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The genus *Dumasia* (Fabaceae) in Thailand

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ABSTRACT

In Thailand two species of *Dumasia* occur, *D. villosa* subsp. *villosa* and *D. yunnanensis*. They grow in montane and dry evergreen forests, in open or disturbed areas and limestone ridges 550–2,500 meters above sea level, in northern, northeastern, and central Thailand. We present a key to the two Thai *Dumasia* based on their vegetative, flowering and fruiting characters, and provide nomenclature, descriptions, photographs, illustrations, and information about their distribution and ecology.

KEYWORDS: *Dumasia*, Fabaceae, Glycininae, Leguminosae, Phaseoleae, Thailand.

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INTRODUCTION

Dumasia DC., a small genus in the Fabaceae, subtribe Glycininae, tribe Phaseoleae (Lackey, 1981; Schrire, 2005), comprises of eight species, two subspecies and one variety distributed in tropical and subtropical Asia and Africa. They grow in seasonally dry tropical to warm temperate upland forest, forest margins and in riverine secondary vegetation (Schrire, 2005; Pan & Zhu, 2010). *Dumasia* was established by Augustin de Candolle (1825) with the description of *D. villosa* DC. based on a collection of Nathaniel Wallich's from Nepal.

Dumasia can be easily distinguished from other genera of subtribe Glycininae by a tubular calyx with an obliquely truncate mouth and yellow flowers (Ferguson & Skvarla, 1981; Harvey, 1894; Lackey, 1981; Pan & Zhu, 2010). However, the taxonomy of *Dumasia* remains problematic because of the complicated morphological variation in the genus: indumentum, stipules, leaflet shape and fruit shape are important diagnostic characters, but inflorescence length, flower details and seed number showed little taxonomic significance (Pan & Zhu, 2010).

Craib (1928) reported two species of *Dumasia* for Thailand, including *D. leiocarpa* Benth. and *D. villosa*, found in evergreen forest in northern Thailand, but these reports were not accompanied by key or description. Furthermore, the record of *D. leiocarpa* is erroneous as this species, as *D. villosa* subsp. *leiocarpa* (Benth.) B.Pan & X.Y.Zhu, only occurs in Sri Lanka. Because of this, most *Dumasia* specimens in herbaria are misidentified which makes this revision necessary.

MATERIALS & METHODS

Herbarium specimens deposited at AAU, BK, BM, BKF, C, CMUB, E, K, KKU, L, P, PSU and QBG were studied. Additional specimens were also collected in the field at various localities in Thailand and deposited at BKF. Measurements and morphological features presented in the descriptions and the key are original and based on the herbarium specimens and specimens collected by the authors in the field.

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TAXONOMIC TREATMENT

DUMASIA

DC., Ann. Sci. Nat. (Paris) 4(13): 96. 1825; Prodr. 2: 241. 1825 & Mém. Légum.: 255. 1826; Benth. & Hook.f., Gen. Pl. 1: 529. 1865; Baker in Hook.f., Fl. Brit. India 2: 182. 1876; Backer & Bakh.f., Fl. Java 1: 624. 1963; Hutch., Gen. Fl. Pl. 1: 447. 1964; Verdc., Fl. Trop. E. Africa, Legum. 4: 513. 1971; Thuân, Fl. Cambodge, Laos & Vietnam 17: 53, pl. 5. 1979; Verdc., Bot. Bull. Dept. Forests Papua New Guinea 11: 488. 1979; R.H.Maxwell in Dassan. & Fosberg, Revis. Handb. Fl. Ceylon 7: 299. 1980; Grierson & D.G.Long, Fl. Bhutan 1(3): 695. 1987; B.Pan & X.Y.Zhu, Ann. Bot. Fenn. 47: 245. 2010; Sa Ren & M.G.Gilbert in C.Y.Wu *et al.*, Fl. China 10: 242. 2010. Type species: *Dumasia villosa* DC.

