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A TAXONOMIC REVISION OF THE GENUS *LIPPIA* [HOUST. EX] LINN. (VERBENACEAE)* IN AUSTRALIA

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Abstract

A taxonomic revision of the genus *Lippia* in Australia is presented. Only one species is recorded from Australia, identified for the first time as *L. alba*. Affinities and distribution are considered for the genus and the species. A detailed description of the species is supplemented by a habit sketch of a flowering branch and analytical drawings of the flower as well as leaf variation.

Taxonomic History of the Genus

Linnaeus (1753) established the genus *Lippia* with one species, *L. americana*, the type of which came from Veracruz, Mexico. It was placed in the group "Didynamia Angiospermia" where it was retained by Reichard (1778), Murray (1784), Gmelin (1792), Persoon (1797, 1807), Willdenow (1800), Michaux (1803), Link (1822), Poiret (1823), Sprengel (1825), Sweet (1827), Loudon (1830), Dietrich (1842) and others. Adanson (1763) placed it in "Premiere Section" of "Verbenae", Gleditsch (1764) in "Petalostemonum", Rüling (1774) in "Jasmina" and Scopoli (1777) in "Caprifolia". Subsequently, Scopoli (1786) described from north-west Italy the genus *Zappania,* which the present author has placed in the synonymy of *Lippia.* Gaertner (1788) recorded *Lippia* in "Centuria Quarta", de Jussieu (1789) in "Vitices", Necker (1790) in his "Plasyrgophyta", Poiret (1791) in "Diandria Monogynia", Schreber (1791) in "Didynamia Gymnospermia", Batsch (1802) in "Personatar" and Reichenbach (1828) under the tribe "Verbeneae" in the Labiatae. In 1805, Jaume Saint-Hilaire proposed the family Verbenaceae for *Lippia* and other related genera. The family Verbenaceae was accepted for the genus by de Jussieu (1806), Robert Brown (1810), Kunth (1818), Blume (1926), Endlicher (1838), Bentham (1839, 1870, 1876), Lindley (1847), Schauer (1847), F. Mueller (1868, 1882, 1889), Briquet (1895), Bailey (1883, 1890, 1901, 1913), H.J. Lam (1919) and by the majority of other botanists.

In 1829, Dumortier divided the Verbenaceae into two tribes: Verbeneae and Viticeae, with *Lippia* in the tribe Verbeneae. This tribe was accepted for the genus by Bartling (1830), Bentham (1839, 1870, 1876), Spach (1840), Brongniart (1843), Schauer (1847), Walpers (1852), Miquel (1858), Grisebach (1862), Harvey (1868), Bailey (1883, 1890, 1901, 1913), Caruel (1884), C.B. Clarke (1885), Gray (1886), Durand (1888), Post & Kuntze (1904), King & Gamble (1909), Lemée (1943) and others. Endlicher (1838) divided the family Verbenaceae into three tribes: Lippieae, Lantaneae and Aegiphileae, with *Lippia* in the tribe Lippieae. This tribe was accepted for the genus by Meisner (1840), Dietrich (1842) and Walpers (1845, 1847). Schauer (1847) re-classified the Verbenaceae into three tribes: Verbeneae, Viteae and Avicennieae. He based the tribe Verbeneae on its inflorescence being indeterminate, ovule erect, anatropous, attached at the base of the locule; Viteae on inflorescence definite, ovules pendulous, amphitropous or subanatropous, attached to the central axis, and Avicennieae on inflorescence capitate, ovules paired, pendulous, amphitropous, attached to the apex of the axis. Schauer (1847) subdivided the tribe Verbeneae into seven subtribes: Spielmannieae, Monochileae, Casselieae, Verbeneae, Lantaneae, Duranteae and Petreeae, with *Lippia* in the subtribe Verbeneae. He also divided the genus into five sections: *Aloysia, Goniostachyum,*

* The present treatment of the genus *Lippia* is the thirteenth in the series of taxonomic revisions in the family Verbenaceae in Australia. (See Munir, 1982, 1984a, 1984b, 1985, 1987a, 1987b, 1989, 1990a, 1990b, 1991, 1992, 1993a.)

Dipterocalyx, Zapania and *Rhodolippia*, with Australian species of the genus in the section *Zapania.*

Bentham (1876) proposed a new classification for the Verbenaceae by dividing it into eight tribes: Phrymeae, Stilbeae, Chloantheae, Verbeneae, Viticeae, Caryopterideae, Symphoremeae and Avicennieae, with *Lippia* in the tribe Verbeneae. He too divided the genus into two sections: *Aloysia* and *Zapania*, with Australian species of the genus in the section Zapania. In 1895, Briquet re-classified the Verbenaceae and upgraded the tribe Verbeneae to a subfamily Verbenoideae. The latter consisted of six tribes: Euverbeneae, Lantaneae, Priveae, Monochileae, Petraeeae and Citharexyleae, with *Lippia* in the tribe Lantaneae. This classification was adopted by Dalla Torre & Harms (1904), H.J. Lam (1919), Junell (1934), Moldenke (1959, 1971), Melchior (1964), Lopez-Polacios (1977), Raj and several others. In the same treatment, Briquet (1895) subdivided the genus *Lippia* into two subgenera: *Aloysia* and *Zapania*. He further subdivided the subgenus *Zapania* into five groups "*Gonostachym*" [*Goniostachyum* Schauer], *Acantholippia, Dipterocalyx, Euzapania* and *Rhodolippia*. The group *Euzapania* was further subdivided into three subgroups: *Axilliflorae, Paniculatae* and *Corymbosae*, with Australian species apparently in the subgroup *Axilliflorae*. These subgenera, groups and subgroups were adopted by Dalla Torre & Harms (1904). The majority of botanists, however, have not divided the genus into subgenera and groups, but have retained it in the Verbenaceae without reference to any subfamily or a tribe. In the present work, Briquet's (1895) classification of the Verbenaceae is followed in retaining *Lippia* in the tribe Lantaneae. The subgenera, groups and subgroups proposed for the genus, however, are not accepted because of the unreliability of characters used.

Australian History of the Genus

The first Australian specimens of *Lippia* as circumscribed here (excluding *Phyla* Lour. and *Aloysia* Ort.) were collected by John Dallachy during 1863, from Rockhampton, Queensland. Then more specimens were collected from the same area by O'Shanesy during 1864-1865, Dietrich during 1865 and Thozet during 1863-1865. Subsequently at least one collection was made by F.M. Bailey along the Fitzroy River in the town of Rockhampton. Recently a few more collections were made on Cape York Peninsula and west of Rockhampton. In 1969, the first and the only known collection of *Lippia* from Northern Territory was made by N. Byrnes from south of Darwin between Daly Waters and Larrima.

The first written record of this genus in Australia was published by F. Mueller (1868) when he described O'Shanesy's and Thozet's collections [two of each] from Queensland as a new *Lippia* species *L. lantanifolia*. Later, Bentham (1870) recognised one of Dallachy's collections from Rockhampton as *L. geminata* Kunth. Subsequently, F. Mueller (1882, 1889), Bailey (1883, 1890, 1901, 1913), Ewart & Davies (1917), H.J. Lam (1919) although recording this genus from Australia, included *Phyla* Lour. in *Lippia* (s.lat.). The former has been accepted now as a distinct genus. None of these authors, however, recorded *L. lantanifolia* as a synonym of *L. geminata*. Moldenke (1959, 1971, 1978, 1980) recorded both names as distinct species with *L. lantanifolia* as "endemic to Queensland", Australia. In most floras, *L. geminata* has been recorded as distinct or lately as a synonym of *L. alba* (Mill.)N.E. Br. ex Britton & P. Wilson. None of these floras, however, has ever shown *L. lantanifolia* in the synonymy of the above named species. During the present study, therefore, *L. lantanifolia* is recorded here as a *syn. nov.* of *L. alba*.

