

# Taxonomy of *Dendrolobium* (Leguminosae) in Thailand

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**ABSTRACT.**— *Dendrolobium* includes seven species and eight taxa in Thailand, viz. *D. baccatum*, *D. lanceolatum* (var. *lanceolatum* and var. *microcarpum*), *D. olivaceum*, *D. rugosum*, *D. thorelii*, *D. triangulare* and *D. umbellatum*. Four names are lectotypified, including *Lespedeza lanceolata*, *Desmodium wallichii*, *Desmodium cephalotoides* and *Desmodium umbellatum* var. *costatum*. Two names are reduced to synonymy, i.e., *Lespedeza cambodiana* under *Dendrolobium lanceolatum* and *Dendrolobium rugosum* var. *moniliferum* under *Dendrolobium rugosum*.

**KEY WORDS:** *Desmodium*, Desmodieae, Fabaceae, Papilionoideae, taxonomy

## INTRODUCTION

*Dendrolobium* was described by Bentham (1852). The species belonging to this genus have often been treated under *Desmodium* Desv. in various taxonomic categories, including *Desmodium* sect. *Eudesmodium* (De Candolle, 1825), *Desmodium* subgen. *Dendrolobium* (Wight & Arnott, 1834), and *Desmodium* sect. *Dendrolobium* (Bentham, 1864). Nowadays, *Dendrolobium* is accepted again in several taxonomic works (e.g., Ohashi, 1973, 1998 & 2004; Pedley, 1999). The genus is characterized by its racemose inflorescence with dense flowers and by its fruits which have a thick and hard pericarp, compared with fruit pericarp of other genera in tribe Desmodieae. There are about 18 species of *Dendrolobium*, and they are mostly distributed in Asia and Australia. A few species extend their distributions to Africa (Ohashi, 1973, 1998, 2004, 2005; Pedley, 1999; Ohashi, 2005). For Thailand, this is the first taxonomic revision for genus

*Dendrolobium* and it is a contribution to the progress of the Flora of Thailand project.

## MATERIALS AND METHODS

The taxonomic study of genus *Dendrolobium* in Thailand is based on specimens from various herbaria viz. AAU, ABD, BCU, BK, BKF, BM, BO, C, CMU, CMUB, E, FOT, G, G-DC, HN, HNL, HNU, K, KEP, KCU, K-W, KYO, L, NOUL, P, PSU, QBG, SING and TI. Online photographs of specimens deposited at A, BR, LD, MO, NY, P and US were also examined. The herbarium acronyms are followed Thiers (continuously updated). The NOUL abbreviation used here is for the herbarium of the Faculty of Sciences, National University of Laos, Laos. This study is also based on field surveys in various parts of Thailand during which plant specimens were collected and deposited mainly at the KCU herbarium.

## RESULTS

### Taxonomic treatment

**DENDROLOBIUM** (Wight & Arn.) Benth. in Jungh. & Miq., Pl. Jungh. 2: 215. 1852. Type species: *Dendrolobium umbellatum* (L.) Benth.— *Desmodium* sect. *Eudesmodium* DC., Prodr. 2: 325. 1825, pro parte.— *Desmodium* subgen. *Dendrolobium* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 223. 1834.— *Desmodium* sect. *Dendrolobium* (Wight & Arn.) Benth., Fl. Austral. 2: 229. 1864.

Small to large shrubs. *Leaves* ±alternately arranged, stipulate, stipellate, 3-foliolate; venation pinnately veined; petioles unwinged. *Inflorescences* shortly racemose or paniculate, terminal or axillary; each inflorescence node with 1 flower; primary bract absent; secondary bract 1; bracteoles 2. *Flowers* densely arranged in a head-like partial inflorescence; calyx connate, 4-teethed; corolla of 5 petals; stamens 10, monadelphous; ovary with 1 carpel. *Pods* indehiscent, laterally compressed or moniliform, straight or slightly curved, usually

with persistent calyx; pericarp thick and hard.

About 18 species distributed in Asia and Australia with a few species reaching Africa. Seven species are native to Thailand.

1. *Dendrolobium baccatum* (Schindl.) Schindl. in Fedde, Repert. Spec. Nov. Regni Veg. 20: 278. 1924.— *Desmodium baccatum* Schindl. in Engl., Bot. Jahrb. Syst. 54(1): 59. 1916. Type: Cambodia. *Talmy 127* (lectotype **P** [P00087856!, digital image], designated by Dy Phon et al. (1994)).— *Desmodium clovisii* Gagnep. in Lecomte, Notul. Syst. (Paris) 3: 258. 1914, *nom. illeg.* Fig. 1A–C.

Shrub to 3 m tall; stem and twigs terete, glabrous to tomentose. *Leaves*: stipules triangular, caducous, 4–9 by 2–3 mm, puberulent, margin villose; petioles 0.5–4 cm long, pubescent to tomentose; rachis 3–15 mm long, pubescent to tomentose. *Leaflets* subcoriaceous; stipels ±triangular, glabrous to pubescent, 1.5–5 by 0.5–3 mm, apex acuminate; petiolules 1–4 mm long, pubescent to tomentose. *Terminal leaflet*

### Key to the species

1. Pods with 1 seed, rarely 2 seeds.....**2. *D. lanceolatum***
1. Pods with 2 to several seeds, or rarely 1 seed.....**2**
2. Stipules equal to or less than 1.5 cm long, abaxial side glabrescent to pubescent.....**3**
2. Stipules more than 1.5 cm long, abaxial side silvery hairy.....**6**
3. Calyx caducous.....**7. *D. umbellatum***
3. Calyx persistent.....**4**
4. Apex of lower calyx tooth acute and narrow, shortly beaked.....**1. *D. baccatum***
4. Apex of lower calyx tooth obtuse to rounded, not beaked.....**5**
5. Apex of standard distinctly 2-lobed (*ca.* 1 mm).....**4. *D. rugosum***
5. Apex of standard emarginate, indistinctly lobed (less than 0.5 mm).....**6. *D. triangulare***
6. Calyx more than 9 mm long. Standard 11–11.2 by 7.5–8.5 mm. Wings auriculate on both upper and lower sides.....**5. *D. thorelii***
6. Calyx less than 9 mm long. Standard *ca.* 8.5 by 5–5.4 mm. Wings auriculate on upper side.....**3. *D. olivaceum***

lanceolate to ovate, obovate or elliptic, 2.5–8 by 1.5–4 cm, apex acute to acuminate, obtuse or rounded, base attenuate to obtuse, margin entire, upper surface puberulent, lower surface pubescent to appressed tomentose; lateral veins 9–18 per side, reaching the margin. *Lateral leaflets* narrowly lanceolate or narrowly elliptic, 2–5.5 by 0.5–3 cm, apex acute to acuminate or obtuse, base asymmetrical, margin entire, upper surface puberulent, lower surface appressed tomentose; lateral veins 6–15 per side, reaching the margin. *Inflorescences* racemose, usually terminal or rarely axillary, 1–2 cm long, with 10–20 flowers; peduncle 3–8 mm long. *Secondary bract* variable in shape and size, 1.5–4 by 0.5–1 mm, apex acute to acuminate, pubescent, margin villose. *Flowers* 10–12 mm long; bracteoles narrowly triangular, 1.5–4 by 0.2–1 mm, apex acute to acuminate, pubescent; pedicels 1–4 mm long, pubescent to tomentose. *Calyx* 4–6 mm long, persistent; each tooth 3–5 mm long, the lowest one longer than the rest, upper one bifid, outside pubescent to tomentose, inside puberulent. *Corolla* white to creamy white; standard obovate, 10–11 by 8–9 mm, apex emarginate, claw 2–2.5 mm long; wings slightly curved, 10–11 by 2–3 mm, apex obtuse, base auriculate, claw *ca.* 3 mm long, auriculate; keel *ca.* 11 by 3–3.5 mm, apex narrowly acute or shortly beaked, base auriculate, claw *ca.* 3 mm long. *Stamens* 11–12 mm long; anthers *ca.* 1 mm long. *Gynoecium*: ovary oblong, *ca.* 2 mm long, pubescent; style *ca.* 11 mm long, puberulent. *Pods* moniliform or laterally compressed, 15–30 by 4–6 mm, indehiscent, lomentaceous, (1–)2–6-articulate, glabrous