Herbs, stem twining, glabrescent, glabrous or pubescent. *Leaves* trifoliolate pinnately compound, alternate; stipules persistent, lanceolate, ovate or linear, striate, apex acute or acuminate; stipels setaceous, 2 pairs, 1 pair attached to the base of petiolule of terminal leaflet, persistent or caducous and another pair attached to the base of petiolules of lateral leaflets, persistent; leaflets chartaceous or membranaceous, pubescent, villous, glabrescent or glabrous; terminal leaflet ovate, broadly ovate, elliptic, suborbicular, rarely obovate, apex emarginate, retuse, obtuse or acute and apiculate, base obtuse, cuneate or truncate; lateral leaflets slightly smaller than terminal leaflet, ovate or broadly ovate, rarely suborbicular or elliptic, apex obliquely emarginate, retuse, obtuse or acute and apiculate, base obliquely obtuse, cuneate or truncate. *Inflorescences* axillary pseudoracemes; bracts persistent, linear or ovate. *Flowers* yellow, zygomorphic; bracteoles 2, appressed to the base of calyx tube, persistent, linear or ovate. *Calyx* tubular, the mouth obliquely truncate, lobes obsolete, inconspicuous or absent. *Corolla* 5, with long claw, glabrous; standard obovate, apex emarginate, obtuse or retuse, base with 2 small auricles, margin slightly inflexed; wings oblong, apex obtuse, adherent to keels by longitudinal folds; keels oblong, subtriangular or elliptic with a small pocket, apex obtuse. *Stamens* 10, diadelphous, 9 filaments connate and 1 vexillary filament free; anther elliptic or ovate, uniform and dorsifixed, anther of vexillary stamen slightly smaller than the others. *Pistil* simple, ovary superior, linear, villous or glabrous, shortly stipitate; style filiform, dilated near the apex, distally cylindrical and geniculate; stigma terminal, capitate with hairy ring. *Fruits* legumes, light green when young, greenish-brown or brown when dried, linear, falcate or subfalcate, constricted between seeds or not, villous or glabrous, with a small persistent apical beak, stipitate at base. *Seeds* 2–5, blackish-brown or black, ellipsoid or subglobose, smooth.

About eight species in the world; two species in Thailand.

KEY TO THE SPECIES

1. Terminal leaflet ovate or broadly ovate, more than 5 cm long; rachis of inflorescence more than 6 cm long; fruits constricted between seeds; stipules more than 4 mm long
   2. Stem, rachis and petiole golden-brown pubescent; fruits villous — **1. D. villosa** subsp. **villosa**
   2. Stem, rachis and petiole glabrous to glabrescent; fruits glabrous — **D. villosa** subsp. **leiocarpa** (distributed in Sri Lanka)
1. Terminal leaflet elliptic or suborbicular, rarely obovate, less than 5 cm long; rachis of inflorescence less than 6 cm long; fruits not constricted between seeds; stipules less than 4 mm long — **2. D. yunnanensis**

1. Dumasia villosa DC., Ann. Sci. Nat. (Paris) 4(13): 97. 1825; Prodr. 2: 241. 1825 & Mém. Légum.: 257, pl. 44. 1826; Miq., Fl. Ned. Ind. 1(1): 227. 1855; Baker in Hook.f., Fl. Brit. India 2: 183. 1876; Gagnep. in Lecomte, Fl. Indo-Chine 2(3): 308, f. 32. 1916; Craib, Fl. Siam. 1(3): 437. 1928; Backer & Bakh.f., Fl. Java 1: 624. 1963; Verdc., Fl. Trop. E. Africa, Legum. 4: 513, f. 74. 1971; Thuân, Fl. Cambodge, Laos & Vietnam 17: 54, pl. 5. 1979; Verdc., Bot. Bull. Dept. Forests Papua New Guinea 11: 488, f. 120. 1979; R.H.Maxwell in Dassan. & Fosberg, Revis. Handb. Fl. Ceylon 7: 300. 1980; Grierson & D.G.Long, Fl. Bhutan 1(3): 696. 1987; B.Pan & X.Y.Zhu, Ann. Bot. Fenn. 47: 246, f. 5. 2010; Sa Ren & M.G.Gilbert in C.Y.Wu *et al.*, Fl. China 10: 243. 2010. Type: Nepal, 1821, *Wallich Cat. no. 5523* (lectotype **G** seen on digital image, designated by B.Pan & X.Y.Zhu [2010]; isolectotype **G** seen on digital image, **K-W!**). Fig. 1.

— *D. pubescens* DC., Ann. Sci. Nat. (Paris) 4(13): 97. 1825; Prodr. 2: 241. 1825& Mém. Légum.: 257, pl. 45. 1826. Type: Nepal, 1821, *Wallich Cat. no. 5523* (holotype **G** n.v.).