The recent records of *Lippia* (s.str.) from Australia were emumerated by Moldenke (1959, 1971, 1980, 1981), Burbidge (1963), Baines (1981), Munir (1983), Chapman (1991) and Leach et al. (1992). Introduced and naturalised in the tropics of Australia, it has not yet spread beyond Northern Territory and Queensland boundaries. Presently only one species of *Lippia* is known in Australia.

Chromosome numbers

Chromosome counts of only three *Lippia* (s.str.) species are available. The majority are reported from *L. alba*. These counts are based on material from outside Australia. The highest number (2n = 40 (42?)) was reported by Moldenke (1973) and the lowest (2n = 24) by Coleman (1982). The earliest chromosome count (2n = 30) was reported by Choudhury & Bose (1956) from *L. geminata* Kunth. This was later reconfirmed and/or recorded by Bose & Choudhury (1960) and Fedorov (1974). Of the same species, the haploid number 16 was recorded by Kumar & Dutt (1989). In 1982, Coleman reported a haploid number of 12 from *L. salviaefolia* Cham. and Filippa (1984) recorded a haploid number of 15 from *L. turbinata* Griseb. The chromosome number 2n = 30 seems to be generally consistent in the genus *Lippia* (s.str.).

LIPPIA [Houst. ex] Linn.

Lippia [Houst. ex] Linn., Sp. Pl. 2 (1753) 633; Gen. Pl. edn 5 (1754) 282; Adans., Fam. Pl. 2 (1763) 198; Reichard, Gen. Pl. (1774) 324, n. 844; Scop., Intr. Hist. Nat. (1777) 146; Juss., Gen. Pl. (1789) 109; Poir. in Lam., Encycl. Meth. Bot. 3 (1789) 531; Poir. in Lam., Tabl. Encycl. Meth. Bot. 1 (1791) 56; J.F. Gmel., Linn. Syst. Nat. 2 (1792) 955; Willd., Linn. Sp. Pl. edn 4, 3 (1800) 356; J. St.-Hil., Expos. Fam. Nat. 1 (1805) 250; Juss., Ann. Mus. Hist. Nat. 7 (1806) 75; Kunth in Humb., Bonpl. & Kunth, Nov. Gen. & Sp. Pl. 2 (1818) 262; Poir. in Lam., Tabl. Encycl. 3 (1823) 91; Spreng., Syst. Veg. 2 (1825) 751, p.p.; Dumort., Anal. Fam. Pl. (1829) 22; Bartl., Ord. Nat. Pl. (1830) 180; Spreng., Gen. Pl. 2 (1831) 417; Endl., Gen. Pl. 1 (1838) 633, n. 3684; Benth., Ann. Nat. Hist. 2 (1839) 445-447; Meisn., Pl. Vasc. Gen. Vol. 1 Tab. Diagn. (1840) 290, p.p. & Vol. 2 Commen. (1840) 199, p.p.; D. Dietr., Syn. Pl. 3 (1842) 596, p.p.; Walp., Repert. Bot. Syst. 4 (1845) 42, p.p.; Schauer in A. DC., Prod. 11 (1847) 572, p.p.; Walp., Repert. Bot. Syst. 6 (1847) 688; Ann. Bot. Syst. 3 (1852) 232; Miq., Fl. Ind. Bat. 2 (1858) 905, p.p.; Benth., Fl. Aust. 5 (1870) 34, p.p.; Pfeiff., Nomencl. Bot. Vol. 2, part 1 (1874) 132, p.p. & Vol. 2, part 2 (1874) 1569, 1570, 1647, p.p.; Benth. in Benth. & Hook.f., Gen. Pl. 2 (1876) 1142, p.p.; F. Muell., Syst. Cens. Aust. Pl. 1 (1882) 102, p.p.; F.M. Bailey, Synop. Qld Fl. (1883) 376, p.p.; C.B. Clarke in Hook.f. (ed.), Fl. Brit. Ind. 4 (1885) 563, p.p.; F. Muell., Sec. Syst. Cens. Aust. Pl., part 1 (1889) 171, p.p.; F.M. Bailey, Cat. Indig. & Natur. Pl. Qld (1890) 35, p.p.; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4, 3a (1895) 151, p.p.; F.M. Bailey, Qld Fl. 4 (1901) 1171, p.p.; F.M. Bailey, Compr. Cat. Qld Pl. (1913) 382; H.J. Lam, Verbenac. Malay. Archip. (1919) 15, p.p.; Britton & P. Wilson, Sci. Surv. Porto Rico & Virgin Isl. 6 (1925) 141, p.p.; Junell, Symb. Bot. Upsal. 4 (1934) 31, p.p.; Moldenke, Lilloa 4 (1939) 292; Publ. Carnegie Inst. Wash. No. 522 (1940) 164; Moldenke in Pulle (ed.), Fl. Suriname 4 (1940) 267; Lemée, Dict. Descrip. Syn. Gen. Pl. Phan. 8b (1943) 653; Moldenke, Résumé Verbenac. etc. (1959) 278, 297, 298, 310, 393-398, 406, 460; J.F. Macbr., Fl. Peru (1960) 644, p.p.; N.T. Burb., Dict. Aust. Pl. Gen. (1963) 179; D.N. Gibson in Standl. & L.O. Williams, Fl. Guatemala (1970) 206, p.p.; Moldenke, Fifth Summary Verbenac. etc. 1 & 2 (1971) 476, 524, 525, 527, 549, 738-743, 753, 889; C.D. Adams, Fl. Pl. Jamaica (1972) 630, p.p.; Clifford & G. Ludlow, Keys Fam. & Gen. Qld Fl. Pl. (1972) 124; Moldenke, Ann. Missouri Bot. Gard. 60 (1973) 66; Lopez-Pal., Revista Fac. Farm. Univ. Los Andes-Merida 15 (1974) 55; Fl. Venezuela Verbenac. (1977) 416; Moldenke, Phytologia 41 (1978) 131; Moldenke, Phytologia 38 (1978) 230; Phytologia 39 (1978) 434; Phytologia 40 (1978) 200; Phytologia 41 (1979) 131; Phytologia 42 (1979) 199; Phytologia 44 (1979) 124, 125, 136, 138, 328, 384, 509 & 512; Phytologia 45 (1980) 36-37, 40, 339, 352, 507; Phytologia 46 (1980) 173-175, 177, 179, 508; Phytologia Mem. II, Sixth Summary Verbenac. etc. (1980) 5, 397, 419, 462, 463; Phytologia 48 (1981) 151; J.A. Baines, Aust. Pl. Gen. (1981) 219; Munir in B.D. Morley & H.R. Toelken (eds), Fl. Pl. Aust. (1983) 288; Raj, Rev. Palaeobot. Palynol. 39 (1983) 364; Jans.-Jac. in Görts (ed.), Fl. Guianas 4 (1988) 48; R.A. Howard, Fl. Lesser Antilles 6 (1989) 232, p.p.; A. Chapm., Aust. Pl. Name Index, K-P (1991) 1845-1846; G.J. Leach et al., N. Terr. Pl. Sp. Cons. Signif. (1992) 37; Verdc. in Polhill (ed.), Fl. Trop. E. Afr. Verbenac. (1992) 27.

Type: L. americana Linn., Sp. Pl. 2 (1753) 633.

Zappania Scop., Delic. Fl. & Faun. Insubr. 1 (1786) 34, t. 15.
Type: Z. odoratissima Scop. Scopoli described only one species under the genus.

Lippia Houst. ex Linn. sect. *Goniostachyum* Schauer in A. DC., Prod. 11 (1847) 574.
Type: As for *Goniostachyum* (Schauer)Small (1903).

