) 320; Hall. f., Meded. Rijks-Herb. Leid. no. 37 (1918) 54.

Type: Whitford & Hutchinson F.B. No. 9490, Siocon River, dist. of Zamboanga, Mindanao, Philippines, -ii.1908 (PNH, syntype n.v.); Huichison F.B. No. 11245, loc. cit., iii.1908 (PNH, syntype n.v.).

V. niida Merr., Philipp. J. Sci. (Bot.) 7 (1912) 343; H.J. Lam, Verbenac. Malay. Arch. (1919) 194.

Type: Klemme F.B. No. 19546, Tanob, Prov. of Misamis, Mindanao, Philippines, 7.v.1911 (K!, PNH n.v. — syntypes).

V. bombacifolia Wall. Cat. (1828) no. 1749, nom. nud.

V. pallida Wall. Cat. (1828) no. 1751, nom. nud.

V. leucoxydon auct. non Linn. f.: sensu Schauer in A. DC., Prod. 11 (1847) 692 p.p.; sensu Kurz, For. Fl. Burma 2 (1877) 273; Gamble, Man. Ind. Timb. (1881) 298.

V. glabrata auct. non R. Br.: sensu Benth., Fl. Aust. 5 (1870) 68 p.p. excl. syn. *V. cunninghamii* Schauer & Pl. extra N. Aust.; sensu F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 103, p.p., quoad loc. Qld; sensu Bailey, Synop. Qld Fl. (1883) 380, p.p., quoad loc. Cape York & Gilbert River; sensu C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 588, p.p., excl. syn. *V. cunninghamii* Schauer; sensu F. Muell., Sec. Syst. Cens. Aust. Pl. 1 (1889) 173, p.p., quoad loc. Qld; sensu Schumann & Hollr., Fl. Kais.-Wilh. Land (1889) 121, p.p., quoad *Hollrung 672 & 708*; sensu Bailey, Qld Fl. 4 (1901) 1180, p.p., excl. syn. *V. cunninghamii* Schauer & Pl. extra N.T.; sensu Schumann & Lauterb., Fl. D. Schutzgeb. Südsee (1901) 523, p.p., quoad *Hollrung 672 & 708*; sensu Bailey, Comp. Cat. Qld Pl. (1913) 386, p.p., quoad loc. Cooktown; sensu Hall. f. in Meded. Rijks-Herb. 37 (1918) 54, p.p., quoad pl. extra-Aust.; sensu H.J. Lam, Verbenac. Malay. Arch. (1919) 203, p.p., excl. syn. *V. cunninghamii* Schauer & loc. N & W. Aust.; sensu H.J. Lam & Bakh., Bull. Jard. Bot. Ser. III, 3 (1921) 62, p.p., excl. syn. *V. cunninghamii* Schauer & loc. N. Aust.; sensu Bakh. & H.J. Lam, Bull. Jard. Bot. Ser. III, 4 (1922) 285, p.p., quoad pl. extra-Aust.; sensu Merr., Enum. Philipp. Fl. Pl. 3 (1923) 394, p.p., quoad pl. extra-Aust.; sensu Ridley, Fl. Mal. Penin. 2 (1923) 634, p.p., excl. pl. extra-Aust.; sensu Dop, Bull. Soc. Hist. Natur. 57 (1928) 207 & 209, p.p., quoad pl. extra-Aust.; sensu Dop in Lecomte, Fl. Gen. Indo-Chine 4 (1935) 840, p.p., excl. syn. *V. cunninghamii* Schauer, *V. pentaphylla* Merr. & loc. Aust.; sensu Fletcher, Kew Bull. no. 10 (1938) 435, p.p., excl. loc. N. Aust.; sensu Specht in Specht & Mounford, Recd Amer.-Aust. Sc. Exped. (Bot.) Arnhem Land 3 (1958) 292, p.p., quoad Pl. Qld & extra-Aust.; sensu Mold., Résumé Verbenac. etc. (1959) 211 excl. N.T., 225, 283-287, p.p., quoad pl. Qld & extra-Aust.; sensu Backer & Bakh. f., Fl. Java 2 (1965) 605, p.p., quoad Pl. extra-Aust.; sensu Mold., Fifth Summary Verbenac. etc. 1 & 2 (1971) 374, 603, 718, 720-22, 724, 725, p.p., quoad Pl. extra-Aust., excl. Pl. N.T. & W.A.; sensu Mold., Sixth Summary Verbenac. etc. (1980) 339, 366, 457 & 458, p.p., quoad Pl. extra-Aust., excl. Pl. N.T. & W.A.; sensu Mold., Phytologia 45 (1980) 483, p.p., excl. syn. *V. cunninghamii* Schauer; sensu Mold., Phytologia 49 (1981) 166, p.p., excl. pl. N.T. & W.A.; sensu Mold., Phytologia 48 (1981) 458, p.p., quoad pl. extra-Aust.; sensu Mold., Phytologia 51 (1982) 254, p.p., quoad pl. extra-Aust.; sensu Mold., Phytologia 52 (1982) 134, p.p., quoad Pl. extra-Aust.

Typification

The type of *V. helogiton* was not available for examination. According to Stafleu & Cowan (1979), "the type specimens of *Die Flora der deutschen Schutzgebiete* in der Südsee were in B". If the holotype of *V. helogiton* was destroyed during the Second World War, it must be investigated whether isotypes are extant. Alternatively, a neotype should be selected, and *Hollrung 708* should be taken into consideration because *Hollrung 672* and *Hollrung 708* were seen and cited by K. Schumann (1901) and annotated by him as one and the same species. A duplicate of *Hollrung 708* is preserved in Herb. MEL. The specimen is particularly complete and well preserved and should be taken into consideration as a candidate for the neotype if no isotype can be traced. Dr J. Hryniewicz has informed me (Pers. Comm. dated 22.xi.1984) that there is no duplicate of *Hollrung 672* extant in Herb. WRSL.

Description (Fig. 4)

A large shrub or a tree (3-) 5-20 (-30) m high. *Stem* 15-60 cm diameter, bark light brown or grey, flaky, narrowly fissured; branchlets somewhat 4-angled, the young parts pubescent, the growing parts turning black when dry. *Leaves* 3-5-foliolate; leaflets narrowly elliptic, elliptic-lanceolate, rarely elliptic-ovate, acuminate at the apex, cuneate towards the base, (3-) 5-17 (-22) cm long, (2-) 3-7 (-9) cm broad, chartaceous or membranaceous, glabrous and shining above, slightly pubescent on the midrib and main nerves underneath, dark brown, often turning black when dry, non-glandular; pairs of nerves 6-15; petioles puberulous but becoming glabrous, (3-) 5-12 (-16) cm long; petiolules puberulous, sometimes becoming glabrescent, 5-20 (-30) mm long, rarely absent. *Inflorescence* axillary, in the axil of upper leaves, lax, shorter than the leaf, minutely puberulous; cymes pedunculate, dichotomously branched, few flowered, 6-15 (-22) cm long, 6-8 (-12) cm wide; primary peduncles puberulous, later becoming glabrous, (2-) 4-7 (-10) cm long. *Flowers* pedicellate, rather small; pedicels pubescent, 1-3 (-4) mm long, often with 2 minute opposite bracteoles at the base. *Calyx* cupuliform, regularly

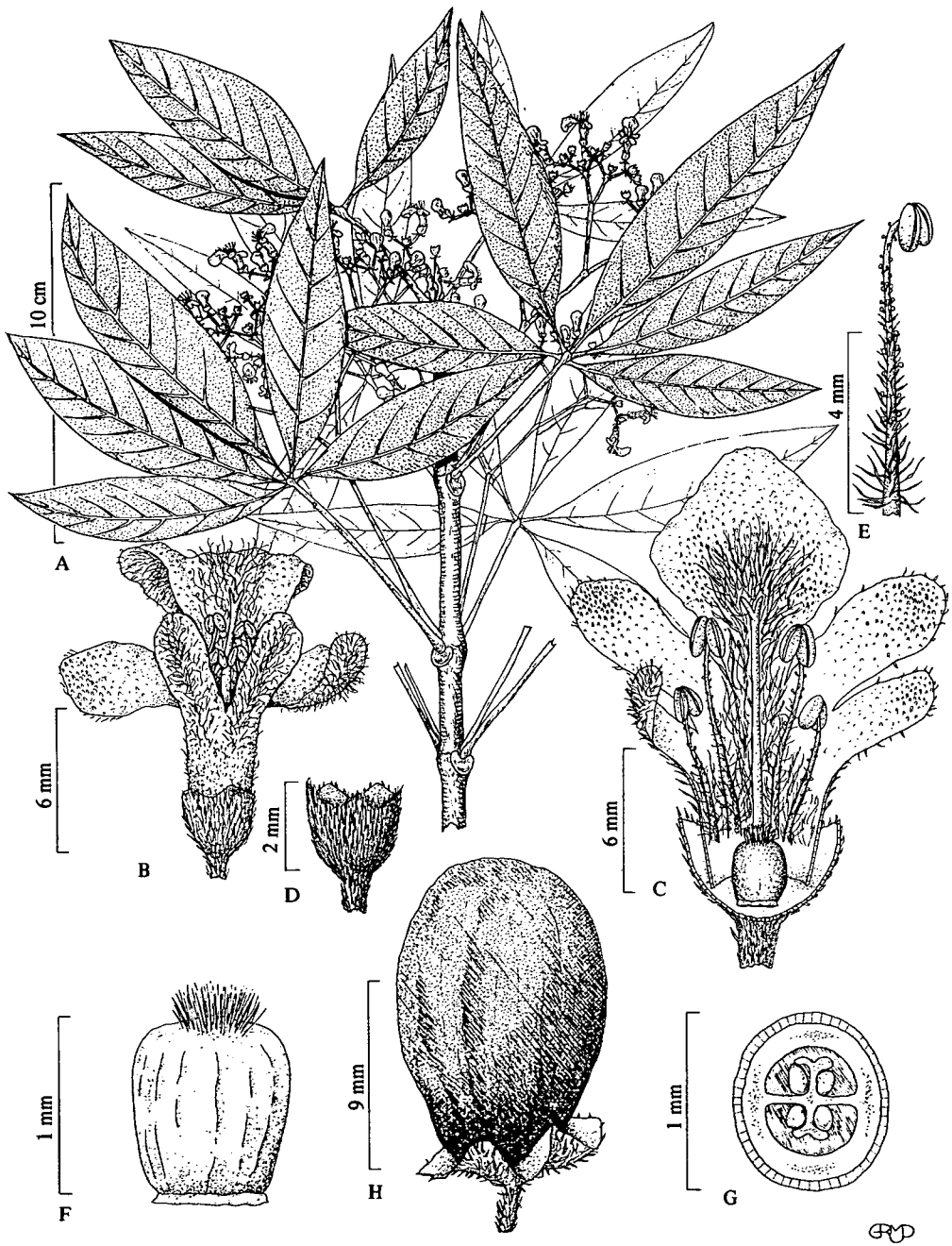


Fig. 4. *Vitex heligoton* Schumann. (A-G, B. Hyland 12381: QRS; H, B. Hyland 11558: QRS).

5-toothed at the top, pubescent outside, glabrous within; lobes small, broadly ovate, acute or acuminate, ± 0.5 mm long; tube more or less cylindrical, 2-3 mm long, 1.5-2 mm diam. *Corolla* "white", "purplish-white" or "creamy purple", 2-lipped, 5-lobed in the upper half, tubular below, pubescent but non-glandular outside, densely villous inside the tube with hairs extending to the large midlobe of the lower lip within, the smaller lobes somewhat papillose within; the large middle lobe of the lower lip broadly elliptic-obovate or almost orbicular in outline, 5-8 mm long, 4-6 mm broad; densely villous on the median portion inside; the lateral lobes of the lower lip oblong or oblong-ovate, 3-4 mm long, 2-3 mm wide at the base; the two lobes of the upper lip more or less elliptic-ovate, 3-3.5 mm long, 2-2.5 mm broad at the base; tube more or less cylindrical, inflated upwards, at least twice as long as the calyx, 5-7 mm long, 2-3 mm diam. at the top. *Stamens* exerted, connate to the corolla tube; filaments filiform, villous in the lower half, glandular in the upper half, somewhat broadened below, anterior pair 7-8 mm long, the lateral pair 6-7 mm long; anthers more or less orbicular in outline, ± 0.5 mm long, nearly as broad, lobes free and divergent in the lower half. *Ovary* ovoid-globose, villous at the top, glabrous below ± 1 mm diam.; style exerted, glabrous, filiform, 7-10 mm long, stigma shortly 2-fid. *Fruit* obovoid or oblong-obovoid, rounded at the apex, glabrous, 8-15 (-20) mm long, 6-10 (-12) mm diam., pinkish-purple when mature, turning black when dry; accrescent calyx somewhat saucer-shaped, 6-8 mm diam.

Representative specimens: (collections seen: Australian 26; non-Australian 15)

AUSTRALIA: QUEENSLAND: *Blake 14728*, Georgetown, 23.xi.1942 (BRI); *Bouel 2*, Endeavour River, -i.1881 (MEL); *Cameron 20327*, Prince of Wales Island, Torres Strait, 9.ii.1975 (QRS); *Daemel s.n.*, Cape York, -x.1866 (MEL97927, MEL582917-MEL582919); *Daintree s.n.*, Gilbert River, 1869 (MEL97936); *Flecker 1137*, Hodgkinson River, 15.xii.1936 (QRS); *Flecker 6502*, Thornborough & Mt Mulligan, 30.xi.1939 (BRI); *Hyland 2469*, Lockerbie, Cape York Peninsula, 30.xi.1962 (BRI); *Hyland 11558*, Packer's Creek, 22.i.1982 (QRS); *Hyland 11760*, Parish of Kesteyen, Timber Reserve 14, 23.iii.1982 (QRS); *Moriarty 2561*, Leichhardt Creek, ca 4 km W of Mt Molloy, 9.xii.1978 (AD); *Smith 11976*, 2 miles NNW of Coen, on banks of Coen River, 16.x.1962 (BRI, L); *Smith 12415*, Bamaga Mission, 11.2 km SW of Cape York, 24.x.1965 (CANB, L); *Smith 12623*, between Somerset, ca 13 km SE of Cape York, 30.x.1965 (BRI); *Sparvell 6502*, Mareeba, 26.xi.1940 (QRS).

PAPUA NEW GUINEA: *Brass 8464*, Penzara, between Morehead and Wassi Kussa Rivers, Western division, -xii.1936 (A, BRI, CANB, LAE); *Henty & Foreman NGF 49346*, Morehead River, near station, 9.xi.1972 (A, BISH, BO, BRI, CANB, K, L, LAE, PNH, SING, SYD, US); *Hollrung 708*, Augusta Station, 1887 (B n.v., MEL!); *Katik NGF 37970*, Gogol Timber Area, Madang subdistrict, 18.x.1973 (A, BISH, BO, BRI, CANB, E, FI, K, L, LAE, M, PNH, QRS, SING, SYD, US); *Katik NGF 46595*, Enesil Village near Gogol River, 14.x.1969 (A, BISH, BO, BRI, CANB, K, L, LAE, PNH, SING, SYD, US); *Robbins 1730*, Nubia, Madang District, 16.ix.1958 (CANB, LAE).

IRIAN JAYA: *Koorders 27046*, Banjumas, Java, 20.i.1897 (K, MEL); *Koorders 28170*, Semarang, Java, 15.vi.1897 (B, BRI, K); *Lam 1144*, Meervlakte, Irian Jaya, 18.ix.1920 (BO, BRI); *Lorenzo BW7257*, Andai near Manokwari, 27.viii.1958 (BO, CANB, L); *Schram BW2748*, Hollandia, Irian Jaya, 28.iii.1956 (BO, CANB, L); *Schram BW7986*, Sanggang, Manokwari, Irian Jaya, 10.xii.1958 (BO, BRI, L); *Backer 27850*, Kangean, 1925 (BO, L).

PHILIPPINES: *Sulit PNH 12507*, Iraan Mountains Aborlan, Palawan, -v-vi.1950 (PNH); *Klemme FB19546*, Tangob, Misamis Prov., Mindanao, 7.v.1911 (KI, PNH n.v, syntype of *V. nitida* Merr.).

Distribution (Map 3)

In Australia, *V. helogiton* is chiefly known from the tropical areas of northern Queensland. The main distribution is in the coastal parts of the Cape York Peninsula, particularly north of latitude 17°S. Further south, a few collections were reportedly gathered from west of Georgetown along the Gilbert River. So far, its occurrence further inland in Queensland is not known. From off-shore islands, it has been recorded from the Prince of Wales Island in Torres Strait.

Collections from outside Australia have been examined from Papua New Guinea, Irian Jaya, Indonesia and the Philippines.

Comments

V. helogiton is recorded here for the first time from Australia. It was described by K. Schumann (1905) who had earlier (1889, 1901) identified its type as *V. glabrata* R. Br. In 1909, a conspecific collection from Mindanao Island in the Philippines was described by E.D. Merrill as a new species *V. pentaphylla*. Regarding the affinity of his new taxon, Merrill (1909) noted that "this species is most closely allied to *Vitex littoralis* Dcne.; but is at once distinguishable by its five leaflets which are not at all glandular beneath". A few years later, a different collection of the same species from the above named island was described by Merrill (1912) as another new *Vitex* species named *V. nitida*. In the protologue, he commented that it was "A species well characterised by its 3- and 5-foliolate leaves, the lower two leaflets, when present, much reduced, its axillary, peduncled cymes, truncate calyx, and densely pubescent corolla. It is most closely allied to *Vitex pentaphylla* Merr., but is apparently sufficiently distinct from that species".

In 1919, H.J. Lam reduced *V. pentaphylla* and *V. helogiton* to synonymy under *V. glabrata*, but with some reluctance he retained *V. nitida* as a distinct species. Under *V. nitida*, H.J. Lam (1919) remarked that "this species belongs possibly to the subsection *Axillares*, for it is not clear from Merrill's description whether there are only axillary cymes forming together a terminal (pseudo-terminal) panicle, or if also a real terminal panicle is present". A few years later, Merrill (1923) reduced both his species *V. pentaphylla* and *V. nitida* to synonymy under *V. glabrata*, without any mention of *V. helogiton*. Subsequently, Moldenke (1959, 1971, 1980) recorded *V. helogiton*, *V. pentaphylla* and *V. nitida* as synonyms of *V. glabrata*. Apparently, none of these authors seem to have examined the type of *V. glabrata*, because their description of *V. glabrata* is found to be that of *V. helogiton*.

