

A checklist of the genus *Tarennia* Gaertn. (Rubiaceae) in Thailand

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ABSTRACT. A checklist of the genus *Tarennia* in Thailand is presented. Twenty-four species and one variety are recorded. *T. cinnamomea* Craib, *T. elliptica* Craib, *T. pubescens* Craib and *T. viridis* Craib are reduced to synonymy of *T. pulchra* (Ridl.) Ridl., *T. collinsae* Craib, *T. cinerea* Craib and *T. puberula* Craib, respectively. A key to the species is provided, together with ecological data and information on the geographical distribution. Some species are illustrated.

INTRODUCTION

The generic name *Tarennia* was established in 1788 when J. Gaertner described the genus in his *De Fructibus et Seminibus Plantarum*. The genus name is based on the vernacular name of *T. zeylanica* Gaertn., which was known to the natives of Ceylon as *Tarennae* (Merrill, 1920). The genus contains ca 180 species, and is distributed in the tropical parts of Asia and Africa (De Block & Robbrecht, 1998) with species occurring in primary evergreen forests and scrub in the lowlands as well as at higher altitude.

The delimitation of the infrageneric elements of the genus *Tarennia* is largely based on placentation and seed type which are both very variable in morphology and anatomy (Bridson 1979; De Block et al. 2001). For example, in terms of placentation, the number of ovules per locule varies from one to numerous; they may be (partly) immersed in the placenta or pendulous from it; the placenta itself may be attached at the upper half, the middle or at the lower half of the septum. Seeds are very diverse too, e.g. the number and shape of the seeds range from a single spherical seed to numerous small angular seeds; the endosperm is ruminate or entire; their exotestal cells are parenchymatous to thickened at the outer tangential and radial walls (De Block 1997; De Block & Robbrecht 1998). The systematic affinities of the genus have been discussed by Verdcourt (1958), Bremekamp (1966), and recently by Andreasen & Bremer (1996), De Block et al. (2001) and Degreef et al. (2001). The genus is placed in the tribe Pavetteae, subfamily Ixoroideae, and Hooker (1880) separated the genus (as “*Webera*”) into two sections for the Asiatic species, based mainly on the number of ovules per locule. The first section, *Euwebera*, had two ovules or more in each locule. The second one, *Pseudixora*, had one ovule per locule.

Like many Rubiaceae genera, the genus *Tarennia* is very poorly known in Thailand. Craib (1915) described three new species, *T. collinsae* Craib, *T. pauciflora* Craib and *T. vanprukii* Craib. Later, 22 species and 11 varieties were recorded in the *Florae Siamensis*

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Enumeratio (Craib, 1932), but no key was provided. No recent treatment is available and the lack of a revision has led to difficulty in the identification of Thai species. To remedy this, this study gives an overview of all Thai species, information on their ecology and distribution as well as a key for identification.

Govaerts et al. (2008) list 24 species of *Tarenna* from Thailand in the World Checklist of Rubiaceae. Based on our understanding of species' patterns of variation and examination of type specimens, our treatment differs from that of the checklist as regards the status of some taxa (see below). In particular, we did not find any specimens of *T. asiatica* (L.) Kuntze ex K. Schum. from Thailand, which is presented as a Thai species by the checklist. *T. asiatica* is very similar to *T. hoaensis* Pit. so some Thai specimens of the latter have been determined as the former in error. *T. hoaensis* differs from *T. asiatica* through being a smaller tree with very large leaves and its inflorescences possessing sparsely short-hairy axes.

TAXONOMIC TREATMENT

TARENNA

Gaertn., Fruct. Sem. Pl. 1: 139. 1788; Hiern in Oliver, Fl. Trop. Afr. 3: 88. 1877; Koord. & Valetton, Meded. Lands Plantentuin 59: 77. 1902; Dalla Torre & Harms, Gen. Siph.: 497. 1905; Merr., Philipp. J. Sci. 17: 461. 1920; Pit. in H. Lecomte, Fl. Indo-Chine 3: 205. 1922; Ridl., Fl. Malay Penins. 2: 102. 1923; Hutchinson & Dalziel, Fl. W. Trop. Afr. 2: 75. 1931; Bremekamp in Feddes Repert. Spec. Regni Veg. Nov. 37: 7. 1934; Corner, Ways. Trees. 2: 651. 1940; Backer & Bakh.f., Fl. Java 2: 162. 1965; Bridson, Kew Bull. 34: 377. 1979; Wong in Ng, Tree Fl. Malaya 4: 409. 1989.—*Cupi* Rheede, Hortus Malabaricus 2: 23. 1678, (nom. rej.); Adans., Fam. Pl. 2: 158. 1791.—*Chomelia* L., Opera Varia: 210. 1758, (nom. rej.); Schumann in Engl. & Prantl, Pflanzenfam. 4(4): 74. 1891.—*Webera* Schreb., Gen. Pl. 2: 794. 1791; Benth. & F. Muell., Fl. Austral. 3: 412. 1866; Kurz, Forest Fl. Burma 2: 46. 1877; Hook.f., Fl. Brit. India 3: 101. 1880; King & Gamble, Mat. Fl. Malay Penins. 15: 64. 1904.—*Stylocoryna* Cav., Icon. 4: 45. 1797; Miq., Fl. Ned. Ind. 2: 202. 1856; King & Gamble, Mat. Fl. Malay Penins. 14: 198. 1904; Ridl., Fl. Malay Penins. 2: 108. 1923.—*Canthiopsis* Seem., Fl. Vit.: 166. 1866.—*Bonatia* Schltr. & K. Krause, Bot. Jahrb. Syst. 40(92): 44. 1908.—*Flemingia* Hunter ex Ridl., J. Straits Branch Roy. Asiat. Soc. 53: 83. 1909.—*Camptophytum* Pierre ex A. Chev., Veg. Ut. Afr. Trop. Franç. 9: 221. 1917.

Small trees, treelets, small or large shrubs, to 7 (–25) m high; young branches subterete to terete in cross-section, with a groove running longitudinally in the middle on the wider sides, bark greenish, brownish or white, glabrous or hairy; older branches terete, subterete to rounded, bark brownish, grey or black, smooth, shallowly cracked or corky, glabrous or pubescent. Leaves simple, opposite-decussate; blade ovate, obovate, elliptic, ovate-oblong, obovate-oblong or lanceolate, membranous to coriaceous; upper surface pale green or greenish, glabrous or sparsely to densely pubescent, hairs often restricted to nerves; lower surface greenish, glabrous or sparsely to densely pubescent, hairs sometimes microscopic, drying dark brown to black; base attenuate, cuneate or rounded; apex acute, acuminate or caudate; margin entire, rarely undulate or sometimes revolute; lateral nerves 4–9 (–14) pairs, inconspicuous or conspicuous beneath, without or with hairs tuft or ciliate crypt domatia

at the angle between mid-vein and lateral nerves. Petiole glabrous or pubescent. Interpetiolar stipules broadly triangular, narrowly triangular, filiform or cuspidate, persistent or caducous, blackish at central area when dry, sometimes with secretory collectors present on the adaxial side. Inflorescences terminal on main or lateral branches, sessile or pedunculate, if pedunculate then erect or pendulous; brachiate dichasial cymes, compact or lax; peduncle short or sessile; axes, pedicels and calyces glabrous or covered with short hairs; order bracts with both stipular and foliar parts or with only stipular parts, the stipular parts triangular, broadly triangular or narrowly triangular, the foliar parts elliptic, triangular, narrowly triangular or forming small leaves, bracts present at the base of all branches, persistent or caducous. Flowers 5-merous, fragrant, bisexual, in threes (triads) at the branchlet ends, with bracteoles at the base all branches, persistent or caducous; the flowers of the triad with a short pedicel or sessile; bracteoles usually present except for the central flowers of the triads, opposite at the base of the ovary or on the pedicel, filiform or narrowly triangular with acuminate apex. Calyx green, hairy; tube short; lobes filiform, triangular, broadly triangular or ovate, with rounded or acute tips, as long as, shorter or longer than the inferior ovary. Corolla white, cream or greenish, tube cylindrical or funnel-shaped, on the inside the upper part near the throat pubescent (hairs silky or short) and the lower part glabrous, outside pubescent; lobes contorted to the left in bud, with rounded, acute or apiculate apex, the inner surface glabrous or pubescent at the base, the outer surface covered with spreading hairs, margins ciliate. Stamens inserted at the corolla throat, alternate with the corolla lobes, attached to the throat by a short filament, filaments tubular, glabrous; anthers linear, with short sterile apical appendix, basifixed, opening by means of longitudinal slits, twisted or not after spreading. Style-stigma complex conspicuously long-exserted, fusiform or club-shaped, densely soft hairy above or sparsely short hairy; the lower stylar portion slender, as long as, shorter or longer than the swollen upper part; the latter bearing stigmatic areas fused over most of the length, represented by papillate, longitudinal furrows, the 2 stigmas only free at their very tip. Ovary small, globose or ellipsoid, glabrous to densely hairy, with 2 locules, each containing a fleshy, peltate, axillary placenta, ovules one, a few or numerous, immersed in the placenta; disc conspicuous. Fruits berry-like, bilocular, globose, subglobose or ellipsoid, with short persistent calyx or calyx scar, glabrous or pubescent, dark green, greenish or whitish, black when ripe; endocarp membranaceous. Seeds 1-many per fruit, globose to subglobose with $\pm$ circular adaxial cavity in case of one seed per fruit, plano-convex in case of a few seeds per fruit and broadly triangular or angular in case of numerous seeds per fruit, brownish to black, testa with secondary thickenings; endosperm horny; embryo curved, with foliaceous cotyledons.

About 370 species in the tropics, with the highest number in Africa. Twenty-four species and one variety in Thailand.

KEY TO THE SPECIES (A)

(based mainly on flowering material)

1. Mature inflorescences erect, peduncle straight
2. Locule 1-ovulate
3. Corolla lobes elliptic; corolla bud stellate, with apiculate apex
4. Calyx lobes broadly triangular, shorter than the ovary
4. Calyx lobes linear, as long as or longer than the ovary

21. *T. stellulata*

12. *T. insularis*

3. Corolla lobes oblong; corolla bud truncate, without apiculate apex
5. Both surfaces of leaf glabrous or sparsely covered with short hairy on the lower surface
6. Pedicel of the center flower sessile or short, to 2 mm long
7. Inflorescence more than 2.5 cm long; central first order axes more than 5 mm long
8. Calyx lobes triangular or filiform, with acute apex
9. Leaves oblong or lanceolate, the length more than 3 times the width
10. Inflorescences sparsely covered with short hairs; calyx lobes triangular, shorter than the ovary
11. Leaves membranous; fruit crowned by persistent calyx
12. Calyx lobes narrowly triangular; corolla bud acute; northeastern and southeastern Thailand **19. *T. quocensis***
12. Calyx lobes broadly triangular; corolla bud truncate; peninsular Thailand only **24. *T. wallichii***
11. Leaves coriaceous; fruit with calyx scar **23. *T. vanprukii***
10. Inflorescences densely covered with short hairs; calyx lobes filiform, as long as or longer than the ovary **22. *T. valida***
9. Leaves elliptic, the length less than 3 times the width **4. *T. collinsae***
8. Calyx lobes ovate, with rounded apex
13. Small tree; leaves elliptic, more than 5 cm wide **11. *T. hoensis***
13. Shrubs; leaves lanceolate, less than 5 cm wide **20. *T. sakae***
7. Inflorescences to 2.5 cm long; central first order axes to 5 mm long **14. *T. membranacea***
6. Pedicel of the center flower more than 2 mm long
14. Both surfaces of leaf glabrous
15. Leaves elliptic or obovate; calyx lobes ovate, with rounded apex **5. *T. pauciflora***
15. Leaves ovate; calyx lobes broadly triangular, with acute apex **1. *T. adangensis***
14. Lower leaf surface puberulous **6. *T. curtisii***
5. Upper leaf surface glabrous or hairy on midrib only, lower leaf surface densely pubescent or softly cinereo-pubescent
16. Leaves less than 5 cm wide; calyx lobes broadly triangular, with acute apices **3. *T. cinerea***
16. Leaves more than 5 cm wide; calyx lobes ovate, with rounded **8. *T. harmandiana***
2. Locule a few multi-ovulate
17. Calyx lobes as long as or longer than the ovary, locule 3-ovulate
18. Lower leaf surface with sparse or microscopic hairs; corolla bud truncate, without apiculate apex **2. *T. angustifolia***
18. Lower leaf surface puberulous; corolla bud stellate, with apiculate apex **17. *T. puberula***
17. Calyx lobes shorter than the ovary; locule multi-ovulate
19. Trees; leaves obovate; corolla tubes less than 1 cm long, style-stigma complex less than 2 cm long **5. *T. costata***
19. Large shrubs; leaves elliptic; corolla tubes more than 1.2 cm long, style-stigma complex more than 3 cm long **7. *T. fragrans***
1. Mature inflorescence pendulous, peduncle curved
20. Leaves elliptic, lanceolate or oblanceolate, glabrous or hairy on the lower surface only; pedicel of the center flower more than 3 mm long
21. Upper leaf surface glabrous, lower leaf surface hairy
22. Lower leaf surface hispidulous
23. Leaves lanceolate; calyx lobes triangular, shorter than the ovary **9. *T. hirsuta***
23. Leaves oblanceolate; calyx lobes filiform, as long as or longer than the ovary **10. *T. hispidula***
22. Lower leaf surface densely pubescent **13. *T. longifolia***
21. Both surfaces of leaf glabrous **18. *T. pulchra***
20. Leaves ovate, hairy on both surfaces; pedicel of the center flower less than 3 mm long or sessile **16. *T. pilosa***

KEY TO THE SPECIES (B)

(based mainly on vegetative and fruit characters)