Goniostachyum (Schauer)Small, Fl. S.E. U.S. edn 1 (1903) 1012 & 1337, based on *Lippia* sect. *Goniostachyum*.
Lectotype: G. graveolens (Kunth)Small, loc. cit. 1903.—*fide* Farr et al., Index Nom. Gen. Vol. 2, E-P (1979) 737.

Dipterocalyx Cham., Linnaea 7 (1832) 241.—*fide* Moldenke (1971, 1973), Lopez-Pal. (1977).
Types: D. hirtus Cham. loc. cit. (1832) 241 lectotype designated here; *D. glabrescens* Cham. loc. cit. (1832) 242, *syntype.*

Erect shrubs or undershrubs. *Stem* branched, woody, with simple hairs, often hirsute or tomentose. *Leaves* simple, decussate-opposite or ternate, rarely alternate or in 4's, deciduous, entire to variously toothed or lobed, exstipulate, petiolate or sessile, membranous to coriaceous, mostly penninerved. *Inflorescence* spicate or capitate, solitary or fascicled in leaf axils, or aggregate in terminal corymbs or panicles; spikes pedunculate, mostly contracted into heads or cylindric, sometimes elongating in fruit, densely-flowered; bracts conspicuous, not deciduous, decussate or many ranked, herbaceous, often folded, sometimes concave or flat, imbricate, mostly ovate or lanceolate. *Flowers* small, sessile, borne singly in the axils of bracts, often more or less 4-ranked. *Calyx* persistent, membranous, gamosepalous, ovoid-campanulate or compressed and 2-keeled or 2-winged, some 2-lipped, the rim 2- or 4-fid or 4-dentate. *Corolla* gamopetalous, hypocrateriform or infundibular, 4-lobed, zygomorphic; tube cylindric, straight or curved, slightly exserted from calyx; lobes oblique, spreading, somewhat 2-lipped, the anterior lip larger than the posterior. *Stamens* 4, didynamous, inserted at about the middle of the corolla-tube, included or slightly exserted; anthers ovate, unappendaged, the cells parallel. *Ovary* 2-locular, each locule with 1 ovule; style often short with oblique or sublateral stigma. *Fruit* dry, ovoid, surrounded by the fruiting-calyx and sometimes partially adnate to it, dividing into 2 mericarps or "nutlets" at maturity; pericarp papery or hard. *Seeds* without endosperm.

Number of species: World ± 200 species and about 60 infraspecific taxa; Australia only one naturalised species which according to Bentham (1870) was "probably introduced from South America, where it is often common, ranging from Buenos Ayres to Mexico". The much higher number of species attributed to this genus by some authors is probably due to inclusion of species of *Phyla* Lour. and *Aloysia* Ort. For instance, Howard (1989) considered it "a genus of about 400 species".

Derivation of name

The genus is named after Augustin Lippi, 1678-1701, Italian naturalist and botanist, who was killed in Abyssinia (Ethiopia) at the age of 23.

Distribution (Map 1)

According to Moldenke (1940, 1971, 1973, 1980), Britton (1965), Gibson (1970), Jansen-Jacobs (1988), Howard (1989), Verdcourt (1992) and several other authors, the genus *Lippia* is widely distributed in subtropical and tropical America, also a few species in tropical parts of the Old World. In Australia, it has been recorded from the tropical parts of Queensland and Northern Territory only.

Comments

Scopoli (1786) described a new genus *Zappania* which was later recorded by various authors as "*Zapania*", "*Zapamia*" or "*Zipania*". All are orthographic variants of *Zappania* and have been erroneously credited by some botanists to authors other than Scopoli. Several authors have recorded *Zappania* or *Zapania* as a synonym of *Phyla* Lour. Moldenke (1959), however, correctly recognised *Zappania* Scop. as a synonym of *Lippia*. In his subsequent publications (1971, 1978), he too regarded *Zappania* Scop. as a synonym of *Phyla* Lour. The present author has seen the protologue of *Zappania* and believes that the description and the plate 15 accompanying it are definitely of a *Lippia* species now called *L. alba* (Mill.)N.E. Br. ex Britton & P. Wilson.

Moldenke (1978) compared the generic descriptions given to this genus by various authors over the years (1849-1969) and concludes that "Presumably all these authors included *Acantholippia*, *Aloysia* and *Phyla* in their concept of *Lippia*". The present author has noticed this tendency in the publications by Bentham (1870), F. Mueller (1882, 1889), Bailey (1883, 1901, 1913), Schauer (1847), Briquet (1895) and many others. The majority of botanists whose concept of *Lippia* comprise an assemblage of the above named genera have not only enlarged the distribution range of the genus, but have recorded more than the actual number of species in the genus (s.str.). As mentioned earlier, the known number of taxa in the genus is about 200 species and ± 60 infraspecific taxa.

Affinities

Lippia is closely related to *Lantana* in its inflorescence being spicate, often subcapitate during anthesis and elongating in fruit, pedunculate; flowers sessile, bracteate; calyx small, inconspicuous, usually hidden by the subtending bractlets; perfect stamens 4 with anthers not appendaged; fruit composed of only 2 'pyrenes' [mericarps or nutlets]; pyrenes 1-celled and 1-seeded. Nevertheless, *Lantana* may easily be distinguished by its stem and leaves being harshly pubescent; calyx-rim truncate or shallowly toothed; corolla 4- or 5-lobed; fruit drupaceous, usually with a fleshy and juicy exocarp and hard endocarp.

According to Jansen-Jacobs (1988), "the genera *Lantana* and *Lippia* are often difficult to separate. The only difference is the structure of the fruit (berry-like or a dry 2-parted schizocarp). In herbarium material it is not always possible to know whether the fruit was somewhat fleshy or dry in vivo. If no real ripe fruits are present it is uncertain whether the 2-celled fruit is falling apart or not. Probably *Lantana* and *Lippia* comprise one genus".

There are several characters common to *Lippia*, *Acantholippia*, *Aloysia* and *Phyla*. In all these genera the calyx is 2 - 4-cleft or conspicuously toothed; corolla 4-lobed; fruit small, dry, with a hard and thin or papery exocarp, separating into two 1-celled mericarps. However, *Acantholippia* can readily be distinguished from the rest of these genera by being a more or less spinescent shrub with greatly reduced leaves and inflorescence. Of the remaining three genera, *Aloysia* differs from both *Lippia* and *Phyla* in its spikes being elongate during anthesis, with scattered and often distant flowers. Several botanists have treated *Lippia* and *Phyla* as one genus, because both these genera have spikes dense and congested during anthesis, often subcapitate, with closely imbricate flowers. Nevertheless, *Phyla* can readily be distinguished by being mostly herbaceous, with trailing or ascending stems, rooting at the nodes, sometimes somewhat woody at the base; spikes somewhat elongating in fruit; bracts cuneate-obovate or flabelliform, not 4-ranked; pubescence of medifixed hairs.

In 1839, Bentham described a new genus *Cryptocalyx* from British Guiana which he thought was closely related to *Lippia*. While discussing affinities between these two and other related genera Bentham (1839) wrote: "The genus *Lippia*, as far as I have examined it, appears best limited by Chamisso and Schlechtendal. The pericarp is thicker than in *Cryptocalyx*, and the pyrenes, though easily separable, are yet held together by it. In *Riedelia* the fruit is rather of

Lantana, and must therefore be kept distinct from *Lippia*, unless indeed this genus be joined to *Lantana*. *Dipterocalyx* appears also from Chamisso and Schlechtendal's description to be distinct. *Aloysia* is too natural a group to be united to *Lippia*, unless nearly the whole of Verbeneae be considered as one genus".

For further information see "affinities" in Munir (1993a).