to sparsely pubescent, not reticulate; articles 5–7 by 4–5 mm long. *Seeds* light yellow, reniform, 3–3.2 by 2–2.2 mm, with arillate rim.

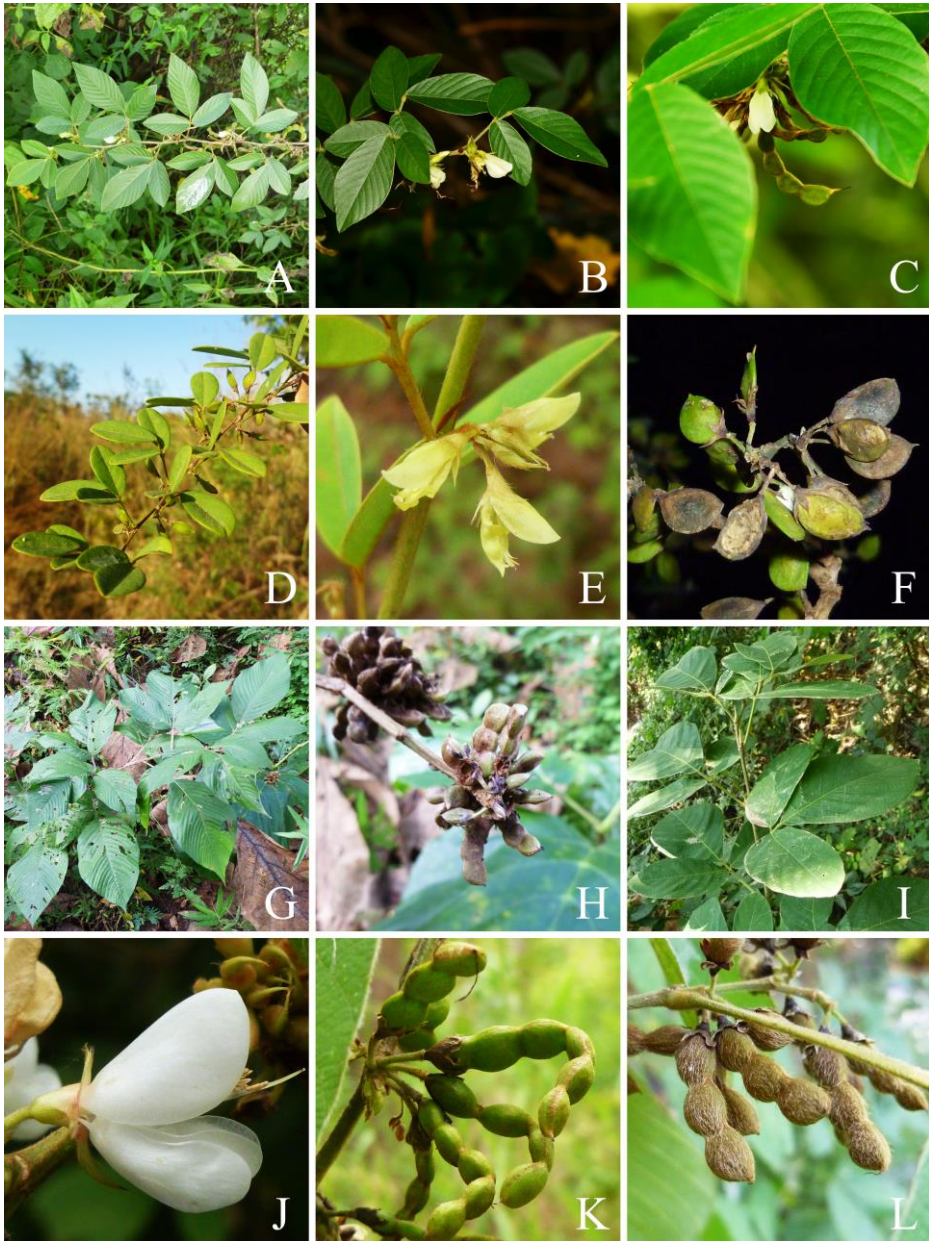
**Thailand.**— NORTH-EASTERN: Maha Sarakham [Kantharawichai, Walai Rukkhawet Botanical Garden, 15 Dec. 2015, *Muangyen et al.* 429 (QBG)]; EASTERN: Surin [Tha Tum, Thung Kula Ronghai, 7 Aug. 1970, *Sutheesorn* 2059 (BK)]; Si Sa Ket [route to Wang Yai waterfall, 13 Oct. 2012, *Saisorn* 48 (KKU)]; *ibid.*, 25 Jan. 2014, *Saisorn et al.* 214 (KKU)]; Ubon Ratchathani [Mueang, Bung Siang Tit, 21 Dec. 2008, *Puudjaa & Hemrat* 1522 (BKF-2 sheets)]; SOUTH-EASTERN: Chanthaburi [Nam Tok Taka Mao, 25 Aug. 1972, *Larsen et al.* 31693 (AAU, BKF)]; Sa Kaeo [Aran-yapraphet, 31 Mar. 1962, *Chantanameuk* 125 (BK)]; *ibid.*, 17 Oct. 1928, *Put* 1995 (BK, BM, K, L, P)]; *ibid.*, 19 Oct. 1928, *Put* 2050 (ABD, BK, BM, K)]; CENTRAL: Nonthaburi [Pak Kret, 5 Aug. 1923, *Marcan* 1443 (ABD, BM)].

**Distribution.**— Laos, Cambodia, Vietnam.

**Ecology.**— Mixed deciduous forest, swamp forest and roadside near rice field, 150–400 m alt. Flowering: August–October.

**Vernacular.**— Iniao (อินเี่ยว) (Surin); khi katuet pae (ขี้กะตืดเป) (Si Sa Ket); pradam phi (ปราด่าผี), kok mak khao ki (กกหมากข้าวกิ) (Sa Kaeo).

**Notes.**— The pod of *Dendrolobium baccatum* can be either moniliform or laterally compressed. *Desmodium clovisii* Gagnep. is described based on the same original specimens as *D. baccatum* Schindl.