1. Lower leaf surface glabrous or with hairy domatia in the nerve axils
2. Lateral nerves up to 7 pairs
 3. Leaf apex acuminate; fruiting inflorescence more than 2.5 cm long
 4. Leaves ovate; calyx lobes broadly triangular, with acute apex **1. *T. adangensis***
 4. Leaves elliptic or obovate; calyx lobes ovate, with rounded apex **15. *T. pauciflora***
 3. Leaf apex acute; fruiting inflorescence to 2.5 cm long **14. *T. membranacea***
2. Lateral nerves more than 7 pairs
 5. Leaves elliptic, the length less than 3 times the width
 6. Leaves less than 5 cm wide **4. *T. collinsae***
 6. Leaves more than 5 cm wide **11. *T. hoensis***
 5. Leaves oblong or lanceolate, the length more than 3 times the width
 7. Fruiting inflorescence erect, peduncle straight
 8. Leaves membranous; fruit crowned by persistent calyx
 9. Fruits more than 7.5 mm wide, persistent calyx lobes narrowly triangular; northeastern and southeastern Thailand **19. *T. quocensis***
 9. Fruits less than 7.5 mm wide, persistent calyx lobes broadly triangular; peninsular Thailand only **24. *T. wallichii***
 8. Leaves coriaceous; fruit with calyx scar **23. *T. vanprukii***
 7. Fruiting inflorescence pendulous, peduncle curved **18. *T. pulchra***
1. Lower leaf surface hairy
10. Fruit with 1–2 seeds
 11. Leaves elliptic or lanceolate; upper leaf surface glabrous or hairy on the mid-vein only
 12. Lower leaf surface hispidulous or sparsely covered with short hairs
 13. Fruiting inflorescence erect, peduncle straight
 14. Lateral nerves more than 7 pairs
 15. Lateral nerves inconspicuous; peduncle more than 1 cm long, densely hairy **22. *T. valida***
 15. Lateral nerves conspicuous; peduncle to 1 cm long, glabrous or sparsely hairy **20. *T. sakae***
 14. Lateral nerves less than 7 pairs
 16. Leaves less than 4 cm wide
 17. Leaf apex acuminate; fruit with persistent filiform calyx; calyx lobes longer than the ovary **12. *T. insularis***
 17. Leaf apex acute; fruit with persistent broadly triangular calyx lobes; calyx lobes shorter than the ovary **6. *T. curtisii***
 16. Leaves more than 4 cm wide **21. *T. stellulata***
 13. Fruiting inflorescence pendulous, peduncle curved
 18. Leaves oblanceolate; calyx lobes filiform, as long as or longer than the ovary **10. *T. hispidula***
 18. Leaves lanceolate; calyx lobes broadly triangular, shorter than the ovary **9. *T. hirsuta***
 12. Lower leaf surface velvety or pubescent
 19. Leaves elliptic; fruiting inflorescence erect, peduncle straight
 20. Leaves less than 5 cm wide **3. *T. cinerea***
 20. Leaves more than 5 cm wide **8. *T. harmandiana***
 19. Leaves oblanceolate; fruiting inflorescence pendulous, peduncle curve **13. *T. longifolia***
 11. Leaves ovate; upper leaf surface hairy **16. *T. pilosa***
10. Fruit with 3–numerous seeds
 21. Fruit with 3–6 seeds
 22. Leaves coriaceous, shiny; lower leaf surface with sparse or microscopic hairs; petiole to 1 cm long **2. *T. angustifolia***
 22. Leaves membranous; lower leaf surface hispidulous; petiole more than 1 cm long **17. *T. puberula***
 21. Fruit with numerous seeds

23. Trees; leaves obovate, with acute apex; lateral nerves conspicuous beneath **5. *T. costata***
23. Large shrubs; leaves elliptic, with acuminate apex; lateral nerves inconspicuous beneath **7. *T. fragrans***

1. *Tarenna adangensis* (Ridl.) Ridl., Fl. Malay Penins. 2: 107. 1923; Craib, Fl. Siam. 2: 87. 1932; Wong in Ng, Tree Fl. Malaya 4: 412, 415. 1989; Turner, Gard. Bull. Singapore 47: 447. 1995.— *Webera adangensis* Ridl., J. Straits Branch Roy. Asiat. Soc. 61: 54. 1912. Type: Thailand, Adang Island, 22 July 1911, *Ridley* 15897 (holotype **K!**; isotype **SING!**).— *T. calcarea* Ridl., J. Straits Branch Roy. Asiat. Soc. 86: 295. 1922. Type: Malaysia, Perak, 26 Jan. 1921, *Ridley* s.n. (holotype **K!**).

Thailand.—SOUTHWESTERN: Phetchaburi [Kaeng Krachan, 9 Aug. 2002, *Middleton, Suddee, Davies & Hemrat* 894 (**K**)]; Prachuap Khiri Khan [Thap Sakae, Huai Yang Waterfall, 25 March 1987, *Soejaito, Smitinand, Santisuk, Taylor & Nantasak* 5790 (**L**), 22 Aug. 1982, *Shimizu, Konta, Wongprasert & Sangkhachand* T-28694 (**BKF**)]; PENINSULAR: Chumphon [Siepyuan, 7 Sept. 1927, *Put* 1001 (**BK, BM, K**)]; Surat Thani [Kanchanadit, 31 Aug. 1927, *Kerr* 13050 (**BK, BM**)]; Kantuli, 7 Sept. 1931, *Put* 4132 (**AAU, BK, BM, K**); Khlong Phanom National Park, 18 April 2005, *Kesonbua* 164 (**KKU**); Ko Ngua Talam, 7 April 1927, *Kerr* 12533 (**BK, BM, K**); Ko Pa-ngan, 11 Nov. 1927, *Put* 1263 (**BK, BM, K**); Ko Tao, 29 March 1927, *Kerr* 12474 (**BK, BM, K**) & 12724 (**BK, BM, K**), 24 Aug. 1927, *Kerr* 13016 (**BK, BM, K**), 10 July 1927, *Kerr* s.n. (**BM**); Aug. 1975, *Prapat* 3 (**K**); Phangnga [Ko Si Ko Ha, 12 April 1928, *Kerr* 15147 (**AAU, BK, BM, K**); Ko Surin, 17 March 2006, *Kesonbua* 179 (**KKU**); Similan Island, 8 April 1999, *Wongprasert et al.* s.n. (**BKF**); Thung Song, Khao Chem, 21 July 1929, *Rabil* 133 (**BK, BM, K**); Krabi [Ko Phi Phi, 8 April 1930, *Kerr* 18874 (**BK, BM, K**), 10 April 1930, *Kerr* 18916 (**BK, K**); Muang, Wat Tham Suea, 19 April 2005, *Kesonbua* 166 (**KKU**); Phatthalung [Sri Ban Pot, Khao Pu Khao Ya, summit of Pa Peung, 1 April 2005, *Kesonbua* 156 (**KKU**), 13 June 1987, *Maxwell* 87–556 (**AAU, BKF, CMU, L, PSU**)]; Trang [Khao Chong, 30 Nov. 1969, *Sangkhachand* 2203 (**BK**); Khao Wang, 3 Aug. 1929, *Rabil* 345 (**BK, BM**); Si Kaew, Had Long Yin, 8 April 2003, *Middleton, Chamchamroon, Lindsay, Pooma & Suwanachat* 2045 (**BKF**); Satun [Adang Island, 14 Jan. 1928, *Kerr* 14372 (**BK, K**); La-ngu, Ko Kabeng, Sept. 1999, *Phengkklai et al.* 12142 (**BKF**); Tung Nui, 13 Aug. 1928, *Kerr* 14656 (**AAU, K, L**); Songkhla [Pedang Basar, Khao Lup Chang, 9 April 2005, *Kesonbua* 149 (**KKU**), 25 June 1986, *Maxwell* 86–419 (**AAU, BKF**)]; Yala [Than To, 16 June 1970, *Smitinand* 11004 (**BKF, K, L, P, E**)].

Distribution.—Peninsular Malaysia, Singapore.

Ecology.—Common in evergreen forest, frequently on limestone bedrock; altitude to 800 m. Flowering and fruiting periods: All year round.

Vernacular.—Khem khao dam (เข็มนาดำ) (Chumphon); yai krang bai yai (ยายกรังใบใหญ่) (Surat Thani).

Notes.— *Tarenna adangensis* is easily distinguished by means of its lax inflorescences, long pedicels and coriaceous, ovate leaves without domatia in the vein angles; the calyx lobes are broadly triangular with acute apices and the stigma is glabrous.

2. *Tarenna angustifolia* (King) Merr., Philipp. J. Sci. 17: 472. 1920; Craib, Fl. Siam. 2: 88. 1932; Wong in Ng, Tree Fl. Malaya 4: 412, 414. 1989; Turner, Gard. Bull. Singapore 47: 447. 1995.— *Stylocoryna angustifolia* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 72: 199. 1903; Ridl., Fl. Malay Penins. 2: 108. 1923. Type: Malaysia, Perak, April 1885, *King* 8265 (holotype **K!**; isotype **SING!**).

Thailand.— PENINSULAR: Surat Thani [Khlong Phanom National Park, 18 April 2005, *Kesonbua* 165 (**KKU**)]; Phangnga [Takua Thung, Khao Phing Kan, without date, *Shimizu, Konta, Wongprasert & Sangkhachand* T-29214 (**BKF**)]; Krabi [Ko Phi Phi Le, 10 April 1930, *Kerr* 18925 (**BK, BM**)]; Muang, Wat Tham Suea, 23 Oct. 2004, *Kesonbua* 124 (**KKU**) & 21 March 2006, *Kesonbua* 180 (**KKU**); Noppkrat Tara beach (Ko Noi), 23 Oct. 2004, *Kesonbua* 126 (**KKU**); Sra Morakot Wildlife Sanctuary, 10 April 2003, *Middleton, Lindsay & Pooma* 2099 (**BKF**)]; Nakhon Si Thammarat [Thung Song, Khao Chem, 21 July 1929, *Rabil* 130 (**BK, BM**)]; Satun [Tarutao Island, 21 April 1969, *Chermisiriwathana & Kasem* 1476 (**BK**)].

Distribution.— Peninsular Malaysia, Singapore, Philippines.

Ecology.— Common in evergreen forest, on limestone bedrock in the peninsula; altitude to 150 m. Flowering and fruiting periods: March to October.

Notes.— *Tarenna angustifolia* varies considerably: the upper surface of leaf is usually glabrous, but often there are sparse hairs or microscopic hairs on the lower surface, whereas some specimens have only sparsely distributed hairs on the leaf veins. The leaf shape varies from ovate or lanceolate to broadly elliptic. The inflorescence branches are short with dense flowers and the ovary has a few ovules per locule.

3. *Tarenna cinerea* Craib, Fl. Siam. 2: 88. 1932. Type: Thailand, Surat Thani, Nawng Wai, 8 March 1927, *Kerr* 12283 (holotype **K!**; isotypes **BK!, BM!**).— *T. pubescens* Craib, Fl. Siam. 2: 94. 1932, **synon. nov.** Type: Thailand, Prachuap Khiri Khan, Pak Tawan, 29 July 1931, *Kerr* 20516 (holotype **K!**; isotypes **BK!, BM!**).

Thailand.— NORTHEASTERN: Loei [Wang Sa Phung, 17 March 1927, *Kerr* 1345 (**BK**)]; SOUTHWESTERN: Prachuap Khiri Khan [Bang Saphan, 24 Dec. 1927, *Kerr* 8192 (**K**), without date, *Put* 1345 (**BM, K**); Pak Tawan, 29 July 1931, *Kerr* 20516 (**BK, BM, TCD, K**)]; PENINSULAR: Chumphon [Lang Suan, Tako, 13 June 1928, *Put* 1635 (**BK, BM**)]; Surat Thani [Nong Wai, 8 March 1928, *Kerr* 12283 (**BK, BM, K**)].

Distribution.— Endemic to Thailand.

Ecology.— Scattered on rocky limestone hills in evergreen forest; altitude 100–300 m. Flowering and fruiting periods: December to July.

Notes.— *Tarenna cinerea* can be distinguished by the elliptic leaves which are glossy on the upper surface and pubescent on the lower surface, the calyx lobes are broadly triangular and the ovary is densely covered with hairs.

4. *Tarenna collinsae* Craib, Bull. Misc. Inform., Kew 1915: 430. 1915 & Fl. Siam. 2: 89. 1932; Pit. in H.Lecomte, Fl. Indo-Chine 3: 220. 1923; P.H.Hô, Câyco Vietnam 3, 1: 228, fig. 7673. 1993. Type: Thailand, Chon Buri, Sriracha, 1 July 1913, *Collins* 120 (holotype **K!**).— *T.*

elliptica Craib, Fl. Siam. 2: 90. 1932, **synon. nov.** Type: Thailand, Chiang Rai, Doi Tam Tu Pu, 11 April 1926, *Garrett* 276 (holotype **K!**; isotype **L!**).— *T. elliptica* var. *saxicola* Craib, Fl. Siam. 2: 91. 1932. Type: Thailand, Loei, Wang Saphung, 17 March 1924, *Kerr* 8768 (holotype **K!**; isotype **BK!**).

