

The genus *Volkameria* L. (Lamiaceae) in Thailand

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ABSTRACT. A taxonomic revision of the genus *Volkameria* L. in Thailand is presented. One species is enumerated. Description, ecological and distributional data, vernacular names and illustrations are recorded.

KEYWORDS: Labiatae, Lamiaceae, revision, Thailand, *Volkameria*

INTRODUCTION

The genus *Volkameria* was first established by Linnaeus in 1753 on the basis of one species *V. aculeata* L., belonging to Lamiaceae (Yuan *et al.*, 2010). In previous publications, this genus was treated in the genus *Clerodendrum* L., for example by Fletcher (1938), Kochummen (1978), Moldenke & Moldenke (1983), Liang & Gilbert (1984), Munir (1989), Rajendran & Daniel (2002) and Harley *et al.* (2004), but was then placed in the genus *Volkameria* following the phylogenetic studies of the genus *Clerodendrum* *s.l.* and related genera based on chloroplast DNA (cpDNA) restriction site data (Steane *et al.*, 1997), nuclear ITS sequences (Steane *et al.*, 1999) and the four relatively fast-evolving chloroplast DNA regions of *trnT-L*, *trnL-F*, *trnD-T* and *trnS-fM* (Yuan *et al.*, 2010) strongly indicated that *Clerodendrum* *s.l.* is

separated into three major clades associated with their geographical distribution: an Asian clade, an African clade and a Pantropical Coastal clade. Especially in a Pantropical Coastal group, Yuan *et al.* (2010) recognized this group at the generic level, resurrecting the genus *Volkameria* for these species. The different morphological characters between the two genera of *Volkameria* and *Clerodendrum*, based upon Yuan *et al.* (2010) are presented in Table 1.

Volkameria is a genus of approximately 25-30 species that are distributed in pantropical areas (Yuan *et al.*, 2010). There is one recorded species of *Volkameria* in Thailand (known as *C. inerme* (L.) Gaertn.) (Fletcher, 1938; The Forest Herbarium, 2001; Leeratiwong, 2001). This taxonomic work is a part of the revision of the Lamiaceae for the Flora of Thailand.

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TABLE 1. The morphological comparison of the genera *Volkameria* and *Clerodendrum*

Characters	<i>Volkameria</i>	<i>Clerodendrum</i>
Leaf blade	Usually shorter than 6 cm	Mostly longer than 6 cm
Inflorescence	Mostly axillary	Commonly terminal
Fruiting calyx	Rarely accrescent, smaller than fruits, enclosing the fruit base and not brightly coloured	Accrescent, larger than fruits and brightly coloured
Fruit	Commonly dryish, not brightly coloured	Usually fleshy with bright colour contrasting with calyx

MATERIALS AND METHODS

This study for the Flora of Thailand is based on close examination of both field observations and the herbarium specimens from the following herbaria: AAU, BCU, BK, BKF, BM, C, CMU, E, K, KKU, L, P, PSU, QBG and SING (abbreviations following Thiers, 2014). Morphological, ecological and distributional data, vernacular names and illustrations are also provided.

TAXONOMIC TREATMENT

VOLKAMERIA

L., Sp. Pl.: 637. 1753; Gen. Pl. ed. 5: 284. 1754 & Mant. Pl.: 90. 1767; Burm.f., Fl. Indica: 136. 1768; Juss., Gen. Pl. 2: 144. 1789 & Ann. Mus. Natl. Hist. Nat. 7: 74. 1806; Willd., Enum. Pl.: 658. 1809; Dumort., Anal. Fam. Pl.: 22. 1829; Endl., Gen. Pl. 1: 636. 1838; Ench., Bot.: 312. 1841; Walp., Repert. Bot. Syst. 4: 99. 1845; Schauer in DC., Prodr. 11: 656. 1847; Yuan, Mabb., Steane & Olmstead, Taxon 59(1): 131. 2010.— *Huxleaya* Ewart in Ewart & Rees, Proc. Roy. Soc. Victoria, ser. 2, 25: 109. 1912; Munir, J. Adelaide Bot. Gard. 13: 35.