**FIGURE 1.** Photographs of living specimens of genus *Dendrolobium* in Thailand. A.–C. *D. baccatum*: A. Branch with leaves, B. Inflorescence and flowers and C. Flower and fruits; D.–F. *D. lanceolatum* var. *lanceolatum*: D. Branch with leaves, E. Inflorescence and flowers and F. Fruits; G.–H. *D. olivaceum*: G. Branch with leaves and H. Fruits; I.–L. *D. rugosum*: I. Branch with leaves, J. Flowers, K. Fruits (with glabrescent hairs) and L. Fruits (with dense hairs). B and C taken by Teerawat Srisuk and others taken by first author.

2. *Dendrolobium lanceolatum* (Dunn)  
Schindl. in Fedde, Repert. Spec. Nov. Regni

Veg. 20: 278. 1924.—*Lespedeza lanceolata*  
Dunn, J. Linn. Soc., Bot. 35: 488. 1903.

Type: China. Hainan, Nam-Fom-See, *Ford* 372 (lectotype **K** [K000880981!], designated here; isolectotypes **NY** [NY00015684!, digital image], **NY** [NY00015685!, digital image], **US** [US00002252!, digital image]).— *Desmodium lanceolatum* (Dunn) Schindl. ex Gagnep. in Lecomte, Fl. Indo-Chine 2: 572. 1920.— *Lespedeza cambodiana* V.D.Nguyen, Kew Bull. 68: 361. 2013, **syn. nov.** Type: Cambodia. Mondulkiri province, Chida district, Chey Commune, *Du, Regalado, Hoe & Sizemore CB-VN 636* (holotype **NH**, n.v.; isotypes **K** [K001051586!], **K** [K001051587!] & **K** [K001051588!]). Fig. 1D–F.

Shrub, 1–5 m tall; stem and twigs terete, glabrescent. *Leaves*: stipules triangular, 9–11 by 2–3.5 mm, puberulent; petioles 0.5–2 cm long, puberulent; rachis 5–10 mm long, pubescent. *Leaflets* subcoriaceous; stipels triangular, 4–4.5 by 0.4–0.5 mm, apex acuminate; petiolules 2–2.5 mm long, pubescent. *Terminal leaflet* lanceolate to elliptic, 2.5–8.5 by 0.5–3 cm, apex acute, base obtuse to acute, margin entire, upper surface glabrous to glabrescent, lower surface appressed pubescent; lateral veins 6–9 per side. *Lateral leaflets* narrowly lanceolate, 1.5–6.5 by 0.5–2.5 cm, apex acute, base obtuse, cuneate or asymmetrical, margin entire, upper surface glabrous to glabrescent, lower surface appressed pubescent; lateral veins 5–6 per side. *Inflorescences* racemose, terminal or axillary, 1–1.5 cm long, with 13–15 flowers; peduncle 2–6 mm long. *Secondary bract* ovate, ca. 2 by 0.6 mm. *Flowers* 10–12 mm

long; bracteoles ovate, 2–3 by 0.5 mm, apex acuminate, pubescent; pedicels 2.5–3.5 mm long, puberulent. *Calyx* light green, connate, 5.5–7 mm long, persistent; the lowest being tooth the longest, outside puberulent, inside puberulent. *Corolla* white to yellowish white; standard obovate to elliptic, 9.5–9.8 by 5.5–5.6 mm, apex emarginate, base attenuate, claw ca. 2 mm long; wings oblong, 6.2–8 by 1.5–2 mm, apex obtuse, claw ca. 1.8 mm long, auriculate; keel 11.2–11.5 by 2.8–3 mm, apex beaked, base auriculate, claw ca. 3 mm long. *Stamens* 9–11 mm long; anthers ca. 0.6 mm long. *Gynoecium*: ovary ca. 1 mm long; style ca. 10 mm long. *Pods* laterally compressed, 1-articulate, puberulent, reticulate. *Seeds* yellow to light brown, reniform, 4–4.3 by 2–2.4 mm, with arillate rim.

Two varieties distributed in China, Thailand and Indo-China. Both indigenous to Thailand.

#### 2.1 var. *lanceolatum*

**Thailand.**— NORTHERN: Lampang [Thoen, Ban Mae Wa, 29 Feb. 2012, *Norsaengsri et al.* 9086 (**QBG**); *ibid.*, Li-Theon road, 17 Jan. 1995, *Pooma* 950 (**CMUB**)]; Uttaradit [Tha Pla, Sirikit Dam, 26 Jun. 2002, *Norsaengsri & Tathana* 9690 (**QBG**)]; Tak [Ban Pa Yang, 16 Nov. 1920, *Kerr* 4580 (**AAU, ABD, BK, BM, K**)]; Ban Tak, Mae Salid, 28 Aug. 2010, *Norsaengsri* 7068 (**QBG**); Sam Ngao, Wang Chan, 20 Aug. 2010, *Norsaengsri* 7039 (**QBG**); Wang Chao, 13 Dec. 1913, *Kerr* 3029 (**AAU, ABD, BM, K**); unknown locality, 18 Jan.

#### Key to the varieties

1. Pod articles obovate or elliptic, laterally compressed, 5–15 by 5–8 mm.....**2.1 var. lanceolatum**
1. Pod articles suborbicular, not laterally compressed, 3.5–4.5 by 3–4.5 mm.....**2.2 var. microcarpum**