Thailand.—NORTHERN: Chiang Mai [Doi Chiang Dao, 6 March 1958, *Khanchai* 853 (**BKF**); Doi Kayo, Mae Die Waterfall, 6 Jan. 2000, *Maxwell* 00-5 (**AAU, BK**); Doi Tung, 12 Jan. 1975, *Geesink, Hiepko & Phengkklai* 8253 (**BKF, K, L, P**)]; Chiang Rai [Doi Tam Tu Pu, 11 April 1926, *Garrett* 276 (**K, L**)]; Lampang [Muang Ngao, 17 July 1931, *Put* 4032 (**AAU, BK, BM, K**); Wang Die, Chae Son National Park, 4 Nov. 1996, *Maxwell* 96-1484 (**BKF, CMU, L**)]; Sukhothai [Khirimat, Khao Pha Neap, 27 Nov. 1977, *Phengkklai et al.* 3936 (**BKF**)]; Chai Nat [28 km of Chinat, 5 June 1963, *Merrill* 5487 (**K, L**)]; NORTHEASTERN: Loei [Pha Nok Khao, 6 Nov. 1970, *Charoenphol, Larsen & Warncke* 4549 (**AAU, BKF, K**), 22 March 1958, *Smitinand* 4507 (**BKF**), 9 Sept. 1963, *Smitinand & Sleumer* 1137 (**BKF, K, L**); Wang Saphung, 17 March 1924, *Kerr* 8768 (**K, BK**)]; SOUTHWESTERN: Kanchanaburi [Khao Pu Makkai, Nong Hoy, 10 July 1978, *Phengkklai, Tamuru, Niyomdham & Sangkhachand* 4271 (**BKF, K**); Sai Yok, 4 Aug. 1974, *Kostermans* 1146 (**L**), *van Beusekom, Phengkklai, Geesink & Wongwan* 3986 (**K**); Salak Phra Wildlife Sanctuary, *van Beusekom, Phengkklai, Geesink & Wongwan* 4055 (**BKF, K, L, P**); Phetchaburi [23 July 1926, *Kerr* 11000 (**BM, K**), 7 Nov. 1926, *Kerr* 11069 (**BM**), 1 April 1921, *Marcan* 624 (**BM, K**)]; Prachuap Khiri Khan [Huai Sai, 2 July 1926, *Kerr* 10751 (**BK, BM, K, TCD**), 28 June 1921, *Winit* 579a (**BK, K**), 30 June 1921, *Winit* 591 (**K**); Kaeng Krachan National Park, *Kerr* 11000 (**BM, K**), 7 Nov. 1926, *Kerr* 11069 (**BK, BM, K, L**), 2 Feb. 1921, *Marcan* 553 (**BM, K**), 11 Aug. 2002, *Middleton, Suddee, Davies & Hemrat* 965 (**AAU, BKF, K**); Khao Daeng, 17 Aug. 2002, *Middleton, Suddee & Hemrat* 1148 (**CMU**), 10 May 1974, *Larsen et al.* 33781 (**AAU, K, P**), 1 July 2000, *Newman, Boonthavikorn, Hemrat & Middleton* 1162 (**K**), 14 Aug. 1992, *Niyomdham* 3006 (**BKF**), 2 Dec. 1929, *Put* 2506 (**AAU, BK, BM, K, L**), 26 Oct. 1973, *Sutheesorn* 2715 (**BK**), 22 Oct. 1973, *Sutheesorn* 2729 (**BK**); Khao Sam Roi Yot, 23 Feb. 2000, *Chayamarit, van Welzen, Pooma, Pattharahirankanok & Pasitphirom* 1857 (**L**), along trail to Phraya Nakhon Cave, 27 Oct. 2004, *Kesonbua* 131 (**KKU**), 7 May 1974, *Larsen et al.* 33733 (**K**); Khao Ta Luang Kaew, Ko Nom Sao, 29 April 1974, *Larsen et al.* 33665 (**AAU, K, P**)]; CENTRAL: Lop Buri [Chai Badan, Lam Narai, 29 Aug. 2001, *Pooma, de Wilde, Duyffjes, Chamchumroon & Phattarahirankanok* 2985 (**BKF**)]; Saraburi [Muang, Khao Bok Yuk, 2 Oct. 1952, *Chit* 2 (**BKF**); Praphuthabat, Wat Pra Bat, 6 Feb. 1971, *Maxwell* 71-38 (**BK**); Pukhae Botanical Garden, 29 Nov. 1984, *Murata, Mitsuta, Yahara, Nagamasu & Nantasan* T-51049 (**BKF**)]; SOUTHEASTERN: Sa Kao [Angruenai, 18 Jan. 1997, *Wongprasert* s.n. (**BKF**); Huai Yen, Pang Sida National Park, 6 July 2001, *Chamchumroon & Puff* 1193 (**BKF**); Chon Buri [Ira Island, off Thung Brong, 7 Sept. 1975, *Maxwell* 75-1003 (**AAU, BK, L**); Ko Chang, Samaesan Island, 13 June 1998, *Wongprasert et al.* s.n. (**BKF**), 25 July 1998, *Wongprasert et al.* s.n. (**BKF**); Phattaya, Ko Phai, 11 July 1998, *Wongprasert et al.* s.n. (**BKF**); Sattahip, Ko Karm, *Chermisrivatthana* 1219 (**BK**); Sri Racha, 1 July 1913, *Collins* 120 (**K**), 7 Dec. 1927, *Collins* 1751 (**BK**)]; Trat [Ko Chang National Park, Khlong Plu Waterfall, 4 July 2001, *Chamchumroon & Puff* 1162 (**AAU, BKF, L, P**)].

Distribution.—Laos, Cambodia, Vietnam.

Ecology.—Common in dry deciduous or limestone hill forest; altitude to 1600 m. Flowering and fruiting periods: November to March and April to October.

Vernacular.— Khem khao (เข็มขาว) (Prachuap Khiri Khan); plong dong (พลองดง) (Saraburi); saming kham ram (สมิงคำราม) (Southeastern); mi kham ram (หมี่คำราม), ya yuan hin (ยาญวนหิน) (Trat).

Notes.— *Tarenna collinsae* is very similar to *T. cinerea* in leaf shape, inflorescence shape and size. It differs mainly in the leaves being glabrous on both surfaces, and in the infructescences with more fruits. Also, the secretory collectors present on the stipules are more clearly visible than in *T. cinerea*.

5. *Tarenna costata* (Miq.) Merr., Philipp. J. Sci. 52: 472. 1921; Ridl., Fl. Malay Penins. 2: 109. 1923; Craib, Fl. Siam. 2: 89. 1932; Corner, Wayside Trees. 2: 651. 1940; Wong in Ng, Tree Fl. Mal. 4: 410, 415. 1989; Turner, Gard. Bull. Singapore 47: 447. 1995.— *Stylocoryna costata* Miq., Fl. Ned. Ind. 2: 203. 1857 & Sum. Seine Pflanzenwelt: 217. 1862; King & Gamble, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 72: 201. 1903. Type: Malaysia, Malacca, 14 March 1967, Maingay 945 (lectotype **K!**).— *Webera costata* (Miq.) Hook.f., Fl. Brit. India 3: 103. 1880.— *Webera costata* (Miq.) Boerl., Handl. Fl. Ned. Ind. 2(1): 129. 1891, *nom. illeg.*

Thailand.— SOUTHEASTERN: Rayong [Ban Pe, 21 Feb. 1930, *Put* 2871 (**AAU**, **BK**, **BM**, **K**), 21 Feb. 1980, *Put* 2733 (**K**)]; Chanthaburi [Khao Sabap, *Kerr* 18089 (**BK**, **K**)]; Trat [Khao Kuap, 20 May 1930, *Put* 2871 (**BK**, **BM**, **K**); Khao Saming, 2 Jan. 1930, *Kerr* 17915 (**BK**, **BM**, **K**), 30 Jan. 1927, *Put* 595 (**BK**, **BM**, **K**); Ko Chang, 5 May 1923, *Marcan* 1309 (**BM**, **K**)]; PENINSULAR: Ranong [Khleng Ban Bong, 26 Nov. 1974, *Indraphong* 63 (**AAU**, **K**, **L**, **P**)]; Kraburi, Bang Yai Waterfall, 23 April 1967, *Sutheesorn* 2359 (**BK**)]; Surat Thani [Ko Samui, 9 April 1927, *Kerr* 12556 (**AAU**, **BK**, **BM**, **K**), 7 March 1930, *Kerr* 18406 (**BK**, **K**)]; Phangnga [Khao Katawan, 7 March 1930, *Kerr* 18406 (**AAU**, **BK**, **BM**, **K**)]; Krabi [Ko Pu, 12 April 1930, *Kerr* 18956 (**BK**, **BM**)]; Satun [Adang Island, 15 Jan. 1928, *Kerr* 13983 (**AAU**, **BK**, **BM**, **K**)]; Narathiwat [Sirindhorn Waterfall, 15 Sept. 1997, *Niyomdham* 5139 (**BKF**)].

Distribution.— India, Peninsular Malaysia, Singapore, Sumatra, Borneo, Philippines.

Ecology.— Scattered in lowland evergreen forest; altitude to 300 m. Flowering and fruiting periods: September to April.

Vernacular.— Nuan (นวล) (Surat Thani); ya yuan (ยาญวน) (Trat).

Notes.— *Tarenna costata* is distinguished by its corolla lobes are distinctly shorter than the tube, numerous ovules and seeds. The species differs from others in having a tree-like habit and sparsely short hairy obovate leaves in which the lateral nerves are conspicuous on the lower surface.

6. *Tarenna curtisii* (King) F.N. Williams, Bull. Herb. Boissier 2(5): 952. 1905; Ridl., Fl. Malay Penins. 2: 107. 1923; Craib, Fl. Siam. 2: 90. 1932; Wong in Ng, Tree Fl. Malaya 4: 412, 414. 1989; Turner, Gard. Bull. Singapore 47: 447. 1995.— *Webera curtisii* King, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 73: 67. 1904. Type: Thailand, Satun, Tarutao Island, March 1892, *Curtis* 2805 (holotype **K!**; isotype **SING!**).

Thailand.— PENINSULAR: Phangnga [no locality, *Haniff & Nur* 3556 (**SING**)]; Satun [Tarutao Island, March 1892, *Curtis* 2805 (**K**, **SING**)].

Distribution.— Peninsular Malaysia, Singapore.

Ecology.— Common in evergreen forest over limestone bedrock; altitude to 150 m. Flowering and fruiting periods: April to July.

Notes.— *Tarenna curtisii* is similar to *T. adangensis* in characters of the inflorescence and flowers, and similar to *T. angustifolia* in leaf shape and size. The species differs from the former in its shorter inflorescences and sulcate stigma, and differs from the latter in its shorter calyx lobes, uniovulate locules and corolla lobes with rounded apex.

7. *Tarenna fragrans* (Blume) Koord. & Valetton, Meded. Lands Plantentuin 59: 77. 1902 & Bijdr Boomsoort. Java 8: 75. 1902 & Atlas Baumarten von Java: fig. 535. 1915; Merr., Philipp. J. Sci. 52: 470. 1921 & Enum. Philipp. Fl. Pl. 3: 525. 1923; Corner, Wayside Trees. 2: 652. 1940; Elm., Leaf. Philipp. Bot. 4: 1358. 1952; Backer & Bakh.f., Fl. Java. 2: 308. 1965; Wong in Ng, Tree Fl. Malaya 4: 411, 415. 1989; Keng, Concise Fl. Sing.: 161. 1990; Turner, Gard. Bull. Singapore 47: 447. 1995.— *Wahlenbergia fragrans* Blume, Cat. Hort. Buit.: 15. 1823. Type: Indonesia, Java, Blume 1333 (holotype **L!**).— *Ceriscus fragrans* (Blume) Nees, Flora 8: 116. 1825.— *Stylocoryna fragrans* (Blume) Blume, Bijdr. 9: 982. 1826; Miq., Fl. Ned. Ind. 2: 202. 1856 & Sum. Seine Pflanzenwelt: 217. 1862; King & Gamble, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 72: 201. 1903; Ridl., Fl. Malay Penins 2: 109. 1923.— *Webera fragrans* (Blume) Hook.f., Fl. Brit. India 3: 103. 1880; F.-Vill., Novis App.: 108. 1880; Boerl., Handl. Fl. Ned. Ind. 2(1): 129. 1891.— *Chomelia fragrans* (Blume) K.Schum. in Engler & Prantl, Nat. Pflanzenfam. 4(4): 74. 1891.

Thailand.— PENINSULAR: Narathiwat [Bang Kun Tong, 14 Feb. 1984, *Niyomdham* 776 (**AAU, P**), 21 Sept. 1985, *Niyomdham et al.* 1060 (**AAU, L, P**); South of Narathiwat, 8 April 1974, *Larsen et al.* 33078 (**AAU, K**), 9 April 1974, *Larsen et al.* 33109 (**AAU, BKF, L**); Su Ngai Kolok, Sirindhorne Research and Nature Study Center, 20 Dec. 1993, *Fukuoka & Koyama* T-61927 (**BKF**); Su Ngai Pa Di, Phlu To Daeng forest, 31 March 2005, *Kesonbua* 138 (**KKU**); Tak Bai, Pru Ku Jum, 13 April 1996, *Niyomdham & Puudjaa* 466 (**AAU**)].

Distribution.— India, Peninsular Malaysia, Singapore, Sumatra, Java, Borneo, Philippines.

Ecology.— Scattered in swampy forest. Flowering and fruiting periods: December to April.

Vernacular.— Chan hom (จันทร์หอม) (Narathiwat).

Notes.— *Tarenna fragrans* is similar to *T. costata* in its flower, in which the corolla lobes are shorter than the tube and in having numerous ovules and seeds. It differs in having longer glabrous corolla tubes. Moreover, it is large shrub rather than a tree and the lateral veins of the elliptic leaves are indistinct on the lower surface.

8. *Tarenna harmandiana* Pit. in H.Lecomte, Fl. Indo-Chine 3: 213. 1923. Type: Cambodia, Pursat, *Harmand* 6186 (holotype **P!**).

Thailand.— SOUTHWESTERN: Prachuap Khiri Khan [Pranburi, 17 Aug. 1965, *Phengnaren* 91 (**BKF**); Sam Roi Yot, 8 July 1926, *Kerr* 10898 (**AAU, BK, BM, K**), 2 May 1932,

Kerr 21570 (**BK, BM, K**); SOUTHEASTERN: Sa Kao [Aranyaprathet, Khlong Nam Sai, 19 Nov. 1964, *Sutheesorn* 169 (**BK**)]; Chon Buri [Sattahip, Ban Thung Brong, 3 May 1971, *Maxwell* 71-361 (**BK**) & 71-363 (**AAU**); Khao Khiao, 5 Feb. 1969, *Phengklai* 1999 (**L**)]; Trat [Ko Chang, 5 April 1923, *Kerr* 6889A (**AAU, BK, K**)].

Distribution.— Cambodia.

Ecology.— In dry evergreen forest; altitude 0–50 m. Flowering and fruiting periods: February to August.

Notes.— *Tarenna harmandiana* is distinguished from all other Thai species of *Tarenna* by having large and thick leaves, pubescent on their lower surface and pubescent inflorescences.

9. *Tarenna hirsuta* Craib, Fl. Siam 2: 91. 1932. Type: Thailand, Pattani, Khao Kala Kiri, 2 April 1928, *Kerr* 14976 (holotype **K!**; isotypes **BK!**; **BM!**).

Thailand.— PENINSULAR: Satun [Tarutao National Park, Puntao bay, 5 June 1980, *Congdon* 572 (**AAU**)]; Pattani [Khao Kala Kiri, 2 April 1928, *Kerr* 14976 (**BK, BM, K**)].

Distribution.— Endemic to Thailand.

Ecology.— Scattered in evergreen forest along streams; altitude to 500 m. Flowering and fruiting periods: June to April.

Notes.— The species is distinguished by its having a pendulous inflorescence and broader calyx lobes. Leaves are elliptic or lanceolate and hispidulous on the lower surface.

10. *Tarenna hispidula* Craib, Fl. Siam. 2: 91. 1932; Wong in Ng, Tree Fl. Malaya 4: 410, 414. 1989; Turner, Gard. Bull. Singapore 47: 447. 1995. Type: Malaysia, Langkawi, Buran, *Ridley* 15818 (holotype **K!**; isotype **SING!**).— *T. hispidula* var. *brevipes* Craib, Fl. Siam. 2: 92. 1932. Type: Thailand, Pattani, Bukit, 24 January 1931, *Put* 3616 (holotype **K!**; isotype **BK!**).— *T. hispidula* var. *smithiae* Craib, Fl. Siam. 2: 92. 1932. Type: Thailand, Nakhon Si Thammarat, Khao Luang, *Smith* 735 (holotype **K!**).