During present investigation, *V. glabrata* is found restricted chiefly to the northern parts of the Northern Territory and Western Australia. The distribution range of *V. helogiton* is found to extend from northern Queensland in Australia to all over Malesia and from India to Indochina. Superficially, both *V. glabrata* and *V. helogiton* have more or less the same aspect. Both have similar looking leaves, axillary inflorescence, almost identical flowers with exerted stamens and style. The leaflets in *V. helogiton*, however, often turn blackish when dry, and are cuneate towards the base, ovary villous on top and fruit somewhat larger [8-15 (-20) by 6-10 (-12) mm] than that of *V. glabrata*. In view of these differences, *V. helogiton* is reinstated here as a distinct species. All references of *V. glabrata* from outside Australia were based on misidentification of plants belonging to *V. helogiton*. Therefore, of the synonyms recorded by other authors under *V. glabrata* only *V. cunninghamii* Schauer belongs to this species. All the rest are found to belong to *V. helogiton* Schumann.

According to collecting notes by Bouel 2 (MEL) and others, the fruit of this species "is very good to eat".

Affinities

V. helogiton is very closely related to *V. glabrata* in its leaves being glabrous; inflorescence axillary, lax, dichotomously branched; calyx and corolla not glandular outside; filaments distinctly glandular, villous towards the base. For the distinguishing characters and more detail see "key to the species" and "affinities" under *V. glabrata*. There are a few characters common to *V. helogiton*, *V. melicopea* and *V. acuminata*. (For detail see "key to the species").

5. *V. rotundifolia* L. f., Suppl. Pl. Syst. Veg. (1782) 294; Sasaki, List. Pl. Formos. (1928) 353, 354; Hara, Outline Phytogeogr. Jap. (1959) 56; Mold., Phytologia 8 (1961) 86; Chippendale, Proc. Linn. Soc. N.S.W. 96 (1972) 256; Baines, Aust. Pl. Gen. (1981) 393.

Type: Thunberg s.n., in Japan, undated (LINN, Herb. Smith, microfiche!).

V. ovata Thunb., Fl. Jap. (1784) 257; Willd., Sp. Pl. 3 (1800) 390; Pers., Syn. Pl. 2 (1806) 143; R. Br., Prod. Fl. Nov. Holl. (1810) 511; Spreng., Syst. Veg. 2 (1825) 756; Hook. & Arn., Bot. Beech. Voy. (1841) 206, 268, t. 47; Walp., Rep. Bot. Syst. 4 (1845) 82; Sieb. & Zacc., Abh. Akad. Muench. 4 (1846) 152; Merr., Govt. Lab. Publ. Philip. 6 (1904) 17; Bur. Gov. Lab. no. 27 (1905) 68; Rev. Iden. Sp. Blan. Fl. Filip. (1905) 68; Philip. J. Sc. 1, Suppl. 1 (1906) 121; Philip. J. Sc. Bot. 3 (1908) 297, 432; Wilson, J. Arn. Arb. 1 (1920) 186; Chung, Mem. Sc. Soc. China 1 (1924) 227; Domin, Biblioth. Bot. 89 (1929) 560; Corner, Gard. Bull. Str. Settle. 10 (1940) 258; M.R. Hend., Malay. Wild. Fl. part 2 (1950) 387, f. 357; Specht, Recd. Amer.-Aust. Sc. Exped. (Bot.) Arnhem Land 3 (1958) 292; Backer & Bakh. f., Fl. Java 2 (1965) 604; St. John, Phytologia 39 (1978) 317; Chippendale, Proc. Linn. Soc. N.S.W. 96 (1972) 256.

Type: "Crescit in littore Papenberg et Satsuma E. Macao Chinae missa quoque mihi fuit a Dn. P.I. Bladh", (UPS, microfiche!).

V. repens Blanco, Fl. Filip. edn 1 (1837) 513.

Type: Philippines, loc. incert. (n.v.).

V. trifolia L. var. *simplicifolia* Cham., Linnaea 7 (1832) 107, [as "*β. simplicifolia*"]; Shirasawa, Bull. Coll. Agric. Tokyo 2 (1895) 270; H.J. Lam, Verbenac. Malay. Arch. (1919) 182; Hosokawa, Trans. Nat. Hist. Soc. Formos. 23 (1933) 233; Degener, New Illust. Fl. Haw. Isl. (1946) Fam. 315; Meeuse, Blumea 5 (1942) 73; Merr., Pl. Life Pac. World, repr. edn (1946) 32, 37, 47 & f. 46; Mold., Phytologia 6 (1958) 183-192 & 197; Résumé Verbenac. etc. (1959) 211, 212, 226, 379, 380, 387, 388; Phytologia 8 (1961) 86-88; Neal, Gard. Haw. (1965) 728; Ohwi, Fl. Jap. (1965) 765; Mold., Phytologia 17 (1968) 54-56 & 114-117; Fifth Summary Verbenac. etc. 1 & 2 (1971) 349, 351, 353, 375, 709, 712, 725, 727-730, 792; Huang, Pollen Fl. Taiwan (1972) 244, t. 163, f. 15-17; Mold., Phytologia 25 (1973) 235; M.R. Henderson, Malay. Wild Fl. Dict. 1 (1974) 387; Mold., Phytologia 34 (1976) 266, 268; Phytologia 41 (1979) 302; Sixth Summary Verbenac. etc. (1980) 339-341, 343, 368, 459; Mold., Phytologia 52 (1982) 141; Mold., Phytologia 51 (1982) 352; Manilal & Sivar., Fl. Calicut (1982) 229; Sivar. & Manilal, J. Econ. & Taxon. Bot. 3 (1982) 816; Mold., Phytologia 52 (1982) 184; Mold. in Dassan & Fosb., Fl. Ceylon 4 (1983) 382.

Type: *Collector undesignated s.n.*, from sandy shores near Cavite, Luzon, Philippine Islands, undated (possibly in Herb. B, n.v.). Perhaps destroyed during the war.

V. trifolia L. var. *unifoliolata* Schauer in A. DC., Prod. 11 (1847) 683; Mann, Proc. Amer. Acad. Arts 7 (1867) 194; Engl., Bot. Jahrb. 6 (1885) 66; Maxim. in Mém. Biol. 12 (1886) 514; Bull. Acad. Sc. St. Petersb. 31 (1887) 82; H.J. Lam, Verbenac. Malay. Arch. (1919) 182; Bull. Jard. Bot. Buitenz. Ser. III, 3 (1921) 53; Bakh. & H.J. Lam, Bull. Jard. Bot. Buitenz. Ser. III, 4 (1922) 285; Dop, Bull. Soc. Hist. Natur. 57 (1928) 206, sphalm. var. *unifoliata*; P'ei, Mem. Sc. Soc. China 1 (1932) 100; Dop in LeComte, Fl. Gen. Indo-Chine 4 (1935) 835, sphalm. var. *unifoliata*; Mold., Phytologia 6 (1958) 184.

Syntypes: *Sieber s.n.*, Mauritius (G-DC, n.v.); *Chamisso s.n.*, in littoribus arenosis Luconiae ad Cavite (probably B, n.v.); *Meyen s.n.*, Syng-moon (n.v.); *Millet s.n.*, *Vachell 174*, Canton, China (n.v.); *Thunberg s.n.* & *Goering s.n.*, Japan (n.v.); *R. Brown s.n.*, Novae Hollandia (BM!); *Macrae s.n.*, in ins. Oweeche (n.v.).

V. trifolia L. var. *obovata* Benth., Fl. Aust. 5 (1870) 67; Bailey, Synop. Qld Fl. (1883) 379; Cat. Indig. & Natur. Pl. Qld (1890) 35; Qld Fl. 4 (1901) 1179; Comp. Cat. Qld Pl. (1913) 386.

Syntypes: *A. Cunningham 217*, Snapper Island, Queensland, -v.1819 (BM, K, MEL 4 spec.); *A. Cunningham 216*, Goulburn & Sims Islands, Northern Territory, 1818 (BM, K, MEL).

V. trifolia var. *unifoliata* Miq., Cat. Mus. Bot. Lugd.-Bat. (1870) 70, probably misspell. of Schauer's *unifoliolata*; Fawcett, Natur. Wond. E. Arch. (1885) 514; Hillebr., Fl. Haw. Isl. (1888) 342; Kawakami, List Pl. Formos. (1910) 85; Mold., Suppl. List Invalid Names (1941) 11; Phytologia 6 (1958) 184; Phytologia 17 (1968) 54, sphalm. var. "*unifolia*".

Type: n.v., probably the same as for var. *unifoliolata* Schauer.

V. agnus-castus L. h. *ovata* Kuntze, Rev. Gen. Pl. 2 (1891) 510, 511; Hara, Enum. Sperm. Japan 1 (1948) 190.

Type: "Anam: Turong" (n.v.). This taxon seems to have been based on *V. ovata* Thunb. Therefore, the type should be as for *V. ovata* Thunb.

V. trifolia L. var. *ovata* (Thunb.) Makino, Bot. Mag. Tokyo 17 (1903) 92; Merr., Sp. Blanc. (1918) 332; Enum. Philip. Fl. Pl. 3 (1923) 397; Merr. in Ling., Sc. J. 5 (1927) 158; Fletcher, Kew Bull. (1938) 432; Mold., Alph. List Invalid Names Suppl. 1 (1947) 29.

Type: As for *V. ovata* Thunb.

V. trifolia L. var. *repens* Ridley, Fl. Malay Penin. 2 (1923) 631.

Syntypes: *Watson*, Kuantan, Malaya (K, SING, n.v.); *Ridley*, Kelantan, Malaya (K, SING, n.v.).

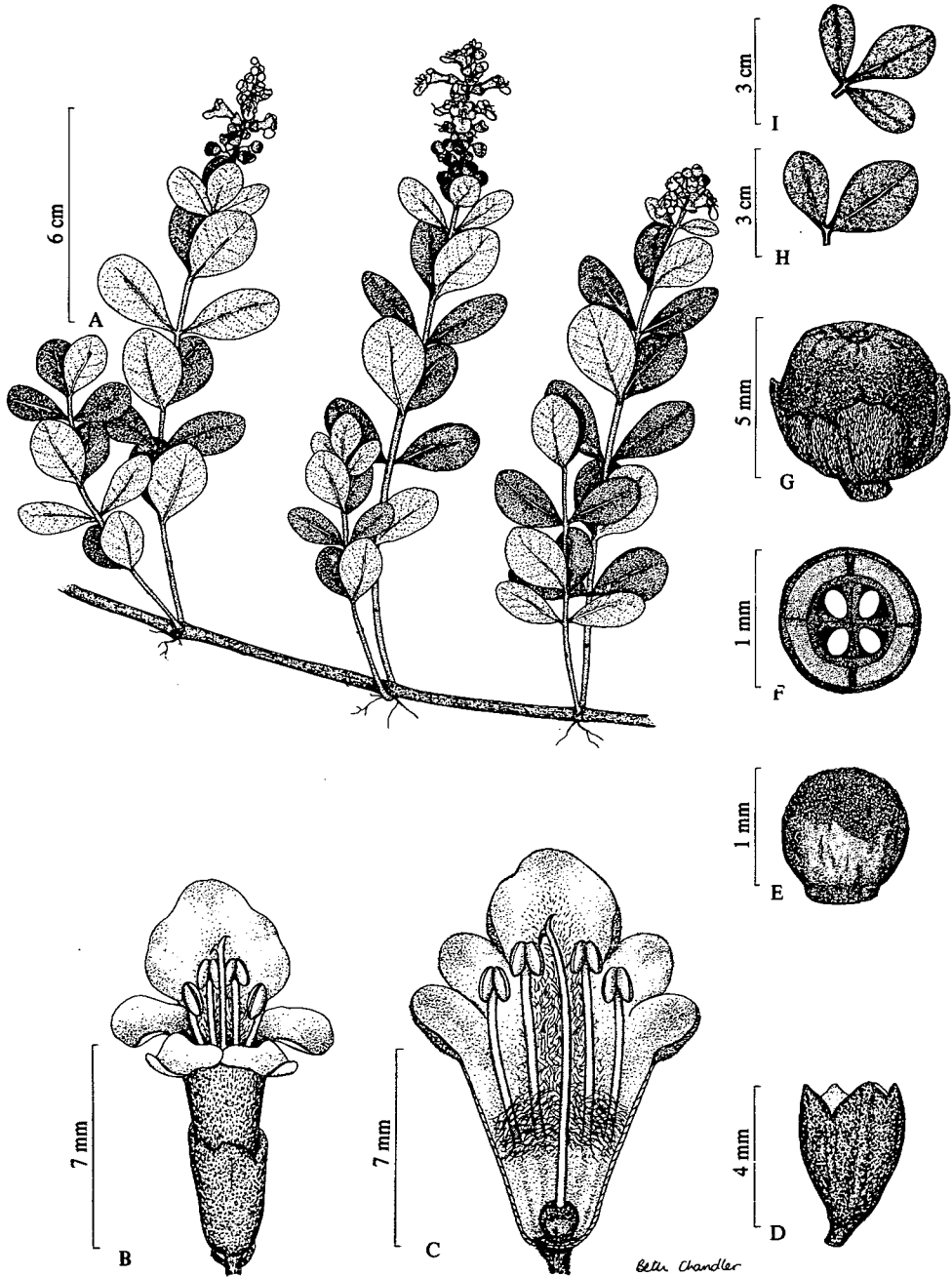


Fig. 5. *Vitex roundifolia* L. f. (A-G, W.T. Jones 1500: CANB; H-I, N.B. Byrnes 1018: AD).

V. trifolia L. subsp. *littoralis* Steenis, Blumea 8 (1957) 516; Balgooy, Pac. Pl. Areas 3 (1975) 276.

Type. *S. Bloembergen 3894*, interior east of Wonreli, Secondary Country, beach-shore. Kisar, Lesser Sunda Islands, Indonesia, 22.iv.1939 (L, holotype!, BO, BRI, isotypes!).

V. trifolia L. sensu Miq., Fl. Ind. Bat. 2 (1856) 859, p.p., quoad descrip. and syn. *V. repens* Blanco, *V. ovata* Thunb. and var. *unifoliolata* Schauer; sensu Benth., Fl. Hongk. (1861) 273, p.p., quoad syn. *V. ovata* Thunb. and var. *unifoliolata* Schauer; sensu Seemann, Fl. Vit. part 5 (1866) 190, p.p., quoad syn. *V. ovata* Thunb. and *V. repens* Blanco; sensu F. Muell., Fragm. Phytogr. Aust. 6 (1868) 152, p.p., quoad syn. *V. ovata* Thunb.; sensu C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 583, p.p., quoad syn. *V. ovata* Thunb. and *V. repens* Blanco; sensu Bailey, Qld Woods (1888) 92, p.p., quoad descrip.; sensu Forbes & Hemsl., J. Linn. Soc. 26 (1890) 258, p.p., quoad syn. *V. ovata* Thunb. and var. *unifoliolata* Schauer; sensu Hall. f., Meded. Rijks-Herb. Leid. no. 37 (1918) 40, p.p., quoad syn. var. *obovata* Benth., var. *simplicifolia* Cham. and var. *unifoliolata* Schauer; sensu Gamble, Fl. Pres. Madr. (1924) 1101-1102, p.p., quoad descrip.; sensu Pope, Man. Wayside Pl. Haw. (1968) 195.

Description (Fig. 5)

A prostrate shrub on sandy sea-shores, 10-40 (-90) cm high, spreading to about 10 m diameter. *Stem* procumbent or creeping, rooting at the nodes with silky-tomentose young branches. *Leaves* mostly 1-foliolate, rarely a few sub-2-foliolate or 3-foliolate, sessile or shortly petiolate, obovate-oval, broadly oblong-elliptic, orbicular or obovate-spathulate, (1.5-) 3-5 (-6) cm long, (1-) 2-3 (-3.5) cm broad, rounded at both ends or sometimes abruptly subacuminate at the apex, attenuate at the base, usually pale dull-green, pubescent above, velutinous- or silky-tomentulose below; pair of nerves 4-6; petiole tomentulose, 1-5 (-10) mm long. *Inflorescence* mostly abbreviated terminal thyrse borne on small side-branches, densely tomentulose, 3-10 (-13) cm long, 1-2.5 cm wide; cymes shortly pedunculate, usually branched, arranged in a pyramidal panicle, lateral primary peduncles absent or 1-5 mm long; flowers shortly pedicellate; pedicels densely glandular and tomentulose, 0.5-2 mm long; bracteoles linear, 1-2.5 mm long. *Calyx* cyathiform, glandular and silky-tomentulose outside, glabrous within, 5-ribbed outside, with 5 short teeth at the top; teeth 0.5-1 mm long, 1-1.5 mm broad at the base; tube cylindrical, 3-4 mm long, 2-3 mm diam. at the top. *Corolla* hypocrateriform, varying from purplish-mauve to lilac-blue, 2-lipped and 5-lobed above, tubular below, glandular and silky-tomentulose outside, villous inside the tube and on the lower half of the large anterior lobe of the lower-lip, glabrous near the base of the tube; the anterior lobe broadly elliptic or almost orbicular in outline, glabrous in the upper inner half and along the periphery outside, 3-5 (-6) mm long, 3-5 mm broad; the two lateral lobes more or less oblong-elliptic or elliptic-ovate, 2-3 (-4) mm long, 1.5-3 (-3.5) mm broad at the base; the two lobes of the upper lip oblong-ovate, 2-3 (-4) mm long, 1.5-3 (-3.5) mm broad; tube cylindrical below, gradually enlarged upwards, almost twice the length of the calyx, 4-7 mm long, 2-4 mm broad at the top. *Stamens* exserted, connate to the corolla-tube; filaments filiform, glabrous above, villous near the base, the anterior pair 7-9 mm long, the lateral pair 6.5-8 mm long; anthers elliptic-oblong in outline, \pm 1 mm long, lobes oblong, free and divergent in the lower half. *Ovary* globose, glabrous, densely glandular all over, 1-1.5 mm diam.; style exserted, glabrous, filiform, 8-12 mm long; stigma shortly 2-lobed. *Fruit* globose, green when fresh, becoming dark-brown when dry, glabrous, glandular all over, 4-5.5 mm long, 5-6.5 mm diam.; fruiting calyx glandular and tomentulose outside, glabrous within, 5-denticulate, 5-6.5 mm diam.