- 1974, *Phengklai 3164* (**BKF, L, P**); Sukhothai [unknown locality, 25 Aug. 1961, *Chermsirivathana 73* (**BK**)]; Phitsanulok [Thung Salaeng Luang, 24 Jul. 1966, *Larsen et al. 821* (**AAU, E, K, L, P**)]; Wat Bot, Kaeng Chet Kwae, 4 Oct. 2006, *Maknoi & Pongsattayapipat 1153* (**QBG**); Nakhon Sawan [Pak Nam Pho, Jul. 1920, *Vanpruk 1024* (**ABD, K**)]; Phrae [Maharat, 8 Apr. 1913, *Vanpruk 359* (**BKF, K**)]; Mueang, Phae Muang Phi forest, 26 Jun. 2012, *Norsaengsri & Tathana 9497* (**QBG**); NORTH-EASTERN: Phetchabun [Nam Nao, 18 Sept. 1994, *BGO. Staff. 1650* (**QBG**) & *1665* (**QBG**)]; Nam Nao National Park, 16 Jun. 1964, *Adisai 769* (**BK**); *ibid.*, 8 Aug. 1953, *Bunrot 16* (**BKF**); *ibid.*, 28 Jul. 1964, *K.B. 155* (**BKF**); *ibid.*, 18 Nov. 2005, *Mattapha 1002* (**KKU**); *ibid.*, 29 Jul. 2012, *Saisorn 30* (**KKU**); *ibid.*, 28 Dec. 2012, *Saisorn 109* (**KKU**); *ibid.*, 25 Feb. 2013, *Saisorn 118* (**KKU**); unknown locality, 5 Jan. 1960, *Smitinand 6300* (**BKF, K**); Loei [Phu Kradueng, 12 Oct. 1967, *Prayad 1022* (**BK**); *ibid.*, 6 Sept. 1969, *S.P. et al. 39* (**BKF**); *ibid.*, 28 Aug. 1969, *Sangkhachand 2023* (**BK**); *ibid.*, 3 Sept. 1967, *Shimizu et al. T-12950* (**AAU, BKF, L**); *ibid.*, Na Noi, 11 Nov. 1970, *Charoenphol et al. 4927* (**AAU, BKF, K**); *ibid.*, Phu Kradueng National Park, 26 Aug. 1988, *Fukuoka T-63633* (**BKF, L**); Tha Li, Kaeng Tatka, 4 Jun. 2009, *Maknoi 3213* (**QBG**); Wang Saphung, 8 Jul. 1948, *Dee 76* (**BKF**); *ibid.*, Sithan 28 Aug. 1958, *Smitinand 4786* (**BKF, K**); unknown locality, 25 Dec. 2011, *Norsaengsri & Tathana 8437* (**QBG**); Nong Bua Lam Phu [Mueang, 10 Jul. 1997, *Phengklai 10348* (**BKF**)]; Udon Thani [Ban Phai roadside, 27 Jul. 2003, *Chantaranothai et al. s.n.* (**KKU** no. 6447)]; Udon Thani-Khon Kaen [unknown locality, 27 Jul. 2003, *Mattapha 245* (**KKU**)]; Sakon Nakhon [Phu Phan National Park, *Chantaranothai et al. 666* (**KKU**), 866 (**KKU**) & 1202 (**KKU**); *ibid.*, 1 Nov. 1998, *Leeratiwong 98-30* (**KKU**); *ibid.*, 3 Jul. 1999, *Leeratiwong 99-79* (**KKU**); *ibid.*, 22 Oct. 2012, *Saisorn 77* (**KKU**); Wanon Niwat, Ban Wang Nam Yen, 25 Nov. 2012, *Saisorn 92* (**KKU**); Nakhon Phanom [Mueang, Ban At Samat, 5 Apr. 2003, *Kanokmedhakul 2* (**KKU**)]; Mukdahan [Kao Ma Ho, 15 Jun. 1932, *Lakshnakara 944* (**ABD, BK, BM, K**); Khamcha-i, 13 Dec. 1982, *Koyama et al. T-30966* (**BKF**); Mueang, 17 Nov. 1984, *Murata et al. T-50941* (**BKF**); *ibid.*, 4 Nov., *Vacharee 455* (**BK**); *ibid.*, 12 Apr. 1983, *Vacharee 517* (**BK**); *ibid.*, Don Man village, 12 Dec. 1982, *Koyama et al. T-30921* (**BKF, L**); Phu Pha Thoep National Park, 5 Aug. 2004, *Nielsen et al. 1510* (**AAU, BKF**); *ibid.*, 22 Oct. 2012, *Saisorn 86* (**KKU**); Phu Sa Dok Bua National Park, 5 Aug. 2004, *Jonganurak et al. 1513* (**BKF**); Kalasin [Kuchinarai, 7 Aug. 1963, *Pradit 334* (**BK**)]; Khon Kaen [Chum Phae, Phu Wiang, 2 Jan. 1976, *Sutheesorn 3566* (**BK**); Khao Suan Kwang, Khao Suan Kwang Zoo, 2012, *Saisorn 60* (**KKU**); *ibid.*, 5 Aug. 2012, *Saisorn 182* (**KKU**); Nam Phong, 22 Jun. 2003, *Chantaranothai et al. s.n.* (**KKU** no. 9524); Phu Khiao Game Reserve, 8 Nov. 1984, *Murata et al. T-50042* (**BKF, L**); Phu Wiang, 16 Sept. 1994, *BGO. Staff. 1582* (**QBG**); *ibid.*, 2 Jan. 1996, *BGO. Staff. s.n.* (**QBG**); Si Chomphu, Dong Lan, 13 Aug. 1968, *Phengnaren 667* (**BKF, K**); Bueng Kan [Bung Khla, 8 Nov. 1991, *Niyomdham 4891* (**BKF**); Bung Khla, Nong Dern, 10 Aug. 2004, *Nielsen et al. 1612* (**AAU, BKF**); Phu Thok, 20 Oct. 2012, *Saisorn 76* (**KKU**); Seka, Chet Si waterfall, 20 May 2004, *Pooma et al. 4126* (**AAU, BKF-2** sheets); Seka, opposite side of Prathum Samakchi temple, 25 Nov. 2012, *Saisorn 91* (**KKU**); EASTERN: Chaiyaphum [Chum Phae-Chaiyaphum, 11 Aug. 1972,

- Larsen et al.* 31681 (AAU, **K**); Mueang, Ban Chelong Tai, 5 Jan. 1970, *Lekagul* 33 (**BKF**); Nam Phrom-Thung Kramang, 13 Dec. 1971, *van Beusekom et al.* 4200 (**BKF, C, K, P**); Phu Khiao, Phu Khiao Wildlife Sanctuary, Oct. 1999, *Phengklai et al.* 12322 (**BKF**); Phu Khiao, Thung Kramang trail, 4 Aug. 1972, *Larsen et al.* 31410 (AAU, **BKF, K, L, P**) & 31423 (**P**); Phu Kum Khao, 26 Jun. 1997, *Niyomdham* 5111 (**BKF**); Nakhon Ratchasima [Bua Yai, 1 Nov. 1931, *Put* 4265 (**ABD, BK, BM, E, K**); Huai Thalaeng, 20 Aug. 2001, *Pooma et al.* 2117 (**BKF**); *ibid.*, 25 Dec. 1928, *Put* 2250 (AAU, **ABD-2** sheets, **BK, BM, E, K**); *ibid.*, Hin Dat, 20 Dec. 2005, *Pooma et al.* 3938 (**BKF-2** sheets); Pak Chong, 24 Aug. 1958, *Leetharorn* 5 (**BCU**); *ibid.*, 24 Aug. 1958, *Sangsiri* 9 (**BCU**); Pak Thong Chai, 16 Jul. 1957, *Phraphat* 104 (**BKF**); *ibid.*, 19 Sept. 1957, *Phraphat* 203 (**BKF**); Wang Nam Khiao, 5 Aug. 1967, *S.N.* 455 (**BKF**); unknown locality, 18 Dec. 1962, *Phengklai* 591 (**BKF**); Buri Ram [Ban Kruat, 4 Oct. 1984, *Murata et al.* T-37470 (AAU, **BKF, L**); Khao Phanom Rung, 3 Oct. 1984, *Murata et al.* T-37258 (AAU, **BKF, L**) & T-37314 (AAU, **BKF, L**); Mueang, 22 Jul. 1984, *Sakol et al.* 6059 (**BK**); *ibid.*, Khao Kradong, 15 Oct. 2012, *Saisorn* 59 (**KKU**); south of Buri Ram, 4 Oct. 1984, *Murata et al.* T-37418 (AAU, **BKF, L**) & T-37428 (**BKF**); unknown locality, 26 Nov. 1976, *Phengklai et al.* 3418 (**BKF-2** sheets, **PSU**); Surin [Kap Choeng, Ban Mon Chareon, 15 Oct. 2012, *Saisorn* 55 (**KKU**); Mueang, Tong Yai waterfall, 15 Oct. 2012, *Saisorn* 55 (**KKU**); unknown locality, 3 Dec. 1976, *Phengklai et al.* 3569 (**BKF, PSU**); Roi Et [Phanom Phrai, Ban Kok Kaew, 4 Oct. 1985, *Paisooksantivatana* y1669-85 (**BK**); Yasothon [Pa Kham Nam Kliang, 12 Oct. 2012, *Saisorn* 37 (**KKU**) & 38 (**KKU**); Si Sa Ket [Uthumphon Phisai-Si Sa Ket, 7 Oct. 1984, *Murata et al.* T-37807 (AAU, **BKF, L**) & T-37826 (AAU, **BKF, L**); Wildlife Sanctuary along highway no. 2341, 14 Oct. 2012, *Saisorn* 51 (**KKU**); Ubon Ratchathani [Khong Chiam, Phranin waterfall, 25 Oct. 1998, *Wongprasert et al.* s.n. (**BKF** no. 127081); Phibun Mangsahan, along road to Khong Chiam, 2 Jul. 2014, *Meeboonya et al.* RM 322 (AAU, **E**); Muang Sam Sip, Nong Khun village, 11 Dec. 1982, *Koyama* T-30821 (**BKF, QBG**); SOUTH-WESTERN: Kanchanaburi [Mahidol University (Kanchanaburi campus), 14 Sept. 2013, *Pisuttimarn* 164-1 (**KKU**); Sai Yok, Lumsum, 14 Aug. 1967, *Kazem* 574 (**BK**); Ratchaburi [Chom Bueng, Dec. 1918, *Winit* 482 (**ABD, BK, BKF, K**); Thung Luang, 10 Nov. 1930, *Marcant* 2766 (**ABD, BM, K**); Phetchaburi [Nong Ya Plong, 10 Sept. 2002, *Puudjaja* 1113 (**BKF**); CENTRAL: Lop Buri [Lam Narai, 13 Nov. 1975, *Smitinand* 12107 (**BKF**); Saraburi [Kaeng Khoi, Pa Sak river, 9 Dec. 1923, *Kerr* 7959 (**ABD, E**); SOUTH-EASTERN: Sa Kaeo [Aranya-prathet, 16 Oct. 1928, *Put* 1972 (**ABD, BK, BM, K**); *ibid.*, 8 Aug. 1953, *Suvatabhandhu* 463 (**BK**); *ibid.*, 9 Aug. 1930, *Suvatabhandhu* 19596 (**ABD, BK, BM, E, K**); *ibid.*, 11 May 1930, *S.N.* (**BK**); *ibid.*, Ban Yang Dong, 2 Jan. 1967, *S. & S.* 1973 (**BK**); Ta Phraya, 18 Nov. 1964, *Sakol* 163 (**BK**); Prachin Buri [Kabin Buri, 3 Dec. 1983, *Fukuoka & Ito* T-34653 (**BKF**) & T-34654 (**BKF**); *ibid.*, Ban Leng, 10 Nov. 1930, *Marcant* 2588 (**ABD, BM, K**); Chon Buri [Si Racha, 6 Sept. 1958, *Chimpleeya* 3 (**BCU**); *ibid.*, 9 Dec. 1927, *Collins* 1761 (**ABD, BK, BM, K**); Si Racha, Khao Khiao, 24 Apr. 1975, *Maxwell* 75-443 (AAU, **BK, L**); *ibid.*, 4 Sept. 1975, *Maxwell* 75-997 (AAU, **BK, L**); Chanthaburi [Soi Dao, Ban Taruang, 19 Dec. 1924, *Kerr* 9719 (**ABD, BK, BM, K**);