Thailand.— PENINSULAR: Chumphon [Khao Pang Tasae, 11 April 1967, *Sutheesorn* 2189 (**BK**)]; Ranong [Krabung, Bang Yai Waterfall, 21 April 1967, *Sutheesorn* 2345 (**BK**)]; Nakhon Si Thammarat [Khao Luang, *Smith* 735 (**K**), 22 May 1968, *van Beusekom & Phengklai* 924 (**BKF, K, L, P**)]; Satun [Tarutao Island, 5 April 2005, *Kesonbua* 142 (**KKU**)]; Pattani [Bukit, 24 Jan. 1930, *Put* 3616 (**BK, K**)].

Distribution.— Peninsular Malaysia, Singapore.

Ecology.— Scattered in evergreen forest along streams; altitude to 950 m. Flowering and fruiting periods: January to April.

Notes.— *Tarenna hispidula* is similar to *T. hirsuta* in having drooping inflorescences and pubescent lower leaf surfaces. It differs in having denser inflorescences, the longer hairs on the lower leaf surface and by the filiform calyx lobes which are longer than the ovary.

11. *Tarenna hoensis* Pit. in H.Lecomte, Fl. Indo-Chine 3(2): 214. 1923; Craib, Fl. Siam. 2: 92. 1932; P.H.Hô, Câyco Việt Nam 3, 1: 228, fig. 7675. 1993. Type: Vietnam, Cochinchine, June 1866, *Pierre* 1833 (holotype **P!**). Fig. 1.

Thailand.— NORTHEASTERN: Nong Khai [Bung Khla, Phutoknoi, 8 Nov. 1996, *Niyomdham* 4865 (**AAU, BKF**), 21 June 1997, *Niyomdham* 5081 (**BKF**)]; EASTERN: Nakhon Ratchasima [Katok, 3 Dec. 1923, *Kerr* 8192 (**AAU, BK, BM, L**); Pak Thong Chai, *Damrongsak* 50 (**BK**), 21 Aug. 1963, *Damrongsak* 139 (**BKF**), 19 Dec. 1967, *Damrongsak* 491 (**BKF**), 18 Dec. 1967, *Sanoh* 156 (**BKF**), 21 Aug. 1967, *Phengnaren* 401 (**BKF**), 26 March 1968, *Phengnaren* 648 (**BKF, L**), 26 March 1968, *Santisuk* 85 (**BKF, L**)]; Buriram [Nang Rong, March 1922, *Wanarak* 10 (**BK, K**)]; SOUTHWESTERN: Prachuap Khiri Khan [Bang Saphan, 1 July 1920, *Winit* 576 (**BKF, K**); Hui Sai, 30 June 1921, *Winit* 590 (**K**); Hui Wa Ton, 28 June 1921, *Winit* 583 (**K**)]; SOUTHEASTERN: Sa Kao [Aranyaprathet, Klong Nam Sai, 19 Nov. 1964, *Sutheeson* 169 (**BK**); Wang Nam Yen, 15 Jan. 1997, *Wongprasert* s.n. (**BKF**)]; Prachin Buri [Krabin Buri, 12 May 1920, *Kerr* 12324 (**BK**), 12 May 1930, *Kerr* 19324 (**AAU, BM, K**)]; Chon Buri [Ang Chang Nam, Ban Bueng, 17 Aug. 1976, *Maxwell* 76–522 (**AAU, BK, L**); Ko Samae San, without date, *Wongprasert et al.* s.n. (**BKF**); Satthahip, Ko Phra, 25 June 2000, *Phengklai et al.* 12540 (**BKF**); Rayong [Ban Pe, 18 Feb. 1930, *Put* 2688 (**BK, BM, TCD**); Klaeng, Khao Cha Mao National Park, 27 June 2001, *Chamchumroon & Puff* 1067 (**BKF**), *Shimizu, Toyokuni, Koyama, Yahara & Phanichaphol* T-23419 (**BKF, P**); Ko E-lao, 22 Sept. 1928, *Kerr* s.n. (**BK**); Ko Samet, 17 Dec. 1974, *Geesink & Hiepko* 7880 (**AAU, BKF, K, P, L**); Chanthaburi [Makham, Ban Dang, 30 Nov. 1945, *Chit* 151 (**BKF**)]; Trat [Ko Chang, 22 March 2001, *Chayamarit, Wongprasert, Pooma, Chamchumroon, Phattarahirankanok & Newman* 2797 (**BKF**), 5 April 1923, *Kerr* 6889 (**K**) & 6889A (**AAU, BK, BM, K**), 25 March 2005, *Kesonbua* 134 (**KKU**), 26 March 2005, *Kesonbua* 135 (**KKU**), 5 May 1923, *Marcen* 1309 (**BM, K**)]; PENINSULAR: Surat Thani [Ko Pha-Ngan, 5 June 1925, *Put* 793 (**K**), 25 June 1975, *Chana, Sumruay & Sakcharin* 227 (**BKF**); Ko Samui, 3 March 1974, *Geesink, Hiepko & Phengklai* 7728 (**K**), 3 Dec. 1974, *Geesink, Hiepko & Phengklai* 33078 (**BKF, K, L**), 28 May 1927, *Put* 713 (**AAU, BK, BM, K**); Ko Tao, 22 Sept. 1928, *Kerr* 16064 (**BM, K, L, TCD**), 23 Sept. 1928, *Kerr* 16082 (**AAU, BK, BM, K**)].

Distribution.— Cambodia, Vietnam.

Ecology.— Common in lowland evergreen or deciduous forest or on limestone hills; altitude to 550 m. Flowering and fruiting periods: All year round.

Vernacular.— Chan-ta-nia (จันทะเนี้ย) (Khmer-Eastern); chan khao (จันทร์ขาว), chan bai lek (จันทร์ใบเล็ก), chan thana (จันทนา) (Prachup Khiri Khan); chan hom (จันทน์หอม) (Rayong).

Notes.— *Tarenna hoensis* is a small tree with very large leaves. The species is similar to *T. harmandiana* in the shape and size of the leaf and inflorescence. It differs in having leaves which are glabrous on both surfaces, and in having the inflorescences with sparsely short-hairy axes.

12. *Tarenna insularis* (Ridl.) Ridl., Fl. Malay. Penins. 2: 107. 1923; Craib, Fl. Siam. 2: 89. 1932; Wong in Ng, Tree Fl. Malaya 4: 412, 414, 415. 1989; Turner, Gard. Bull. Singapore 47: 447. 1995.— *Webera insularis* Ridl., J. Straits Branch Roy. Asiat. Soc. 61: 55. 1912. Type: Thailand, Adang, Nipis, 22 July 1911, *Ridley* 15896 (holotype **K!**).

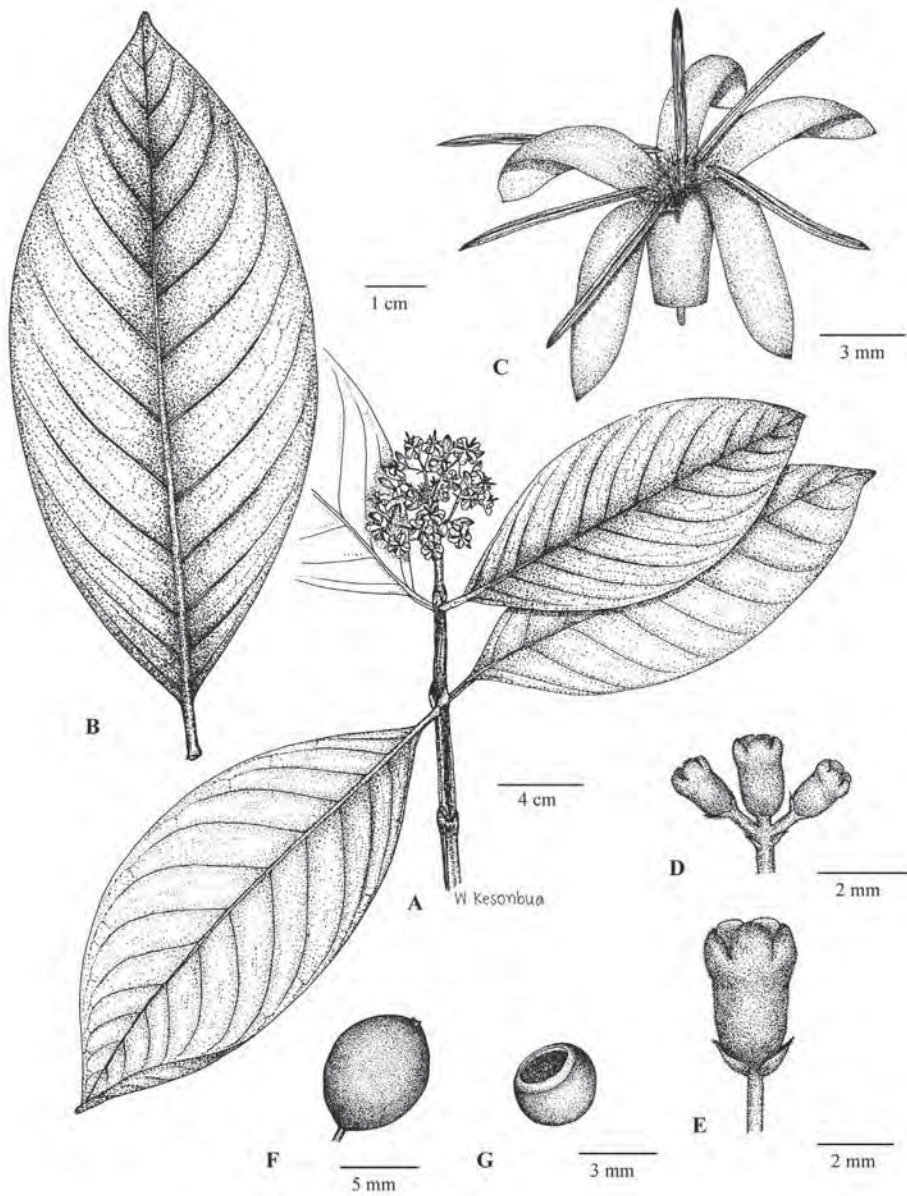


Figure 1. *Tarenna hoensis* Pit.: A. flowering branch; B. leaf; C. corolla, stamens, style and stigma; D. flower triad (corollas fallen); E. pedicel with bracteoles, ovary and calyx; F. fruit; G. seed. A–D. from *Kesonbua* 135 (KKU), E–F. from *Put* 713 (BK). Drawn by W. Kesonbua.

Thailand.—NORTHEASTERN: Khon Kaen [Khon Kaen University, cultivated, 30 June 2006, *Kesonbua* 182 (**KKU**)]; CENTRAL: Krung Thep Maha Nakhon [cultivated, 2 April 1927, *Lakshanakara* 304 (**BK**)]; PENINSULAR: Ranong [Boonyapal Waterfall, 8 Sept. 1984, *Fukuoka*, *Santisuk* & *Nanakorn* T-36002 (**BKF**)]; Kaper, 17 Jan. 1929, *Kerr* 16696 (**BK, K**); Ngao Waterfall, 8 July 1992, *Larsen*, *Niyomdham*, *Sirirugsa*, *Tirvengadam* & *Nørgaard* 43225 (**AAU**); Khao Teekin, 4 April 1962, *Sutheesorn* 2377 (**BK**)]; Surat Thani [Bangbao, 9 March 1957, *Smitinand* 3801 (**BKF, L**)]; Nang Wai, 7 March 1927, *Kerr* 12273 (**BM, K**) & 12274 (**BM, K**); Saphan Lek, 8 March 1928, *Kerr* 14400 (**BM, K**)]; Phangnga [Khao Phra Mi, *Hansen* & *Smitinand* 11837 (**BKF**)]; Phuket [Khao Tosac, 13 May 1967, *Sutheesorn* 2617 & 2618 (**BK**)]; Krabi [Ko Phi Phi, 1 March 1929, *Kerr* 172831 (**BK, BM, K, L, TCD**)]; 8 April 1930, *Kerr* 18879 (**K, L, TCD**)]; Satun [Adang Island, Laem Sone area, *Maxwell* 87–317 (**BKF, L**)]; Nipis, 22 July 1911, *Ridley* 15896 (**K**); Pa Thung Nui, 27 Feb. 1961, *Ploenchit* 1636 (**BKF**)]; Songkhla [Muang, Khao Kaw Seng, 19 Oct. 2004, *Kesonbua* 108 (**KKU**)]; Pattani [Khao Kalakhiri, 31 March 1928, *Kerr* 14933 (**BM, K**)].

Distribution.— Peninsular Malaysia.

Ecology.— In evergreen forest, usually along streams or by waterfalls, also on limestone hills; altitude to 600 m. Flowering and fruiting periods: September to April.

Vernacular.— Khem khiao (เขมเขี้ยว) (Bangkok).

Notes.— *Tarenna insularis* is similar to *T. stellulata*, but differs in its narrow calyx segments, calyx lobes which are longer than the ovary, its fruiting inflorescences have fewer fruits which are crowned by persistent filiform calyces and its leaves are usually smaller.

13. *Tarenna longifolia* Ridl., Fl. Malay. Penins. 2: 107. 1923; Corner, Wayside Trees. 2: 652. 1940; Wong in Ng, Tree Fl. Malaya. 4: 409, 414. 1989; Turner, Gard. Bull. Singapore 47: 447. 1995. Type: Malaysia, Penang, *Wallich* Cat. No. 1832 (holotype: **K-W!**).— *Ixora longifolia* G. Don, Gen. Syst. 3: 573. 1834, nom. illeg; Kurz; For. Fl. Burma 2: 17. 1877.— *Pavetta longifolia* Miq., Fl. Ned. Ind. 2: 275. 1857.— *Webera longifolia* (Miq.) Hook.f., Fl. Brit. India 3: 105. 1880; King & Gamble, Mater. Fl. Mal. Pen. 14: 69. 1904; Ridl., J. Straits Branch Roy. Asiat. Soc. 61: 55. 1912.— *Chomelia longifolia* (Miq.) De Wild., Ann. Mus. Congo Belge, Bot., V, 1: 206. 1906.— *Stylocoryna longifolia* (Miq.) C.B. Rob., Proc. Amer. Acad. Arts 45: 408. 1910.

Thailand.— PENINSULAR: Phangnga [Khlong Nang Yon, 30 April 1973, *Geesink* & *Santisuk* 5061 (**AAU, K**)]; Trang [Khao Chong Botanical Garden, 10 Sept. 1990, *Puff*, *Igersheim* & *Ueachirakan* 900910–1/11 (**BKF**)]; Songkhla [Ton Nga Chang, 21 Aug. 1992, *Niyomdham* 3159 (**AAU**)]; Yala [Betong, 2 April 2005, *Kesonbua* 140 (**KKU**)].