Representative specimens (collections seen: Australian 124, non-Australian 26)

AUSTRALIA: QUEENSLAND: *Banfield s.n.*, Brammo Bay, Dunk Island, 1914 (BRI267720); *Barnard 2*, Townsville, 8.vi.1941 (CANB, MEL); *Blake 11250*, Nielson Park - Bargara, near Bundaberg, 25.iv.1936 (BRI, CANB, MO); *Brass 1919*, Port Douglas, 13.i.1932 (BRI); *Clements 5*, Rockhampton, -iv.1917 (BRI); *Cunningham 217*, Snapper Island, -v.1819 (BM, K, MEL, syntype of *V. trifolia* var. *obovata* Benth.); *Domin 8162 & 8163*, near Russel River, -i.1910 (PR); *Hyland 7397*, Bathurst Bay, 28.viii.1974 (BRI, L, QRS); *McDonald & Batianoff 1291*, Dalrymple Beach, 10 km S of Mackay, 6.iv.1975 (BRI); *F. Mueller s.n.*, Bloomfield River, -1885 (MEL97997); *Krazing PO1444*, ca 6 km N of Karumba, 15.vii.1974 (BRI, CBG, L); *Persieh 281*, Endeavour River, 1882 (MEL98041); *Reilley s.n.*, Haughton River, 1891 (MEL97973); *Peiniger 10830*, Cairns, 14.iii.1947 (QRS); *Smith 11014*, Bloomfield Beach, ca 1.6 km N of Bloomfield River, 4.ix.1960 (BRI, L); *Stoddart 4189*, Sinclair Island, 8.viii.1973 (BRI, L);

Stoddart 4756, Turtle Island III, 3.x.1973 (BRI, L); *Telford 2022*, Forrest Beach, E of Ingham, 25.v.1970 (BRI, CBG); *Tindale s.n.*, Wellesley Islands & Mornington Island, 31.v.1963 (AD 2 spec., BRI); *Webb & Norris 3079*, Bramston Beach, -xi.1956 (BRI); *Webster & Tracy 18969*, Dunes near the mouth of Harley's Creek, 12.x.1973 (NSW); *Wrigley & Telford 1435*, Quarantine Bay, S of Cooktown, 19.vi.1972 (CBG).

NORTHERN TERRITORY: *Byrnes 291*, Casuarina Beach, Darwin, 24.i.1968 (L, NT); *Chippendale 8235*, 3 miles S Danger Point, Cobourg Peninsula, 21.vii.1961 (AD, BRI, CANB, L, MEL, NT, PERTH); *Craven 3824*, Sir Edward Pellew Group, E side of South West Island, 11.ii.1976 (BRI, CANB, L, NT, PERTH); *A. Cunningham 216*, Goulburn & Sims Islands, 1818 (BM, K, MEL, syntype of *V. trifolia* L. var. *obovata* Benth.); *Dunlop 2920*, Maria Island, Gulf of Carpentaria, 22.vii.1972 (NT); *Latz 3280*, Wessel Islands, 28.ix.1972 (CANB, MO, NT); *Perry 1223*, 60 miles N of Wologorang Station, 3.vi.1948 (BRI, CANB, MEL, NT); *Specht 677*, Yirrkala, 19.vii.1948 (AD, BRI, CANB, L, MEL); *Wightman 1097*, Brogden Point, Murganella, 10.ii.1984 (DNA).

WESTERN AUSTRALIA: *Gulliver 16*, Kimberley, 1875 (MEL98022); *Wilson 11279*, Anjo Peninsula, N coast of W.A., 2.vii.1973 (CANB, PERTH).

PAPUA NEW GUINEA: *Reedy s.n.*, Ratau River, SW of Daru, undated (MEL97875).

INDONESIA: *Bloembergen 3894*, Lesser Sunda Isl. Kisar, 22.iv.1939 (BO, BRI, L).

NEW CALEDONIA: *Schlechter 15548*, [Auf den Bergen bei] Oubatche, 23.xii.1902 (L).

POLYNESIA: *Fosberg 11981*, Moerai, Rurutu Isl., 29.viii.1934 (BISH, L).

HAWAIIAN ISLANDS: *Royen 10192*, Oahu, below Airfield Beach Park, 22.x.1907 (BISH, L).

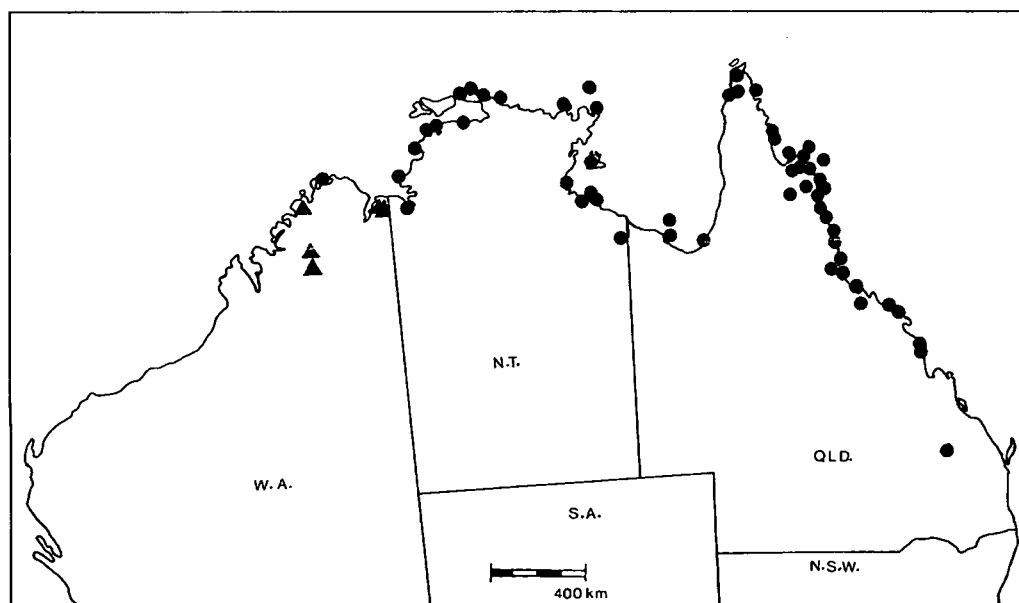
MALAYA: *Burkill 2255*, near Endau, Johore, 3.vi.1960 (K, SING).

PHILIPPINES: *Ramos 7467*, Cagayan Prov., Luzon, -iii.1909 (MEL, PNH).

HONG KONG: *Tsiang Ying 669*, way to Hom Tin, Lantau Island, 20.vi.1928 (BRI).

Distribution (Map 4)

In Australia, *V. rotundifolia* is found in the coastal areas of Queensland, Northern Territory and Western Australia. In Queensland, the distribution is mainly along the coast from Bundaberg northwards to the tip of Cape York Peninsula, and along the Gulf of Carpentaria coast it has been collected from near Mapoon Mission Station and Karumba. It has also been reported from several off-shore islands along the east coast and in the Gulf of Carpentaria. The east coast islands are mainly along the Great Barrier Reef and in the Gulf it has been recorded from Mornington Island and Sweers Island.



Map 4. Distribution of *V. rotundifolia* ●, *V. velutinifolia* ▲.

Distribution in the Northern Territory is chiefly along the northern and north-western coast. Most collections from northern coastal areas came from Cobourg Peninsula, Napier Peninsula and Gove Peninsula. Along the north-west coast, the majority of known localities are between Darwin and Victoria River. From the Gulf of Carpentaria, this species has been recorded from Groote Eylandt and the Sir Edward Pellew Group of Islands.

In Western Australia, it has been recorded from the north-coast of the Kimberley region. So far, it is known to occur only near Kalumburu Mission and Anjo Peninsula, but further exploration would probably reveal its occurrence in other parts of tropical Australia. So far, this species has not been collected from the interior of Australia.

Collections from outside Australia have been examined from Papua New Guinea, Lesser Sunda Island (Indonesia), New Caledonia, Polynesia, Hawaiian Islands, Malaya, Philippines and Hong Kong. In addition to this, the distribution of this taxon has been recorded by Moldenke (1971, 1980) from Brazil, Mauritius, Reunion, Bangladesh, Sri Lanka, Andaman Islands, China, Taiwan, Japan, Ryukyu Islands, Korea, Indochina, Thailand, Borneo, Sarawak, New Hebrides and Fiji. Sivarajan & Manilal (1982) reported it from South India.

In Australia, *V. rotundifolia* is reportedly grown in Queensland and Western Australia. Moldenke (1980) recorded its cultivation in England, Florida, Germany, Hawaiian Islands, Hong Kong, Java, Johnston Island, Maryland and New York.

Comments

The status of this taxon has been disputed by various taxonomists. Some considered it as a distinct species, while others regarded it as a subspecies or a variety of *V. trifolia* L. Linnaeus f. (1782) initially described it as a new species *V. rotundifolia*. Later, it was described by Thunberg (1784) as *V. ovata* Thunb., and by Blanco (1837) as *V. repens* Blanco. Subsequently, von Chamisso (1832) described it as var. *simplicifolia* of *V. trifolia*. In his revision of the Verbenaceae, Schauer (1847) regarded it also as a var. β *unifoliolata* of *V. trifolia*. Afterwards, Makino (1903) named it *V. trifolia* var. *ovata* (Thunb.) Makino, Ridley (1930) called it *V. trifolia* var. *repens* Ridley and Bentham (1870) by yet another varietal name *V. trifolia* var. *obovata* Benth.

This evaluation as a variety was maintained by Bailey (1901), H.J. Lam (1919), H.J. Lam & Bakhuizen (1921), Merrill (1923), Meeuse (1942), Moldenke (1971, 1980, 1983) and several other botanists. On the other hand, it has been treated as a distinct species by Walpers (1845), Merrill (1905), Corner (1939), and following him by Backer & Bakhuizen (1965). To justify the varietal rank of this taxon, Ridley (1930) said that when plants of *V. ovata* are grown inland they develop into bushes like *V. trifolia*, so that the distinction between them would appear to be due to external factors and not to hereditary. He further claimed to have seen it change (from the typical prostrate habit with runner-like branches, and obovate, small, simple leaves) into normal *V. trifolia* after transplantation to the Botanic Gardens, Singapore.

To test Ridley's statement, Corner (1939) collected seeds from typical plants of *V. ovata* on the coastal sand-dunes of Pahang State in Malaysia. He raised and grew ten plants in fairly good, not sandy, soil in the Nursery at the Botanic Gardens, Singapore, where plants of *V. trifolia* and *V. negundo* L. were also growing. The ten plants developed without exception into typical *V. ovata* without change in their habit. "Their branches reached one meter high then flopped over and rooted at the ends or turned up again in the manner of bramble (*Rubus*)". Their leaves, inflorescence and flowers were typical of *V. ovata*. According to Corner (1939), therefore, *V. ovata* does not turn into *V. trifolia* when grown inland. Further, on the coast of Perak in Malaysia, Corner found a few old plants of *V. trifolia* growing in open sandy scrub. These plants of *V. trifolia* were upright, 2-3 metres high, with a woody trunk over 1 m high and 7.5 cm thick. Their branches were never creeping or rooting at the nodes, leaves trifoliate, and inflorescence and flowers were typical of *V. trifolia*. From these facts, Corner

refuted the concept of the conspecificity of *V. ovata* and *V. trifolia*, and regarded them as two distinct species. In addition, he said he had found no intermediates between *V. ovata* and *V. trifolia*. In his opinion, the floral characteristics of *V. ovata* have been overlooked and incorporated in the description of *V. trifolia*. Corner (1939) maintained the name *V. ovata* Thunb. for this taxon, and assumed to have found differences with *V. trifolia* in the corolla, fruiting calyx, and the fruit.

According to van Steenis (1957), "the only characteristics holding are vegetative in nature, viz. the typical prostrate, rooting, runner-like branches, and the obovate, small, simple leaves, and geographic: its exclusive growth on the sandy beach". In his opinion, it is a clear-cut "ecological (littoral) race", exclusive of the *V. trifolia* population. He therefore named it subsp. *littoralis* Steenis of *V. trifolia*. Van Steenis tried to verify Corner's assumed differences between *V. ovata* and *V. trifolia* in the calyx, corolla and the fruit. However, he could not corroborate Corner's statement from any specimen of this taxon in Herb. L.

Modern taxonomists are divided among those who regard it as a species, a subspecies, or a variety. During present investigations, Corner's finding refuting the conspecificity of *V. ovata* and *V. trifolia* is accepted. It is considered here as a distinct species, but the name *V. ovata* is placed in the synonymy of *V. rotundifolia* L.f. which is the earliest valid name for this species. The calyx, corolla and the fruit of *V. rotundifolia* (= *V. ovata* Thunb.) appear similar to those of *V. trifolia*, and inflorescences of *V. rotundifolia* are smaller than the average size in *V. trifolia*, and are borne on small side-branches.

In the "New Illustrated Flora of the Hawaiian Islands", the calyx of this taxon (under the name *V. trifolia* var. *simplicifolia* Cham.) was erroneously described by Degener (1946) as being "silky tomentose within and glabrous without", and "ovary pulverulent". In fact, the calyx in this taxon is glabrous within and tomentose outside, and the ovary glandular all over.

V. rotundifolia is a widespread and variable species found mostly on sandy sea-shores and on sand-dunes. In view of its common occurrence near the sea-shores, it is popularly called "Beach Vitex", and because of its creeping habit some people call it "Creeping Vitex". According to collectors' field notes, this species growing in the sand becomes very deep-rooted, but on account of the looseness of the ground, their roots may be easily grubbed and pulled. Backer & Bakhuizen (1965) state that the main stem is often entirely buried in the sand from which only the flowering branchlets emerge.

The dispersal of this species takes place by various means. According to Ridley (1930), "the small drupe with its light corky pericarp is found in river- and beach-drift. The wide distribution is ascribed to dispersal by sea-currents but also dispersal by pigeons may play a role locally".

The plant is of considerable value as a sand-binder to prevent beach erosion.

Affinities

Amongst Australian *Vitex* species, *V. rotundifolia* is most closely related to *V. trifolia*. In both species, leaves are always tomentulose underneath, the inflorescence terminal and pyramidal in outline, and flowers and fruit with most characters similar. However, *V. rotundifolia* may readily be identified by its procumbent habit, sandy sea-shore habitat; stem creeping and rooting at the nodes; leaves mostly 1-foliolate, rounded to rounded-obovate in outline, pubescent-tomentulose all over, usually sessile, sometimes with a short petiole of 1-5 (-10) mm long.

V. rotundifolia has a few characters common with *V. velutinifolia*. Both species have tomentose leaves, terminal inflorescence, similar flowers and nearly similarly shaped fruit. The latter, however, can easily be distinguished by its erect habit; stem neither creeping nor rooting at the nodes; leaves 3-foliolate; leaflets narrowly elliptic-lanceolate, usually petiolulate; ovary non-glandular and villous at the top.

6. *Vitex velutinifolia* Munir, sp. nov.

Frutex vel arbor 3-8 m alta. *Ramuli* aliquantum 4-angulati dense cinerascenti-tomentosi vel velutini. *Folia* 3-foliolata rare 1-foliolata; foliola plerumque petiolulata elliptico-lanceolata vel anguste ovato-lanceolata integra acuminata basi cuneata (3-) 4.5-7.5 (-9) cm longa (1.5-) 2-3.5 (-4.5) cm lata chartacea omnino cinerascenti-velutina. *Inflorescentia* terminalis cinerascenti-tomentosa; cymae pedunculatae in ambito plus minusve pyramidalis. *Flores* fere sessilis vel breviter pedicellati; pedicelli 0.5-3 mm longi. *Calyx* tubularis aliquantum cupulatus 5-dentatus extra glandifer et dense cinerascenti-tomentosus intra glaber. *Corolla* pallido-malvina vel caerulea 2-labiata apice 5-lobata subter tubularis extra pubescens glandiferque intra tubo villosa lobo antico elliptico-oblongo lobis aliis oblongo-ovatis. *Stamina* exserta; filamenta filiformes in dimidio inferiore villosi; antherae in ambito ellipticae vel orbiculares. *Ovarium* globulum apice villosum; stylus exsertus glaber filiformis; stigma 2-fida. *Fructus* globulo-ellipsoideus glaber 5-7 mm longus ubi maturatus purpureo-ater.

Type: *M. Lazarides* 8471, The Gorge, Station Creek, 35km north-north-east of Carlton Hill Homestead, north-eastern Kimberley, Western Australia, 11.iii.1978 (CANB, holotype; NT, PERTH — isotypes).

Description (Fig. 6)

Shrub or tree 3-8 m high. *Stem* with bark smooth in the upper part, slightly fissured in the lower part, mottled dark and pale grey; branchlets somewhat 4-angled, densely greyish-tomentose or velutinous. *Leaves* 3-foliolate, rarely 1-foliolate, petiolate; leaflets usually petiolulate, the lateral sometimes sessile, elliptic-lanceolate or narrowly ovate-lanceolate, entire, mostly acuminate, cuneate at the base, (3-) 4.5-7.5 (-9) cm long, (1.5-) 2-3.5 (-4.5) cm broad, chartaceous, somewhat glossy and dark-green above, olive-green below, greyish-velutinous all over; pairs of nerves 6-9; petioles greyish-tomentose or velutinous, (1.5-) 2-4 (-5.5) cm long; petiolules greyish-tomentose, (2-) 3-8 (-10) mm long. *Inflorescence* terminal, greyish-tomentose, 7-15 cm long, 7-10 cm wide; cymes pedunculate, in lax thyrsoid panicles, more or less pyramidal in outline; lateral primary peduncles 1-3.5 cm long; flowers almost sessile or shortly pedicellate; pedicels greyish-tomentose, 0.5-3 mm long; bracts linear-lanceolate, \pm 1 mm long. *Calyx* tubular, somewhat cup-shaped, 5-toothed at the top, sparsely glandular and densely greyish-tomentose outside, glabrous inside, \pm 2 mm long, 2-2.5 mm diam. at the top end; teeth \pm 0.5 mm long, 0.5-1 mm broad at their base. *Corolla* pale-mauve or blue, 2-lipped, 5-lobed in the upper half, tubular below, pubescent and glandular outside, villous inside the tube with hairs extending to the large anterior lobe of the lower lip; the anterior lobe broadly elliptic-oblong or almost orbicular in outline, 4-6 mm long, nearly as broad; the two lateral lobes of the lower lip more or less oblong-ovate, obtuse, 2.5-3 (-3.5) mm long, 2.5-3 mm broad at the base; the two lobes of the upper lip more or less ovate, obtuse, 2-3 mm long, 2-2.5 mm broad at the base; tube cylindrical near the base, abruptly dilating upwards above the calyx, at least twice the length of the calyx, 4.5-5.5 mm long, 4-5 mm broad at the top. *Stamens* exserted, connate to the lower part of the corolla-tube; filaments filiform, villous excepting the top end, the anterior pair 7-8 mm long, the lateral pair 6-7 mm long; anthers more or less elliptic or almost orbicular in outline, \pm 1 mm long, nearly as broad, lobes oblong, free and divergent in the lower half. *Ovary* globular, villous at the top, glabrous elsewhere, non-glandular, 1-2 mm diam.; style exserted, glabrous, filiform, 9-10 mm long; stigma distinctly 2-fid. *Fruit* globular-ellipsoid, glabrous, 5-7 mm long, 4-6 mm diam., purple-black when ripe.