PENINSULAR: Chumphon [Sapli, 26 May 29, *Hanift & Nur 4270* (**BM, K**)].

**Distribution.**— China, Laos, Vietnam, Cambodia.

**Ecology.**— Oak forest, mixed deciduous and dry dipterocarp forests, rice field, 15–1000 m alt. Flowering: April–January.

**Vernacular.**— Duk ueng (ดูกอุ้ง) (Chaiyaphum, Loei); kham phi lek (ขามผีเล็ก) (Phetchabun); klaep nu (แกลบหนู), klaep hu nu (แกลบหูหนู), praeng hu nu (แปรงหูหนู) (Prachin Buri); kraduk khiat (กระดุกเขียด) (Mukdahan, Nakhon Phanom); kraduk ueng (กระดุกอุ้ง) (Nakhon Sawan, Nong Bua Lam Phu, Nong Khai, Ratchaburi, Tak); kraduk ueng yai (กระดุกอุ้งใหญ่) (Nakhon Ratchasima); phak duk ueng (ผักดูกอุ้ง) (Mukdahan); ueng yai (อุ้งใหญ่) (Central, Northeastern).

**Notes.**— The holotype at NH and the isotype at K were cited in the original description of *Lespedeza cambodiana*, but there are three duplicates at K, one of which is labelled as holotype and the other two as isotypes. Here we therefore follow the original publication.

2.2 var. *microcarpum* H. Ohashi, *Ginkgoana* 1: 65. 1973. Type: Thailand. Near Wang Chao (Raheng), 12 Nov. 1920, *Kerr 4568*. (holotype **BK** [BK258003!]; isotypes **AAU!**, **ABD!**, **BM** [BM000839665!], **K** [K000880971!]).

**Thailand.**— NORTHERN: Lampang [Mae Tha, Mae Tha village, 18 Oct. 2010, *Maxwell 10-33* (**QBG**); Thoen, Wiang Mok, 20 Nov. 2014, *Norsaengsri 11655* (**QBG**); Tak [Wang Chao, 12 Nov. 1920, *Kerr 4568* (holotype **BK**; isotypes **AAU**, **ABD**, **BM**, **K**); Kamphaeng Phet [Ban Nam Tok, Khao Son Kamphaeng Phet, 24 Nov. 1977, *Phengkklai et al. 3904* (**BKF-2** sheets, **PSU**)]; NORTH-EASTERN: Loei [Phu Kradueng, Tat Hong, 22 Nov. 2007,

*Norsaengsri 3090* (**QBG**); EASTERN: Nakhon Ratchasima [Pak Chong, Chantuek, 1 Sept. 1924, *Kerr 9106* (**AAU**, **ABD**, **BK**, **BM**, **E**, **K**)].

**Distribution.**— Endemic to Thailand.

**Ecology.**— Mixed deciduous and bamboo forests on limestone mountains, 100–400 m alt. Flowering: around August.

**Vernacular.**— Klaep nu lek (แกลบหนูเล็ก) (General).

**Notes.**— This variety has smaller pod articles than the typical variety.

3. *Dendrolobium olivaceum* (Prain) Schindl. in Fedde, *Repert. Spec. Nov. Regni Veg.* 20: 279. 1924.— *Desmodium olivaceum* Prain, *J. Asiat. Soc. Bengal*, Pt. 2, *Nat. Hist.* 66(2): 389. 1897. Type: Myanmar. Upper Burma, Chindwin Hills, 8 Sept. 1890, *Prager 370*. (lectotype **K** [K000880978!], designated by Ohashi (1973); isolectotype **K** [K000880979!]). Fig. 1G–H.