Distribution.— India, Myanmar, Peninsular Malaysia, Singapore, Borneo.

Ecology.— In evergreen forest; altitude 30–120 m. Flowering and fruiting periods: September to April.

Notes.— *Tarenna longifolia* is similar to *T. hispidula* in having drooping inflorescences and lanceolate leaves. It differs in having very firmly chartaceous leaves which are dense hairy on the lower surface, laxer inflorescences and short filiform calyces.

Ixora longifolia is illegitimate and therefore cannot function as a basionym. Therefore the first available validly published name has been used.

14. *Tarenna membranacea* Pit. in H. Lecomte, Fl. Indo-Chine 3(2): 215. 1923; P.H. Hô, Càyco Vietnam 3, 1: 229, fig. 7677. 1993. Type: Vietnam, Cochinchine, March 1877, *Pierre* 3168 (holotype **P!**; isotype **K!**).

Thailand.— EASTERN: Nakhon Ratchasima [Khao Yai National Park, 17 March 1965, *Kasem* 423 (**BK**), 19 July 1973, *Murata, Fukuoka & Phengkklai* T-16293 (**AAU, BKF, L**)]; SOUTHWESTERN: Kanchanaburi [Wangka, *Kerr* 10463 (**K**)]; Phetchaburi [Kaeng Krachan National Park, 11 Dec. 2002, *Middleton, Suddee & Hemrat* 1543 (**K**)]; Prachuap Khiri Khan [Tap Sakae, Huai Yang Waterfall, 25 Aug. 2002, *Middleton, Suddee & Hemrat* 1303, Herb. of Biology Dept., Chiang Mai University, 7 Oct. 1930, *Put* 3241 (**AAU, K**), 7 Feb. 1970, *van Beusekom & Santisuk* 2697 (**AAU, BKF, L, P**)]; CENTRAL: Saraburi [Muak Lek, 28 April 1922, *Marcan* 780 (**BM**); Sam Lan forest, 1 April 1974, *Maxwell* 74–256 (**AAU, BK**); Hin Lap, 9 Aug. 1929, *Put* 2407 (**AAU, BK, K, L**)]; SOUTHEASTERN: Chanthaburi [Pong Nam Ron, Pa Rawang, 8 Oct. 1955, *Bunnak* 522 (**BKF**); Khao Soi Dao, 30 June 2001, *Chamchumroon & Puff* 1119 (**BKF**), 13 May 1974, *Geesink, Hattink, Phengkklai* 6719 (**BKF, K, L**), 28 April 2005, *Kesonbua* 170 (**KKU**); Khao Satap, 7 Jan. 1930, *Kerr* 17997 (**BK, BM, K, P**)].

Distribution.— Laos, Vietnam.

Ecology.— Primary evergreen forest, sometimes along streams or in damp places; altitude 200–800 m. Flowering and fruiting periods: January to October.

Notes.— *Tarenna membranacea* is characterized by its white young branches, membranous ovate leaves, small inflorescences and broadly triangular or ovate calyx lobes. The species is similar to *T. adangensis* in leaf shape and size but not in texture. Calyx lobes and inflorescences are also different.

15. *Tarenna pauciflora* Craib, Bull. Misc. Inform., Kew 1915: 430. 1915 & Fl. Siam. 2: 93. 1932; Pit. in H. Lecomte, Fl. Indo-Chine 3(2): 215. 1923. Type: Thailand, Phrae, Me Kammi, near Rawng Kwang, 14 Feb. 1912, *Kerr* 2367 (holotype **K!**; isotypes **BK!**, **BM!**).

Thailand.— NORTHERN: Lampang [Mae Long, 10 March 1930, *Winit* 1969 (**K**)]; Phrae [Mae Kammi, near Rong Kwang, 14 Feb. 1912, *Kerr* 2367 (**BK, BM, K**)].

Distribution.— Endemic to Thailand.

Ecology.— In primary evergreen forest; altitude 120–210 m. Flowering and fruiting periods: January to March.

Notes.— *Tarenna pauciflora* closely resembles *T. adangensis* in inflorescence and flower size but differs in having obovate or elliptic leaves, ovate calyx lobes with rounded apices and a shorter style-stigma complex.

16. *Tarenna pilosa* (Craib) Bremek., Feddes Repert. Spec. Nov. Regni Veg. 37: 202. 1934.— *Pavetta pilosa* Craib, Bull. Misc. Inform., Kew 1932: 433. 1932 & Fl. Siam. 2: 169. 1932. Type: Thailand, Trat, Khao Saming, 23 Jan. 1927, *Put* 534 (holotype **K!**; isotype **BK!**). Fig. 2.

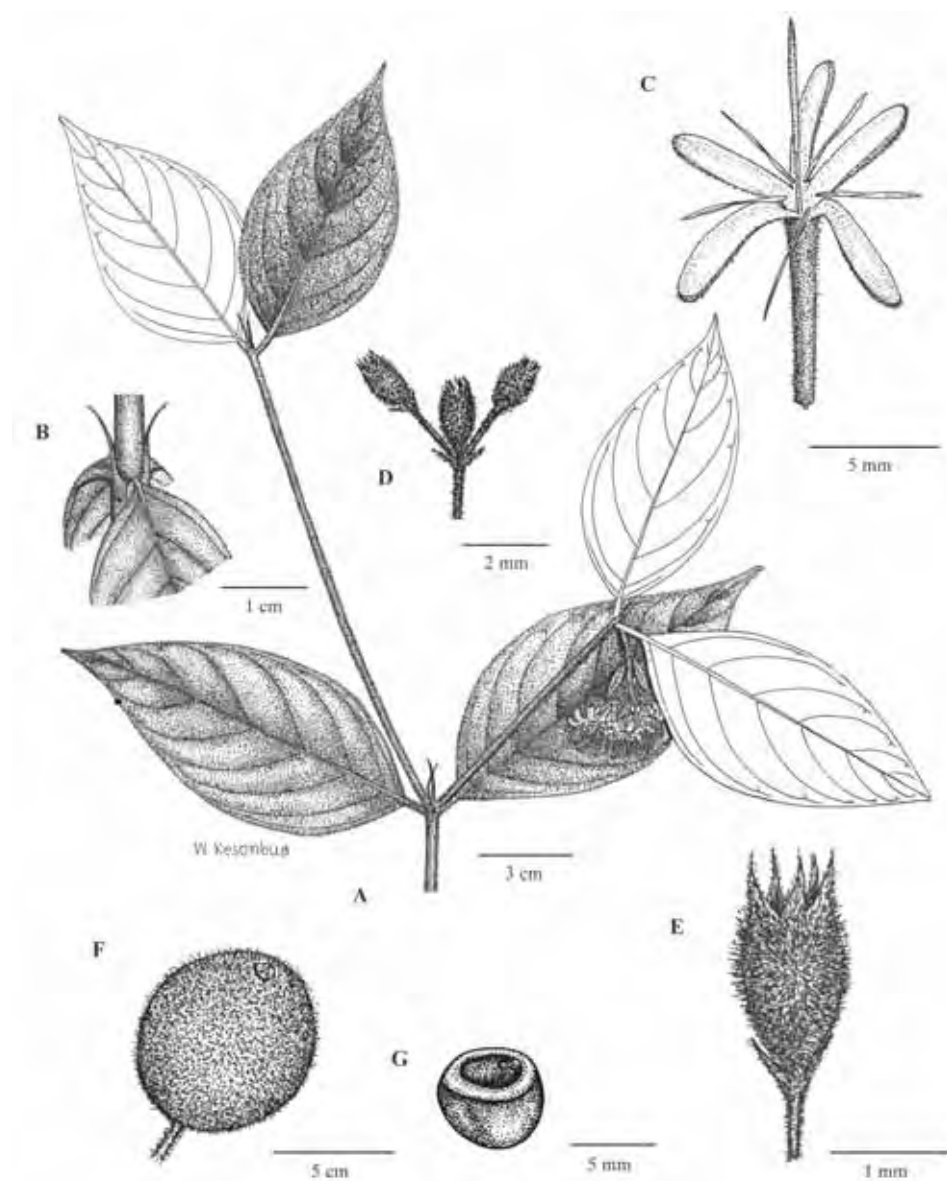


Figure 2. *Tarenna pilosa* (Craib) Bremek.: A. flowering branch; B. interpetiolar stipules; C. corolla, stamens, style and stigma; D. flower triad (corollas fallen), note subsessile terminal flower; E. pedicel with bracteoles; ovary and calyx; F. fruit; G. seed. All from *Kesonbua* 133 (KKU). Drawn by W. Kesonbua.

Thailand.— SOUTHWESTERN: Kanchanaburi [Huai Bankao, 12 Nov. 1971, *van Beusekom, Phengklai, Geesink & Wongwan* 3726 (**P**)]; SOUTHEASTERN: Chanthaburi [Khao Sabap, 9 Jan. 1930, *Kerr* 17966 (**BK**)]; Trat [Huai Rong, 19 Dec. 1929, *Kerr* 18065 (**K**) & 18065A (**K**); Khao Kuap, 20 May 1930, *Put* 2879 (**BK**); Khao Saming, 22 Jan. 1927, *Put* 517 (**BK**) & 534 (**K**); Khlong Yai, Sala Ratcha Karun (Khao Lan), 24 March 2005, *Kesonbua* 133 (**KKU**)].

Distribution.— Endemic to Thailand.

Ecology.— In mixed deciduous, evergreen or bamboo forest, or on limestone hills; altitude 5–750 m. Flowering and fruiting periods: December to May.

Notes.— *Tarenna pilosa* is easily recognized by being pubescent throughout (especially leaves, inflorescences and young branchlets).

17. *Tarenna puberula* Craib, Fl. Siam. 2: 94. 1932. Type: Thailand, Surat Thani, Yanyao, 24 Feb. 1930, *Kerr* 18242 (holotype **K!**; isotypes **BK!**, **BM!**).— *T. puberula* Craib var. *adpressa* Craib in Fl. Siam. 2: 94. 1932. Type: Thailand, Chumphon, Langsuan, Pato, 3 March 1927, *Kerr* 12199 (holotype **K!**; isotypes **BK!**, **BM!**).— *T. viridis* Craib in Fl. Siam. Enum. 2(1): 97. 1932, **synon. nov.** Type: Thailand, Ranong, Kaper, 23 Jan. 1919, *Kerr* 16839 (holotype **K!**; isotypes **BK!**, **BM!**).

Thailand.— SOUTHWESTERN: Phetchaburi [Kaeng Krachan National Park, Thorthip Waterfall, 26 Aug. 1995, *Parnell, Pendry, Jebb & Boonthavikoon* 95–442 (**AAU**, **BKF**, **K**, **L**, **TCD**)]; PENINSULAR: Chumphon [Langsuan, Pato, *Kerr* 12199 (**BK**, **K**), 27 Feb. 1927, *Kerr* 12151 (**BM**, **K**)]; Ranong [Kaper, *Kerr* 16839 (**BK**, **K**), Khlong Na Kha Wildlife Sanctuary, 25 Oct. 2004, *Kesonbua* 129 (**KKU**); La-un, Suwansiri Waterfall, 22 April 2005, *Kesonbua* 169 (**KKU**); Muang, Raksawarin Park, 2 April 2005, *Kesonbua* 167 (**KKU**)]; Surat Thani [Yanyao, *Kerr* 18242 (**BK**, **K**), 19 Feb. 1930, *Kerr* 19341 (**K**)]; Krabi [between Ao Luek and Krabi, 19 March 1960, *Smitinand & Abbe* 6578 (**K**)]; Nakhon Si Thammarat [Ta Samet, 28 Jan 1928, *Kerr* 14290A (**BM**, **K**)]; Satun [Khuan Don, 20 Oct. 2004, *Kesonbua* 115 (**KKU**)].

Distribution.— Endemic to Thailand.

Ecology.— In evergreen forest, usually along streams or by waterfalls; altitude 20–300 m. Flowering and fruiting periods: October to March.

Vernacular.— Chan khon (จันทน์) (Peninsular).

Notes.— *Tarenna puberula* is distinguished by its short inflorescences, filiform calyx lobes and by being hairy throughout. The species closely resembles *T. stellulata*, but differs in its longer calyx lobes and dense hairs on the lower surface of the leaf. Govaerts et al. (2008) place this species in synonymy with *T. attenuata*. We compared type specimens of both species in detail. *T. puberula* Craib resembles *T. attenuata* in inflorescence size and leaf shape, but differs in having corolla lobes with apiculate apices and in having leaves which have scattered hairs all over the lower surface. Also, the species has several ovules per locule. Thus we used *T. puberula* as the name of the Thai species, as did Craib (1932).

18. *Tarenna pulchra* (Ridl.) Ridl., Fl. Malay Penins. 2: 107. 1923; Wong in Ng, Tree Fl. Malaya 4: 410, 415. 1989; Turner, Gard. Bull. Singapore 47: 448. 1995.— *Webera pulchra*

Ridl., J. Fed. Malay States Mus. 4: 33. 1909. Type: Malaysia, Talom, 30 March 1909, *Ridley* 13639 (holotype **K!**).— *T. cinnamomea* Craib, Fl. Siam. 2: 88. 1932, **synon. nov.** Type: Thailand, Chumphon, Ta Ngaw, 16 Jan. 1927, *Kerr* 11468 (holotype **K!**; isotype **BK!**).— *T. cinnamomea* var. *elongata* Craib, Fl. Siam. Enum. 2(1): 89. 1932. Type: Thailand, Phangnga, Khao Bangto, 22 Feb. 1929, *Kerr* 17191 (holotype: **K!**; isotypes **BK!**, **BM!**).— *T. cinnamomea* var. *intermedia* Craib, Fl. Siam. Enum. 2(1): 89. 1932. Type: Thailand, Trang, Khao Soi Dao, 27 April 1930, *Kerr* 19160 (holotype **K!**; isotype **BK!**). Fig. 3.