Specimens examined

AUSTRALIA: WESTERN AUSTRALIA: *Done* 342, Camp Creek, Mitchell Plateau, 14° 53'S, 125° 45'E, 18.x.1980 (DNA); *Dunlop* 6035 & *Done*, Manning Gorge, Mt Barnett Station, 16° 39'S, 125° 55'E, 10.x.1981 (AD, DNA); *Lazarides* 8471, The Gorge, Station Creek, 35 km NNE of Carlton Hill Homestead, north-eastern Kimberley, 11.iii.1978 (CANB, holotype; NT, PERTH, isotypes).

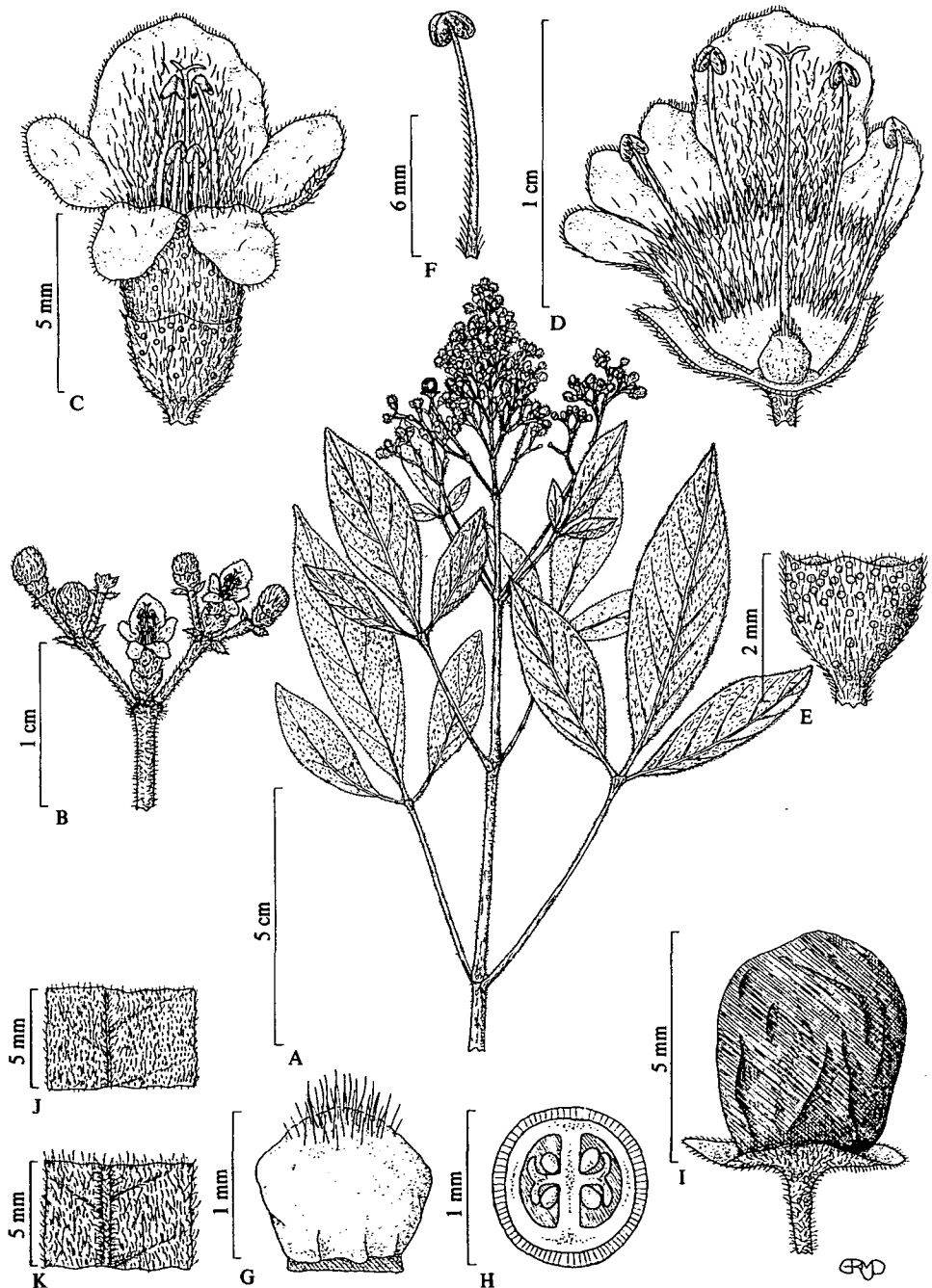


Fig. 6. *Vitex velutinifolia* Munir, sp. nov. (A-K, *M. Lazarides* 8471: CANB, holotype).

Distribution (Map 4)

V. velutinifolia is endemic to northern Western Australia where it is known to occur in the tropics of the Kimberley region. So far, it has been recorded only from four disjunct localities to the north of latitude 18°S.

Comments

This species has been misidentified as *V. acuminata* R. Br. which has more or less similarly shaped leaves and a terminal inflorescence. The latter, however, may readily be identified by its leaves, stamens and ovary being glabrous. In the two paratype collections cited here, some ovaries appear to be almost glabrous. It seems that the villous hairs on top of the ovary were possibly shed at a relatively younger stage. In the holotype, however, the hairs were noticed on the fully developed ovary.

Stamens are inserted towards the base of the corolla-tube and their filaments are hairy only on the side facing away from the wall of the corolla-tube.

The leaves are mostly 3-foliolate, but in *C. Done* 342 (DNA) and *C.R. Dunlop* 6035 & *C. Done* (AD, DNA) both 3-foliolate and (a few) unifoliolate leaves were observed.

Affinities

V. velutinifolia is closely allied to *V. acuminata* in its leaves being elliptic-lanceolate; inflorescence terminal, pyramidal; calyx and corolla pubescent and glandular outside; fruit globular-ellipsoid, dark-purple when ripe. However, *V. velutinifolia* may easily be identified by its leaflets being greyish-velutinous all over and ovary villous at the top. *V. velutinifolia* is also near to *V. rotundifolia* in having tomentose leaves, terminal inflorescence and similar flowers. For distinguishing characters see "affinities" under the latter.

There are a few characters common between *V. velutinifolia* and *V. trifolia*. The latter, however, differs by its leaflets being glabrescent above, and ovary densely glandular and glabrous.

7. *Vitex benthamiana* Domin, *Biblioth. Bot.* 89 (1929) 560, fig. 182; Fedde & Schust., *Just's Bot. Jahresber.* 56 (1937) 286; Mold., *Pl. Life* 2 (1948) 50; *Résumé Verbenac. etc.* (1959) 211, 390; *Phytologia* 5 (1956) 355; *Phytologia* 8 (1961) 21-43; *Phytologia* 15 (1967) 228; *Fifth Summary Verbenac. etc.* 1 & 2 (1971) 349, 729, 730; *Phytologia* 44 (1979) 390; *Phytologia* 45 (1980) 481; *Sixth Summary Verbenac. etc.* (1980) 339, 588; *Phytologia* 51 (1982) 217.

Type: *K. Domin* 8164, on arid hills near Cloncurry, Queensland, Australia, -ii.1910 (PR!, lectotype here designated); *K. Domin* 8165 & 8166, loc. cit. ii.1910 (PR, syntypes!).

V. trifolia L. var. *parviflora* Benth., *Fl. Aust.* 5 (1870) 67, p.p., excl. spec. from Moreton Bay; Bailey, *Synop. Qld Fl.* (1883) 379; Schumann & Hollr., *Fl. Kais. Wilh. Land* (1889) 121, p.p., excl. *Hollrung* n.486; Bailey, *Cat. Pl. Qld* (1890) 35; *Qld Fl.* 4 (1901) 1179; *Comp. Cat. Qld Pl.* (1913) 386; Wangerin, *Justs Bot. Jahresber.* 56 (1936) 668; Fedde & Schust., *Justs Bot. Jahresber.* 56 (1937) 286.

Type: *W. Landsborough s.n.*, on Gulf of Carpentaria possibly near Albert River, Queensland, Australia, -ii.1862 (MEL98012), syntype of *V. benthamiana* Domin.

V. agnus-castus auct. non L.: sensu Wangerin, *Just's Bot. Jahresber.* 56 (1936) 668, p.p., quoad syn. *V. benthamiana* Domin.

Typification

V. benthamiana is based on two (syntype) collections, one by K. Domin himself from Cloncurry and another by W. Landsborough from near the Gulf of Carpentaria. Both

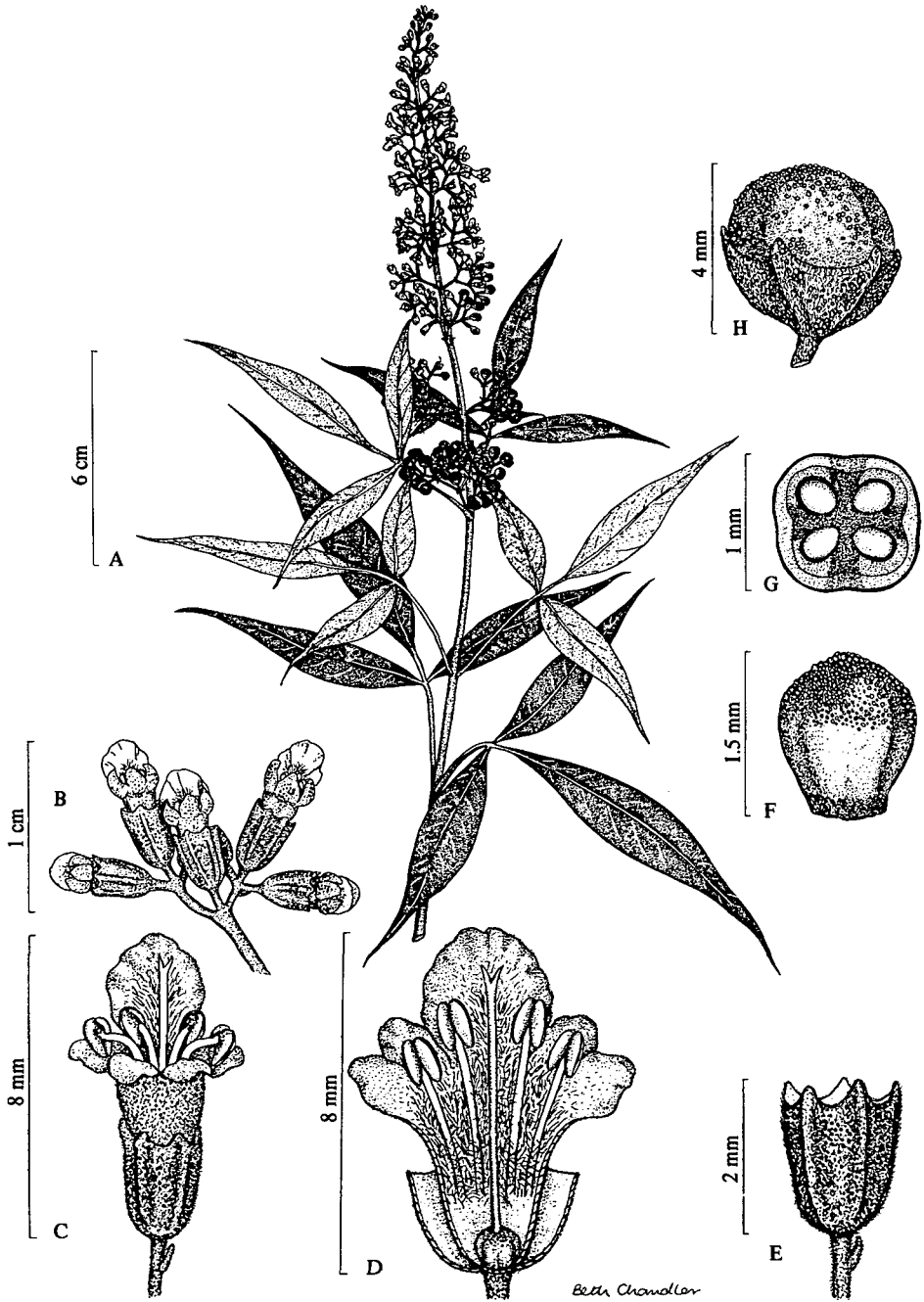


Fig. 7. *Vitex benthamiana* Domin (A-H, R.A. Perry 1061: AD).

collections come from Queensland, with the former comprising at least three duplicates and the latter only one. Since the author did not choose a type, it is, therefore, proposed to select a lectotype for this species. Of these, a duplicate of Domin's own collection (*Domin 8164*: PR) is particularly complete and well preserved and is selected here as the lectotype.

Description (Fig. 7)

Shrub or small tree 1.5-4.5 m high. *Stem* erect, branched, cylindrical, striate, densely pubescent. *Leaves* mostly 3-foliolate, rarely a few 1-foliolate, petiolate; leaflets narrow lanceolate, rostrate-acuminate at the apex, cuneate towards the base, (2-) 3-10 (-13.5) cm long, (0.7-) 1-1.8 (-2.3) cm broad, entire, membranous, glabrescent and dark-green above, very densely greyish-silvery pubescent beneath, the lateral nerves concealed by the dense indumentum underneath, the terminal leaflet usually petiolulate the lateral leaflets always sessile; petioles greyish-pubescent, 1-3 (-4) cm long; petiolules greyish-pubescent, 1-10 (-15) mm long. *Inflorescence* terminal, cinereous-pubescent, (4-) 6-20 (-31) cm long, 3-10 cm wide; cymes pedunculate, usually branched, arranged into pyramidal panicles; the lateral primary peduncles 3-10 mm long; flowers sessile or on a short pedicel of up to 1 mm long. *Calyx* more or less cyathiform, minutely 5-toothed at the top, 5-ribbed, densely glandular and mealy-puberulent outside, glabrous within, 2-3 mm long, 1.5-2 mm broad at the top; teeth \pm 0.5 mm long, nearly as broad. *Corolla* pinkish-lilac or light-mauve, 2-lipped of 5 lobes above, tubular below, glandular and silky-tomentulose outside, villous inside the tube and at the lower inner half of the large anterior lobe of the lower lip, glabrous near the base of the tube; anterior lobe broadly elliptic or orbicular, glabrous in the upper inner half and along the periphery outside, 2-4 mm long, 2-3.5 mm broad; the two lateral lobes more or less ovate, 1.5-2 mm long, 1.2-1.8 mm broad at the base; the two lobes of the upper lip ovate, (1-) 1.5-2 mm long, (1-) 1.5-2 mm at the base; tube more or less cylindrical, about twice as long as the calyx, gradually dilated upwards, (3-) 4-5 mm long, 1.5-2.5 mm wide at the top. *Stamens* exserted, connate to the inside of the corolla-tube; filaments filiform, glabrous above, villous in the lower part, the anterior pair (3.5-) 4-5 (-6) mm long, the lateral pair (3-) 3.5-4.5 (-5) mm long; anthers more or less elliptic-oblong in outline, \pm 1 mm long, lobes oblong, free and divergent in the lower half. *Ovary* globose, glabrous, glandular all over, \pm 1 mm diam.; style exserted, glabrous, filiform, 6-8 mm long, shortly 2-fid at the apex. *Fruit* globose, glabrous, glandular all over, 3-4 mm diam., purplish, ultimately black; fruiting calyx glandular and mealy-puberulent outside, glabrous within, distinctly 5-denticulate, 3.5-4.5 mm diam.

Specimens examined

AUSTRALIA: QUEENSLAND: *Bailey s.n.*, Sweers Island, -vi.1901 (BRI267704); *Beamont & Bushoff 7051*, 6-7 miles S of Mary Kathleen, 12.iv.1971 (BRI, CANB); *Blake 6347*, Cloncurry, 23.vi.1934 (BRI, MO, NT); *Cabbage 3952*, Quamby, NNW of Cloncurry, 30.viii.1913 (NSW); *Cole & Provan 181*, bed of Cabbage Tree Creek, N of Little Eva Mine, 19.iv.1962 (BRI); *Dittrich s.n.*, vicinity of Nicholson River, -vii.1986 (BRI); *Domin 8164*, near Cloncurry, -ii.1910 (PR, lectotype); *Domin 8165 & 8166*, loc. cit., -ii.1910 (PR, syntypes. See comments); *Everist & Smith 213*, loc. cit., 6.ii.1937 (BRI); *Farrell 347*, 5 km E of Mary Kathleen, 27.iii.1976 (BRI); *Gittins 775*, Mammoth Mines, -v.1963 (NSW); *Halliday 428*, c. 55 km W of Cloncurry on road to Mt Isa, 7.iv.1975 (AD, AK); *Landsborough s.n.*, on Gulf of Carpentaria, possibly from Albert River, -ii.1862 (MEL98012, syntype!); *Lestang 9397*, Adels Grove, -iii.1945 (BRI, QRS); *MacGillivray 2217*, western Queensland, -viii.1928 (BRI); *F. Mueller s.n.*, Albert River, undated (MEL894, MEL98002, MEL98003); *Perry 1061*, 6 miles E of Undilla Station, 28.v.1948 (AD, BRI, CANB, NT, PERTH); *Thozet 104*, between Burketown and Flinders River, undated (MEL98011); *Trapnell & Williams 106*, 1.6 km E of Burketown Wharf, 17.viii.1973 (BRI).

Distribution (Map 5)

V. benthamiana seems to be endemic to Australia where the main distribution is in the north-western part of Queensland. The major distribution is chiefly to the south of the Gulf of Carpentaria where it seems restricted between latitude 17° and 21°S, and longitude 138° and 141°E. Most northern localities are in the coastal area north of Burketown. In the south it has been recorded chiefly from areas around Cloncurry and Mt Isa. Besides, a few collections from

near the Northern Territory border. From within the Gulf of Carpentaria it has been reported only from Sweers Island. So far, the occurrence of this species in the Northern Territory has not been confirmed.