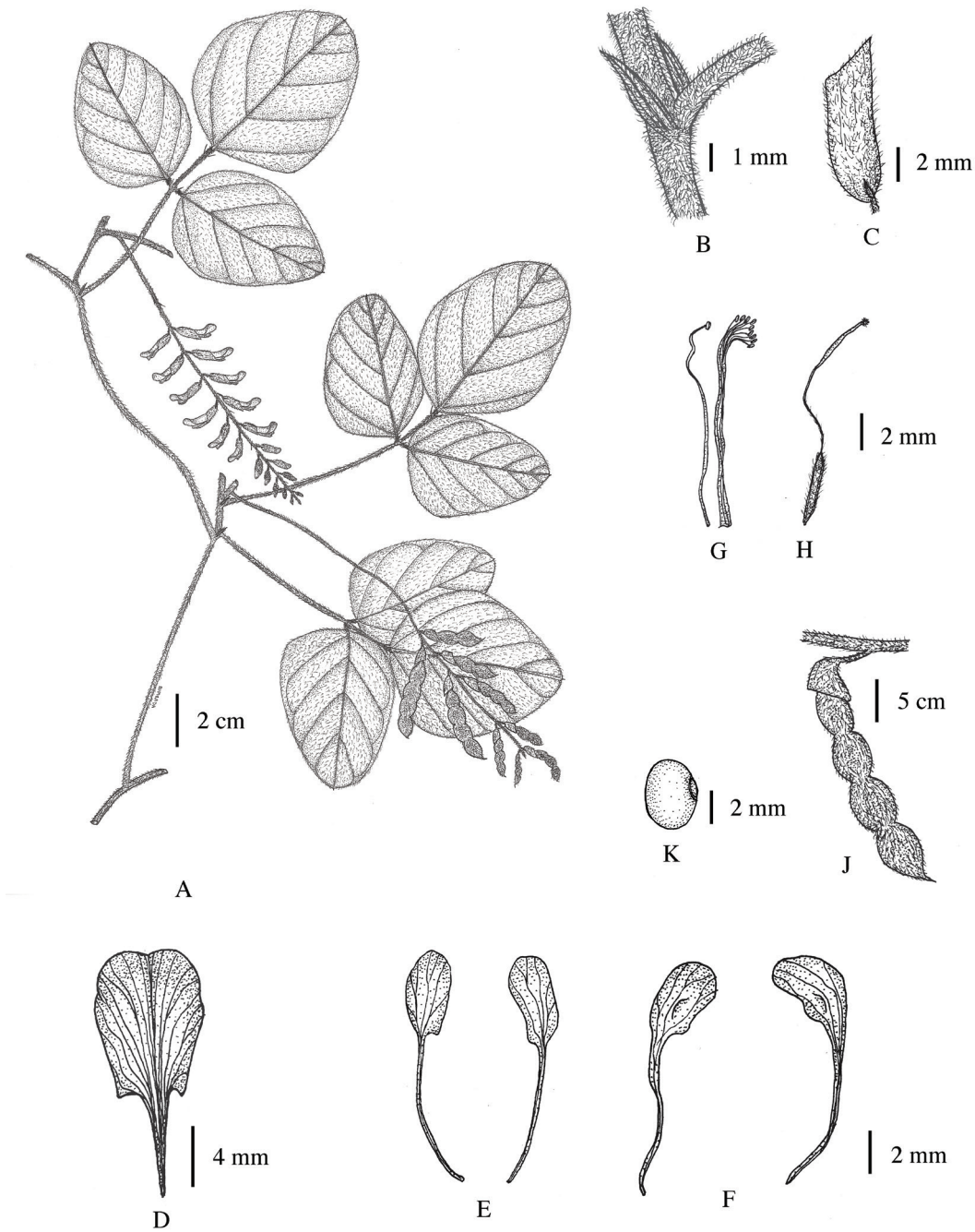

Figure 1. *Dumasia villosa* DC.: A. branch with inflorescence and infructescence; B. stipules; C. calyx; D. standard; E. wings; F. keels; G. stamen; H. pistil; J. fruit; K. seed.