	Lippia	*Phyla*	*Lantana*	*Aloysia*
Habit	spreading shrubs	prostrate herbs	spreading shrubs	spreading shrubs
Hairs	simple	medifixed	simple	simple
Spikes at anthesis	± elongate	dense	dense	elongate
Bracts conspicuous	+	+	+	-
Bracts 4-ranked	+	-	-	-
Calyx compressed, 2-keeled	+	+	-	-
Stigma	sublateral	terminal	sublateral	terminal
Fruit exocarp	thin	thin	fleshy	thin
Corolla-tube much protruding	-	-	+	+

Table 1. Table showing main diagnostic characters of the genera *Lippia, Phyla, Lantana* and *Aloysia*. (+ = present; - = absent; ± = sometimes present.)

Lippia alba (Mill.)N.E. Br. ex Britton & P. Wilson, Sci. Surv. Porto Rico & Virgin Isl. 6 (1925) 141. **var. alba**; Moldenke, Lilloa 4 (1939) 294; Moldenke, Publ. Carnegie Inst. Wash. No. 522 (1940) 165; Moldenke in Pulle (ed.), Fl. Suriname 4 (1940) 268; Moldenke, Résumé Verbenac. etc. (1959) 209, 460; J.F. Macbr., Fl. Peru (1960) 646; Sastri et al., Wealth Ind. 6 (1962) 142, fig. 49; D.N. Gibson in Standl. & L.O. Williams (eds), Fl. Guatemala (1970) 208; Moldenke, Fifth Summary Verbenac. etc. 1 & 2 (1971) 347, 890; C.D. Adams, Fl. Pl. Jamaica (1972) 630; Moldenke, Ann. Missouri Bot. Gard. 60 (1973) 70; Lopez-Pal., Revista Fac. Farm. Univ. Los Andes Merida 15 (1974) 56, fig. 10; Lopez-Pal., Fl. Venezuela Verbenac. (1977) 419, fig. 98; Moldenke, Phytologia 38 (1978) 386; Phytologia 39 (1978) 434; Phytologia 41 (1978) 131; Lopez-Pal., Revista Fac. Farm. Univ. Los Andes Merida 20 (1979) 27; Moldenke, Phytologia Mem. II, Sixth Summary Verbenac. etc. (1980) 337, 558; Phytologia 48 (1981) 156; Raj, Rev. Palaeobot. Palynol. 39 (1983) 350, 364, 396; Jans-Jac. in Görts (ed.), Fl. Guianas 4 (1988) 49, fig. 11; R.A. Howard, Fl. Lesser Antilles, Part 3 (1989) 233; A. Chapm., Aust. Pl. Name Ind. K-P (1991) 1846.

Type: As for *Lantana alba* Mill., Gard. Dict. edn 8 (1768) no. 8.

Lantana alba Mill., Gard. Dict. edn 8 (1768) no. 8; Link, Enum. Pl. Hort. Berol. 2 (1822) 126; Miq., Fl. Ind. Bat. 2 (1858) 904; Knuth, Feddes Repert. Spec. Nov. Beih. 43 (1927) 599.
Type: William Houston s.n., Campeche, Mexico, undated (BM, holotype!).

Verbena globiflora L'Her., Stirp. Nov. 1 (1786) 23, t. 12; Willd., Sp. Pl. 1 (1797) 116.—*fide* Moldenke (1940) & Lopez-Palacios (1977).
Type: L'Heritier s.n., probably collected from the Paris garden, originally from "Mato Grosso Paraguay", undated (G, microfiche!). The locality 'Mato Grosso' is in Brazil, not Paraguay.

Zappania odoratissima Scop., Delic. Fl. Faun. Insubr. 1 (1786) 34, 35, t. 15.—*fide* Moldenke (1973), Lopez-Palacios (1977).
Type: No type specimen other than t. 15 is cited in the protologue. The plate no. 15 is accepted here as the type.

Zapania lantanoides Lam., Tabl. Encycl. Méth. Bot. 1 (1791) 58. —*fide* Lopez-Palacios (1977) & Moldenke (1973).
Type Herb. Lamarck No. 246, 'Amerique meridionale', undated (P-LA, microfiche!).

Lantana lavandulacea Willd., Sp. Pl. edn 4, 3 (1800) 319.—*fide* Moldenke (1973) & Lopez-Palacios (1977).
Type: Willdenow s.n., Cat. no. 11512, from the plant growing in Berlin Botanic Garden under the name *Lantana odorata*, undated (B2 spec., microfiche!).

Verbena capensis Thunb., Prod. Fl. Cap. (1800) 96.—*fide* Moldenke (1940).
Type: No specimen cited with the protologue. In Herb. Thunb. Cat. No. 470, Uppsala, two specimens mounted on one sheet having hand-written annotation: "*Verbena capensis*". (UPS, microfiche!).

Lippia asperifolia A. Rich. ex Marthe, Cat. Pl. Jard. Méd. Paris (1801) 67; Sprengel, Syst. Veg. 2 (1825) 751; D. Dietr., Synop. Pl. (1842) 596; Walp., Rep. Bot. Syst. 4 (1845) 47; Schauer in A. DC., Prod. 11 (1847) 583; Miq., Fl. Ind. Bat. 2 (1858) 906; Kuntze, Rev. Gen. Pl. 3 (1898) 251; Baker in Dyer, Fl. Trop. Afr. 5 (1900) 280; Ram. Gayena, Fl. Nicarag. 1 (1911) 560; H.J. Lam, Verbenac. Malay. Archip. (1919) 18; Knuth, Feddes Repert. Spec. Nov. Beih 43 (1927) 601; D.C. Raju, Bull. Bot. Soc. Bengal 23 (1969) 70, fig. 1.—*fide* Moldenke (1973) & Lopez-Palacios (1977).
Type: Not designated.

Zapania odorata Pers., Syn. Pl. 2 (1806) 140.—*fide* Moldenke (1973) & Lopez-Palacios (1977).
Type: "Habitat in America" (P, n.v.).

Lippia geminata Kunth in Humb., Bonpl. & Kunth, Nov. Gen. & Sp. Pl. 2 (1818)266; Cham., Linnaea 7 (1832) 215; Schauer in A. DC., Prod. 11 (1847) 582; Griseb., Fl. Brit. W. Ind. Isl. (1862) 495; Benth., Fl. Aust. 5 (1870) 35; F. Muell., Syst. Cens. Aust. Pl. 1 Vascul. (1882) 102; F.M. Bailey, Synop. Qld Fl. (1883) 376; C.B. Clarke in Hook.f. (ed.), Fl. Brit. Ind. 4 (1885) 563; A. Gray, Fl. N. America, 2nd edn, 2 (1886) 338; F. Muell., Sec. Syst. Cens. Aust. Pl. part 1 Vascul. (1889) 171; F.M. Bailey, Qld Fl. 4 (1901) 1172; Ram. Goyena, Fl. Nicarag. 1 (1911) 559; F.M. Bailey, Compr. Cat. Qld Pl. (1913) 382; H.J. Lam, Verbenac. Malay. Archip. (1919) 18; Standl., Trees & Shrubs of Mexico, U.S. Natl. Herb. 23 (1924) 1248; Knuth, Feddes Repert. Spec. Nov. Beih. 43 (1927) 601; Gamble, Fl. Pres. Madras, repr. edn, 2 (1956) 762; Haines, Bot. Bihar & Orissa, repr. edn, 2 (1961) 740; Prain, Beng. Pl., repr. edn, 2 (1963) 616; A. Chapm., Aust. Pl. Name Index K-P (1991) 1846.—*fide* Britton & P. Wilson (1925), Moldenke (1973) & Lopez-Palacios (1977).
Type: Humboldt & Bonpland 1140, Rio Apure, Venezuela, undated (P, microfiche!). In the protologue, information re-type reads: "Crescit in inundatis fluminis Apura juxta Santa Barbara".