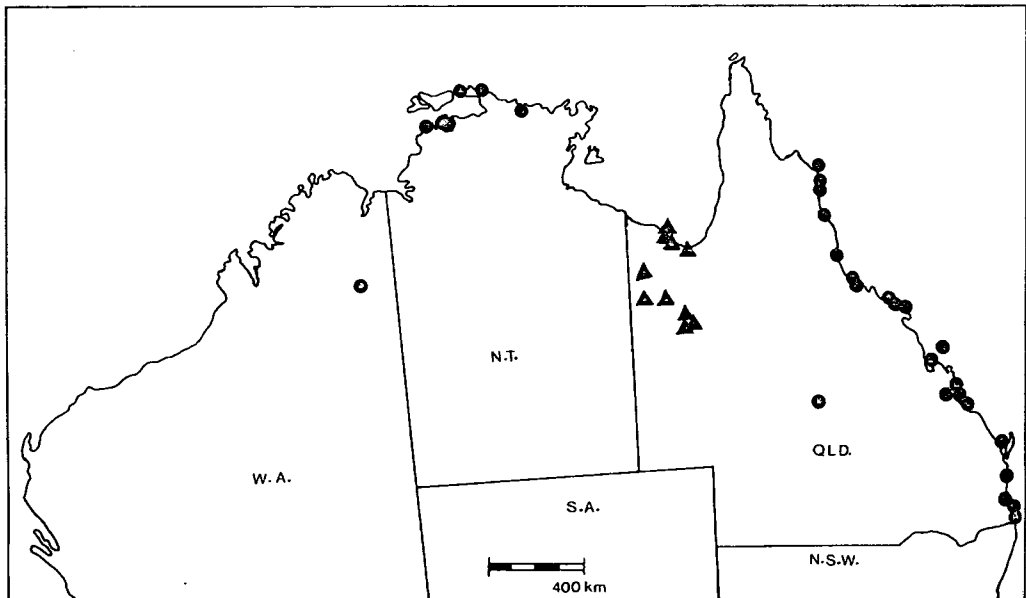
Comments

Bentham (1870) published this taxon as a var. *parviflora* of *V. trifolia*, and described the number of "leaflets 5 or sometimes 3 to each leaf". According to present studies, however, the leaves of this taxon are mostly 3-foliolate, rarely a few 1-foliolate. It appears that perhaps Bentham included in var. *parviflora* some collections belonging to the typical variety. He did not cite any specimen with the description, therefore, it is difficult to positively identify those specimens which caused Bentham to record up to 5 leaflets to each leaf of this taxon.

One of the syntypes of *V. benthamiana*, collected by Landsborough in 1862, was reported by Bentham (1870) and Domin (1929) as having come from "Northern Australia, on the Gulf of Carpentaria". Moldenke (1959, 1971, 1980) recorded "Northern Australia" as Northern Territory where this species does not occur. In fact, Landsborough's collection on the Gulf of Carpentaria came from Albert River in Queensland.

Domin's syntype collection from Cloncurry, Queensland, comprises three duplicates, each with a different number. In the present work, all three numbers (*Domin 8164*, *Domin 8165* & *Domin 8166*) are considered as belonging to one and the same collection. The different numbering seems to apply to different herbarium sheets and should not, therefore, be taken as different collections. Domin (1929) did not cite any of these numbers in the protologue but he recorded only the locality and collecting date.

Several collections of *V. benthamiana* and *V. trifolia* var. *trifolia* are found identified by others as *V. negundo* L. The occurrence of *V. negundo* in Australia has not been confirmed by any collection. The small flowers of *V. negundo* do look like those of *V. benthamiana*, but the latter differs by the shape and colour of its leaves, disposition of inflorescence and the flower characters.



Map 5. Distribution of *V. benthamiana* ▲, *V. trifolia* var. *subtrifecta* ●.

Affinities

V. benthamiana is nearest to *V. trifolia* in its leaflets being glabrescent above, greyish-tomentose below; inflorescence terminal, pyramidal; flowers almost identical in all major characters; ovary densely glandular and glabrous; fruit globose. Nevertheless, *V. benthamiana* may readily be distinguished by its leaflets being narrow-lanceolate, rostrate-acuminate, narrowing towards the base, generally up to 2 cm broad; lateral nerves beneath hidden by dense indumentum; fruit small, 3-4 mm in diameter. Fruit in *V. trifolia* is 5-6 mm in diameter.

There are several characters in common between *V. benthamiana* and *V. negundo* L. Both have more or less similarly shaped leaflets, terminal inflorescence, small flowers with calyx and corolla glandular and pubescent outside, stamens and style exerted, and ovary glabrous and glandular. However, *V. negundo* may easily be distinguished by its leaves being 3-5-foliolate; leaflets sometimes coarsely and obtusely serrate in the middle, their primary lateral nerves quite prominent underneath; inflorescence narrow and much less branched; calyx-lobes longer and narrower than those of *V. benthamiana*; fruit obovoid to oblong-obovoid. The fruit in *V. benthamiana* is always globose.

8. *Vitex trifolia* L., Sp. Pl. edn 1, 2 (1753) 638; Willd., Sp. Pl. 3 (1800) 392; R. Br., Prod. Fl. Nov. Holl. (1810) 511; Sprengel, Syst. Veg. 2 (1825) 757; Blume, Bijdr. Fl. Ned. Ind. (1926) 812; Cham., Linnaea 7 (1832) 107; Roxb., Fl. Ind. 3 (1832) 69; D. Dietr., Synop. Pl. 3 (1843) 611; Schauer in A. DC., Prod. 11 (1847) 683; Miq., Fl. Ind. Bat. 2 (1858) 859; F. Muell., Fragm. 3 (1862) 59; Benth., Fl. Aust. 5 (1870) 66; F. Muell., Fragm. 9 (1875) 5; Bailey & Ten.-Woods, Proc. Linn. Soc. N.S.W. (1880) 174; F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 103; Maxim., Bull. Soc. Acad. Sc. St. Petersb. 31 (1886) 82; Schumann in Schumann & Hollr., Fl. Kais. Wilh. Land (1889) 121; Hemsley, J. Linn. Soc. (Bot.) 30 (1894) 187, 206; Briq. in Engl. & Prantl, Pflanzenfam. 4, 3a (1895) 172; Merr., Fl. Manila (1912) 404; Merr., Enum. Philip. Fl. Pl. 3 (1923) 397; Ridley, Fl. Mal. Penin. 2 (1923) 630; Dop, Bull. Soc. Hist. Natur. 57 (1928) 206; Domin, Biblioth. Bot. 89 (1929) 560; Dop in Lecomte, Fl. Gén. Indo-Chine 4 (1935) 834; Fletcher, Kew Bull. (1938) 432; R. Henderson, Trees N.S.W. (1947) 273; Mold., Phytologia 6 (1958) 165, 174; Résumé Verbenac. etc. (1959) 211, 249, 250, 302, 335, 379, 380, 384, 385, 389-391, 423; Baker & Bakh.f., Fl. Java 2 (1965) 604; Mold., Fifth Summary Verbenac. etc. 1 & 2 (1971) 349, 375, 421, 534, 602, 710-712, 719, 720, 723, 729-732; Chippendale, Proc. Linn. Soc. N.S.W. 96 (1972) 256; Balg. & de Vogel, Pac. Pl. Area 3 (1975) 276; Mold., Sixth Summary Verbenac. etc. (1980) 339-343, 367, 405, 413, 423, 431, 436, 456, 458, 460; Jacobs & Pickard, Pl. N.S.W. (1981) 210; Mold., Phytologia 51 (1982) 330.

Type: Collector not known, Herb. Linnaeus 811/7, India, loc. incert. undated (LINN, microfiche!).

Small tree or shrub, sometimes decumbent and low. *Branches* obscurely quadrangular, minutely grey-tomentose. *Leaves* very variable, simple, 2-, 3- or 5-foliolate, petiolate; leaflets ovate-lanceolate, obovate-spathulate or oblong-elliptic, sessile or the central 1-3 leaflets petiolulate, often pubescent on both sides, but usually becoming nearly glabrous on the upper side at least when old. *Inflorescence* terminal, grey-tomentose; cymes opposite, pedunculate, forming short panicles, either simple and spike-like or slightly branched, the floral leaves reduced to small bracts. *Flowers* almost sessile or shortly pedicellate. *Calyx* obscurely 2-lipped, with 5 small teeth at the top or almost truncate, 5-ribbed, greyish-tomentose and white-glandular outside, glabrous within, 2-4 mm long, 1.5-3 mm wide, cup-shaped. *Corolla* 2-lipped, hypocrateriform, pubescent and glandular outside, villous inside the tube; tube nearly twice as long as the calyx; the 4 upper lobes short, the lowest twice as large and often as long as the tube. *Stamens* exerted, connate to the corolla-tube; filaments filiform, glabrous above,

villous near the base, 3-6 mm long. *Ovary* globose, glandular-dotted in the upper, glabrous in the lower part, 2-celled, with 2 ovules in each cell; style exerted, glabrous, filiform, 5-8 mm long, with stigma shortly 2-fid. *Fruit* globular, glandular, up to 6 mm diam.; fruiting calyx cupuliform, 5-6 mm long and wide, cinereous-puberulent outside, entire or irregularly 5-denticulate.

Distribution

A widespread species from Afghanistan to India, Bangladesh and eastward through Burma, Malaysia, Indonesia, Papua New Guinea, northern Australia, New Caledonia, Fiji and Polynesia, north into the Hawaiian Islands, southern China, the Philippines, and Japan and westward to Mauritius, Madagascar, and Natal.

8a. *Vitex trifolia* L. var. *trifolia*. Sims, Curtis Bot. Mag. 47 (1820) t. 2187; Walp., Rep. Bot. Syst. 4 (1845) 83, p.p., excl. syn. *V. ovata* Thunb.; Seemann, Fl. Viti 5 (1866) 190, p.p., excl. syn. *V. ovata* Thunb. & *V. repens* Blanco; F. Muell., Fragm. 6 (1868) 152, p.p., excl. syn. *V. ovata* Thunb.; Bailey, Synop. Qld Fl. (1883) 379, p.p., excl. var.; C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 583, p.p., excl. syn. *V. ovata* Thunb.; Bailey, Cat. Indig. & Nat. Pl. Qld (1890) 35, p.p., excl. var.; Forbes & Hemsley, J. Linn. Soc. Bot. 26 (1890) 258, p.p., excl. syn. *V. ovata* Thunb.; Collett & Hemsley, J. Linn. Soc. Bot. 28 (1891) 110, p.p., excl. var.; Bailey, Qld Fl. 4 (1901) 1179, p.p., excl. var.; Comp. Cat. Qld. Pl. (1913) 386, p.p., excl. var.; Ewart & Davies, Fl. N. Terr. (1917) 238, p.p., quoad spec. Henne; H.J. Lam, Verbenac. Malay. Arch. (1919) 180, p.p., excl. syn. *V. repens* Blanco & *V. rotundifolia* L. f.; E. Wilson, J. Arn. Arb. 1 (1920) 186 as "*V. trifoliolata*"; H.J. Lam & Bakh., Bull. Jard. Bot. Ser. III, 3 (1921) 52, p.p., excl. var. *rotundifolia* L. f.; Mold. in Dassan. & Fosb., Fl. Ceylon 4 (1983) 378.

V. trifolia L. var. *bicolor* (Willd.) Mold., Known Geogr. Distrib. Verbenac. edn 2 (1942) 79; Phytologia 6 (1958) 174-180; Résumé Verbenac. etc. (1959) 211, 212, 226, 380, 381, 384, 387-389; Phytologia 8 (1961) 84-86; Phytologia 17 (1968) 51-53; Fifth Summary Verbenac. etc. 1 & 2 (1971) 349, 351, 352, 375, 711, 712, 714, 719, 723-725; Phytologia 51 (1982) 345; in Dassan. & Fosb., Fl. Ceylon 4 (1983) 386.

Type: Herb. Willdenow 11709. Habitat in India orientali, undated. A cultivated specimen from Botanical Garden at Berlin (B-W, microfiche!).

V. trifolia L. var. *trifoliata* Cham., Linnaea 7 (1832) 107; Mold., Phytologia 6 (1958) 165, pro syn.

Type: As for *V. trifolia* L. var. *trifolia*.

V. trifolia L. var. *trifoliolata* Schauer in A. DC., Prod. 11 (1847) 683; H.J. Lam, Verben. Malay. Archip. (1919) 182; H.J. Lam & Bakh., Bull. Jard. Bot. Ser. III, 3 (1921) 53; Mold., Prelim. Alph. List Invalid Names (1940) 52; Phytologia 8 (1961) 83.

Type: As for *V. trifolia* L. var. *trifolia*.

V. bicolor Willd., Enum. Hort. Berol. 2 (1809) 660; Schauer in A. DC., Prod. 11 (1847) 683; Miq., Fl. Ind. Bat. 2 (1858) 860; Hall. f., Meded. Rijk-herb. Leid. no. 37 (1918) 42.

Type: Herb. Willdenow 11709. Habitat in India orientali, undated. A cultivated specimen from Botanical Garden at Berlin (B-W, microfiche!).

V. agnus-castus L. var. *trifolia* (L.) Kurz, For. Fl. Burma (1877) 270, based on *V. trifolia* L.; Kuntze, Rev. Gen. Pl. 2 (1891) 510, 511; Mold., Alph. List Invalid Names (1942) 52.

Type: As for *V. trifolia* L.

V. integerrimis Mill., Gard. Dict. edn 8 (1768) *Vitex* no. 3.

Type: India, undated (BM, n.v.).

V. trifolia L. var. *acutifolia* Benth., Fl. Aust. 5 (1870) 67; Bailey, Synop. Qld Fl. (1883) 379; Qld Fl. 4 (1901) 1179; Comp. Cat. Qld Pl. (1913) 386.

Syntypes: R. Brown s.n. (J.J. Bennett No. 2321), along the coast from Cape York to Moreton Bay, Queensland, 1802-1805 (BM, K).

V. varifolia Salisb., Prod. Stirp. Hort. Allert. (1796) 107.

Type: John Ger Koenig, loc. incert, undated (BM, n.v.).

V. negundo L. var. *bicolor* (Willd.) H.J. Lam, Verben. Malay. Archip. (1919) 191; H.J. Lam in Bot. Jahrb. 59 (1924) 27; Mold., Phytologia 17 (1968) 51; Corner, Gard. Bull. Str. Settlm. 10 (1939) 258.

Type: As for *V. bicolor* Willd.

V. petiolaris Domin, Biblioth. Bot. 89 (1929) 561.

Type: Domin 8167, Cairns, northern Queensland, Australia, -xii.1909 (PR, holotype!).

V. iriomotensis Ohwi, Acta Phytotax. Geobot. 7 (1938) 29.

Type: n.v., possibly in TO.

V. ternifolia Hort. ex Mold., Phytologia 6 (1958) 174.

Type: n.v., whereabouts not known.

V. negundo auct. non L. sensu C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 583, p.p., quoad syn. *V. bicolor* Willd.; P'ei, Mem. Sc. Soc. China 1 (1932) 101, p.p., quoad syn. *V. bicolor* Willd. & *V. negundo* L. var. *bicolor* (Willd.) H.J. Lam.; sensu Mosam., Sc. Rep. Kanaz. Uni. Biol. 4 (1955) 49; sensu Court, Cat. Liv. Pl. CBG (1980) 81; sensu Munir in Morley & Toelken (eds), Fl. Pl. Aust. (1983) 287, fig. 175.

V. triphylla auct. non L.: sensu Royle, Ill. Bot. Himal. (1839) 299; Mold., Alph. List Inval. Names Suppl. 1 (1947) 29.

Description (Fig. 8)

Shrub or small tree to 6.5 m tall. *Stem* to 25 cm diam. at breast height, branched from near the base, with bark smooth or finely checked, light-brown. *Leaves* mostly 3- or 5-foliolate, sometimes 1-3-foliolate or only 1-foliolate (i.e. undivided); leaflets subequal in size or the 2 lateral ones much smaller, oblong-elliptic or ovate-lanceolate, (2-) 3-8 (-13) cm long, (1-) 2-4 (-5) cm broad, acute or short-acuminate towards the apex, varying to obtuse, rounded or somewhat emarginate, cuneate-attenuate or somewhat rounded at the base, entire, membranous, glabrescent and rich dark-green above, usually turning black in drying, densely greyish- or white-tomentose beneath, the central 1-3 leaflets usually petiolulate, the lateral ones usually sessile or subsessile; petioles greyish-pubescent, 5-60 mm long; petiolules greyish-pubescent, 1-15 (-20) mm long. *Inflorescence* with a few cymes in the upper-most leaf-axils, cinereous or sordid-puberulent throughout, (3-) 5-18 (-25) cm long, 4-8 cm wide; cymes arranged into a pyramidal thyrse; the lateral primary peduncles 1-5 cm long. *Corolla* varying from blue to lavender, purple, mauve or violet; the anterior lobe broadly elliptic or almost orbicular, glabrous along the outside periphery, 3-5 mm long, 3-6 mm broad; the two lateral lobes more or less oblong-ovate, obtuse, (1.5-) 2-3 mm long, (1.3-) 1.5-2.5 mm broad at the base; the two lobes of the upper lip oblong-ovate, obtuse, 1-2.5 mm long, 1-2 (-2.5) mm broad at the base; tube nearly cylindrical, about twice the length of the calyx, 4-6 mm long, 2-3 mm wide at the top end. *Fruit* 4-6 mm diameter, at first green, then yellowish-reddish, finally blue or black.