— *D. congesta* Graham in Wall., Numer. List nr. 5524. 1831–32, **nom. nud.**

— *D. capensis* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 2: 245. 1836. Type: South Africa, "In locis sylvarum umbrosis prope "K'Neisna", Dec., *Ecklon & Zeyher 1625* (holotype **S** seen on digital image).

— *D. glaucescens* Miq., Fl. Ned. Ind. 1(1): 227. 1855. Type: Java, Bandong, *Zollinger 590* (holotype **P!**).

— *Apios martini* H.Lév., Fl. Kouy-Tchéou: 225. 1914–15. Type: China, 29 Aug., 22 Sept. 1897, *Martin & Bodinier 1825* (holotype **E!**).

— *Erythrina mairei* H.Lév., Bull. Géogr. Bot. 25: 50. 1915. Type: China, Yunnan, Sept. 1912, *Mairei s.n.* (holotype **E!**).

subsp. **villosa**

Herbs, stem twining, golden-brown pubescent. *Leaves*: petiole 3.5–8.5 cm long, golden-brown pubescent; rachis 0.5–2.5 cm long, densely golden-brown pubescent; stipules linear or lanceolate, 4.5–6 × ca 0.5 mm, striate, apex acuminate, margin entire, abaxial surface sparsely to densely golden-brown pubescent, adaxial surface glabrous; stipels persistent, setaceous, 1–3 mm long, apex acuminate or acute, margin entire, abaxial surface densely golden-brown pubescent, adaxial surface glabrous; petiolules 2.5–5 mm long, densely golden-brown pubescent; leaflets chartaceous, ovate or broadly ovate, densely golden-brown pubescent or villous on both surfaces, with 4–7 lateral veins each side; terminal leaflet 5.5–8.5 × 3–6 cm, apex emarginate, retuse, obtuse or acute and apiculate, base obtuse or cuneate; lateral leaflets 5–7.5 × 2.5–4.5 cm, apex obliquely emarginate, retuse, obtuse or acute and apiculate, base obliquely obtuse or cuneate. *Inflorescence* axillary, 18–40-flowered pseudoracemes; peduncle 2.5–4 cm long, sparsely to densely golden-brown pubescent; rachis 8.5–15 cm long, densely golden-brown pubescent; bracts linear, 1.5–3 mm long, apex acuminate, abaxial surface sparsely to densely golden-brown pubescent, adaxial surface glabrous. *Flowers*: pedicel 2–3 mm long, densely golden-brown pubescent; bracteoles persistent, linear, 1.5–2.5 mm long, apex acuminate, abaxial surface sparsely to densely golden-brown pubescent, adaxial surface glabrous. *Calyx* 0.4–1.5 × 0.3–0.5 cm, abaxial surface sparsely pubescent, adaxial surface glabrous. *Corolla* yellow with white claws; standard obovate, 1.6–1.8 × 0.7–0.8 cm (excluding claw 1–1.2 cm long), apex emarginated or obtuse, margin slightly inflexed, claw 0.6–0.8 cm long; wings oblong, 1–1.8 × 0.2–0.3 cm (excluding claw 0.3–0.6 cm long), apex obtuse, margin entire, claw 0.7–1.2 cm long; keels oblong or subtriangular, 1–1.7 × 0.2–0.3 cm (excluding claw 0.3–0.5 cm long), apex obtuse, margin entire, claw 0.7–1.2 cm long. *Stamens*: filaments 1.2–1.8 cm long; anther elliptic, ca 0.5 mm long, anther of vexillary stamen orbicular. *Pistil* 1.2–1.8 cm long; ovary linear, golden-brown villous, base shortly stipitate. *Fruits* linear, 2–3.5 × 0.4–0.5 cm, densely golden-brown villous, constricted between seeds, short stipitate; fruit stalk 4–5 mm long, densely golden-brown pubescent. *Seeds* 2–4, black, ellipsoid or subglobose, 4–4.5 × 3–3.5 mm.

Thailand.— NORTHERN: Chiang Mai [Doi Ang Khang, 12 Jan. 1975, *Sadakorn 425* (**BK**); Doi Chiang Dao, 15 Jan. 1989, *Maxwell 89-46* (**BKF**, **L**); ibid., 2 Dec. 1961, *Smitinand & Anderson 7268* (**BKF**, **K**); Doi Suthep-Pui, 26 Dec. 1997, *BGO Staff 10292* (**QBG**); ibid., 23 Dec. 1912, *Kerr 2814* (**BM**, **E**, **K**); ibid., 3 Dec. 1992, *Maxwell 92-791* (**BKF**, **CMUB**, **L**, **P**)].