Verbena odorata (Pers.)Steud., Nom. Bot. Phan. edn 1 (1821) 873.—*fide* Moldenke (1973) & Lopez-Palacios (1977).
Type: As for *Zapania odorata* Pers. (1806).

Lantana geminata (Kunth)Spreng., Syst. Veg. 2 (1825) 763.—*fide* Moldenke (1973) & Lopez-Palacios (1977).
Type: As for *Lippia geminata* Kunth.

Lippia capensis (Thunb.)Sprengel, Syst. Veg. 2 (1825) 751; D. Dietr., Synop. Pl. (1842) 596.—*fide* Moldenke (1940).
Type: As for *Verbena capensis* Thunb.

Lantana mollissima Desf., Cat. Hort. Paris, edn 3 (1829) 393.—*fide* Moldenke (1973) & Lopez-Palacios (1977).
Type: (Probably at Por FI, n.v.)

Lippia citrata Cham., Linnaea 7 (1832) 214.—*fide* Moldenke (1940, 1973) & Lopez-Palacios (1977).
Type: Hoffmannsegg s.n., "Habitat in Bookia". "E. Brasilia meridionali et acquinoctiali misit Sellow", undated (B—H.W. No. 11611, microfiche!).

Lantana lippioides W.J. Hook. & C.A.W. Arnott, Bot. Beechey's Voy. (1841) 305.—*fide* Standley (1924), Moldenke (1940, 1973) & Lopez-Palacios (1977).
Type: *Lay & Collie s.n.*, "Tepic, 54 miles from San Blas, Mexico, Dec. - Feb. 1827" (K, n.v.).

Lippia scabra Hochst., Flora 28 (1845) 68.—*fide* Moldenke (1940).
Type: Dr. Ferdinand Krauss s.n., "Natalbai, Junio 1839" (TUB, n.v.).

Lippia geminata Kunth var. *microphylla* Griseb. Fl. Brit. W. Ind. Isl. (1862) 495.—*fide* Britton & P. Wilson (1925), Moldenke (1940, 1973) & R.A. Howard (1989).
Type: Hjalmars s.n., Bahamas, Turk Islands; *Lockh s.n.*, Trinidad, undated (GOET/K, n.v.).

Lippia panamensis Turcz., Bull. Soc. Imp. Natur. Mosc. 36 (2) (1863) 201.—*fide* Moldenke (1973) & Lopez-Palacios (1977).
Type: Not designated.

Lippia lantanifolia F. Muell., Fragm. 6 (1868) 151; Moldenke, Résumé Verbenac. etc. (1959) 209; Phytologia 12 (1965) 187-242; Phytologia 13 (1966) 359; Fifth Summary Verbenac. etc. 1 & 2 (1971) 347, 892; Phytologia 39 (1978) 163; Phytologia Mem. II, Sixth Summary Verbenae. etc. (1980) 337; Phytologia 48 (1981) 177; A. Chapm., Aust. Pl. Name Index K-P (1991) 1846.—**syn. nov.**
Type: P.A. O'Shanesy s.n., Rockhampton, Queensland, undated (MEL 583660, lectotype designated here; MEL 583658 & MEL 583659, isolectotypes!); *Thozet 68 & s.n.*, Rockhampton, Queensland, undated (respectively MEL 583653 & MEL 583652—syntypes).

Zapania geminata (Kunth)Gibert, Enum. Pl. Montev. (1873) 44.
Type: As for *Lippia geminata* Kunth

Lippia lantanoides J.M. Coult., Contr. U.S. Natl. Herb. 2 (1892) 328.—*fide* Britton & P. Wilson (1925) & Moldenke (1940).
Type: "Southern Texas, along the Rio Grande to Brazos Santiago" (US, *n.v.*). The collector's name, collection number and date of collection is not mentioned in the protologue.

Lippia globiflora (L'Her.)Kuntze, Rev. Gen. Pl. 3 (1898) 251.—*fide* Moldenke (1940).
Type: As for *Verbena globiflora* L'Her.

Lippia globiflora (L'Her.)Kuntze var. *geminata* (Kunth)Kuntze, Rev. Gen. Pl. 3 (1898) 251.
Type: As for *Lippia geminata* Kunth.

Lippia globiflora (L'Her.)Kuntze var. *microphylla* (Griseb.)Kuntze, Rev. Gen. Pl. 3 (1898) 252.
Type: As for *Lippia geminata* Kunth var. *microphylla* Griseb.

Lippia javanica auct. non (Burm.f.)Sprengel: sensu A. Meeuse, Blumea 5 (1942) 68; D.C. Raju, Bull. Bot. Soc. Bengal 23 (1969) 69; p.p., *quoad syn. L. alba* (Mill.)N.E. Br. ex Britton & P. Wilson.

Typification of L. lantanifolia F. Muell.

L. lantanifolia is based on *P.A. O'Shanesy's s.n.* collection comprising at least three duplicates and *A. Thozet's s.n.* collection and collection no. 68. All these collections came from Rockhampton, Queensland. F. Mueller (1868) described these collections as a new *Lippia* species *L. lantanifolia* but did not designate the type for this taxon. It is, therefore, necessary to choose a lectotype for this name. All syntypes are preserved in Herb. MEL where F. Mueller worked and almost certainly were used by him in preparing the original description of this species. Of all the syntypes, only one duplicate of O'Shanesy's s.n. (No. MEL 583660) has been annotated as "*Lippia lantanifolia* F.v. Mueller". The specimen is particularly complete and well preserved. It is chosen here as the lectotype for this name.

Description (Fig. 1)

A strongly aromatic shrub, with procumbent-straggling branches, 0.5 - 2 (-2.4) m tall. *Stem* and branches almost cylindrical or obtusely tetragonal, virgate, strigose-hirsute mixed with small glands, 5 - 10 (-15) mm diam.; young shoots often hoary. *Leaves* opposite or sometimes in whorls of three, petiolate; lamina ovate, ovate-elliptic, ovate-oblong or almost orbicular, obtuse, crenate, often cuneate or attenuate to the base and decurrent on the petiole, sometimes more or less truncate at the base, (10-) 15 - 40 (-45) mm long, (5-) 10 - 25 (-35) mm wide, rugose, hirsute, with intermixed minute glands on the lower (abaxial) surface, the primary and secondary veins impressed above, prominent beneath, the secondary veins 5 - 7 pairs; petiole pubescent-hirsute, glandular, (2-) 4 - 10 (-15) mm long. *Inflorescence* of capitate or subcapitate spikes, pedunculate, mostly 1 [rarely 2] in the axil of upper leaves, usually much shorter than the subtending leaves or subequalling the petiole; spikes (flower-heads) first subglobose, later (at anthesis) somewhat oblong, 5 - 12 mm long, 4 - 8 mm diam.; peduncle obtusely tetragonal, hirsute with intermixed minute glands, (4-) 7 - 15 (-20) mm long, ± 1 mm diam. *Flowers* sessile, each in the axil of a bract; bracts sessile, very broadly ovate or rotund-ovate, abruptly acuminate, herbaceous, hispid-hirsute with intermixed minute glands outside (abaxially), glabrous inside (adaxially), (2-) 3 - 5 mm long, (2-) 3 - 3.5 mm wide, the outer spreading. *Calyx* shorter than the bract, 2-lobed, about one-third as long as the corolla-tube, membranous, somewhat globular, somewhat compressed not ribbed, 1.5 - 2 mm long, 1 - 1.5 mm diam., pilose and glandular outside, glabrous inside, the lobes broad and obscurely 2-toothed. *Corolla* hypocrateriform, in various shades of 'blue', 'pink', 'lilac', 'mauve', 'purple' or 'white', slightly surpassing the bract; tube cylindrical and glabrous in the lower half, much dilated upwards, pilose and glandular outside the upper dilated half, pilose inside the throat, 3 - 4 (-5) mm long, 0.5 - 1 mm diam.; lobes short, broad and nearly equal except for the anterior lobe of the lower lip which is almost twice as long as the others, the 4 smaller lobes nearly rounded, (0.5-) 1 - 1.5 mm long, 0.5 - 2 mm wide, the largest anterior lobe 1 - 2 mm long, 1 - 1.5 (-2) mm wide. *Stamens* included; filaments short, glabrous, ± 0.5 long; anthers globose, ± 0.5 mm long.