Thailand.— SOUTHWESTERN: Kanchanaburi [Sangkhlaburi, 9 Aug. 1968, *Prayad* 1490 (**BK**)]; PENINSULAR: Chumphon [Ta Ngaw, 16 Jan. 1927, *Kerr* 11468 (**BK**, **BM**, **K**)]; Ranong [Kaper, Klong Naka Wildlife Sanctuary, 7 Sept. 1984, *Shimizu*, *Toyokuni*, *Koyama*, *Santisuk* & *Nanakorn* T-35947 (**BKF**, **L**), *Fukuoka*, *Santisuk* & *Nanakorn* T-35952 (**BKF**, **L**)]; Hat Somban, 23 April 1967, *Sutheesorn* 2362 (**BK**); Muang, Raksawarin Park, 8 April 2004, *Kesonbua* 168 (**KKU**); Surat Thani [Khlong Phanom National Park, 18 April 2005, *Kesonbua* 163 (**KKU**); Kiriratuikorn, Khao Daeng Row, 3 July 1966, *Sutheesorn* 1198 (**BK**); Ko Samui, 9 April 1927, *Kerr* 12550 (**AAU**, **K**), 20 Aug. 1975, *Prapat* 63 (**K**)]; Phangnga [Khao Bangto, 22 Feb. 1929, *Kerr* 17191 (**BK**, **K**); Khao Lam Pi-Thai Muang National Park, 10 Sept. 1990, *Puff*, *Igersheim* & *Ueachirakan* 900910–1/10 (**BKF**); Khao Nang Hong, 24 Aug. 1967, *Shimizu*, *Fukuoka* & *Nalampoon* T-8001 (**BKF**); Klong Nang Yon, 30 May 1973, *Geesink* & *Santisuk* 5061 (**AAU**); Takua Pa, 13 July 1972, *Larsen*, *Nielsen* & *Santisuk* 30928 (**AAU**)]; Nakhon Si Thammarat [Chawang, Tap Chao Kun, 17 June 1960, *Snan* 702 (**BKF**); Khao Luang National Park, Karom Waterfall, 13 April 2005, *Kesonbua* 158 (**KKU**), 23 Aug. 1995, *Larsen*, *Tange*, *Moran*, *Niyomdham* & *Puudjaa* 45897 (**AAU**), 13 April 1985, *Ramsri* 25 (**BKF**, **L**); Noppithum, Krung Ching Waterfall, 15 April 2005, *Kesonbua* 159 (**KKU**); Pharommalok Waterfall, 8 April 2004, *Kesonbua* 161 (**KKU**); Tap Chang, Keereewong, 30 May 1954, *Ploenchit* 774 (**BKF**); Phatthalung [Pa Bon, Ton Sator Waterfall, 8 April 2005, *Kesonbua* 143 (**KKU**); Sri Bun Pot, Khao Pu Khao Ya, 21 Oct. 2004, *Kesonbua* 117 (**KKU**), 9 April 2005, *Kesonbua* 155 (**KKU**), 17 Nov. 1990, *Larsen*, *Barfod*, *Nanakorn*, *Ueachirakan* & *Siriruga* 41489 (**AAU**, **BKF**), 30 July 1986, *Maxwell* 86–533 (**BKF**, **L**); Tha Not, Lan Mom Chuai Waterfall, 8 April 2004, *Kesonbua* 144 (**KKU**)]; Trang [Chong, 14 April 1928, *Kerr* 15162 (**BK**, **BM**, **K**); Khao Soi Dao, 27 March 1930, *Kerr* 19160 (**BK**, **BM**, **K**, **TCD**); Huai Yod, Thale Song Hong, 9 April 2003, *Middleton*, *Hemrat*, *Lindsay*, *Suddee* & *Suwanachat* 1772 (**BKF**); Muang, Khao Chong, 3 May 1966, *Bunnab* 497 (**BKF**), 20 Oct. 2004, *Kesonbua* 120 (**KKU**), 14 Aug. 1975, *Maxwell* 75–844 (**AAU**, **BK**, **L**), 19 May 1987, *Maxwell* 87–450 (**BKF**, **L**), 19 May 1987, *Maxwell* 87–650 (**AAU**), 18 July 1969, *Sangkhachand* 1994 (**BK**), 30 Nov. 1969, *Sangkhachand* 2203 (**BK**); Na Chum Het, Sai Rung Waterfall, 20 Oct. 2004, *Kesonbua* 123 (**KKU**); Na Yong, 11 April 2005, *Kesonbua* 157 (**KKU**); Satun [12 March 1928, *Lakshnakara* 336 (**BK**); 9 May 1967, *Khuankalong*, *T.R.F.* 426 (**BKF**); Langu, Khlong Pan Yow, Ban Bafal, 21 Nov. 1986, *Maxwell* 86–943 (**BKF**, **L**); Songkhla [Boripat Waterfall, 2 May 1986, *Maxwell* 86–273 (**BKF**, **L**); Na Thwee, Ton Lad Waterfall, 9 April 2005, *Kesonbua* 143 & 147 (**KKU**); Sadao, Khao Lup Chang, 25 June 1986, *Maxwell* 86–419 (**AAU**); Ton Nga Chang Waterfall, 10 April 2005, *Kesonbua* 153 (**KKU**), 30 Aug. 1984, *Maxwell* 84–164 (**BKF**); Narathiwat [Waeng, 29 June 1972, *Nitrasirirak* 201 (**BKF**)].

Distribution.— Peninsular Malaysia.

Ecology.— Common in evergreen forest, sometimes also on rocky limestone hills, altitude 50–900 m. Flowering and fruiting periods: All year round.

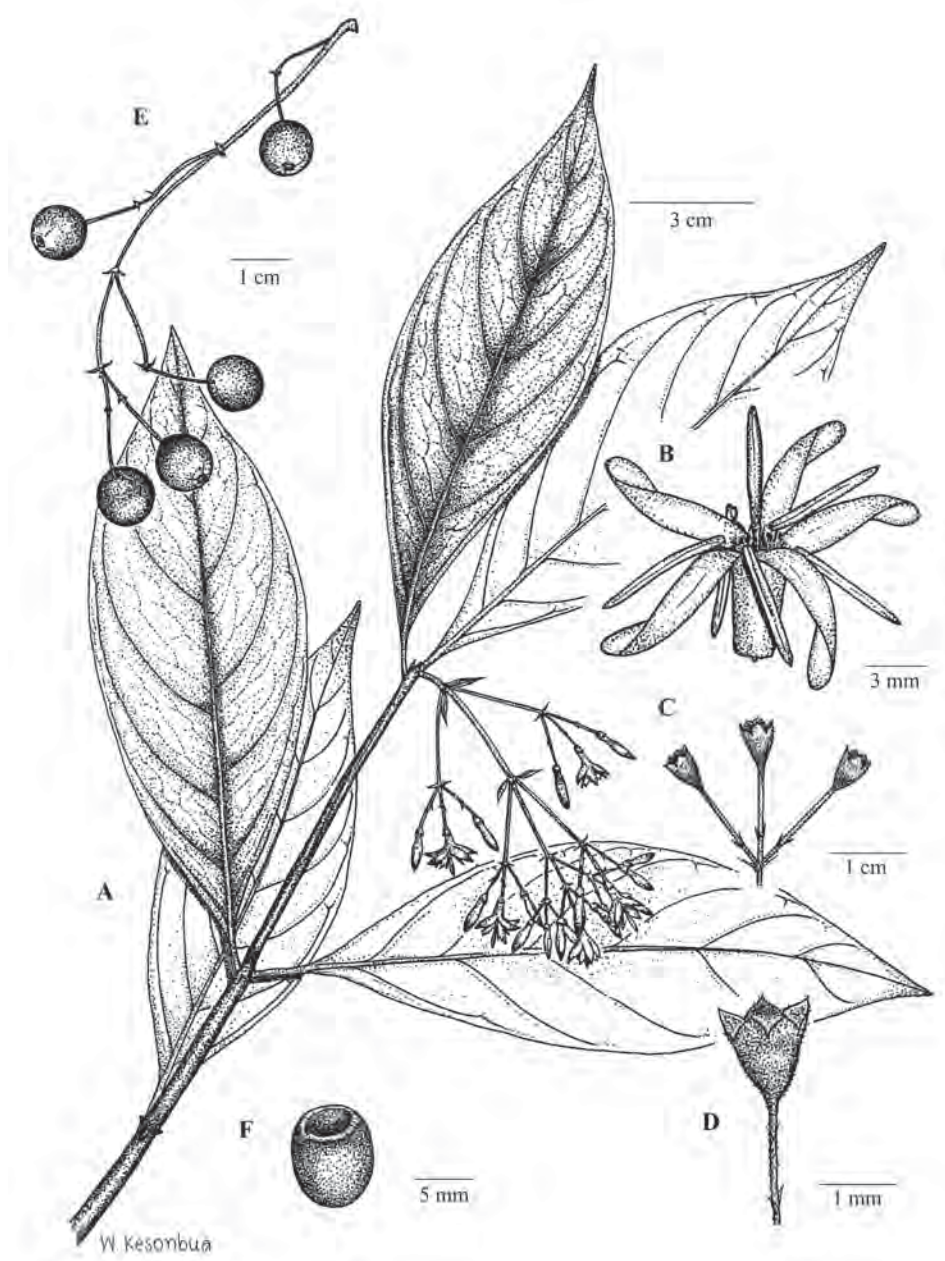


Figure 3. *Tarenna pulchra* (Ridl.) Ridl.: A. flowering branch; B. corolla, stamens, style and stigma; C. flower triad; D. pedicel with bracteoles; ovary and calyx; E. fruiting inflorescence; F. seed. A–D. from *Kesonbua* 120, E–F. from *Kesonbua* 123 (KKU). Drawn by W. Kesonbua.

Vernacular.— Chan bai man (จันทน์) (Peninsular).

Notes.— *Tarenna pulchra* is easily distinguished by its pendulous inflorescences with quite large showy flowers and its glabrous leaves.

19. *Tarenna quocensis* Pit. in H.Lecomte, Fl. Indo-Chine 3(2): 221. 1923; Craib, Fl. Siam. 2: 94. 1932; P.H. Hô, Câyco Vietnam 3, 1: 229, fig. 7678. 1993 [as *T. quocense* Pierre ex Pit.]. Type: Cambodia, May 1874, *Pierre* 3179 (holotype **P!**). Fig. 4.

KEY TO VARIETIES

1. Leaves 3.5–5.5 cm wide, with 9–13 pairs of lateral nerves. Corolla lobes not ciliate **a. var. *quocensis***
1. Leaves 4–12 cm wide, with 7–9 pairs of lateral nerves. Corolla lobes ciliate with white hairs **b. var. *laotica***

19a. var. *quocensis*

Thailand.— NORTHEASTERN: Nong Khai [Bueng Kan, Nong Waeng, 16 Nov. 1966, *Smitinand* 10067 (**BKF, K, L**)]; EASTERN: Nakhon Ratchasima [Hui Reng, 19 Dec. 1929, *Kerr* 17600 (**BM**); Katok, 30 Dec. 1925, *Kerr* 8166 (**AAU, BK, BM, K**); Khao Khieo, 8 March 1964, *Hansen, Seidenfaden & Smitinand* 11374 (**BKF, K, L**), 28 Feb. 1968, *Santisuk* 7 (**BKF**), 23 March 1968, *Santisuk* 72 (**BKF**), 28 Dec. 1969, *van Beusekom & Chaloenpol* 1862 (**AAU, BKF**), 15 March 1968, *van Beusekom & Phengklai* 56 (**K**); Khao Yai National Park, Pha Diew Dai, 22 May 2005, *Kesonbua* 132 (**KKU**) & 173 (**KKU**), 13 March 2005, *Kesonbua* 175 (**KKU**) & 177 (**KKU**); Pak Thong Chai, 3 Nov. 1970, *Chansenphol, Larsen & Warncke* 4467 (**K, P**) & 4486 (**AAU, K**), 25 Nov. 1966, *Dumrongsak* 426 (**BKF**), 18 Jan. 1978, *Dumrongsak* 506 (**BKF**), 16 May 1968, *Dumrongsak* 571 (**BKF**); Sakaerat Experimental Research Station, 5 Dec. 1984, *Fukuoka & Ito* T-34737 (**BKF**); CENTRAL: Nakhon Nayok [Hin Dang, 28 Feb. 2001, *Maxwell* 01-154 (**CMU**); Salika Waterfall, 24 Dec. 1966, *Sutheesorn* 1951 (**BK**)]; SOUTHEASTERN: Prachin Buri [Krabin Buri, 25 Dec. 1924, *Kerr* 9763 (**BK, BM, K**); Ban Kong, 8 Nov. 1930, *Kerr* 19805 (**BK, BM, TCD**), 8 Nov. 1930, *Marcant* 2844 (**BM, K**); Chanthaburi [Khao Sabap, 6 July 1927, *Put* 914 (**BM**)]; Trat [Huai Reng, 19 Dec. 1929, *Kerr* 17600 (**BK, BM, K**); Khao Kuap, 21 May 1930, *Put* 2903 (**BK, BM, K**)].

Distribution.— Laos, Cambodia, Vietnam.

Ecology.— Common in evergreen forest; altitude to 500 m. Flowering and fruiting periods: December to March.

Vernacular.— Ya yuan hin (ยาชวนหิน) (Trat).

Notes.— *Tarenna quocensis* var. *quocensis* is similar to *T. wallichii* but differs in its flower and fruit characters, such as calyx lobe shape and in having larger fruits crowned by long persistent calyx lobes. The two taxa have a vicariant distribution; *T. wallichii* is confined to southern Thailand while *T. quocensis* var. *quocensis* is widespread in northeastern, central and southeastern Thailand.