1990; de Kok, Grayer & Kite, Austr. Bot. 13: 427. 2000; Harley *et al.* in Kubitzki, Fam. Gen. Vasc. 7: 199. 2004.

Shrub, scandent shrub or woody climber, rarely small tree. *Stem and twigs* mostly 4-angled, usually brownish-grey or whitish-grey; nodes swollen, glabrous to pubescent. *Leaves* simple, mostly decussate, rarely whorled (with 3 leaves) or rarely subopposite, glabrous to pubescent; exstipulate. *Inflorescence* cymose, cymes or dichasia, axillary or supra-axillary, upright. *Flowers* bisexual, mostly zygomorphic, resupinate, pedicellate, subtended by bracts or bracteoles. *Calyx* of 5 fused sepals, campanulate, apex with small 5 lobes or sometimes truncate, mostly not accrescent, persistent. *Corolla* sympetalous, hypocrateriform, white, sometimes pink or purple; tube mostly slender; lobes 5, unequal size. *Stamens* 4, didynamous, inserted within corolla tube; filaments long-exserted, alternate with corolla lobes; anthers versatile, 2-lobed, opening by longitudinal slits. *Ovary* superior, bicarpellate, syncarpous, imperfectly 4-locular, with one ovule in each locule; style terminal, elongate, long-exserted, glabrous with shortly, equally bifid. *Fruits* drupaceous,

dryish, mostly becoming black, brown or brownish-black in colour, usually subglobose or obovoid, separating into 4 corky pyrenes, each with 1 exalbuminous seed, subtended by persistent calyx, shorter than fruits.

The genus is widely distributed in the pantropics. There is only one species in Thailand.

***Volkameria inermis* L.**, Sp. Pl.: 637. 1753; Burm.f., Fl. Indica: 136. 1768; Lour., Fl. Cochin.: 388. 1790; Willd., Enum. Pl.: 658. 1809; Yuan, Mabblerley, Steane & Olmstead, Taxon 59(1): 132. 2010. Type: India, *Anon* s.n. in Herb. Linnaeus 890/3 (lectotype Linn, microfiche!).—*Jasminum litoreum* Rumph., Herb. Amb. 5: 86, t. 46. 1747, *nom. illeg.*—*Ovieda inermis* (L.) Burm.f., Fl. Indica: 136. 1768. Type: as for *V. inermis* L.—*Clerodendrum inerme* (L.) Gaertn., Fruct. Sem. Pl. 1: 271. 1788; Burm.f., Fl. Indica: 136. 1768; R. Br., Prodr. Fl. Nov. Holl.: 511. 1810; Hall.f., Meded. Rijks-Herb. 37: 61. 1918; Blume, Bijdr. Fl. Ned. Ind.: 808. 1826; Walp., Repert. Bot. Syst. 4: 112. 1845; Schauer in DC., Prodr. 11: 660. 1847; Miq., Fl. Ind. Bat. 2: 868. 1858; Bent., Fl. Aust. 5: 61. 1870; Kurz, Forest Fl. Burma 2: 266. 1877; C.B. Clarke in Hook.f., Fl. Brit. India 4: 589. 1885; Prain, Bengal Pl. 2: 835. 1903; Brandis, Indian Trees: 507. 1906; Lam, Verb. Malay Arch.: 251. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenzorg, ser. 3, 3: 77. 1921; Merr., En. Philipp.: 401. 1923; Ridley, Fl. Malay. Penins. 2: 624. 1923; Dop in Lecomte, Fl. Indo-Chine 4(7): 854. 1935; Fletcher, Bull. Misc. Inform., Kew 1938: 426. 1938; Bor, Man. Ind. For. Bot.: 303. 1953; Henderson, Malay. Wild Flowers,