Shrub 0.5–1 m tall; stem and twigs silvery tomentose. *Leaves* spirally arranged; stipules oblong, 15–20 by 3–5 mm, silvery tomentose; petioles 3–7.5 cm long, silvery tomentose (hairs 1.5 mm long); rachis 0.5–3 cm long, silvery tomentose. *Leaflets* subcoriaceous; stipels triangular, pubescent; petiolules 3–5 mm long, silvery tomentose. *Terminal leaflet* lanceolate to ovate, 5–25.5 by 3.5–13 cm, apex acuminate to attenuate, base acute to obtuse, margin entire, upper surface glabrous to glabrescent, lower surface puberulent to silvery tomentose; lateral veins 19–27 per side. *Lateral leaflets* oblanceolate or elliptic, 8–21.5 by 3.5–10 cm, apex attenuate to acuminate, base rounded or asymmetrical, margin entire, upper surface puberulent, lower surface appressed and silvery tomentose; lateral veins 15–20 per side. *Inflorescences* racemose, axillary, 1–3 cm long, with more



than 25 flowers; peduncle 2–5 mm long. *Secondary bract* ovate, 3.5–4 by 1–1.5 mm, puberulent. *Flowers* 8–9 mm long; bracteoles linear, 2.4–4 by 0.5 mm, puberulent; pedicels *ca.* 1.5 mm long, appressed pubescent. *Calyx* light green, 6–7 mm long, persistent; each tooth 2–4 mm long, outside pubescent. *Corolla* white; standard elliptic or suborbicular, *ca.* 8.5 by 5–5.3 mm, apex emarginate, base attenuate, claw 2–4.5 mm long; wings oblong, 7.5–8.5 by 1.5 mm, apex obtuse, claw 2–2.5 mm long, auriculate; keel curved, 8.3–9 by 2 mm, apex obtuse, base auriculate, claw 3–3.5 mm long. *Stamens* 8–9 mm long; anthers *ca.* 0.6 mm long. *Gynoecium*: ovary 1.5–1.8 by 0.5 mm long, puberulent; style 7.5–8 mm long. *Pods* oblong, 10–20 by 4.5–5 mm, (1–)3(–4)-articulate, tomentose, not reticulate; articles 5–6 mm long. *Seeds* dark brown to black, reniform or rectangular, 2.1–3.1 by 2.3–3.2 mm, with arillate rim.

**Thailand.**— NORTHERN: Chiang Mai [Chiang Dao, 16 Sept. 2006, *Maxwell 06-663* (CMUB, QBG); *ibid.*, Doi Chiang Dao Wildlife Sanctuary, 8 Nov. 2013, *Clark et al.* 355 (K); *ibid.*, foothill of Doi Chiang Dao, 11 Sept. 1967, *Tagawa et al. T-9799* (BKF-2 sheets, L, P)]; Phayao [Phu Sang National Park, 16 Sept. 1997, *Chueachom s.n.* (BKF)]; Lampang [Ban Pang Ra, 20 Dec. 1973, *Chaloenphol 404* (BKF, P)]; Chae Son National Park, 20 Oct. 1995, *Maxwell 95-925* (CMUB); Huai Tak, Doi Pang La, 25 Sept. 1967, *Shimizu et al. T-10815* (BKF, L)]; Phrae [Song, Mae Yom National Park, 13 Oct. 1991, *Maxwell 91-896* (E, duplicate 5, sheet 1), P)]; Tak [Mae Sot, 7 Nov. 2012, *Saisorn 64* (KKU)]; Umphang, Ta Ko Bi cave, 17 Sept. 2003, *S.N.* (KKU); *ibid.*, Ti Lo Su waterfall, 9 Nov. 2012, *Saisorn 71* (KKU)]; NORTH-EASTERN: Loei [Phu Kradueng, 12 Oct. 1967, *Prayad 1019* (BK)].

**Distribution.**— Myanmar.

**Ecology.**— Mixed deciduous forest, 400–825 m alt. Flowering: September–November.

**Vernacular.**— Khao mai lek (ข้าวไหม้เล็ก) (General).

4. *Dendrolobium rugosum* (Prain) Schindl. in Fedde, Repert. Spec. Nov. Regni Veg. 20: 279. 1924.— *Desmodium rugosum* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(1): 137. 1897. Type: Malaysia. Kedah, Langkawi, *Curtis 2550* (isotype K [K000880973!]).— *Desmodium wallichii* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 388. 1897. Type: Myanmar. Upper Burma, *Wallich 5687B* (lectotype K-W [K001121731!], designated here; isolectotypes K [K000880-975!] & K [K000880976!]).— *Dendrolobium wallichii* (Prain) Schindl. in Fedde, Repert. Spec. Nov. Regni Veg. 20: 279. 1924.— *D. rugosum* var. *moniliferum* H. Ohashi, Ginkgoana 1: 74. 1973. Type: Myanmar. Nov. 1902, *Mokim 644* (holotype CAL, n.v.; isotype P [P00088050!, digital image]), **syn. nov.** Fig. 11–L.

Shrub, 1–4 m tall; stem and twigs glabrescent to pubescent. *Leaves*: stipules ovate, 4–7 by 3.5–4 mm, pubescent; petioles 2–7 cm long, pubescent; rachis 0.5–2.5 mm long, pubescent; stipels linear, 3–7 by 0.5 mm; petiolules 2–5 mm long, pubescent. *Terminal leaflet* broadly oblanceolate or obovate, 4.5–18.5 by 2–5.5 cm, apex acute to acuminate or obtuse, base cuneate, margin entire, upper surface puberulent, lower surface appressed puberulent; lateral veins 9–13 per side. *Lateral leaflets* narrowly elliptic to oblong, 3–14.5 by 1–8 cm, apex acute to obtuse, base asymmetrical, margin entire, upper surface puberulent, lower surface appressed puberulent; lateral veins 7–11 per side. *Inflorescences* racemose, terminal or axillary, 1–1.5 cm long, with

10–15 flowers; peduncle 2–5 mm long. *Secondary bract* triangular, 2.2–2.5 by 1.2–1.5 mm, apex acute, hairy. *Flowers* 10–12 mm long; bracteoles narrowly triangular, 2–3 by 0.7–1 mm, apex acuminate, puberulent; pedicels 2.5–4 mm long, pubescent. *Calyx* light green to brown, 5–7 mm long, persistent; each tooth 1.5–4 mm long, outside puberulent. *Corolla* white; standard ovate or suborbicular, 9.5–11 by 8.5–10 mm, apex emarginate (distinctly 2-lobed, *ca.* 1 mm), claw 2–2.5 mm long; wings oblanceolate to narrowly obovate, 9.5–11 by 2.5–3.5 mm, apex obtuse, base auriculate, claw 2–3 mm long; keel narrowly obovate, 9.5–11 by 3–3.5 mm, apex obtuse, base auriculate (*ca.* 0.5 mm long), claw 2–4 mm long. *Stamens* 8–11 mm long; anthers 0.8–1 mm long. *Gynoecium*: ovary 1.5–2.5 mm long; style 8.5–11.5 mm long. *Pods* moniliform or laterally compressed, 10–40 by 4–6 mm, indehiscent, lomentaceous, (1–) 3–6-articulate, pubescent, not reticulate; articles 5–7 mm long. *Seeds* reniform, *ca.* 3.5 by 3 mm, with arillate rim.

**Thailand.**—NORTHERN: Mae Hong Son [Mae Sariang, 7 Jul. 1966, *Prayad 304* (**BK**); Tham Pla-Namtok Pha Suea National Park, 22 Aug. 2013, *Norsaengsri 10584* (**QBG**); unknown locality, 11 Jul. 1958, *Smitinand 4640* (**K**)]; Chiang Mai [Ban Aen, Nov. 1960, *S.N. 1970* (**BK**); Bo Luang-Mae Sariang, 4 Jul. 1968, *Larsen et al. 2082* (**AAU, C, P**); Chae Son, Mae Soi National Park, 30 Sept. 1991, *Maxwell 91-800* (**E**); Chom Thong, Mae Soi village, 30 Sept. 1991, *Maxwell 95-500* (**E**); *ibid.*, Mae Ya waterfall, 15 Dec. 1998, *Konta et al. 4549* (**BKF-3** sheets); Doi Inthanon National Park, 18 Jul. 1988, *Phengklai et al. 6574* (**AAU, BKF, C-2** sheets, **E, K, P**); Doi Inthanon National Park, Mae Klang waterfall, 19 Aug. 2003, *Chantaranothai et al. s.n.* (**KKU** no. 10496); *ibid.*, 18 Jul.