Ovary oblong-elliptic, glabrous, 0.5 - 1 (-1.5) mm long; style short, glabrous, 1 - 2 mm long; stigma oblique or sublateral, oblong-ellipsoid, 0.2 - 0.3 mm long. *Fruit* enclosed by the bract and membranous calyx, subglobose, glabrous, 1 - 2 mm diam., separating at maturity into two mericarps, each 1-seeded.

Specimens examined (collections seen: Australian 19; non-Australian 33)

AUSTRALIA: QUEENSLAND: *Bailey s.n.*, banks of the Fitzroy River in the town of Rockhampton, undated (MEL 583714); *Bisset L. 2*, 32.19 km N of Blackwater on "Coorooorah", 13.xi.1959 (BRI); *P. Black 652*, Kowanyama, Topsy Creek, -.iv.1978 (BRI); *Dallachy 252*, Rockhampton, 30.i./vii.1863 (K, MEL); *Dietrich 893, 924, s.n.*, Rockhampton, -.ii.1865 (MEL 583711, MEL 583717, MEL 583718); *Dietrich 456*, loc. cit. -.vii.1865 (MEL 583712); *Dietrich 1543*, loc. cit., -.viii.1865 (MEL 583713); *Dietrich 2060*, loc. cit., undated (MEL 583719); *Dietrich 2190*, loc. cit., undated (MEL 583715, MEL 583716); *Ritson s.n.*, Princess Charlotte Bay, -.1953 (BRI 268862); *O'Shanesy s.n.*, Rockhampton, undated (MEL 583660), lectotype of *Lippia lantanifolia* F. Muell. designated here; MEL 583658, isolectotype; *O'Shanesy s.n.* [5], loc. cit. 1.ix.1867 (MEL 583659, isolectotype of *L. lantanifolia* F. Muell.); *Thozet 68 & s.n.*, loc. cit., undated (MEL 583653 & MEL 583652, syntypes of *L. lantanifolia* F. Muell.).

NORTHERN TERRITORY: *Byrnes 1357*, c. 611 km S of Darwin, Stuart Highway, 5.ii.1969 (DNA).

UNITED STATES OF AMERICA: TEXAS: *Cameron s.n.*, Mt. Allen, Lake Hockney, Hidalgo Country, -.vi.1937 (F 899230); *Coulter 13*, Brazos Santiago, -.1889 (F 254258); *Townsend s.n.*, near Braunsville, -.x.1895 (F 375291).

MEXICO: *Calderon 1924*, Colonia San Felipe, Cosamaloapam, Veracruz, 12.vi.1969 (MO); *Jimenez A. et al. JPL-MO94*, Mercado de Abastos, Procedencia Valles Centrales, 7.ii.1986 (MO); *McKee 11001*, 66 km from Tehauntepec on Acayucan road, Oaxaca, 9.xii.1963 (CANB, NSW); *Pringle s.n.*, Matamoros, State of Tamaulipas, 8.viii.1888 (NY); *Schott 46*, Rio Bravo, -.ix/x.1885 (F).

COSTA RICA: *Liesner & Lockwood 2692*, Santa Rosa National Park, 28.vi.1977 (MO); *Liesner, Lockwood & Vega 2792*, Rio Higuerón near agricultural experimentation area near Tobago, 29-30.vi.1977 (MO).

GUATEMALA: *Ortiz 1151*, National Park, Tikal, Depto, Petén, 27.v.1970 (NY).

HONDURAS: *Molin R22161*, along Sinuapa River, vicinity of Nueva Ocotepeque, 26.viii.1968 (NY); *Murray Jr. 428*, 8 km W of Trujillo in village of San Antonio, undated (MO).

MALAWI: *Msiska 227*, Muloza Drift, Riverine forest, 12.ix.1978 (BRI, SRGH).

RHODESIA: *Gibbs Russell 1726*, ca 21 km N.W. of Marula on road to Mananda Dam, 20.iv.1972 (BRI, SRGH).

SOUTH AFRICA: *Liebenberg 8669 & 8722*, Garsfontein, Pretoria, -.ii.1977 (BRI, PRE); *Tyson 848*, King William Town, -.i.1887 (NSW, PRE).

INDIA: *Whitham s.n.*, Calcutta, -.iv.1913 (CAL, NSW).

Distribution and ecology (Map 1)

In Australia, *L. alba* is known to occur in Queensland and Northern Territory. Distribution in Queensland is chiefly around Rockhampton with only two scattered localities on Cape York Peninsula. One of the latter is near Princess Charlotte Bay along the east coast and the other near Kowanyama township along the Gulf of Carpentaria. In Northern Territory, this species has been collected from about 611 km south of Darwin along the Stuart Highway. The collector has not given the precise locality for this record but it seems to be between the townships of Daly Waters and Larrima.

Collections from outside Australia have been examined from the U.S.A., Mexico, Costa Rica, Honduras, Malawi, Zimbabwe, South Africa and India. According to Moldenke (1973), this species is "widely distributed through the West Indies, Mexico, Central America, and subtropical and tropical South America to Argentina; introduced and often escaped from cultivation elsewhere".