Distribution.— Central, West and South Africa, Madagascar, Himalayas, Pakistan, India, Nepal, Bhutan, Myanmar, China, Taiwan, Laos, Vietnam, Malaysia, Indonesia, Philippines, Papua New Guinea, Australia and New Zealand.

Ecology.— Lower montane rain forest and dry evergreen forest, in open or disturbed areas, limestone ridges, sometimes by streams, 550–1,600 m alt. Flowering and fruiting from December to January.

Uses.— The seeds were formerly used as beads (New Guinea) (Verdcourt, 1979).

2. Dumasia yunnanensis Y.T.Wei & S.K.Lee, Guihaia 5(3): 159. 1985; B.Pan & X.Y.Zhu, Ann. Bot. Fenn. 47: 250, f. 10. 2010; Sa Ren & M.G.Gilbert in C.Y.Wu *et al.*, Fl. China 10: 243. 2010. Type: China, Yunnan, Kunming, 9 Nov. 1938, *Teng 171* (holotype **KUN** n.v.). Figs. 2 & 3.

— *D. nitida* Chun ex Y.T.Wei & S.K.Lee var. *kurziana* S.V.Predeep & M.P.Nayar, J. Jap. Bot. 66: 275. 1991. Type: Myanmar, Pegu, *Kurz 1699* (holotype **CAL** n.v.; isotype **CAL** n.v.).

— *D. leiocarpa* sensu Craib [non Benth. in Miq., Pl. Jungh. 2: 231. 1852], Fl. Siam. 1(3): 436. 1928.