Representative specimens (collections seen: Australian 125, non-Australian 124)

AUSTRALIA: QUEENSLAND: *Adams 20046*, Dunk Island, Coconut Bay, -11.x.1959 (BRI); *Bancroft 66*, Palm Islands, undated (BRI267708); *Bäuerlen 28*, Thursday Island, 30.vi.1885 (MEL); *Betche s.n.*, Cairns, -.viii.1901 (NSW145207); *Boorman s.n.*, Brisbane, -.iv.1899 (MEL98004); *R. Brown s.n.* (J.J. Bennett no. 2321), East and North Coast, 1802-1805 (K, MEL97989); *Cameron 20425*, Prince of Wales Island, Torres Strait, 16.ii.1975 (QRS); *Cunningham 218*, Endeavour River, -.1819 (MEL); *Dallachy s.n.*, Moreton Bay, -.vii.1865 (MEL98014); *Dallachy s.n.*, Rockingham Bay, 31.xii.1870 (MEL98038, MEL97968, MEL97969); *Domin 8167*, Cairns, -.xii.1909 (PR, holotype of *V. petiolaris* Domin); *Fitzalan s.n.*, Trinity Bay, 1882 (MEL98032); *Heatwole s.n.*, ca 19 km N of Townsville, 4.iii.1971 (BRI149532-33); *Hubbard 2967*, Wellington Point near Brisbane, 8.v.1930 (BRI, K); *Hyland*

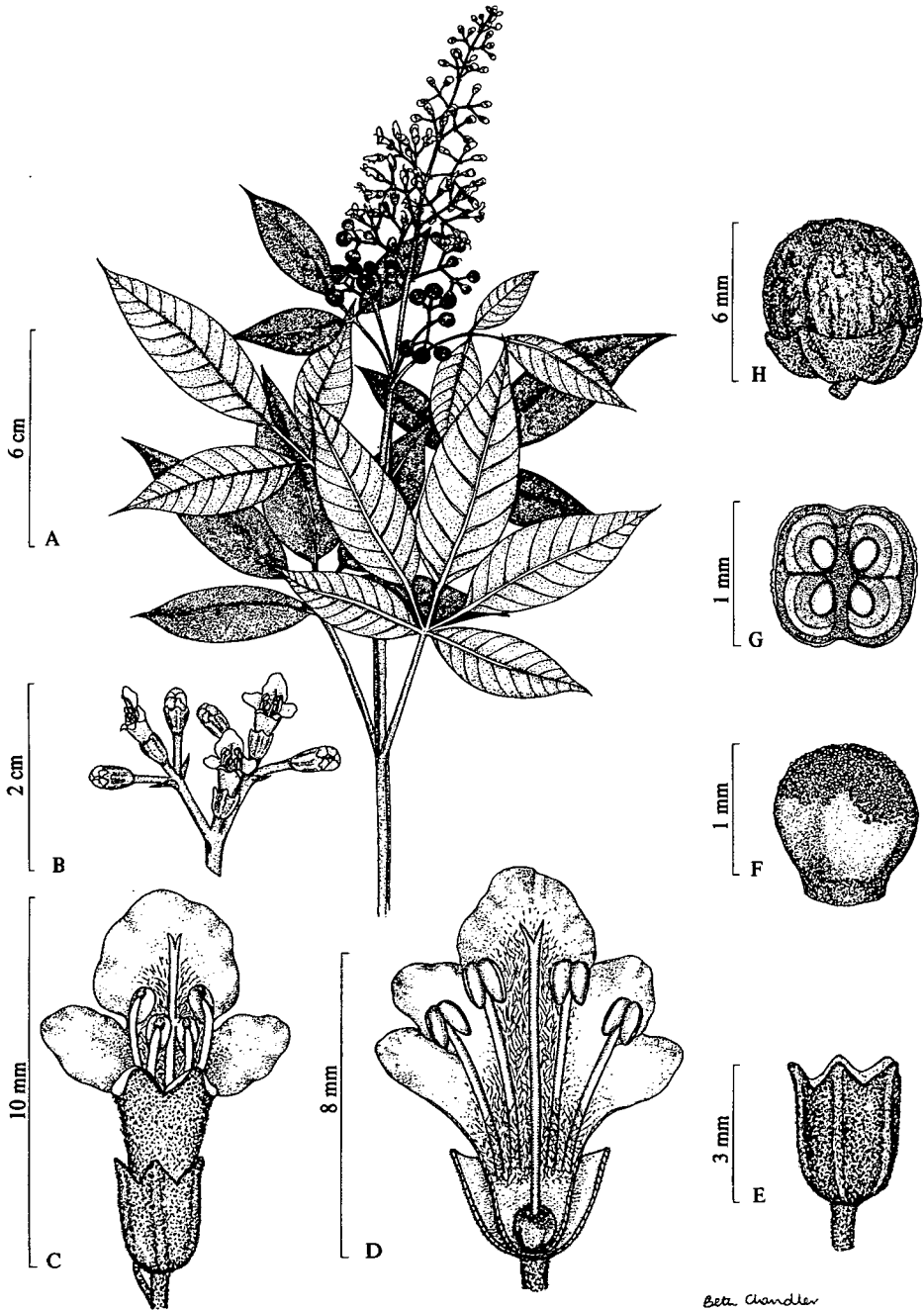


Fig. 8. *Vitex trifolia* L. var. *trifolia* (A-H, B. Labler 91: BRI).

03871, between Mission Beach and Bingil Bay, -vii.1966 (BRI, L 2 spec.); *Johnson s.n.*, Harvey's Creek, 1892 (MEL97958); *Jones 3854*, Airlie-Proserpine, 17.viii.1968 (CANB); *Ladbrook s.n.*, Johnstone River, -xi.1917 (BRI267702, NSW145216); *Leichhardt s.n.*, Brisbane River, 6.vii.1843 (NSW145211); *F. Mueller s.n.*, Fitzroy River, Rockhampton, undated (MEL893, MEL98016); *Ollerenshaw & Kratzing 1363*, ca 62 km NE of Doomadgee on Burketown Rd, 12.vii.1974 (BRI, CBG, L); *O'Shanesy 92*, Rockhampton, undated (MEL97982); *Porter 53*, South Percy Island, 140 km SE of Mackay, 27-31.vi.1980 (BRI); *Sharpe 1590 & 1747*, Hinchinbrook Island, 11.viii.1975 (BRI 2 spec.); *Specht L.I. 188*, Lizard Island, 24.xii.1974 (BRI); *Stoddart 4322*, Low Isles, Green Ant Island, 27.viii.1973 (BRI); *Stoddart 4411*, West Hope Island, 2.ix.1973 (BRI, L); *Telford 1770*, Shoal Point, near Mackay, 19.v.1970 (CBG); *White 10167*, Hayman Island, 12.vi.1934 (BRI, NY); *Wrigley & Telford 1434*, Quarantine Bay, S of Cooktown, 19.vi.1972 (CBG 2 spec., L).

NEW SOUTH WALES: *Boorman s.n.*, Tweed Heads, 24.ii.1914 (NSW145205); *Fawcett s.n.*, Richmond River, 1878 (MEL98015); *Hodgkinson s.n.*, loc. cit., -1874 (MEL97914); *Tanner 3*, near Lismore, -vi.1914 (NSW145204).

PAPUA NEW GUINEA: *Brass 859*, Port Moresby, 29.xii.1925 (A, BRI); *Isles & Croft NGF32225*, Ott Island, New Britain, 20.v.1973 (A, BISH, BRI, CANB, E, K, L, M, PNH, NSW, US); *Hollrung 486*, Constantine Harbour, 1886 (B n.v., MEL).

TONGA ISLANDS: *Crosby 142*, Vavau Islands, -vi.1891 (MEL).

SAMOA: *Whitmee 50*, loc. incert., undated (MEL).

NEW HEBRIDES: *Campbell s.n.*, Aneityum Island, undated (MEL97861).

NEW CALEDONIA: *Schodde 5272*, Marine Drive, Anse Vata, Noumea, 19.i.1968 (A, AD, CANB, L, P).

FIJI: *Bryan f. 208*, Suva Bay, 25.vi.1924 (L); *Parks 20857*, Ellington, -v.-vii.1927 (L, UC).

INDONESIA: *Dali 7732*, W of Mt Hondja, Java, 26.ix.1957 (BO, L); *Sauveur 216*, Timor, Tandajung Ela, undated (A, K, L); *Vogel 4212*, Obi Isl., N Moluccas, 22.xi.1974 (BO, L).

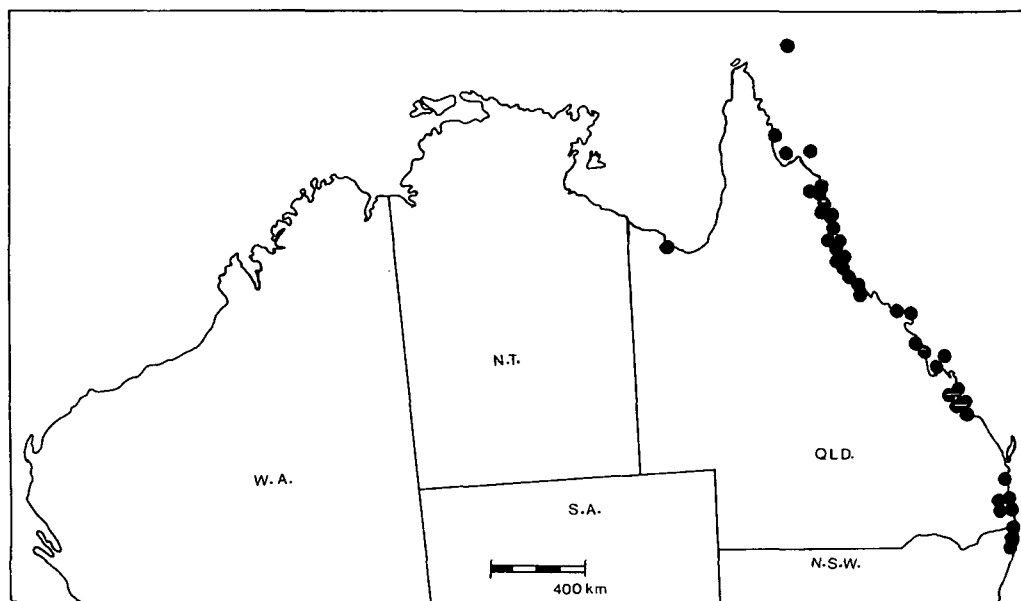
MALAYSIA: *Caudra A.1228*, Maruda, Kudat, Telaga, Sabah, 23.ii.1948 (BO, K); *Purseglove 5015*, Telok Lakei, Bako National Park, 20.v.1956 (L, SING).

PHILIPPINES: *Conklin s.n.*, Mt Yagaw, Mansalay, Mindora, 4.v.1953 (PNH17492); *Edano s.n.*, Panay, Capiz Prov., -x-xi.1925 (BRI267709, PNH 46232).

Distribution (Map 6)

In Australia, *V. trifolia* var. *trifolia* is found only in New South Wales and Queensland. The localities in New South Wales are in the far north-eastern part of the state where it mostly occurs in the area known as the "Macpherson-Macleay Overlap". The known localities are restricted between 28° and 29°S and between 153° and 154°E. In Queensland, the distribution is chiefly in the tropical region of the east-coast with scarcely any locality deep inland. It has been reported from most off-shore islands along the east-coast, and from several major islands in the Torres Strait. So far, it has not been recorded from the west-coast of Cape York Peninsula where it is likely to occur. From the Gulf of Carpentaria region, it has been collected only from about 62 km north-east of Doomadgee on the Burketown Road. Its occurrence in the Northern Territory was based by others on misidentification of its non-typical varieties as var. *trifolia*.

Collections from outside Australia have been examined from Papua New Guinea, Tonga Islands, Samoa, New Hebrides, New Caledonia, Fiji, Cook Islands, Indonesia, Malaysia, Philippines and India. According to Moldenke (1983), "this is a widespread species from Afghanistan to India, Bangladesh and eastward through Burma, Malaya, Indonesia, New Guinea, northern Australia, and New Caledonia, north into southern China, the Philippines, and Japan, and westward to Mauritius, Madagascar and Natal". Due to relegation of var. *bicolor* to a synonym of the typical variety, the above distribution range further extends westward to Tanzania, and eastward to the Pacific Islands including the Hawaiian Islands. According to Moldenke (1971), this species has been cultivated in Australia, Belgium, California, China, Cochinchina, Cuba, Florida, France, India, Java, Johnston Island, Kenya, Maryland, Mauritius, Netherlands, New Hebrides, New York, Reunion, South Africa, Sumatra and Thailand. All these may not necessarily belong to the typical variety.



Map 6. Distribution of *V. trifolia* var. *trifolia* ●.

Comments

The examination of a range of collections, and the types of var. *trifolia* and var. *bicolor* has shown that this species is very polymorphic. The type specimens in Herb. LINN on which this species was based have strictly 3-foliolate discolourous leaves which are distinctly petiolate and their terminal leaflet always petiolulate. The apices of most of their leaflets are long-acuminate. As in the type variety, the leaves on the type specimen of var. *bicolor* (in Herb. B-W) are also discolourous and long-petiolate, with terminal leaflets always petiolulate and most leaflets have a narrow acuminate apex. Nevertheless, the leaves of the var. *bicolor* type are found to be mostly 5-foliolate with a few towards the apex 3-foliolate. The number of leaflets in a leaf seems to be the basis of separating these two varieties with var. *trifolia* mostly 3-foliolate and var. *bicolor* mostly 5-foliolate. There is no other character in the literature which could help to identify these two very closely allied varieties.

During present investigations, a range of *V. trifolia* collections from Australia and overseas have been examined. Their leaves, when dried, are all deep dark- or black-coloured above, greyish or white matted tomentose beneath. The polymorphic nature of this species became evident by observing 1-, 3-, 4- and 5-foliolate leaved specimens identified as *V. trifolia* or *V. trifolia* var. *bicolor*. In some collections, a few 2-foliolate leaves were also observed. Some collections have undivided leaves, some 1-3-foliolate and others 3-5-foliolate with a few undivided as well. In fact, very few specimens have strictly 3-foliolate or only 5-foliolate leaves. There appears to be so much intergradation or transition from 1- to 3-foliolate or 3- to 5-foliolate leaved on the same collection that it is not possible to draw a line between the two taxa. Therefore, in the present revision only var. *trifolia* is retained with var. *bicolor* relegated to its synonymy. The only other varieties of *V. trifolia* recognised from Australia were var. *simplicifolia* and var. *subtrisecta*. In both these varieties the leaves are not discolourous (or two-coloured) and their leaflets or undivided leaves are found to be mostly sessile with a cuneate base. The leaflets in var. *trifolia* and var. *bicolor* are mostly almost rounded or occasionally somewhat truncate at the base.

Material of *V. trifolia* var. *trifolia* has been widely misidentified and distributed in herbaria as *V. trifolia* var. *bicolor* (Willd.) H.J. Lam or *V. negundo* L. The latter has often been considered a closely allied species differing by its calyx being acutely dentate or lobed, leaves 5-foliolate, leaflets petiolulate and lanceolate, and cymes slightly lax to dense.

A few specimens have been identified as *V. trifolia* var. *variegata* Mold. The occurrence of this variety in Australia is improbable and the specimens identified as this variety do not agree with the available descriptions of this taxon.

It has been mentioned under "distribution", that, in Australia, *V. trifolia* var. *trifolia* occurs mainly in Queensland with only a few records from the far north-eastern tip of New South Wales. However, Moldenke (1959, 1971) recorded this variety from the Northern Territory and Western Australia, apparently misidentifying the material of other species and varieties as var. *trifolia*.

Backer & Bakhuizen (1965) suggest that in Java *V. trifolia* L. hybridises naturally with what they call *V. paniculata* Lam., and they assert that in Java the plant flowers throughout the year. It is reported to grow from sea level to 1100 m altitude and is found in periodically very desiccated localities. In some areas, this species has been cultivated as a hedge plant.

Kurz (1877) regarded *V. agnus-castus* L. and *V. trifolia* L. as conspecific, adopting the former epithet. In fact, *V. agnus-castus* is a distinct species, differing from *V. trifolia* by its leaves being always 3-5 (sometimes 7 or 9) -foliolate; leaflets much narrower, tapering towards both ends, sessile or very shortly petiolulate; panicles interrupted, with subsessile, opposite, globose cymes.

H.J. Lam (1919) and Moldenke (1983) recorded the corolla-tube of *V. trifolia* as 0.85-1.3 cm long, and the calyx 4-5 mm long. These measurements are much longer than those for Australian plants seen by the present author.

V. trifolia is sometimes referred to as "*V. trifoliata*", "*V. trifoliolata*" or "*V. triphylla*" without any reference to look up these names and their status. All these names are only orthographic variance of *V. trifolia*.

There are many more names attributed to this taxon than are recorded here in the synonymy.

Affinities

Of Australian *Vitex* species, *V. trifolia* is nearest to *V. rotundifolia*. Both these species have their leaves (or leaflets) greyish-tomentulose underneath; inflorescence terminal, pyramidal in outline; flowers almost identical in their major characteristics, ovary glabrous and glandular all over, and fruit globular, glabrous and glandular even after drying. *V. rotundifolia*, however, can easily be identified by its procumbent habit and sandy sea-shore habitat; stem creeping and rooting at nodes; leaves mostly 1-foliolate, rotund or rotund-obovate, pubescent-tomentulose all over, sessile or sometimes with a short petiole 1-5 (-10) mm long. The leaves in *V. trifolia* are 3-5-foliolate, rarely 1-foliolate, always petiolate and glabrescent above; stem never rooting at the nodes.

There are several characters common to *V. trifolia* and *V. velutinifolia*. For similarities and differences see "key to the species" and "affinities" under the latter.

8b. *V. trifolia* L. var. *subtrisecta* (Kuntze) Mold., *Phytologia* 8 (1961) 88; Neal, *Gard. Hawaii* (1965) 727; Pope, *Man. Wayside Pl.* (1968) 195, 196, t. 111; Mold., *Phytologia* 17 (1968) 117; Fifth Summary Verbenac. etc. 1 & 2 (1971) 349, 351-353, 375, 712, 727, 729, 792; Backer, *Atlas 220 Weeds* (1973) t. 521; Walker, *Fl. Okin. & South Ryuk.* (1976) 893; Mold., Sixth Summary Verbenac. etc. (1980) 339-343, 368, 459; Siv. & Mani., *J. Econ. Taxon. &*

Bot. 3 (1982) 816; Mani & Siv., Fl. Calicut (1982) 229; Mold., Phytologia 52 (1982) 188; Mold. in Dassan. & Fosb., Fl. Ceylon 4 (1983) 385.

Type: Kuntze 5817, from the Willisgebirge in Java, Indonesia, ?2.viii.1875 (NY, holotype!).

V. agnus-castus L. var. *subtrisecta* Kuntze, Rev. Gen. Pl. 2 (1891) 510, 511, basionym; Mold., Phytologia 6 (1968) 165.

V. rotundifolia L. f. var. *heterophylla* Makino, Ill. Fl. Nipp. (1940) 186; Makino & Hara, Enum. Sperm. Jap. 1 (1948) 191; Walker, Fl. Okin. & S. Ryuk. (1976) 894.

Type: Japan, n.v.

V. trifolia L. var. *heterophylla* (Makino) Mold., Phytologia 3 (1949) 178; Phytologia 6 (1958) 180-183; Résumé Verbenac. etc. (1959) 185, 189, 191, 195, 198, 200, 202, 206, 207, 211, 226, 380, 388, 390.

Type: As for V. rotundifolia L.f. var. *heterophylla* Makino.

V. trifolia L. var. *subincisa* Kuntze ex Mold., Phytologia 8 (1961) 88.

Type: n.v.