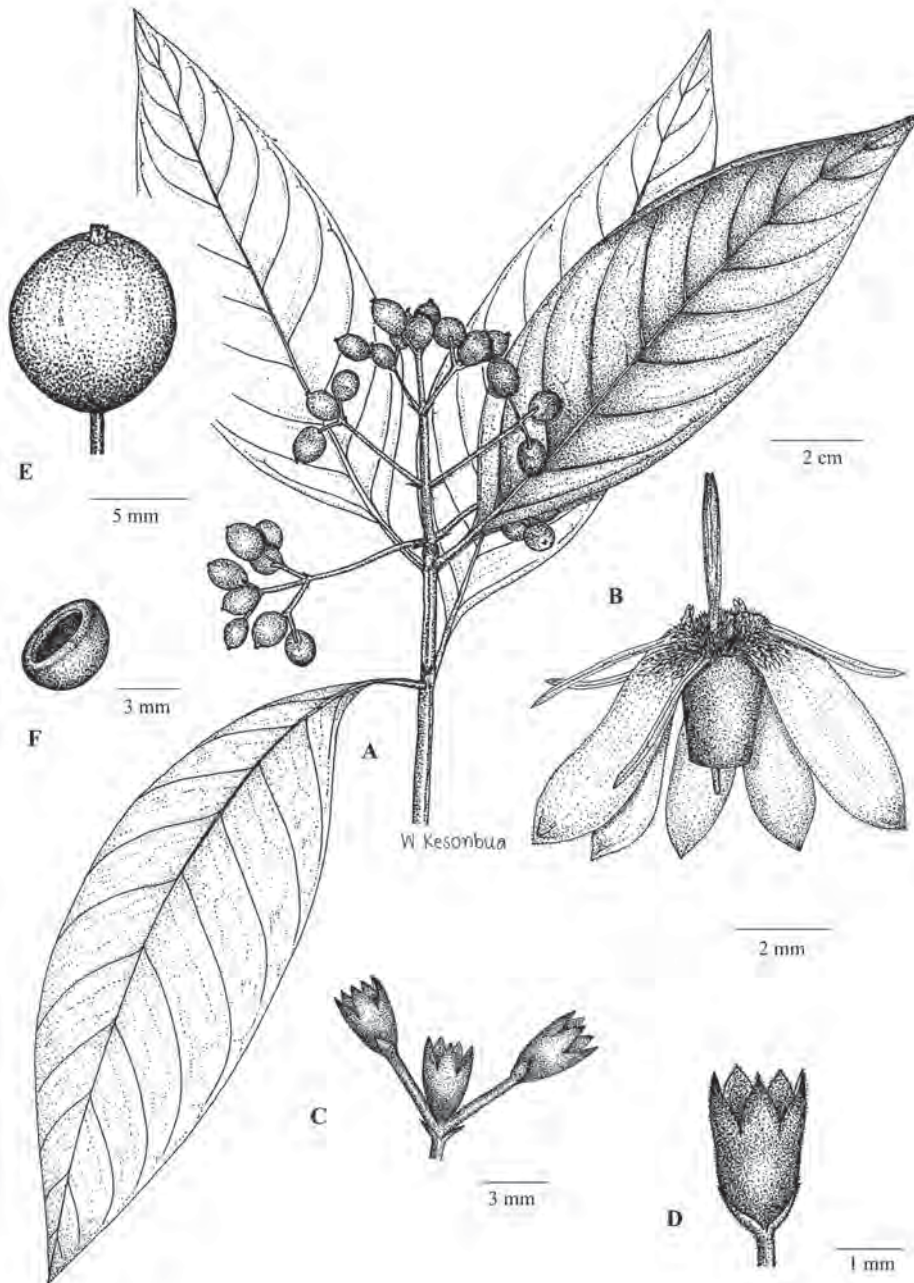


Figure 4. *Tarenna quocensis* Pit. var. *quocensis*: A. fruiting branch; B. corolla, stamens, style and stigma; C. flower triad (corollas fallen), note sub sessile terminal flower; D. pedicel with bracteoles; ovary and calyx; E. fruit; F. seed. A–D. from *Kesonbua* 132 (KKU), E–F. from *Kesonbua* 173

19b. var. *laotica* Pit. in H.Lecomte, Fl. Indo-Chine 3(2): 222. 1923; Craib, Fl. Siam. 2: 94. 1932. Type: Laos, *Harmand* 265 (holotype **P!**).

Thailand.— EASTERN: Ubon Ratchathani [Phu Chong Na Yoi National Park, Phu Ma Ri, 22 Dec. 2005, *KWO* 051222–24 (**QBG**)].

Distribution.— Laos.

Ecology.— Scattered in evergreen forest.

Notes.— Var. *laotica* differs from the typical variety by the characters given in the key and, moreover, in having white hairy corolla lobe margins.

20. *Tarenna sakae* Craib, Fl. Siam. 2: 95. 1932. Type: Thailand, Nakhon Si Thammarat, Lan Saka, 25 April 1928, *Kerr* 15392 (holotype **K!**; isotypes **BK!**, **BM!**).

Thailand.— PENINSULAR: Nakhon Si Thammarat [Lan Saka, 25 April 1928, *Kerr* 15392 (**BK**, **BM**, **K**)]; Phatthalung [Khao Pu Khao Ya National Park, Summit of Pa Pueng, 13 June 1987, *Maxwell* 87–555 (**BKF**, **L**)]; Satun [Muang, 18 April 1969, *Chermsirivathana & Kasem* 1391 (**BK**, **K**)].

Distribution.— Endemic to Thailand.

Ecology.— Scattered on limestone hills or along roadsides in primary evergreen forest; altitude 100–200 m. Flowering and fruiting periods: June to April.

Notes.— *Tarenna sakae* resembles *T. insularis* in inflorescence size and leaf shape, but differs in having ovate calyx lobes, oblong corolla lobes without apiculate apices and in having leaves which have scattered hairs all over the lower surface and hairy domatia in the vein axils.

21. *Tarenna stellulata* (Hook.f.) Ridl., Fl. Malay Penins. 2: 106. 1923; Craib, Fl. Siam. 2: 95. 1932; Corner, Wayside Trees. 2: 653. 1940; Wong in Ng, Tree Fl. Malaya 4: 412, 414. 1989; Keng, Concise Fl. Sing.: 162. 1990; Turner, Gard. Bull. Singapore 47: 448. 1995.— *Webera stellulata* Hook.f., Fl. Brit. India 3: 104. 1880; Boerl., Handl. Fl. Ned. Ind. 2(1): 130. 1891; King & Gamble, Mat. Fl. Malay Penins. 14: 65. 1904; Ridl., J. Straits Branch Roy. Asiat. Soc. 61: 55. 1912. Type: Malaysia, Malacca, *Wallich* s.n. (holotype **K!**; isotype **L!**).— *Ixora stellulata* (Hook.f.) Kuntze, Revis. Gen. Pl. 1: 278 1891, *nom. illeg.*— *Pavetta aristata* Wall., Cat. no. 6169, *nom. nud.* Fig. 5.

Thailand.— SOUTHEASTERN: Kanchanaburi [Thong Pha Phum, 29 May 1994, *Wongprasert et al.* 17 (**BKF**)]; PENINSULAR: Surat Thani [Khao Nga La, 7 April 1927, *Kerr* 12532 (**BK**, **BM**, **L**)]; Ko Lao, 20 July 1927, *Kerr* 12960, (**BK**, **BM**, **K**)]; Phangnga [Ban Phot, 20 Dec. 1979, *Shimizu, Toyokuni, Koyama, Yahara & Santisuk* T-27738 (**BKF**, **L**)]; Ko Surin, 1 March 1929, *Kerr* 17283 (**BM**)]; Krabi [Khao Phanom Bencha, Huai Saka Waterfall, 23 Oct. 2004, *Kesonbua* 125 (**KKU**)]; Khao Pra Bang Khram, 1 March 1994, *Niyomdham & Ueachirakan* 3564 (**BKF**); 15 km NW of Krabi, 15 July 1992, *Larsen, Niyomdham, Siriruga, Tirvengadam & Nørgaard* 43425 (**AAU**, **BKF**); km. 25 between Ao Luek and Krabi, 19 March 1960, *Smitinand & Abbe* 24565 (**K**)]; Nakhon Si Thammarat [Khao Luang National Park, Karome Waterfall, 17 May 1985, *Maxwell* 85–491 (**L**), 4 May 1955, *Snan* 252 (**BKF**), 2 March 1962, *Suvarnakoses* 1829 (**BKF**, **K**, **TCD**); Krung Ching Waterfall, Don Muang Cave,

14 April 2005, *Kesonbua* 160 (**KKU**); Phatthalung [Ban Phot, 20 Dec. 1979, *Shimizu, Toyokuni, Koyama, Yahara & Phanichaphol* T-27738 (**L**) & *Shimizu, Toyokuni, Koyama, Yahara & Santisuk* T-27740 (**AAU**), Khao Pu Khao Ya National Park, 21 Oct. 2004, *Kesonbua* 118 & 119 (**KKU**), Matoha Cave, 22 March 1986, *Maxwell* 86–193 (**BKF**), Pa Peung, 26 July 1986, *Maxwell* 86–502 (**BKF, L**); Trang [Nayong, Khao Chong Forest Station, 28 Feb. 2002, *Chamchumroon, Puff & Koonkhunthud* 1364 (**BKF**), 8 March 1976, *Chermsirivatthana & Prayad* 2191 (**BK**), 14 June 1974, *Geesink, Hattink & Charlermphol* 7219 (**K**), 22 Oct. 2004, *Kesonbua* 121 (**KKU**); 13 March 1974, *Larsen et al.* 33215 (**K, L, P**), 12 Aug. 1975, *Maxwell* 75–783 (**AAU**), 30 Oct. 1984, *Maxwell* 84–378 (**BK**), 1 Feb. 1985, *Maxwell* 85–142 (**BKF**), 30 Jan. 1978, *Sangkhachand* 1571 (**BKF, K, L**), 25 Jan. 1958, *Sørensen, Larsen & Hansen* 657 (**BKF**), 24 Jan. 1969, *Samroeng* 23 (**BKF**), 25 Jan. 1958, *Smitinand* 4121 (**BKF, K**), 28 Jan. 1966, *Tagawa, Iwatsuki & Fukuoka* 6991 (**BKF**); Satun [Tarutao Island, 20 April 1969, *Chermsirivatthana & Kasem* 1329 (**BK**); Tapan Lek, 8 March 1928, *Kerr* 14400 (**BK, BM, K, TCD**); Songkhla [Hat Yai, Ton Nga Chang Waterfall, 17 Oct. 2004, *Kesonbua* 103 (**KKU**), Khor Hong Hill, 8 Dec. 1997, *Maxwell* 85–1080 (**AAU, L**), 10 April 1976, *Sutheesorn* 3689 (**BK**); Muang, Kow Seng Hill, 28 April 1985, *Maxwell* 85–425 (**AAU**); Rataphum, Boripat Waterfall, 23 Feb. 1776, *Congdon* 332 (**AAU**), 10 April 2005, *Kesonbua* 116 (**KKU**), 19 Sept. 1984, *Maxwell* 84–232 (**BKF**), 8 Feb. 1985, *Maxwell* 85–174 (**BKF**); Pattani [Khao Kalakiri, 3 March 1928, *Kerr* 14933 (**BK, BM, TCD**); Khok Po, Sai Khao Waterfall, 28 Oct. 1985, *Maxwell* 85–1018 (**BKF, AAU**); Yala [Betong, 21 Feb. 2000, *Niyomdham, Puudja & Chonkunjana* 6001 (**BKF**); Kue Long, 25 April 1974, *Geesink & Hattink* 6405 (**BKF**); Narathiwat [Bacho Waterfall, 1 Dec. 1990, *Tirvengadam & Nanakorn* 1980 (**AAU**); Bajoa, Hui Pa Jo, 28 May 1961, *Bunnak* 178 (**BKF**), Bala forest, Sirinthorn Waterfall, 29 March 2005, *Kesonbua* 136 (**KKU**); Khao Sum Nak, 1 April 1989, *Niyomdham & Ueachirakan* 1990 (**BKF**); Waeng, 29 June 1972, *Nitrasirirak* 202 (**BKF, L**), 5 July 1972, *Nitrasirirak* 240 (**BKF, L**).

Distribution.— India, Peninsular Malaysia, Singapore, Borneo.

Ecology.— In primary evergreen and deciduous forests, often in shady places near streams, also common in evergreen forest near the sea; altitude to 400 m. Flowering and fruiting periods: All year round.

Notes.— *Tarenna stellulata* is characterized by its broad calyx lobes which are shorter than the ovary, its apiculate flower bud, and its fruits which are crowned by the short persistent calyx.

22. *Tarenna valida* Craib, Fl. Siam. 2: 96. 1932. Type: Thailand, Ranong, Khao Phota Luang Kao, 1 Feb. 1929, *Kerr* 16959 (holotype **K!**; isotypes **BK!, BM!**).

Thailand.— SOUTHWESTERN: Phetchaburi [Kaeng Krachan National Park, Thanthip Waterfall, 28 March 2003, *Middleton, Hemrat, Lindsay, Suddee & Suwanachat* 1772 (**BKF**), 9 March 1994, *Wongprasert et al.* 29 (**BKF**); Prachuap Khiri Khan [Bang Sapan, 12 Feb. 1970, *van Beusekom & Santisuk* 2812 (**AAU, BKF, L**); PENINSULAR: Ranong [Khao Phota Luang Kao, 1 Feb. 1929, *Kerr* 16959 (**BK, BM, K**), 5 July 1992, *Larsen, S. Larsen, Niyomdham, Siriruga, Tirvengadam & Nørgaard* 43130 (**BKF, AAU**); Surat Thani [Khao Sok National Park, 6 April 1987, *Santisuk s.n.* (**BKF**); Phangnga [Khao Nang Hong, 24 Aug. 1967, *Shimizu, Fukuoka & Nalampoon* 8007 (**AAU, BKF**); Takua Pa, 11 May 1968, *van Beusekom &*

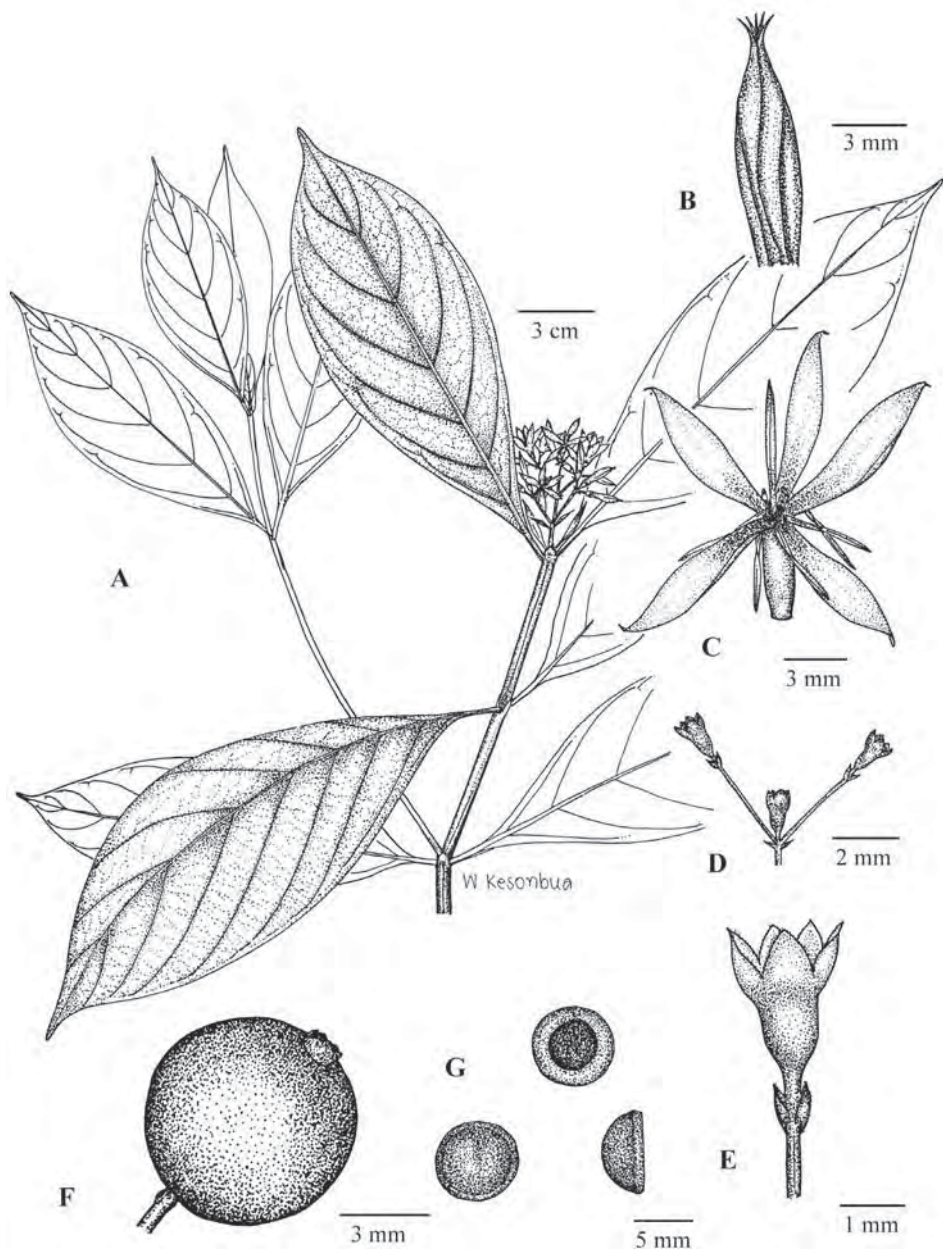


Figure 5. *Tarenna stellulata* (Hook.f.) Ridl.: A. flowering branch; B. upper part of flower bud, note apical appenages; C. corolla, stamens, style and stigma; D. flower triad (corollas fallen), note subsessile terminal flower; E. pedicel with bracteoles; ovary and calyx; F. fruit; G. three views of a seed. All from *Kesonbua* 119 (KKU). Drawn by W. Kesonbua.