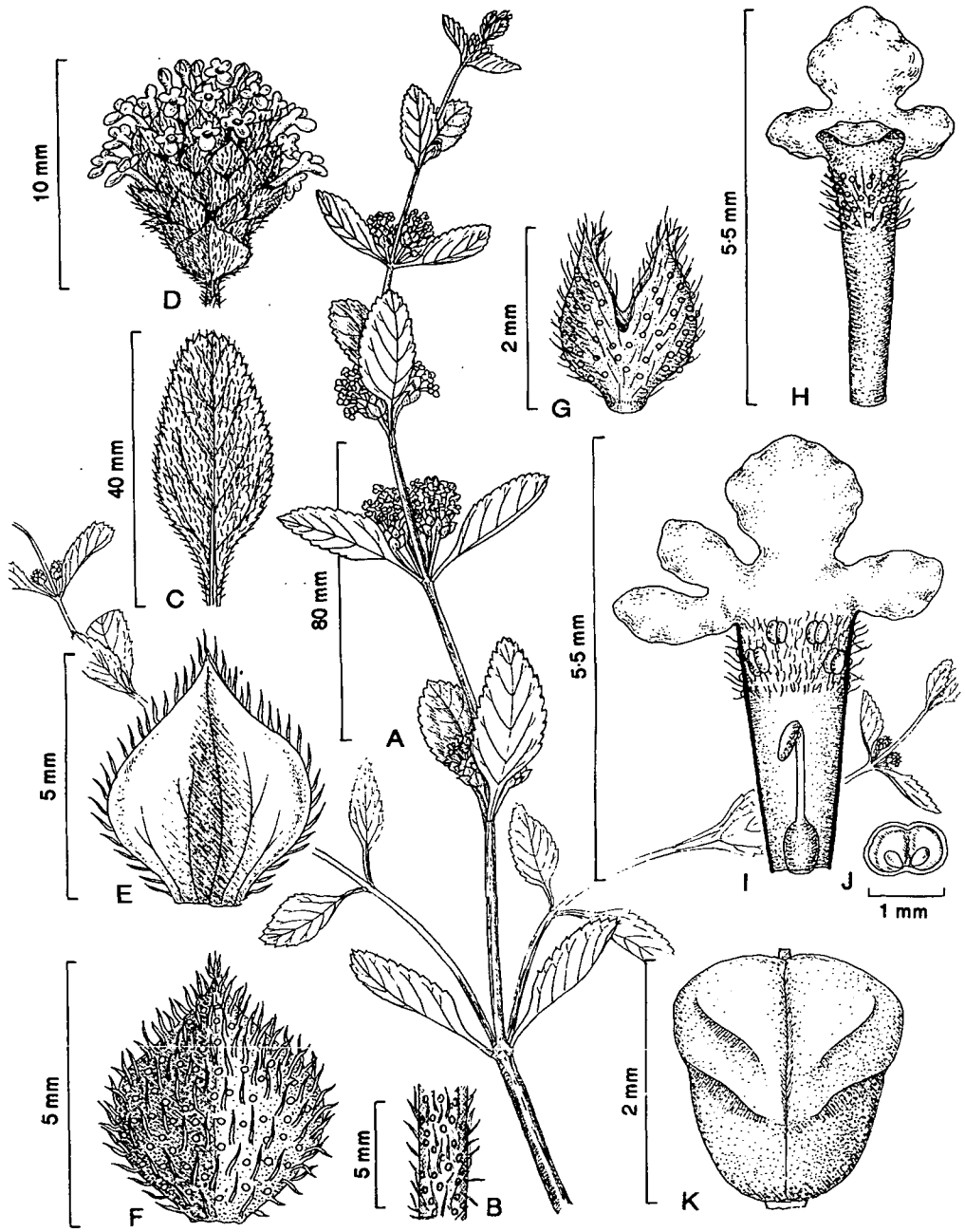
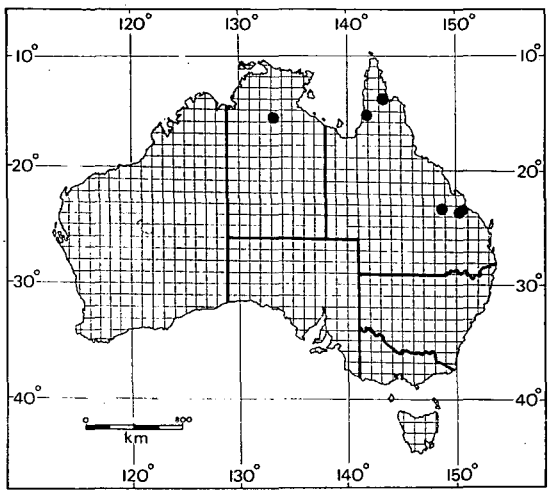


Fig. 1. *Lippia alba* (Mill.)N.E. Br. ex Britton & P. Wilson (A-J, *J.B. Ritson s.n.*: BRI 268862; K, *A. Dietrich 924*: MEL 583718). A, habit sketch of a flower branch; B, part of stem showing hairiness with intermixed glands; C, adaxial view of leaf showing hairiness; D, spike (flower-head); E, adaxial view of bract; F, abaxial view of bract; G, 2-lobed calyx; H, corolla showing glandular and pilose tube on outside; I, corolla longitudinally cut open showing androecium and gynoecium; J, transverse section of ovary; K, fruit.



Map 1. Distribution of *Lippia alba* in Australia

According to collectors' field notes, it is a strongly aromatic shrub, growing in wet places, on muddy river banks and in thickets at lower elevation. It is also known from "gravelly waste places near the sea", "in open woodland" and on "brittle clay loam soil". Sometimes it has been reported to grow on "riverbanks and sandbars". Other collectors have encountered the plant in swampy or gravelly waste places, in dry savannas and cultivated fields, on river flats, in sandy loam, clay loam, dry secondary forests and on wooded hillsides.

Comments

In a handwritten herbarium note, N.E. Brown (Oct. 1921) pointed out "that Miller & Johnston[collection no.] 94 from Margarita Island has been distributed as *Lantana alba* Mill., and feeling sure the name was wrong I compared it with Miller's type of *L. alba* at the British Museum and found that the latter is identical with *Lippia geminata* Kunth in H.B.K.!!. As Miller's name is much the older the plant should be called *Lippia alba*". The combination of *Lantana alba* with *Lippia*, however, was validated about four years later by Britton & P. Wilson (1925).

Moldenke (1973) and Lopez-Palacios (1977) included *Zapania odorata* Pers. and *Verbena odorata* (Pers.)Steud. in the synonymy of *Lippia alba*. Subsequently, Moldenke (1978) pointed out that both these synonyms rather belong to *L. javanica* (Burm.f.)Sprengel.

Meeuse (1942) maintained that *Lantana alba* Mill. [now *Lippia alba*] and *Lippia javanica* (Burm.f.)Sprengel are conspecific, therefore, placed *Lantana alba* in the synonymy of *Lippia javanica*. Meeuse (1942) claimed to have studied the type of *L. javanica*, now preserved in the Delessert Herbarium at Geneva, but there is no indication of his studying the type of *L. alba*, now preserved in the Philip Miller herbarium at the British Museum. The present author has examined the types and other material of both these taxa and found them to belong to two distinct species. Regarding distribution and the specific epithet of *L. javanica*, Meeuse (1942) states that "*Lippia javanica* has, if ever, never been collected in Java again". He further asserts that "unfortunately the specific epithet 'javanica' is quite inappropriate, for the plant does not occur in Java at all". According to present investigation, the genus *Lippia* is not known to occur in any part of Malesia.

H.J. Lam (1919) assumed its presence in the region and recorded it under the name *L. geminata* Kunth, without citing any specimen. In his notes he stated "We make mention of this species, finding it rather probable that it should occur in Malaya, since it is imported into Bengal and Australia".

Patzak & Rechinger (1967) and Stewart (1972) maintained that *Lantana alba* Mill. [now *Lippia alba*] is conspecific with *Lantana indica* Roxb. and placed *L. indica* in the synonymy of *L. alba*. They recorded *L. alba* from the North Western Frontier and Baluchistan provinces of Pakistan. According to C.B. Clarke (1885), *Lippia geminata* Kunth [now synonym of *L. alba* (Mill.)N.E. Br. ex Britton & P. Wilson] is "'so closely resembling *Lantana indica* that without fruit it is difficult to distinguish". He also stated that *L. geminata* is a widely dispersed weed of tropical America, and in the Indo-Pakistan subcontinent it is found only in the southern and

eastern part of tropical India. The occurrence of this species in Pakistan, therefore, is very doubtful and the species recorded by Patzak & Rechinger (1967) is possibly *Lantana indica* Roxb. According to Moldenke (1981), "Material of *Lippia alba* is often misidentified and distributed as *Lantana* species".

According to field notes by one collector [*P. Black 652*: BRI] this plant is "said to be the strongest smelling of the smelly herbs". Howard (1989) states that it is an "Extremely aromatic plant with leaves used widely as a tea for medicinal purposes". Gibson (1970) reports that this plant is "Grown frequently in gardens throughout Central America as a medicinal plant, a tea made from the leaves being a favourite domestic remedy for both intestinal and respiratory disturbances". A similar view is expressed by Standley (1924) who wrote that "The plant is reputed to have sudorific, antispasmodic, stomachic, and emmenagogue properties".

In addition to the above mentioned properties, Moldenke (1973) records its further medicinal use "as a pectoral, diaphoretic and as a tea for diarrhea. The leaves are used in baths in treating fever". Sastri (1962) claims that "The plant is used as a sage in cookery. Leaves are used as vegetable in Khasi hills. They are considered stomachic and nervine in parts of Brazil and Paraguay". Jansen-Jacobs (1988) states that in Guianas it is used as a "medicine for fever. The decoction of the leaves is used to calm down and is soporific".