V. rotundifolia L.f. form. *heterophylla* (Makino) Kitamura in Kitamura & Murata, Acta Phytotax. Geobot. 25 (1972) 34.

Type: As for V. rotundifolia L.f. var. *heterophylla* Makino.

V. trifolia sensu C.B. Clarke in Hook. f., Fl. Br. Ind. 4 (1885) 583, p.p.; Gamb., Fl. Pres. Madr. (1924) 1101-1102, p.p.

Diagnosis (Fig. 9)

Dwarf, erect or subprostrate shrub 0.5-3 m tall, with leaves both 1-foliolate and 3-foliolate interspersed on branchlets; petioles up to 25 mm long. *Leaflets* sessile, elliptic to oblanceolate, obtuse or shortly acuminate at the apex; the terminal leaflet much larger than the laterals, cuneate at the base, up to 9 by 4 cm; lateral leaflets elliptic-obtuse, oblique at the base. *Inflorescence* of densely tomentose thyse, with flowers purplish-mauve or pale-blue. Fruit subglobose, glabrous, glandular all over.

Representative specimens (collections seen: Australian 58, non-Australian 41)

AUSTRALIA: QUEENSLAND: *Bailey s.n.*, Dalrymple Islet, undated (HO); *Blake 22596*, Curtis Island, south-end, 29.iii.1966 (BISH, BRI, CANB, K, MO, SP); *Couper 961*, Barron River, Mareeba, 28.x.1935 (QRS); *Craig 028216*, Noosa Heads, 10.xii.1968 (CBG); *Dallachy s.n.*, Edgecumbe Bay, 14.vi.1863 (MEL98008); *Dallachy s.n.*, Rockingham Bay, 24.xii.1869 (MEL97995, MEL97996); *Domin 8161*, Emu Park, near Rockhampton, -iii.1910 (PR); *Fitzalan s.n.*, Port Denison, undated (MEL97970, MEL98006, MEL98009, MEL98013); *Fosberg 54993*, Lizard Island, Great Barrier Reef, S side, 26.vi.1973 (BRI, L); *Johnson s.n.*, Cleveland Bay, 1876 (MEL98019); *L. Johnson 42326*, Coolangatta Beach, 13.vi.1957 (NSW); *Macgillivray s.n.*, Saddleback Island, -xii-1.1932-3 (BRI); *Persieh 168*, Endeavour River, undated (MEL97972); *Telford 1723*, Yeppoon, 17.v.1970 (CBG); *Telford 5500*, 15 km SE of Gladstone, 3.vi.1977 (CBG); *Williams 79063*, Wild Duck Island, 29.xi.1979 (BRI); *Woods 12*, 6th Isl. of Northumberland Group of Islands, -xi.1873 (MEL98021).

NORTHERN TERRITORY: *Allen s.n.*, near Darwin, 29.ix.1929 (MEL97976); *Chippendale 8162*, near Mountnorris Bay, Cobourg Peninsula, 17.vii.1961 (AD, BRI, CANB, MEL, NT, PERTH); *Gressitt 3675*, Maningrida, 1961 (BRI); *Landsborough s.n.*, Gulf of Carpentaria, undated (MEL98010); *Lazarides & Adams 285*, Casuarina Beach near Lee Point, 9 miles NNE of Darwin, 20.iii.1965 (BRI, CANB, E, K, L, NSW, NT, US); *Rankin 1455*, 2 km NW of Lake Finnis on Woolner Station, 4.x.1978 (BRI, CANB, DNA, K, NT); *Specht 42*, Nightcliff, Darwin, 23.iii.1948 (AD, BRI, L, MEL, NSW).

WESTERN AUSTRALIA: *Thompson s.n.*, R.C. Presbytery, Carnarvon, 10.ix.1964 (PERTH); *Done 374*, Halls Creek area, 21.xi.1980 (DNA).

PAPUA NEW GUINEA: *Henty 11514*, Nadzab, near Lae, Morobe district, 4.viii.1959 (BRI, CANB, LAE); *Schodde & Craven 4544*, Tapala village environs, Malalaua River near mouth of Tauri River, Gulf district, 27.ii.1966 (A, BO, BRI, CANB, G, K, L, LAE, PNH, US).

INDONESIA: *Iwatsuki, Murata, Dransfield & Saerudin 1523*, Atjeh enroute from Takeungeun to Isak, Sumatra, 2.ix.1971 (BO, K, KYO, L); *Rahmat Si Toroës 910*, Hoeta Padang, Asahan, 1-6.v.1928 (BO, L, MICH).

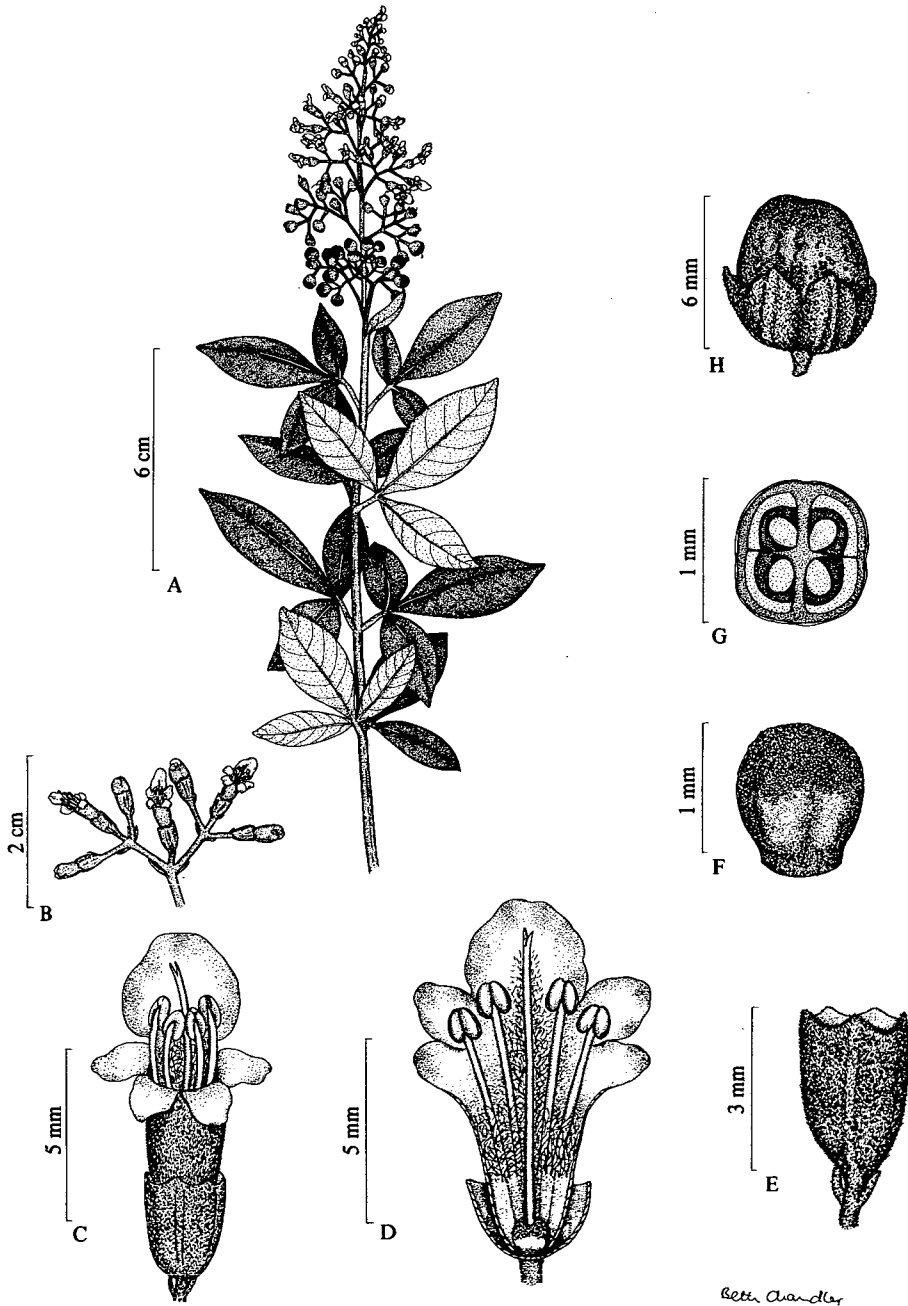


Fig. 9. *Vüex trifolia* L. var. *subtrisecta* (Kuntze) Mold. (A-H, G.M. Chippendale 8162: NT).

IRIAN JAYA: *Royen & Sleumer 8249*, near Anjai, Vogelkop Peninsula, 13.xii.1961 (BO, BRI, CANB, L).

PHILIPPINES: *Canicosa s.n.*, Kinamaligan, Calauag Quezon Prov., Luzon, 4.v.1949 (PNH9784).

MALAY PENINSULA: *Corner 33492*, Kuala Brang, State of Trengganu, 29.iv.1937 (SING).

FIJI: *Smith 7088*, east of Wainimbuka River in vicinity of Ndakuivuna, Tailevu, Viti Levu, 14-26.iv.1953 (BISH, L, US).

NEW CALEDONIA: *Däniker 2417*, Loyalitätsinseln, 15.xi.1925 (L, Z).

MICRONESIA: *Stone 4728*, OSIR Road, Apra Harbour, Guam, 3.iii.1963 (L).

HAWAIIAN ISLANDS: *Spence 151*, along Highway 56 north of Kapaa, Kauai, 13.iv.1973 (BISH, L).

CHINA: *Yip 357*, Guangzhou, Guangdong, 25.vi.1981 (AD, IBSC).

Distribution (Map 5)

In Australia, *V. trifolia* var. *subtrisecta* is found chiefly in Queensland and Northern Territory with only two disjunct localities in Western Australia. In Queensland, the distribution is along the east-coast particularly in the area between the Gold Coast and Cooktown. So far, it has not been reported from the upper half of the Cape York Peninsula or any area along the Gulf of Carpentaria. A few collections are known from off-shore islands along the east-coast and at least one from the Dalrymple Islet in the Torres Strait.

In the Northern Territory, this taxon is found in the northern part of the state where the known localities are restricted between 11° and 13°S and between 130° and 135°E. Most localities, however, are in the Darwin region with only two records from the northern coast. So far it has not been reported from inland or from any off-shore island of the Northern Territory.

There are only two known localities in Western Australia. One near Halls Creek south of the Kimberley region and the other from Carnarvon along the North West Coastal Highway. Further exploration in the Kimberley region might reveal its occurrence in that part of Western Australia.

Collections from outside Australia have been examined from southern China, Taiwan, Malesia, Melanesia, Micronesia and the Hawaiian Islands. According to Moldenke (1983), the distribution range of this variety extends "from India, Ceylon, the Andaman Islands, Burma, Thailand, Malaya, and Indo-China north to southern China and Japan, west to the Mascarene Islands and Madagascar, east through the Ryukyu and Philippine Islands to Indonesia, the Lesser Sunda Islands, New Guinea, New Caledonia, Fiji, and Polynesia".

In Australia, var. *subtrisecta* is cultivated in several towns and cities of Queensland, Northern Territory and Western Australia. Outside Australia, Moldenke (1980) recorded its cultivation (mainly as a hedge plant) in the Bahamas, Baker Island, Belgium, China (Hainan Island), U.S.A. (Florida, Hawaiian Islands & New York), India, Indonesia (Java & Sumatra), Johnston Island, Marshall Islands, Papua New Guinea, Malaysia (Penang), Singapore and Sri Lanka.

Comments

The type of var. *subtrisecta* came from Java where the occurrence of this variety has been reported by Moldenke (1971, 1980, 1983) and Sivarajan & Manilal (1982). Nevertheless, this variety was not recorded in the "Flora of Java" by Backer & Bakhuizen (1965). It seems, that similar to a few other authors, they may have identified this variety as the typical form of the species.

During present investigations, var. *subtrisecta* is found to be very variable, with its leaves commonly 1-, 2-, and 3-foliolate, or a few leaflets more or less binary. According to collector's field notes, it generally occurs in the littoral belt close to mangrove formations, along the river banks, and inland to several hundred meters in altitude.

A few collections with somewhat variegated leaves have been identified as var. *variegata*. Almost all of them came from garden cultivation. Most of these specimens have leaves with a variegation of somewhat greyish speckles. Their leaf-shape and flower-characters, however, are similar to those of var. *subtrisecta*. So far, the variegated-leaved form does not grow naturally in Australia.

According to Moldenke (1971), more work is badly needed on means of distinguishing the present subdivision of *V. trifolia* and several other taxa of the Verbenaceae. Under the "Statement of Policies", Moldenke expressed his doubt on the true status of var. *simplicifolia* and var. *subtrisecta*. In fact, the infraspecific complex of *V. trifolia* seems to have several names apparently referred to variants of the same taxon. A broader concept of the infraspecific taxa may possibly lead to reducing at least a few names to the level of variety or form.

In var. *subtrisecta*, the glands all over the ovary and fruit seem more consistently prominent than those in the typical form of the species.

Affinities

As mentioned for var. *trifolia*, typical variety, var. *subtrisecta* is also allied to *V. rotundifolia* in having similar indumentum on the lower surface of its leaflets, similar inflorescence, flowers and fruit. Nevertheless, var. *subtrisecta* can readily be distinguished by its leaves being distinctly petiolate, mostly 3-foliolate, sometimes 1-3-foliolate; leaflets sessile, elliptic or oblanceolate, obtuse or subacuminate and glabrescent above. The leaves in *V. rotundifolia* are mostly sessile, rotund-obovate, and tomentulose all over.

Acknowledgements

The author is grateful to Dr J.P. Jessop for comments on the draft of this manuscript and for translating into Latin the diagnosis of the new species; to Dr H.N. Moldenke for supplying references relevant to this work; to Mr G.R.M. Dashorst for preparing figures 1-4 & 6; to Mrs Beth Chandler for preparing figures 5 & 7-9; Miss M. Eadsforth for typing the manuscript.

Thanks are also due to the Directors/Curators of the following herbaria for the loan of herbarium specimens: A, ADW, BISH, BM, BO, BRI, CANB, CBG, DNA, E, G, HO, JCT, K, Kings Park Perth, L, LAE, MEL, M, MO, NSW, NT, NY, P, PERTH, PNH, PR, QRS, SING, SYD, US, Z.

References

- Adanson, M. (1763). "Familles des Plantes". Vol. 2:195-201. (Vincent: Paris).
 Anderson, R.H. (1947). *Vitex*. "The Trees of New South Wales". (Govt Printer: Sydney).
 Backer, C.A. & Bakhuizen van den Brink, R.C. (1965). Verbenaceae. "Flora of Java". Vol. 2:594-614. (N.V.P. Noordhoff: Groningen).
 Bailey, F.M. (1883). Verbenaceae. "A Synopsis of the Queensland Flora". 375-381. (J.C. Beal, Govt Printer: Brisbane).
 Bailey, F.M. (1888). Verbenaceae. "Queensland Woods". Edn 2:90-93. (Queensland Commission: Brisbane).
 Bailey, F.M. (1890). Verbenaceae. "Catalogue of the indigenous and naturalised plants of Queensland". 35-36. (Govt Printer: Brisbane).
 Bailey, F.M. (1901). Verbenaceae. "The Queensland Flora". Part 4:1164-1185. (H.J. Diddams & Co.: Brisbane).
 Bailey, F.M. (1913). Verbenaceae. "Comprehensive Catalogue of Queensland Plants". 381-387. (Govt Printer: Brisbane).
 Bartling, F.G. (1830). "Ordines naturalis Plantarum". (Dietrich: Goettingen).
 Batsch, A.J.G.K. (1802). "Tabula affinitatum Regni vegetabilis". (Landes-Industrie Comptoir: Weimar).
 Bentham, G. (1870). Verbenaceae. "Flora Australiensis". Vol. 5:31-70. (L. Reeve & Co.: London).
 Bentham, G. & Hooker, J.D. (1876). Verbenaceae. "Genera Plantarum". Vol. 2:1131-1160. (L. Reeve & Co.: London).
 Blanco, F.M. (1837). *Didynamia Angiospermia*. "Flora des Filipinas Segun el Sistema sexual de Linneo". 484-519. (D. Candido Lopez: Manila).