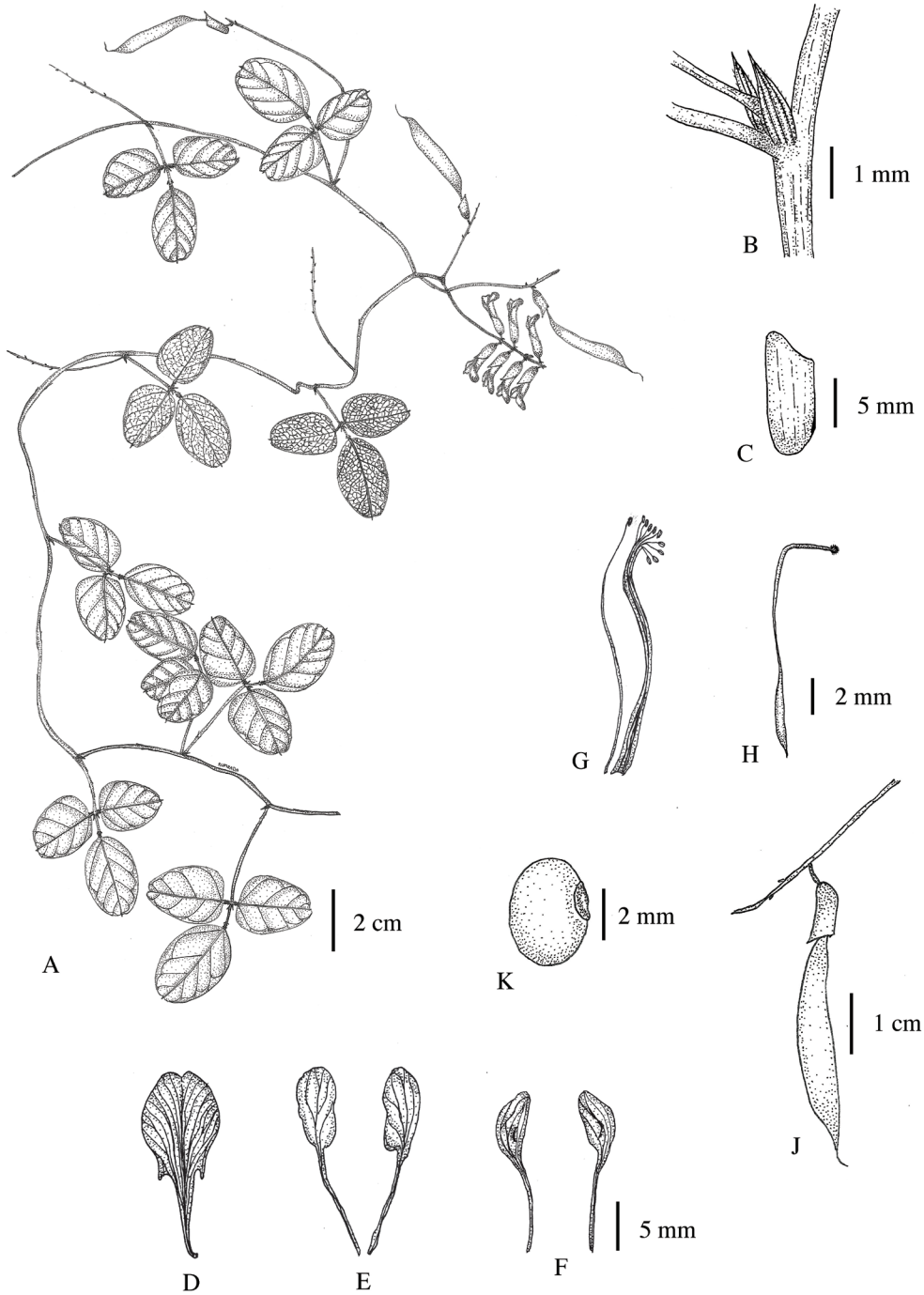

Figure 2. *Dumasia yunnanensis* Y.T.Wei & S.K.Lee: A. branch with inflorescence and infructescence; B. stipules; C. calyx; D. standard; E. wings; F. keels; G. stamen; H. pistil; J. fruit; K. seed.

Herbs, stem twining, slender, glabrous to glabrescent. *Leaves*: petiole 1–5 cm long, glabrous to glabrescent; rachis 3–8 mm long, glabrous to glabrescent; stipules ovate to lanceolate, 1.5–3 × 0.5–1 mm, striate, apex acute or acuminate, margin entire, abaxial surface glabrescent and pubescent along margin, adaxial surface glabrous; stipels setaceous, abaxial surface glabrescent to glabrous, adaxial surface glabrous, 1 pair attached to the base of petiolule of terminal leaflet caducous, not more than 1 mm long, apex acute or obtuse, and another pair attached to the base of petiolules of lateral leaflets persistent, 1.5–2.5 mm long, apex acuminate or acute; petiolules 1.5–3 mm long, sparsely light brown pubescent; leaflets membranaceous, sometimes chartaceous, abaxial surface glabrescent to sparsely pubescent, adaxial surface glabrous to glabrescent, with 4–6 lateral veins each side; terminal leaflet elliptic or suborbicular, rarely obovate, 1–3.5 × 0.5–2.5 cm, apex emarginate, retuse, obtuse or acute and apiculate, base obtuse or truncate; lateral leaflets ovate, rarely suborbicular or elliptic, 1–3.5 × 0.5–2.5 cm, apex obliquely emarginate, retuse, obtuse or acute and apiculate, base obliquely obtuse or truncate. *Inflorescence* axillary, 4–15-flowered pseudoracemes; peduncle 1.5–2.5 cm long, glabrous to glabrescent; rachis 0.5–3 cm long, glabrous to glabrescent; bracts ovate, ca 1 mm long, apex acuminate, base truncate,

Figure 3. *Dumasia yunnanensis* Y.T.Wei & S.K.Lee: A. habit; B. inflorescences with flowers; C. inflorescences with flowers and fruit; D. infructescence with fruits.