Over the range of its distribution, this plant has been known by many different local names. In Australia, the Aborigines of Cook district in Queensland call it "Yok Kur" or "Yo Pung". A few other common names given to this plant are: "Bushy Lippia", "Sweet Verbena of the gardens", "Colic Mint", "Cullen Mint" and "Guinea Mint". According to Moldenke (1973), "over a hundred popular names have been recorded for this plant". In his notes on the genus *Lippia*, Moldenke (1978) recorded for this species a long list of vernacular names.

Various colours attributed to the corolla of this taxon could not be confirmed in the many dried herbarium specimens examined here. The variety of corolla-colours mentioned in this description are taken from collectors' field notes.

According to Moldenke (1939, 1973), the flower-bracts are "nearly as long as the corolla". The present author agrees with Grisebach (1862) and Macbride (1960) who claim that the bracts are a "little exceeded by the [violet] corolla".

In his work on the flora of Nicaragua, Goyena (1911) recognised *Lantana alba* Mill., *Lippia geminata* Kunth and *Lippia asperifolia* Rich as three distinct species. He gave detailed description of each but cited no specimens. In the present investigation, the above three taxa are considered conspecific with *Lippia alba* (Mill.)N.E. Br. ex Britton & P.Wilson.

Moldenke (1939, 1973) regarded *L. alba* as "an extremely variable and polymorphic species; with a synonymy of over 40 scientific names. A dozen subspecific entities have been proposed, some of which may be worth maintaining". A range of variation in leaf shape observed during the present investigation is shown in Fig. 2.

Very few botanists have described the fruit of this taxon. Macbride (1960) has recorded only the fruit - ["drupes"] colour as "dark violet" which the present author could not confirm in the dried herbarium specimens examined here.

Affinities

L. alba is nearest to *L. graveolens* Kunth in being an erect shrub with flower-heads usually not elongating in fruit and flower-bracts ovate to broadly lanceolate. Nevertheless, *L. alba* may easily be distinguished by its peduncles being mostly solitary [rarely two] in each leaf axil,

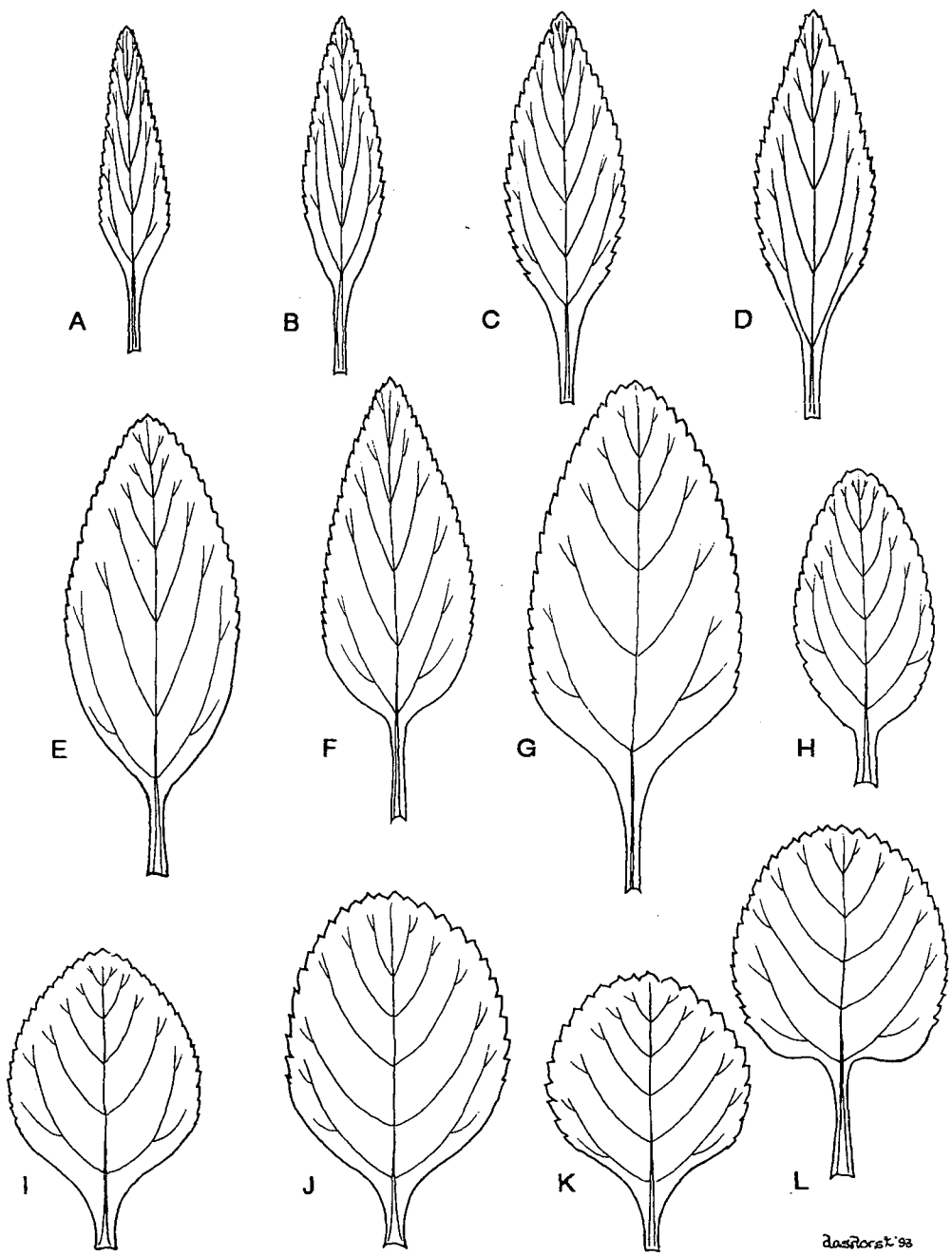


Fig. 2. Range of variation in shape of leaves of *Lippia alba* (Mill.)N.E. Br. ex Britton & P. Wilson. A, *R. Story 3419*: AD; B, *W.J. Hanekom 2267*: AD; C, *A. Schott 46*: F; D, *R.E. Murray Jr 428*: MO; E, *P. Black 652*: BRI; F, *G.M. Calderon 2228*: MO; G, *A. Traverse 1169*: F; H, *N. Byrnes 1357*: DNA; I, *J. Dallachy s.n.*: MEL 583710; J, *A. Dietrich 1543*: MEL; K, *A. Dietrich 893*: MEL; L, *F.M. Bailey s.n.*: MEL 583714.

generally as long as the petiole or longer, and flower-bracts irregularly imbricate in several ranks. In *L. graveolens*, the peduncles are 2 - 6 in each leaf axil, mostly shorter than the petioles; flower-bracts 4-ranked. There are some similarities between *L. alba* and *L. americana* L. Both species have generally 1 or 2 peduncles per leaf axil; flower-bracts imbricate, neither showy, accrescent, nor papyraceous, cuneate-obovate or rotund-ovate, abruptly acuminate or broadly obtuse and short-apiculate. However, *L. americana* can readily be identified by its scrambling, sprawling or scandent habit; leaf-blades more or less scabrous above, entire or obscurely crenate-serrate or serrulate; the trichomes conspicuously bulbous-based, the bases persistent.

Ramakrishnan (1957) considerd his newly described *Lippia unica* Ramakr. as closely "allied" to *L. geminata* Kunth [now *L. alba* (Mill.)N.E. Br. & Britton & P. Wilson]. In his remarks, he stated that "This striking species [i.e. *L. unica*] differs from its allied species *L. geminata* H.B. & K. in its solitary, axillary, condensed, subglobose spikes, elliptic to elliptic-lanceolate, acute, attenuate based leaves with upper surface villous and in its subcordate, acuminate, ciliate bracts. In *L. geminata* H.B. & K. the spikes are in one or two pairs, cylindric and elongate, the leaves ovate, subobtuse with upper surface scabrous-hispidulous hairs with papilose base and somewhat decurrent and the bracts ovate, apicute".

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