Dicot.: 385. 1959; Backer & Bakh.f., Fl. Java 2: 608. 1965; Burkill, Dict. Econ. Prod. Malay. Penins. 1: 592. 1966; Moldenke, Fifth Summary Verbenac. 1: 295. 1971 & Phytologia Mem. 2: 284. 1980; Hsiao, Fl. Taiwan: 421. 1978; Kochummen in Ng, Tree Fl. Mal. 3: 304. 1978; Congdon, Nat. Hist. Bull. Siam Soc. 30(2): 185. 1982; Moldenke & A.L. Moldenke in Dassan. & Fosberg, Rev. Handb. Fl. Ceyl. 4: 447. 1983; Munir, J. Adelaide Bot. Gard. 11: 109. 1989; Keng, Con. Fl. Singapore: 193. 1990; Mabblerley, Sci. New Guinea 19: 39. 1992; Hô, Càyco Vietnam 2: 1052. 1993; Chen & Gilbert in Wu & Raven, Fl. China 17: 42. 1994; Rajendran & Daniel, Ind. Verbenaceae: 112. 2002; Mabblerley, Fl. Nouv. Caléd.: 54, t. 11. 2004; Phuong in N.T. Ban *et al.*, Fl. Vietnam 3: 290. 2005. Type: as for *V. inermis* L.—*V. commersonii* Poir. in Lam., Encycl. 8: 688. 1808. Type: Philippines, (holotype FI herb Desfontaines).—*Clerodendrum coriaceum* Poir. in Lam., Encycl., Suppl. 4: 353. 1816, *nom. illeg.*—*C. ovatum* Poir. in Lam., Encycl., Suppl. 4: 352. 1816, *nom. illeg.*—*C. buxifolium* (Willd.) Spreng., Syst. Veg. 2: 758. 1825. Type: Patria (holotype HBG).—*C. commersonii* (Poir.) Spreng., Syst. Veg. 2: 758. 1825; Schauer in DC., Prodr. 11: 673. 1847; Miq., Fl. Ind. Bat. 2: 882. 1858; Merr., Fl. Manila: 403. 1912. Type: as for *V. commersonii* Poir.—*C. coromandelianum* Spreng., Syst. Veg. 2: 758. 1825; Walp., Repert. Bot. Syst. 4: 112. 1845. Type: India, Coromandel Coast, Pondicherry (holotype HBG).—*C. javanicum* Spreng., Syst. Veg. 2: 759. 1825; Walp., Repert. Bot. Syst. 4: 103. 1845; Miq., Fl. Ind. Bat. 2: 882. 1858. Type: Indonesia, Java (holotype HBG).—

V. neriifolia Roxb. [Hort. Beng.: 46. 1814, *nom. nud.*], Fl. Ind. ed. 1832, 3: 64. 1832. Type: Bangladesh, Chittagong, Island of Mascal, *Roxburgh* s.n. (lectotype BM).— *C. capsulare* Blanco, Fl. Filip.: 509. 1837. Type: not located.— *C. neriifolium* (Roxb.) Wall. ex Steud., Nomencl. Bot., ed. 2, 1: 383. 1840; Walp., Repert. Bot. Syst. 4: 110. 1845; Schauer in DC., Prodr. 11: 660. 1847; C.B. Clarke in Hook.f., Fl. Brit. India 4: 589. 1885; Prain, Bengal Pl. 2: 835. 1903; King & Gamble, J. Asiat. Soc. Bengal 74: 827. 1909; Fletcher; Bull. Misc. Inform., Kew 1938: 425. 1938; Ohwi, Fl. Jap.: 765. 1965. Type: as for *V. neriifolia* Roxb.— *C. inerme* var. *oceanicum* A. Gray, Proc. Amer. Acad. Arts 6: 50. 1862. Type: South Pacific, *C. Wilkes* s.n.— *C. inerme* var. *neriifolium* (Roxb.) Kurz, Forest Fl. Burma 2: 266. 1877. Type: as for *V. neriifolia* Roxb.— *C. neriifolium* var. *macrocarpum* Wall. [Cat. No. 1879.4, *nom. nud.*] ex C.B. Clarke in Hook.f., Fl. Brit. India 4: 589. 1885. Type: Myanmar, Rangoon, *Wallich* Cat. No. 1879.4 (holotype G-DC, microfiche!; isotype K-W!).— *C. ovalifolium* (A. Juss.) Bakh., Bull. Jard. Bot. Buitenzorg, III, 3: 95. 1921, *nom. illeg.*— *C. inerme* var. *macrocarpum* (Wall. ex C.B. Clarke) Moldenke, Phytologia 22: 6. 1971. Type: as for *C. neriifolium* var. *macrocarpum* Wall. ex C.B. Clarke. Fig. 1.