sparsely pubescent along margin. *Flowers*: pedicel 2–3 mm long, glabrescent to sparsely pubescent; bracteoles persistent, ovate, less than 1 mm long, apex acute, base obtuse, sparsely pubescent along margin. *Calyx* 0.8–1.2 × 0.4–0.5 cm, abaxial surface glabrescent and adaxial surface glabrous. *Corolla* yellow with white claws; standard obovate, 1.6–2 × 0.8–1 cm (excluding claw 1–1.2 cm long), apex retuse, margin slightly inflexed, claw 0.6–0.8 cm; wings oblong, 1.7–2 × 0.3–0.4 cm (excluding claw 0.6–0.7 cm long), apex obtuse, margin entire, claw 1.1–1.3 cm long; keels elliptic or subtriangular, 1.6–1.9 × 0.3–0.5 cm (excluding claw 0.5–0.7 cm long), apex obtuse, margin entire, claw 1.1–1.2 cm long. *Stamens*: filament 1.4–1.7 cm long; anther elliptic to ovate, ca 0.5 mm long. *Pistil* 1.4–1.8 mm long; ovary linear, glabrous, base shortly stipitate. *Fruits* falcate, subfalcate or linear, 3–5 × ca 0.5 cm, glabrous, not constricted between seeds, stipitate, 5–8 mm long; fruit stalk 3–4 mm long, glabrous to glabrescent. *Seeds* 2–5, blackish-brown, ellipsoid or subglobose, 4.5–5 × 3–3.5 mm.

Thailand.— NORTHERN: Mae Hong Son [Khun Yuam, 20 Nov. 1998, *Watthana & Srisanga 195* (**BKF**, **CMUB**, **QBG**)]; Chiang Mai [Chang Khian, 29 Oct. 1994, *Nanakorn et al. 2546* (**QBG**); ibid., 29 Oct. 1975, *Sadakorn 602* (**BK**); ibid., 20 Nov. 1977, *Sutheesorn 4267* (**BK**); Doi Chiang Dao, 10 Nov. 1963, *Adisai 636* (**BK**); ibid., 18 Nov. 1963, *Bunchuai 1338* (**L**); ibid., 12 Nov. 2011, *Clark et al. 212* (**K**, **QBG**); ibid., 7 Nov. 2013, *Egan et al. 13-0807* (**K**); ibid., 1 Dec. 1984, *Koyama et al. T-48817* (**BKF**); ibid., 4 Nov. 1995, *Maxwell 95-1047* (**CMUB**); ibid., 24 Nov. 2017, *Meeboonya & Yodboplub 407* (**BKF**); ibid., *Sinchai 150* (**L**); ibid., 16 Dec. 1998, *Suvarnakoses 1006* (**BKF**); Doi Inthanon, 22 Nov. 1964, *Bunchuai 1400* (**K**); ibid., 2 Jan. 1927, *Garrett 365* (**C**, **E**, **K**, **L**); ibid., 17 Dec. 1998, *Konta et al. 4648* (**BKF**); ibid., *Lakshnakara 1483* (**BK**); ibid., 3 Oct. 1971, *Murata et al. T-15992* (**AAU**, **BKF**); ibid., 17 Dec. 1998, *Phengklai et al. 11281* (**BKF**); ibid., 29 Oct. 1962, *Smitinand et al. 7624* (**BKF**); Doi Mon Long, 21 Dec. 1995, *BGO Staff 5510* (**QBG**); Doi Pui, *Koyama et al. T-39657* (**AAU**, **BKF**); ibid., 19 Dec. 1969, *van Beusekom & Phengklai 2633* (**AAU**, **BKF**, **BM**, **C**, **L**, **P**); Doi Suthep-Pui, Oct. 1970, *Dixen 70-284* (**AAU**); ibid., 5 Nov. 2013, *Egan et al. 13-0788* (**K**); ibid., 12 Dec. 1904, *Hosseus 205* (**BM**, **C**, **E**, **K**, **L**, **P**); ibid., 31 Oct. 1909, *Kerr 883* (**BM**, **K**, **P**); ibid., 27 Nov. 1993, *Larsen et al. 44924* (**AAU**, **BKF**, **L**, **PSU**); ibid., 21 Nov. 1987, *Maxwell 87-1480* (**BKF**); ibid., 29 Sept. 2017, *Meeboonya & Yodboplub 397* (**BKF**); ibid., 29 Sept. 2017, *Meeboonya & Yodboplub 398* (**BKF**); ibid., 20 Oct. 1988, *Phengklai et al. 6535* (**BKF**); ibid., 27 Nov. 1993, *Puudjaa 99* (**BKF**); ibid., 11 Dec. 1957, *Smitinand 3976* (**BKF**); ibid., 9 Oct. 1958, *Sørensen et al. 5534* (**BKF**, **C**); ibid., *Suvatabhandu s.n.* (**BK**); Mae Rim, 21 Dec. 1985, *Paisooksantivatana 1639A-85* (**BK**); Doi Nang Ka, Nov. 1980, *Put 3290* (**BK**, **BM**, **E**, **K**, **L**); Doi Buak Ha, 30 Nov. 1965, *Hennipman 3178* (**C**, **K**, **L**)]; Chiang Rai [Khun Chae, 30 Dec. 1997, *Maxwell 97-1546* (**BKF**, **CMUB**, **L**); Wiang Pa Pao, 29 Sept. 1993, *Vial-Debas s.n.* (**CMUB**)]; Nan [Doi Phu Wae, 13 Nov. 2000, *Srisanga 1842* (**CMUB**)]; Lampang [Chae Son, 17 Dec. 1996, *Maxwell 96-1651* (**CMUB**, **L**); Mae Hang, 24 Feb. 1958, *Sørensen et al. 1594* (**C**, **E**)]; NORTH-EASTERN: Loei [Phu Luang, 15 Nov. 1968, *Chermsiriwattana 1075* (**BK**); ibid., 17 Nov. 2000, *Wongprasert 0011-15* (**BKF**)]; CENTRAL: Nakhon Nayok [Khao Yai, Khao Khiao, 12 Oct. 1969, *Kasem 624* (**BK**); ibid., 18 Oct. 1969, *van Beusekom & Charoenphol 1701* (**AAU**, **BKF**, **C**, **E**, **K**, **L**, **P**)].