Phengklai 705 (**BKF, L**); Nakhon Si Thammarat [Tap Chang, Kiriwong, 18 Dec. 1954, *Ploenchit* 230 (**BKF**)].

Distribution.— Endemic to Thailand.

Ecology.— Scattered in primary or secondary evergreen forest, on ridges; altitude 50–1300 m. Flowering and fruiting periods: December to August.

Notes.— *Tarenna valida* closely resembles *T. pulchra* but differs by having erect inflorescences which are rather densely pubescent, and by its calyx lobes which are longer than the ovary and densely short hairy.

23. *Tarenna vanprukii* Craib, Bull. Misc. Inform., Kew 1915: 431. 1915 & Fl. Siam. 2: 96. 1932. Type: Thailand, Phrae, Hui Lom, 27 May 1911, *Vanpruk* 246 (holotype **K!**; isotype **BKF**).— *T. vanprukii* var. *obtus*a Craib, Fl. Siam. 2: 96. 1932. Type: Thailand, Surat Thani, Ko Prap, 5 April 1927, *Kerr* 12523 (lectotype **K!**; isolectotype **BK!**, **BM!**).

Thailand.— NORTHERN: Chiang Mai [Doi Chiangdao, 5 June 1921, *Kerr* 5619 (**BK, BM, K**); Doi Inthanon, Mae Chaem, 11 Dec. 1984, *Koyama, Phengklai, Mitsuta, Yahara & Nagamasu* T-39401 (**BKF**), 17 April 1915, *Winit* 214 (**K**); Mae Rim, Sameung, 7 Sept. 1989, *Maxwell* 89-1043 (**L**), 5 Dec. 1989, *Maxwell* 1515 (**L**), 7 Sept. 1989, *Pooma* 328 (**BKF, K**); Mae Soi, Mae Soi Valley, 6 Sept. 1992, *Maxwell* 92-512 (**CMU, P, L**); Lampang [2 June 1926, *Winit* 1714 (**BK, BKF, K**); Mae Ping, 6 April 1930, *Winit* 1947 (**BKF**); Phrae [Hui Lom, 2 June 1926, *Vanpruk* 246 (**BKF, K**); Phitsanulok [Nakhon Thai, 12 April 1922, *Kerr* 5818 (**AAU, BK, BM, K**); NORTHEASTERN: Nong Khai [Phon Phi Sai, Ban Bang, 2 June 1963, *Adisai* 434 (**BK**); Kalasin [Somdet, Phuphan, 24 Oct. 1975, *Sutheesorn* 3522 (**BK**); EASTERN: Nakhon Ratchasima [Ban Chum Seng, 23 May 1929, *Noe* 189 (**BK, BM, K**); Huai Thalang, 23 Dec. 1928, *Put* 2205 (**AAU, BK, BM, K**); Khao Yai National Park, 22 May 2006, *Kesonbua* 174 (**KKU**); Pak Chong, Khao Mae Teang, 15 Feb. 1976, *Sutheesorn* 3673 (**BK**); Pak Thong Chai, Sakaerat Experimental Research Station, 8 Dec. 1984, *Fukuoka & Ito* T-34736 (**L**), 24 Aug. 1975, *Maxwell* 75-922 (**AAU, BK**) & 75-927 (**AAU, BK, L**); Surin [Sangkha, 6 Oct. 1984, *Murata, Phengklai, Mitsuta, Nagamasu & Nantasan* 37725 (**AAU, BKF**); Si Sa Ket [Kantarak, 17 April 1966, *Sangkhachand* 257 (**BK**); Ubon Ratchathani [22 May 1932, *Kerr* 21551 (**BK, BM, K, L**); SOUTHWESTERN: Uthai Thani [Huai Nam Wing, Ban Rai, 17 April 1963, *Kasem* 301 (**BK**); Phetchaburi [Khao Vong, 10 March 1965, *Sutheesorn* 480 (**BK**); Prachuap Khiri Khan [2 June 1915, *Kerr* 3639 (**BM**); CENTRAL: Saraburi [Ban Nawng Bua, 4 Oct. 1927, *Put* 1147 (**BK, BM**); Muang, Sam Lan forest, 13 April 1974, *Maxwell* 74-271 (**AAU, BK**), 22 Feb. 1975, *Maxwell* 75-155 (**AAU, BK**); SOUTHEASTERN: Chonburi [Ban Bueng, 11 Feb. 1966, *Phengnaren* 223 (**BKF**); Ira Island, 2 Oct. 1976, *Maxwell* 76-656 (**AAU, BK, L**); Sathahip, Khao Khiao, 9 April 1975, *Maxwell* 75-397 (**AAU, BK**); Si Chang Island, 29 Nov. 1992, *Maxwell* 92-780 (**CMU, L**), 14 Feb. 1993, *Maxwell* 93-162 (**CMU, L**); Sriracha, Ban Sa-det, 12 Jan. 1946, *Din* 205 (**BKF**), Leamchabang, a7 Dec. 1927, *Collins* 1757 (**K**), Nong Kao, without date, *Collins* 531 (**BK, BM, K**), 7 Dec. 1927, *Collins* 1751 (**BM**), Nong Nam Khieo, 11 March 1926, *Collins* 1118 (**BK, K**), Nong Yai Bu, 29 April 1921, *Collins* 754 (**K**), Ong Chang Nam Waterfall, Toong Brong, 3 May 1971, *Maxwell* 71-365 (**BK**), 30 Jan. 1975, *Maxwell* 75-77 (**AAU, BK**) & *Maxwell* 75-964 (**AAU, BK, L**), 8 April 1976, *Vacharee* 50 (**BK**); Rayong [Ban Phe, 25 Feb. 1930, *Put* 2772 (**BK, BM, K, TCD**) & 2775 (**BK, BM, K, TCD**), Khao Chamao National Park, 8 Nov. 1994, *Maxwell* 94-1197 (**CMU**); Khao Yot Lem,

Ban Yai Da, 15 Dec. 1974, *Geesink & Hiepko* 7847 (**BKF, K, L, P**); Chanthaburi [Khao Sabap, 6 July 1927, *Pur* 914 (**BK, BM, K, TCD**); Makham, 20 Oct. 1954, *Bunnak* 281 (**BKF**)]; PENINSULAR: Surat Thani [Kiriratnikom, 3 Jan. 1974, *Sutheesorn* 2844 (**BK**); Ko Prap, 5 April 1927, *Kerr* 12523 (**BK, BM, K**); Ko Tao, 12 April 1927, *Kerr* 12669 (**BK, BM, K**)]; Phuket [Khao Tosae, 13 May 1967, *Sutheesorn* s.n. (**BK**)].

Distribution.— Cambodia, Vietnam.

Ecology.— In evergreen forest, mixed forest or in open rocky areas in the deciduous forest, also along streams; altitude to 1700 m. Flowering and fruiting periods: October to June.

Notes.— *Tarenna vanprukii* is similar to *T. collinsae* in having coriaceous leaves and globose fruits with calyx scars at the apex, but it differs in its broader calyx lobes, longer lanceolate leaves, and its larger inflorescences.

24. *Tarenna wallichii* (Hook.f.) Ridl., Fl. Malay Penins. 2: 117. 1923; Craib, Fl. Siam. 2: 89. 1932; Wong in Ng, Tree Fl. Malaya 4: 413, 415. 1989; Turner, Gard. Bull. Singapore 47: 447. 1995.— *Webera wallichii* Hook.f., Fl. Brit. India 3: 157. 1880; Boerl., Handl. Fl. Ned. Ind. 2(1): 130. 1891. Type: Malaysia, Penang, *Wallich* Cat. No. 8401 (holotype **K-W!**; isotypes **L!**, **P!**).— *Ixora wallichii* (Hook.f.) Kuntze, Revis. Gen. Pl. 1: 278. 1891, *nom. illeg.*— *T. wallichii* var. *brunnea* Craib, Fl. Siam. 2: 97. 1932. Type: Thailand, Krabi, Ko Pu, 12 April 1930, *Kerr* 18954 (holotype **K!**; isotype **BK!**).— *T. wallichii* var. *subglabra* Craib, Fl. Siam. Enum. 2(1): 97. 1932. Type: Thailand, Trang, Kantang, 16 Jan. 1928, *Kerr* 17484 (holotype **K!**; isotype **BK!**).— *T. wallichii* var. *viridis* Craib, Fl. Siam. Enum. (1): 98. 1932. Type: Thailand, Satun, Adang Island, 16 Jan. 1928, *Kerr* 14122 (holotype **K!**; isotypes **BK!**, **BM!**).

Thailand.— PENINSULAR: Surat Thani [Khao Yod Leam, Ban Yai Da, 3 Dec. 1974, *Geesink, Hiepko & Phengkai* s.n. (**BKF**)]; Krabi [Ko Pu, 12 April 1930, *Kerr* 18954 (**BM, K**)]; Phatthalung [Ta Nod, Lan Mom Juice Waterfall, 8 April 2005, *Kesonbua* 145 (**KKU**), 23 May 1987, *Maxwell* 87–474 (**BKF, L**)]; Trang [Chong Tu, 30 March 1915, *Vanpruk* 737 (**BKF, K**); Kantang, 16 Jan. 1928, *Kerr* 17484 (**BK, BM, K**)]; Satun [Tarutao Island, 21 April 1969, *Chermisiriwathana & Kasem* 1476 (**BK**), 23 Feb. 1966, *Hansen & Smitinand* 12443 (**K**), 16 Jan. 1928, *Kerr* 14113 (**AAU, BK, BM, K, TCD**) & 14122 (**BK, BM, K**)]; Songkhla [Ban Pak Nam Thepha, 4 June 2001, *Pooma, Chamchumroon & Phattarahirankanok* 2035 (**BKF**); Boripat Waterfall, 27 Jan. 1985, *Maxwell* 85–111 (**BKF**), 23 June 1985, *Maxwell* 85–623 (**AAU, BKF, L**), 8 June 1991, *Maxwell* 92–523 (**AAU, L**), 28 Oct. 1969, *Maxwell* 1862 (**AAU**), 1 Dec. 1990, *Tirvengadam & Nanakorn* 1969 (**AAU, PSU**), 1970 (**AAU, PSU**), 1974 (**AAU, PSU**) & 1977 (**AAU, PSU**); Hat Yai, Khlong Hoi Khong, 19 May 1986, *Maxwell* 86–304 (**L**); Khao Khor Hong, 30 July 2006, *Kesonbua* 186 (**KKU**), 6 Oct. 1988, *Larsen et al.* 40274 (**AAU**), 1 Oct. 1988, *Larsen et al.* 40277 (**AAU**), 20 Oct. 1991, *Larsen, Barford, Nanakorn, Ueachirakan & Sirirugsa* 42450 (**AAU**), 4 June 1992, *Larsen, Renner, Niyomdham, Ueachirakan & Sirirugsa* 42653 (**AAU**); Khao Nam Khang National Park, Ton Lat Waterfall, 9 April 2005, *Kesonbua* 148 (**KKU**); Khao Noi, Feb. 1950, *Williams* 17273, (**K**); Khao Seng Hill, 9 March 1985, *Maxwell* 85–268 (**AAU, BKF, L**), 28 April 1985, *Maxwell* 85–425 (**BKF, L**); Sa Ba Yoi, 26 March 1928, *Kerr* 14802 (**AAU, BK, BM, K**), 7 April 1928, *Kerr* 15091 (**AAU, BM, K**); South of Hat Yai, 29 April 1979, *Congdon* 397 (**AAU**), 5 Sept. 1984, *Maxwell* 84–191 (**AAU, BK, BKF**); Ton Nga Chang, 21 Aug. 1992, *Niyomdham & Puudjaa* s.n. (**BKF**), *Puff*,

Igersheim & Ueachirakan 900914–1/5 (**BKF**); Ton Ouat Fa Waterfall, 19 Oct. 2004, *Kesonbua* 110 (**KKU**); Narathiwat [no locality, 12 Jan. 1986, *Niyomdham* 1131 (**AAU**, **BKF**, **P**)].

Distribution.— India, Cambodia, Peninsular Malaysia, Singapore, Borneo.

Ecology.— Common in lowland evergreen and secondary forests, also along trails in open areas, forest edges, by streams and in coastal hill forest; altitude to 450 m. Flowering and fruiting periods: September to June.

Vernacular.— Chan thana bai lek (จันทนาใบเล็ก) (Narathiwat); khem pa (เข็มป่า) (Narathiwat); ya-rong (ยาโรง) (Malay-Narathiwat).

Notes.— *Tarenna wallichii* is very variable as regards the shape of the leaves, which are oblong to lanceolate with inconspicuous lateral veins. The species is similar to *T. quocensis*, but can be distinguished by its broadly triangular calyx lobes and its smaller fruits with short persistent calyces. Its distribution, moreover, is restricted to the south of Thailand.

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