Scandent shrub or shrub 1-4 m tall; bark brownish-grey or whitish-grey; stem hollow and distinctly swollen, 4-angled, lenticellate, very minutely pubescent or glabrous. *Leaves* chartaceous to subcoriaceous, ovate, obovate, elliptic, elliptic-ovate or lanceolate-ovate,

3-12×2-9 cm, apex acute, obtuse or shallowly retuse, base cuneate or rounded, margin entire, glabrous on both surfaces except with sparsely brown pubescent midrib, with pellucid dots; secondary veins 4-7 on each side; petiole 3-20 mm long, slender. *Inflorescences* usually 3-flowered or occasionally 3-7-flowered, 3-10 cm long; peduncles 1-5 cm long; pedicels 2-9 mm long; bracts linear, 1-2.5×0.1-0.4 mm; bracteoles linear, 0.3-1.5 mm long. *Calyx* green or brownish-green, campanulate, 3-7.5 mm long, apex truncate to minutely toothed; calyx lobes broadly triangular, 0-1.5×0-0.6 mm, apex acute. *Corolla* white sometimes touched with purple; corolla tube (1.5-)2-4 cm long, cylindrical, slender, outer surface covered with sparsely pubescent hairs and glands, inner surface villous; corolla lobes oblong-ovate, oblong, elliptic-oblong or rarely obovate, (3.5-)8-12×(1.5-)4-6 mm. *Stamens* short filaments 1.5-3.5 cm long; long filaments 1.7-4 cm long; anthers oblong, 1.8-3 mm long. *Ovary* oblong-ovate to subglobose, 1.1-2 mm long, slightly 4-lobed at apex, glabrous, with white glands; style 3-6 cm long; stigma (0.6-)1.2-1.7 mm long. *Fruits* 7-15 mm in diam., hard, shiny; persistent calyx 4-10 mm long.

Thailand.— NORTHERN: Nakhon Sawan (Paknam); SOUTH-WESTERN: Ratchaburi, Phetchaburi, Prachuap Khiri Khan (Bang Saphan, Hua Hin, Khao Klong Wan, Kui Buri, Sam Roi Yod); CENTRAL: Nakhon Pathom (Salaya), Bangkok (Chulalongkorn University, cultivated), Samut Prakan, Samut Sakhon; EASTERN: Chon Buri (Si Chang island), Rayong (Klang),

Chanthaburi (Samaesarn island, Tha Mai), Trat (Bang Son, Chang island, Klong Yai, Mak island); PENINSULAR: Chumphon (Khao Mudtree, Lang Suan, Sawi, Ta Ko), Ranong (Ngao), Surat Thani (Bang Yai, Prab island, Yae island), Phangnga (Surin island, Takuapa), Phuket, Trang (Khlong Toh, Kradan island, Lanta Yai island, Si Kao), Satun (Tarutao island), Songkhla (Yo island, Sathing Phra), Narathiwat (Tak Bai).

Distribution.— Wildly distributed in coastal areas from Southern China, Southern Asia, South-east Asia, Australia to Pacific ocean.

Ecology.— Growing along the seashore, beach, mangrove forests, riverbanks and basins, 0-100 m alt. Flowering and fruiting throughout the year.