- Blume, C.L. (1826). Verbenaceae. "Bijdragen tot de flora van Nederlandsch Indie". 807-822. (Lands Drukkerij: Batavia).
- Briquet, J. (1895). Verbenaceae. In Engler, A. & Prantl, K. "Die natürlichen Pflanzenfamilien". Part 4, 3a:132-182. (Wilhelm Engelmann: Leipzig).
- Brongniart, A.T. (1843). "Enumeration des Generes de Plantes cultives au Museum d'histoire naturelle de Paris". (Fortin, Masson & Co.: Paris).
- Brown, R. (1810). Verbenaceae. "Prodromus Florae Novae Hollandiae et Insulae Van-Diemen". 510-514. (Richard Taylor & Co.: London).
- Burkill, I.H. (1966). "A Dictionary of the economic products of the Malay Peninsula". Vol. 2:2277-2282. (Ministry of Agriculture and Co-operatives: Kuala Lumpur).
- Chamisso, L.A. (1832). De Plantis in Expeditione Romanzoffiana et in Herbariis Regiis Observatis disserere pergitur. *Linnaea* 7:105-115.
- Clarke, C.B. (1885). Verbenaceae. In Hooker, J.D. "The Flora of British India". Vol. 4:560-604. (L. Reeve & Co.: Ashford).
- Corner, E.J.H. (1939). Notes on the Systematy and Distribution of Malayan Phanerogams III. *Gard. Bull. Str. Settle. Singapore* 10:239-260.
- Dalla Torre, C.G. & Harms, H. (1904). Verbenaceae. "Genera Siphonogamarum ad Systema Englerianum Conscripta". 429-434. (Wilhelm Engelmann: Leipzig).
- Degener, O. (1946). Verbenaceae. "New Illustrated Flora of the Hawaiian Islands". Family 315. (O. & I. Degener: Honolulu).
- Dietrich, D.N.F. (1842). Didynamia Angiospermia. "Synopsis Plantarum". Vol. 3:600-620. (B.F. Voight: Weimar).
- Domin, K. (1929). Beiträge zur Flora und Pflanzengeographie Australiens. *Biblioth. Bot.* 89(vi):551-562.
- Dop, P. (1928). Les *Vitex* de L'Indochine. *Bull. Soc. Hist. Natur. Toulouse*. 57:197-211.
- Dumortier, B.C.J. (1822). "Commentationes botanicae". 60. (J. Casterman: Tournay).
- Dumortier, B.C.J. (1829). Verbenaceae. "Analyse des Familles des Plantes". 22 (J. Casterman: Tournay).
- Durand, Th. (1888). Verbenaceae. "Index Generum Phanerogamorum". 319-322. (Dulau & Co.: London).
- Endlicher, S.L. (1838). Verbenaceae. "Genera Plantarum Secundum Ordines Naturales Disposita". Vol. 1:632-639. (Fr. Beck: Vienna).
- Ewart, J. & Davies O.B. (1917). Verbenaceae. "Flora of the Northern Territory". 235-239. (McCarron, Bird & Co.: Melbourne).
- Fletcher, H.R. (1938). The Siamese Verbenaceae. *Kew Bull.* 1938:401-445.
- Francis, W.D. (1951). Verbenaceae. "Australian Rain-Forest Trees". 367-373. (Forestry and Timber Bureau: Sydney).
- Gaertner, J. (1788). "De Fructibus et Seminibus Plantarum". Vol. 1:266-275. (G.H. Schramm: Tübingen).
- Gardner, C.A. (1931). Verbenaceae. "Enumeratio Plantarum Australiae occidentalis". Part 3:111-113. (Govt Printer: Perth).
- Giseke, P.D. (1792). "Caroli a Linne . . . Praelectiones in Ordines Naturales Plantarum". (B.G. Hoffmann: Hamburg).
- Gleditsch, J.G. (1764). "Systema plantarum a Stamina situ, etc." (Haude & Spencer: Berlin).
- Gmelin, J.F. (1792). "Caroli a Linne . . . Systema Naturae etc". (B.E. Beer: Leipzig).
- Jaume Saint-Hilaire, J.H. (1805). Verbenaceae. "Exposition des Familles naturelles et de la Germination des Plantes". Vol. 1:245-253. (Treuttel et Würtz: Paris).
- Junell, S. (1934). Zur Gynäceummorphologie und Systematik der Verbenaceen und Labiaten. *Symb. Bot. Ups.* 4:1-219.
- Jussieu, A. de (1759). "Ordines naturales in Ludovici XV Horto Trianonensi Dispositi Anno". (Bibl. Centr.: Paris).
- Jussieu, A.L. de (1789). Vitices. "Genera Plantarum secundum Ordines naturalis disposita". 106-110. (Viduum Herissant & T. Barrois: Paris).
- Jussieu, A.L. de (1806). Sur la Famille des Plantes Verbenacees. *Ann. Mus. Hist. Nat. Paris.* 7:63-77.
- King, G. & Gamble, J.S. (1909). Verbenaceae. "Material for a Flora of the Malayan Peninsula". Vol. 4:1004-1079. (W. Newman & Co.: London).
- Kunth, C.S. (1823). Verbenaceae. "Synopsis Plantarum". Vol. 2:40. (F.G. Levrault: Paris).
- Kurz, S. (1877). Verbenaceae. "Forest Flora of British Burma". Vol. 2:25-276. (Govt Printing: Calcutta).
- Lam, H.J. (1919). "The Verbenaceae of the Malayan Archipelago". (M. De Waal: Groningen).
- Lam, H.J. (1921). In Lam, H.J. & Bakhuizen van den Brink, R.C. Revision of the Verbenaceae of the Dutch East-Indies and surrounding Countries. *Bull. Jard. Bot. Buitenz.* Ser. III, 3:1-116.
- Lamarck, J.B.A.P. de (1823). "Tableau Encyclopédique et Methodique". Vol. 3:56. (Chez Pancoucke: Paris).
- Lemée, A. (1943). Verbenaceae. "Dictionnaire descriptif et synonymique des Generes de Plantes Phanerogames". Vol. 8b:650-657. (Imprimerie Commerciale et Administrative: Brest).
- Lindau, G. (1895). Acanthaceae. In Engler, A. & Prantl, K. "Die natürlichen Pflanzenfamilien". Part 4, 3a:274-354. (Wilhelm Engelmann: Leipzig).
- Lindley, J. (1847). "The Vegetable Kingdom". Edn 2. (Bradbury & Evans: London).
- Link, J.H.F. (1822). Didynamia Angiospermia. "Enumeratio Plantarum Horti Regii Berolinensis altera". Part 2. (G. Reimer: Berlin).
- Linnaeus, C. (1753). Didynamia Angiospermia. "Species Plantarum". Edn 1, vol. 2:602-609. (Laurentius Salvius: Stockholm).
- Linnaeus, C. von fil. (1781). "Supplementum Plantarum. etc". (Impensis Orphanotropei: Braunschweig).

- Loureiro, J. de (1793). *Didymia Angiospermia*. "Flora Cochinchinensis". Edn 2, vol. 2:455-478. (Haude & Spencer: Berlin).
- Maiden, J.H. (1889). "The useful native Plants of Australia including Tasmania". (Turner & Henderson: Sydney).
- Makino, T. (1903). Observations on the Flora of Japan. *Bot. Mag. Tokyo* 17:85-92.
- Meeuse, A.D.J. (1942). Notes on Javanese *Verbenaceae*. *Blumea* 5:66-80.
- Meisner, C.F. (1840). *Verbenaceae*. "Plantarum vascularium Genera secundum Ordines naturalis digesta . . .". Vol. 1. "Tabulis Diagnosticis". 290-292. Vol. 2. "Commentarius". 197-200. (Libraria Weidmannia: Leipzig).
- Melchior, H. (1964). Tubiflorae. In Melchior, H. "Engler's Syllabus der Pflanzenfamilien". Edn 12, vol. 2:424-471. (Borntraeger Borthers: Berlin).
- Merrill, E.D. (1905). *Verbenaceae*. "A review of the identifications of the species described in Blanco's Flora of de Filipinas". 67-69. (Bureau of Public Printing: Manila).
- Merrill, E.D. (1909). New or Noteworthy Philippine Plants VII. *Philipp. J. Sci.* 4:247-330.
- Merrill, E.D. (1912). New or Noteworthy Philippine Plants IX. *Philipp. J. Sci.* 7:259-358.
- Merrill, E.D. (1923). *Verbenaceae*. "An Enumeration of Philippine Flowering Plants". Vol. 3:380-408. (Bureau of Printing: Manila).
- Miquel, F.A.W. (1858). *Verbenaceae*. "Flora Indiae Batavae". Vol. 2:85-913. (C.G. van der Post: Amsterdam).
- Moldenke, H.N. (1959). "A Résumé of the *Verbenaceae*, *Avicenniaceae*, *Stilbaceae*, *Symphoremaceae* and *Eriocaulaceae* of the World as to valid Taxa, Geographic Distribution and Synonymy". (H.N. Moldenke: Mountain, New Jersey).
- Moldenke, H.N. (1971). "A fifth Summary of the *Verbenaceae*, *Avicenniaceae*, *Stilbaceae*, *Dicrasyliaceae*, *Symphoremaceae*, *Nyctanthaceae*, and *Eriocaulaceae* of the World etc". Vol. 1 & 2. (H.N. Moldenke: Wayne, New Jersey).
- Moldenke, H.N. (1980). "Phytologia Memoirs. II. A sixth Summary of the *Verbenaceae*, *Avicenniaceae*, *Stilbaceae*, *Chloanthaceae*, *Symphoremaceae*, *Nyctanthaceae*, and *Eriocaulaceae* of the World etc". (H.N. & A.L. Moldenke: Plainfield, New Jersey).
- Moldenke, H.N. & Moldenke, A.L. (1983). *Verbenaceae*. In Dassanayake, M.D. & Fosberg, F.R. "A Revised Handbook to the Flora of Ceylon". Vol. 4:196-487. (Amerind Publishing Co. Pvt. Ltd.: New Delhi).
- Mueller, F.v. (1862). "Fragmenta Phytographiae Australiae". Vol. 3. (Govt Printer: Melbourne).
- Mueller, F.v. (1864). "Fragmenta Phytographiae Australiae". Vol. 4. (Govt Printer: Melbourne).
- Mueller, F.v. (1865). "Fragmenta Phytographiae Australiae". Vol. 5. (Govt Printer: Melbourne).
- Mueller, F.v. (1868). "Fragmenta Phytographiae Australiae". Vol. 6. (Govt Printer: Melbourne).
- Mueller, F.v. (1875). "Fragmenta Phytographiae Australiae". Vol. 9. (Govt Printer: Melbourne).
- Mueller, F.v. (1882). *Verbenaceae*. "Systematic Census of Australian Plants". Part 1. Vasculares: 102-103. (McCarron, Bird & Co.: Melbourne).
- Mueller, F.v. (1889). *Verbenaceae*. "Second Systematic Census of Australian Plants". Part. 1. Vasculares: 171-173. (McCarron, Bird & Co.: Melbourne).
- Munir, A.A. (1982). A taxonomic Revision of the Genus *Callicarpa* L. (*Verbenaceae*) in Australia. *J. Adelaide Bot. Gard.* 6(1):5-39.
- Munir, A.A. (1984a). A taxonomic Revision of the Genus *Premna* L. (*Verbenaceae*) in Australia. *J. Adelaide Bot. Gard.* 7(1):1-43.
- Munir, A.A. (1984b). A taxonomic Revision of the Genus *Gmelina* L. (*Verbenaceae*) in Australia. *J. Adelaide Bot. Gard.* 7(1):91-116.
- Munir, A.A. (1985). A taxonomic Revision of the Genus *Viticipremna* H.J. Lam (*Verbenaceae*). *J. Adelaide Bot. Gard.* 7(2):181-200.
- Murray, J.A. (1774). "Caroli a Linne . . . Systema Vegetabilium etc.". (J.C. Dieterich: Göttingen).
- Necker, N.J. de (1790). "Elementa Botanica Genera genuina, Species naturales omnium Vegetabilium . . .". (Societas Typographica: Neowedae ad Rhenum).
- Persoon, C.H. (1797). "Caroli a Linne Systema Vegetabilium etc.". (J.C. Dieterich: Göttingen).
- Persoon, C.H. (1807). *Didymia Angiospermia*. "Synopsis Plantarum". Vol. 2:138-182. (J.G. Cotta: Tübingen).
- Post, T.V. & Kuntze, O. (1904). "Lexicon Generum Phanerogamorum". (Duetsche Verlags-Anstalt: Stuttgart).
- Reichard, J.J. (1778). *Didymia Angiospermia*. "Linne's Genera Plantarum". Edn 7. (Varrentrapp: Frankfurt).
- Reichenbach, H.G.L. (1828). *Labiatae*. "Conspectus Regni vegetabilis Per Gradus naturales evoluti". Part 1:115-117. (Carolus Cnobloch: Leipzig).
- Ridley, H.N. (1930). "The Dispersal of Plants throughout the World". (L. Reeve & Co.: Ashford, Kent).
- Roxburgh, W. (1832). *Didymia Angiospermia*. "Flora Indica". Edn 2, vol. 3:1-116. (W. Thacker & Co.: Serampore, Calcutta).
- Schauer, J.C. (1847). *Verbenaceae*. In De Candolle, A., "Prodromus Systematis naturalis Regni Vegetabilis". Vol. 11:522-700. (Victoris Masson: Paris).
- Schreber, J.C.D. (1791). "Caroli a Linne Genera Plantarum . . .". Editio Octava. Post Reichardianam Secunda, prioribus longe auctior atque emendatior". (Warrentrapp et Wenner: Frankfurt a/M).
- Schumann, K. & Hollrung, M. (1889). *Verbenaceae*. "Die Flora von Kaiser Wilhelms Land". 118-122. (Asher & Co.: Berlin).
- Schumann, K. & Lauterbach, K. (1901). *Verbenaceae*. "Die Flora der Deutschen Schutzgebiete in der Südsee". 521-527. (Borntraeger Brothers: Leipzig).

- Schumann, K. & Lauterbach, K. (1905). Verbenaceae. "Nachträge zur Flora der Deutschen Schutzgebiete in der Südsee". 369-373. (Borntraeger Brothers: Leipzig).
- Sivarajan, V.V. & Manilal, K.S. (1982). Notes on some interesting Species of Verbenaceae from South India. *J. Econ. Tax. Bot.* 3:813-817.
- Spach, E. (1840). "Histoire Naturelle des Vegetaux Phanerogams". Vol. 9:225-243. (Librarie Encyclopedique de Roret: Paris).
- Sprengel, K. (1825). Didynamia Angiospermia. "Caroli a Linnaei . . . Systema Vegetabilium". Edn 16, vol. 2:747-765. (Dietrich: Göttingen).
- Stafleu, F.A. & Cowan, R.S. (1979). "Taxonomic Literature". Vol. 2. (Bohn, Scheltema & Holkema: Utrecht).
- Steenis van C.G.G.J. (1957). Miscellaneous botanical Notes VIII. *Blumea* 8:514-517.
- Thunberg, C.P. (1784). Didynamia Angiospermia. "Flora Japonica". 251-258. (Müller: Leipzig).
- Ventenat, E.P. (1799). Pyrenaceae. "Tableau du Règne Végétal". Vol. 2:315-324. (Imprimerie de J. Drissonnier: Paris).
- Walpers, W.G. (1845). Verbenaceae. "Repertorium Botanices Systematicae". Vol. 4:3-134. (Fr. Hofmeister: Leipzig).
- Willdenow, C.L. (1800). Didynamia Angiospermia. "Caroli a Linne Species Plantarum etc.". Edn 4, vol. 3, part 1:2-403. (G.C. Nauk: Berlin).

Index to Scientific Names

Names

New names and combinations are in **bold**. Synonyms, misapplied, misspelt, illegitimate or invalid names are in *italics*.

Page numbers

Page numbers in **bold** refer to the main taxonomic treatment. Page numbers asterisked refer to figures and maps.

<i>Allasia</i> 33	:AEGIPHILEAE 31
— <i>payos</i> 33	:AVICENNIEAE 32
<i>Agnus-castus</i> 34	:CALLICARPEAE 32
— <i>incisa</i> 34	:CARYOPTERIDEAE 32
— <i>negundo</i> 34	:CHASMATOPHYTUM 31
<i>Casarettoa</i> 34	:CLERODENDREAE 32
— <i>diversifolia</i> 34	:LANTANEAE 31
— <i>mollissima</i> 34	:LIPPIEAE 31
CENTURIA QUARTA 31	:PERSONATAE 31
<i>Chrysomallum</i> 34	:PETALOSTEMONUM 31
— <i>madagascariense</i> 34	:SYMPHOREMEAE 32
<i>Clerodendrum</i> 31	:TECTONEAE 32
— <i>tracyanum</i> 33	:VERBENAE 31
<i>Ephialis</i> 34	:VERBENEAE 31, 32
— <i>pentaphylla</i> 34	:VITICEAE 31, 32
<i>Ephielis</i> 34	:VITICES 31, 76
Gmelina 31, 32	:VITICOIDEAE 32
— <i>dalrympleana</i> 32	<i>Vitex</i> 31, 32, 33, 34, 35*, 52, 58, 71, 75
LABIATAE 31, 76	:Agnus-castus 32
<i>Macrostegia</i> 34	:Axillares 32, 52
— <i>ruiziana</i> 34	:Brevibracteatae 32
<i>Nephrandra</i> 33	:Chrysomallum 32
— <i>dubia</i> 33	:Euagnus 32
<i>Premna</i> 32, 35	:Glomerovitex 32
— <i>tracyana</i> 32	:Glomerulosae 32
<i>Psilogyne</i> 34	:Glossocalyx 32
— <i>viticifolia</i> 34	:Limia 32
PYRENACEAE 31	:Lagondium 32
<i>Pyrostoma</i> 34	:Longibracteatae 32
— <i>ternatum</i> 34	:Maillelou 32
<i>Tripinna</i> 33	:Pyrostoma 32
— <i>tripinnata</i> 33	:Terminales 32
<i>Tripinnaria</i> 34	— <i>acuminata</i> 31-33, 36, 39*, 40, 41*, 42, 43, 48, 52, 61
— <i>cochinchinensis</i> 34	— <i>agnus-castus</i> 31, 33, 34, 61, 71
VERBENACEAE 31, 32, 33, 35, 75	— <i>h ovata</i> 53

- var. *subtrisecta* 72
- var. *trifolia* 66
- bombucifolia* 48
- benthamiana* 31, 33, 36, 61, 62*, 63, 64*, 65
- bicolor* 66, 67
- cunninghamii* 32, 44, 46, 49, 52
- dalrympleana* 32
- glabrata* 31-33, 36, 43, 44, 45*, 46, 47*-49, 52
- helogiton* 31, 35, 36, 47*, 48, 49, 50*, 51, 52
- integerrimis* 66
- irimotensis* 67
- leichhardtii* 32
- leucoxydon* 48
- lignum-vitae* 32, 33
- littoralis* 52
- lucens* 47
- macrophylla* 32
- melicopea* 31-33, 36, 37*-39*, 40, 43, 52
- negundo* 31, 57, 64, 65, 67, 71
 - var. *bicolor* 67
- nitida* 48, 51, 52
- ovata* 31
- pallida* 48
- paniculata* 71
- pentaphylla* 48, 49, 52
- petiolaris* 33, 67
- pinnata* 31
- quinata* 48
- repens* 53, 55, 57, 66
- rotundifolia* 31, 32, 34-36, 52, 54*, 56*-58, 61, 66, 71, 75
 - f. *heterophylla* 72
 - var. *heterophylla* 72
- ternifolia* 67
- tracyana* 32
- trifolia* 31-33, 35, 36, 55, 57, 58, 61, 65, 66, 70-72, 75
 - subsp. *littoralis* 31, 55, 58
 - var. *acutifolia* 33, 66
 - var. *bicolor* 31, 66, 70, 71
 - var. *heterophylla* 72
 - var. *obovata* 33, 53, 55, 57
 - var. *ovata* 31, 53, 57
 - var. *parviflora* 33, 61, 64
 - var. *repens* 53
 - var. *rotundifolia* 66
 - var. *simplicifolia* 31, 53, 55, 57, 58, 70, 75
 - var. *subincisa* 72
 - var. *subtrisecta* 36, 64*, 70, 71, 73*-75
 - var. *trifolia* 31, 36, 64, 66, 68
 - var. *trifoliata* 66
 - var. *trifoliolata* 66
 - var. *unifolia* 53
 - var. *unifoliolata* 53
 - var. *unifoliolata* 31, 53, 55, 57
 - β *unifoliolata* 57
 - var. *variegata* 71, 75
- trifoliata* 71
- trifoliolata* 66, 71
- triphylla* 67, 71
- variifolia* 67
- velutinifolia* 31, 36, 56*, 58, 59, 60*, 61, 71
- Viticipremna* 33, 35, 43
- queenlandica* 43
- Walrothia* 34
- Wallrothia* 34
 - articulata* 34
 - leucoxydon* 34