1988, *Fukuoka T-02080* (**BKF**); *ibid.*, 14 Jan. 2013, *Saisorn 116* (**KKU**); *ibid.*, 18 Jul. 1988, *Takahashi T-62566* (**L**); Doi Muang Awn, 17 Nov. 1995, *Poleo 338* (**CMUB**); Hot, 8 Sept. 1996, *BGO. Staff 6* (**QBG**); Huai Rin village, 28 Jul. 1988, *Takahashi et al. 2082* (**C, P**); Op Luang National Park, 13 Jul. 1996, *Maxwell 96-947* (**BKF, CMUB**); *ibid.*, 13 Aug. 1998, *Maxwell 98-856* (**BKF, CMUB, L**)]; Chiang Rai [unknown locality, 1 Dec. 1997, *Chayamarit 1099* (**BKF**)]; Lamphun [Li, Wat Pra Phutthabat Pha Nam, 24 Jul. 2015, *Maknoi 8089* (**QBG**); Mae Ping National Park, 20 May 1994, *Maxwell 94-636* (**CMUB**); Mae Tha, Ban Pa Tong, 23 Aug. 2010, *Norsaengsri 7154* (**QBG**); Pa Sang, Phra Phutthabat Tak Pha, 24 Aug. 2010, *Norsaengsri 7217* (**QBG**)]; Lampang [Ngao, 6 Jun. 2001, *Niyomdham 6508* (**BKF**)]; Phrae [Mae Yom, 2 Nov. 2013, *Clark et al. 318* (**K**)]; Tak [Ban Na, Bhumibol Dam, 14 May 1959, *Bunnak 629* (**BCU, BK**); Me Ping rapids, Keng Ok Ma, 20 Oct. 1911, *Kerr 2189* (**BM, E, K**); *ibid.*, Keng Soi, 23 Nov. 1920, *Kerr 4633* (**ABD, BK, BM, K**); Tha Song Yang, 22 Nov. 2005, *Pooma et al. 5803* (**BKF, E**); Umphang, Doi Hua Mot, 27 May 2008, *Pooma et al. 6987* (**BKF-3** sheets)]; Kamphaeng Phet [Me Janung, 9 Jun. 1922, *Kerr 6109* (**ABD, BK, BM, K**)]; Kamphaeng Phet-Nakhon Sawan [Khlung Lan, 18 Sept. 1997, *van de Bult 30* (**BKF**)]; NORTH-EASTERN: Phetchabun [Lom Sak, Khao Pha Daeng, 15 Aug. 1982, *Shimizu et al. T-28617* (**BKF**); Nam Nao, Poo Hee, 8 Jun. 1964, *Adisai 739* (**BK-2** sheets); Nam Nao, Nam Nao National Park, 14 Jun. 2003, *Chantaranothai et al. s.n.* (**KKU** no. 9292); *ibid.*, 24 Aug. 2006, *Krachai 310* (**KKU**); *ibid.*, 3 Sept. 2013, *Kuttiyot 411* (**QBG**); *ibid.*, 29 May 2003, *Mattapha 219* (**KKU**); *ibid.*, 24 Jun. 2012, *Ninkaew 24-1* (**KKU**); *ibid.*, 28 Jul. 2012,

*Saisorn* 33 (**KKU**) & 34 (**KKU**); *ibid.*, 27 Dec. 2012, *Saisorn* 106 (**KKU**); *ibid.*, 25 Feb. 2013, *Saisorn* 120 (**KKU**); *ibid.*, 27 May 2012, *Saisorn* 156 (**KKU**); Loei [Phu Kradueng, 12 Jul. 1964, *Chantanamuek* 851 (**BK**); *ibid.*, 18 Oct. 1967, *Prayad* 1051 (**BK**); *ibid.*, 6 Sept. 1969, *Sangkachand* 2077 (**BK**); *ibid.*, 3 Sept. 1976, *Shimizu et al.* T-12949 (**BKF**); *ibid.*, Phu Kradueng National Park, 11 Sept. 1990, *Chantaranothai et al.* 90/56 (**BKF, K**); *ibid.*, Phu Kradueng National Park, 20 Feb. 2013, *Saisorn* 123 (**KKU**); *ibid.*, Si Than, 5 Jul. 1948, *Dee* 60 (**BKF**); Udon Thani [Nong Saeng, 17 Jul. 2003, *Sidajium* 10 (**BKF**)]; Mukdahan [Huai Huat National Park, 24 Aug. 2001, *Pooma et al.* 2530 (**BKF-2** sheets, **L**)]; Khon Kaen [Phu Pha Man, Pha Nok Khao, 6 Nov. 1970, *Charoenphol et al.* 4546 (**AAU-2** sheets, **C, K**); *ibid.*, 2 Sept. 1967, *Shimizu et al.* T-8737 (**AAU, BKF, P**); *ibid.*, 11 May 2010, *Norsaengsri & Thongsorn* 6630 (**QBG**); *ibid.*, 4 Aug. 2011, *Norsaengsri et al.* 8018 (**QBG**); *ibid.*, Pha Phuang Cave, 14 Aug. 2012, *Norsaengsri et al.* 9890 (**QBG**); *ibid.*, 15 Aug. 2012, *Norsaengsri et al.* 9897 (**QBG**); EASTERN: Chaiyaphum [Ban Nam Phrom, 23 May 1974, *Geesink et al.* 6857 (**BKF, C, K, P**); Chaiyaphum-Nong Bua Daeng, 15 Aug. 1972, *Larsen et al.* 31909 (**AAU, K**); Nam Phrom, 10 Dec. 1971, *van Beusekom et al.* 4110 (**BKF, K**); Phu Khiao, 3 Aug. 1972, *Larsen et al.* 31335 (**AAU, BKF**); *ibid.*, Chulabhorn Dam, 5 Jul. 2003, *Chantaranothai et al.* s.n. (**KKU**); *ibid.*, Thung Kramang, 4 Aug. 1972, *Larsen et al.* 31419 (**AAU, BKF, K**)]; Nakhon Ratchasima [Pak Chong, 1 Jan. 1924, *Marcan* 1576 (**ABD, BM**)]; SOUTH-WESTERN: Uthai Thani [Khao Din Daeng, 31 May 1974, *Sutheesorn* 3017 (**BK**); Lan Sak, Huai Kha Khaeng Wildlife Sanctuary, 1 Aug. 2013, *Meeboonya et al.* 218 (**AAU, K**); *ibid.*, 12 Nov. 1979, *Shimizu et al.* T-