Distribution.— India, Nepal, Bhutan, Myanmar, China, Laos, Vietnam and Malaysia.

Ecology.— In montane and dry evergreen forests in open or disturbed areas and limestone ridge, 950–2,500 m alt. Flowering and fruiting from September to February.

Vernacular.— Hae phan chan (แห่พันชั้น) (Chiang Mai).

Note.— In Florae Siamensis Enumeratio, Craib (1928) reported *Dumasia leiocarpa* (now synonym of *D. villosa* subsp. *leiocarpa*) from northern Thailand, based on the specimens *Garrett 365*, *Hosseus 205* and *Kerr 883*. We studied these specimens and found that they have elliptic suborbicular or obovate terminal leaflets, one pair of stipels which attached to the base of petiolule of terminal leaflet caducous and fruits are not constricted between seeds. In all these aspects the specimens cited differ from *D. villosa* subsp. *leiocarpa*, and instead they are similar to *D. yunnanensis* (Table 1). Therefore, the correct name for the specimens cited in Florae Siamensis Enumeratio should be *D. yunnanensis*. Many other Thai herbarium specimens of *D. yunnanensis* were misidentified as *D. villosa* subsp. *leiocarpa* or its synonym *D. leiocarpa*, possibly because of similarities in some morphological

characters (Table 1). For this study, we thoroughly examined the specimens from Thai and foreign herbaria and concluded that the Thai specimens identified as *D. villosa* subsp. *leiocarpa*, *D. leiocarpa* or *D. villosa* var. *leiocarpa* were misidentified, and that their correct identification should be *D. yunnanensis*. This conclusion agrees with the study of Pan & Zhu (2010), who indicated that *D. villosa* subsp. *leiocarpa* is only distributed in Sri Lanka.

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Table 1. Differentiating characters of *Dumasia*. *villosa* subsp. *villosa*, *D. villosa* subsp. *leiocarpa* and *D. yunnanensis*.

Characters	*D. villosa* subsp. *villosa*	*D. villosa* subsp. *leiocarpa*	*D. yunnanensis*
stem	twining, golden-brown pubescent	slender, twining, glabrous to glabrescent	slender, twining, glabrous to glabrescent
leaflet	papery, densely golden-brown pubescent or villous on both surfaces	papery, abaxial surface glabrous to glabrescent, adaxial surface glabrous	thin, abaxial surface glabrescent to sparsely pubescent, adaxial surface glabrous to glabrescent
shape and size of terminal leaflet	ovate or broadly ovate, 5.5–8.5 cm long	ovate or broadly ovate, 3–5.5 cm long	elliptic or suborbicular, rarely obovate, 1–3.5 cm long
stipels	persistent both two pairs	persistent both two pairs	one pair attached to the base of petiolule of terminal leaflet caducous, and another pair attached to the base of petiolules of lateral leaflets persistent
ovary	villous	glabrous	glabrous
fruit	torulose and villous	torulose and glabrous	not torulose and glabrous