Vernacular.— Khieo ngu (เขี้ยวงู) (Prachuap Khiri Khan); Kha ki (คากี้) (Southern); Som ne ra (ส้มเนรา) (Ranong); Sak khri yan (สักขรีย่าน) (Chumphon); Sampan nga (ส้มปอง) (Satun), Samma nga (ส้มเงา), Sammali nga (ส้มละเลิง), Samli nga (ส้มลิง) (Central, Eastern); Embreert, Garden quinine, Sorcerers bush, Wild jasmine.

Specimens examined.— *Adisai* 971 (BK); *K. Boonsong & T. Danwiwat* s.n. (BCU); *D. Bouche* s.n. (BK); *P. Chantaranothai et al.* 90/366 (K); *C. Chermsirivathana & T. Smitinand* 2137 (BKF); *D.J. Collins* 96 (K), 1440 (K); *G. Congdon* c39 (AAU, PSU); *N. Fukuoka* T-36266 (BKF), s.n. (BKF); *R. Geesink, T. Hattink & Ch. Charoenphol* 7299 (BKF); *R. Geesink & T. Santisuk* 5218 (BKF, K); *B. Hansen & T. Smitinand* 12256 (BKF, K, SING), 12367 (AAU, BKF, E, K, L);

Itsara 3 (BCU); *K. Iwatsuki* T-27776 (BKF), s.n. (BKF 72147, BKF 82574); *Jaray* 133 (BK); *A.F.G. Kerr* 2039 (BM, K), 2127 (BM, K), 3672 (BM), 11693 (BK, BM, E, K), 12452 (BK), 12652 (BM, K), 16133 (BK, BM, E, K), 17307 (BK, BM, E, K, SING); *C.B. Kloss* 6555 (K); *M.C. Lakshnakara* 415 (BK); *K. Larsen & S.S. Larsen* 33773 (BKF, K); *K. Larsen, T. Smitinand & E. Warncke* 1216 (AAU, BKF); *C. Leeratiwong* 98-2 (KKU), 99-25 (KKU); 2000-9 (KKU), 2000-32 (KKU, PSU); *Marcan* 292 (BM), 711 (BM, SING); *J.F. Maxwell* 93-1017 (CMU, L); *B. Na Songkhla* 629 (BCU); *C. Niyomdham* 589 (BKF); *Y. Paisooksantivatana* y2346-89 (BK); *C. Phengkklai et al.* 3807 (BKF, PSU), 11454 (BKF); *C. Phengkklai & T. Smitinand* 6094 (BKF, K); *S.N.* 86 (BKF), 107 (BKF); *Put* 1538 (BK, BM, E), 1701 (BK, BM, E); *Rabil* 31 (BK); *S. Samadasinwanich* 7 (BCU); *B. Sangkhachand* 1082 (BKF); *T. Shimizu, F. Konta, Th. Wongprasert & B. Sangkhachand* T-28747 (BKF); *G. Seidenfaden* 2077 (BKF, SING); *T. Sindhiphongse* 81 (BKF), *P. Sirirugsa* 647 (PSU); *E. Smith* 928 (BK, E); *T. Smitinand* 232 (BKF); *T. Smitinand & E.C. Abbe* 6563 (BKF, K); *Th. Sørensen, K. Larsen & B. Hansen* 2525 (BKF); *S. Stirapunthu* 9 (BCU); *Sutas* 34 (PSU); *S. Sutheesorn* 1015 (BK), 1332 (BK), 2141 (BK); *Thaew* 81 (BKF); *A. Ubolchalaket* 107 (K); *Umpai* 288 (BK); *Vacharapong* 36 (BK); *Vacharee* 128 (BK); *Vanpruk* 839 (BKF, K); *Th. Wongprasert* s.n. (BKF).



FIGURE 1. *Volkameria inermis* L.: A. flowering branch; B. inflorescence; C. fruits.

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