22396 (**BKF**), T-22407 (**BKF**) & T-22416 (**AAU, BKF-2** sheets)]; Kanchanaburi [Ban Din So, 16 Jul. 1926, *Put* 146 (**ABD, BM, K**); Kao Tawng, 31 Aug. 1950, *Kerr* s.n. (**K**); Sai Yok, 31 Aug. 1928, *Marcan* 2369 (**ABD, BM, K**); *ibid.*, 1 Aug. 1928, *Put* 1817 (**ABD, BK, BM, E, K**)]; Phetchaburi [Kaeng Krachan National Park, 8 Aug. 2002, *Middleton et al.* 857 (**AAU, BKF, CMUB, E, K, L, P**)]; Prachuap Khiri Khan [Thap Sakae, Huai Yang National Park, 25 Aug. 2002, *Middleton et al.* 1308 (**BKF, CMUB, E, K, L**)]; SOUTH-EASTERN: Chanthaburi [Khao Phra Bat, 27 Aug. 1972, *Larsen et al.* 32114 (**AAU, BKF**)]; PENINSULAR: Phangnga [Panji Island, 16 Nov. 1918, *Haniff & Nur* 4073 (**K**)]; Satun [La-ngu, Mu Ko Phetra National Park, 10 Sept. 2008, *Middleton et al.* 4438 (**BKF**); Tarutao Island, 17 Oct. 1979, *Congdon* C3 (**AAU, PSU**) & C47 (**AAU, PSU**)]; Unknown province [west coast of Thailand, Nong Kae forest, 30 Sept. 1927, *Collins* 1585 (**ABD, BK, K**)].

**Distribution.**— Myanmar, China (Yunnan), Laos, Cambodia, Vietnam, Peninsular Malaysia.

**Ecology.**— Dry dipterocarp, dry evergreen, mixed deciduous and lower montane oak and lower montane coniferous forests, 0–1260 m alt. Flowering: May–October.

**Vernacular.**— Kanin nang (กะนินนาง), thao khimin (เถาขี้มัน) (Kanchanaburi); kham phi (ขามผี) (Loei, Phetchabun); thao khamin (เถาขี้มัน) (Kanchanaburi, Phetchabun).

**Notes.**— *Dendrolobium rugosum* var. *moniliferum* is synonymized due to the overlapping character with the typical variety such as the pod character (moniliform or laterally appressed). Examination of the type and other materials of var. *rugosum* and var. *moniliferum* showed that the differences between these varieties are small and

unreliable, so that they are best united under *Dendrolobium rugosum*. A similar variation of the pod is also found in another species, *Dendrolobium baccatum* as mentioned above.

5. *Dendrolobium thorelii* (Schindl.) Schindl. in Fedde, Repert. Spec. Nov. Regni Veg. 20: 279. 1924.— *Desmodium olivaceum* Prain var. *thorelii* Schindl. in Engl., Bot. Jahrb. Syst. 54(1): 60. 1916. Type: Cambodia. Stung Streng, 1866–1868, *Thorel s.n.* (lectotype **P** [P00088064!, digital image], designated by Dy Phon et al. (1994)).— *Desmodium thorelii* (Schindl.) Gagnep., Notul. Syst. (Paris) 3: 259. 1916. Fig. 2A–C.

Shrub, 1–5 m tall; stem and twigs triangular, silvery tomentose. *Leaves* spiral or subalternate; stipules narrowly triangular to obovate, 25–45 by 6–10 mm, silvery tomentose (1–2 mm long); petioles 3.5–10 cm long, silvery tomentose (2–5 mm long); rachis 0.5–2.5 mm long, silvery tomentose (2–5 mm long). *Leaflets* subcoriaceous; stipels narrowly triangular, 5–20 by 0.8–2 mm, apex acuminate; petiolules 4–12 mm long, silvery tomentose (2–5 mm long). *Terminal leaflet* broadly elliptic to broadly lanceolate, 11–33.5 by 5.5–18 cm, apex acuminate to attenuate, base cuneate to obtuse, margin entire, upper surface glabrescent to puberulent, lower surface appressed, silvery tomentose; lateral veins 16–25 per side. *Lateral leaflets* elliptic to obovate, 11–33.5 by 5.5–18 cm, apex acuminate to attenuate, base asymmetrical, margin entire, upper surface glabrescent to puberulent, lower surface appressed, silvery tomentose; lateral veins 15–23 per side. *Inflorescences* racemose, terminal, 2–3 cm long, with more than 30 flowers; peduncle 5–15 mm long. *Secondary bract* curved, 6–11.5 by 1–4.5 mm, with silvery hairs. *Flowers* ca. 10 mm long; bracteoles curved,

5–7 by 0.5–1.5 mm, with silvery hairs; pedicels 4–7 mm long, with silvery hairs. *Calyx* light green to brown, 9.5–11 mm long, persistent; each tooth 3.5–9 mm long, outside silvery hairy. *Corolla* white; standard ±orbicular, 11–11.2 by 7.5–8.5 mm, apex obtuse, claw 3–3.5 mm long; wings slightly curved, 8.3–12 by 2.5–3.5 mm, apex obtuse, base auriculate (on both sides), claw 3–3.6 mm long; keel curved, 10–11 by 2.5–3 mm, apex obtuse, base auriculate, claw 3.5–4 mm long. *Stamens* 10–11 mm long; anthers ca. 1 mm long. *Gynoecium*: ovary 2–2.5 mm long, silvery hairy; style 9.5–12 mm long. *Pods* laterally compressed, curved, 8–27 by 4–6 mm, indehiscent, lomentaceous, (1–)4–5-articulate, silvery tomentose, not reticulate; articles 3–5 mm long. *Seeds* reniform, 2.5–4.5 by 2.5–3.5 mm, with arillate rim.

**Thailand.**— NORTHERN: Chiang Mai [Doi Chiang Dao Wildlife Sanctuary, 17 Jul. 1958, *Sørensen et al.* 4250 (**C**); Fang, 25 Jul. 1968, *Larsen* 2675 (**AAU, E, K, L, P**)]; Phayao [Mueang, Doi Luang National Park, 11 Aug. 1997, *Maxwell* 97-862 (**BKF, CMUB**)]; Nan [Ban Du, 8 Aug. 1998, *Pongamornkul* 230 (**QBG**)]; Lampang [Hang Chat, 25 Aug. 1922, *Put* 739 (**BK, K**); Mae Tha, Doi Khun Tan National Park, 30 Jul. 1994, *Maxwell* 94-841 (**BKF, CMUB**); Mueang Pan, Chae Son National Park, 24 Aug. 1995, *Maxwell* 95-571 (**CMUB**); unknown locality, 25 Aug. 1922, *Winit* 739 (**BK, BKF, K**)]; Phrae [Mae Yom, 2 Nov. 2013, *Clark et al.* 320 (**K-2** sheets)]; Kamphaeng Phet [Ban Klawng Pong, 9 Nov. 1920, *Kerr* 4552 (**ABD, BK, BM-2** sheets, **K-2** sheets)]; Nakhon Sawan [Hua Wai, 31 Aug. 1931, *Put* 4107 (**ABD, BK, BM, E, K**)]; NORTH-EASTERN: Phetchabun [Mueang, Ang Nam Yen forest, 16 Jan. 1969, *Vacharapong* 321 (**BK**); Nam Nao National Park, 14 Jun. 2003, *Chantara-*

*nothai et al. s.n.* (**KKU**); *ibid.*, 4 Sept. 2013, *Kuttiyot 432* (**QBG**); *ibid.*, 7 Sept. 2003, *Mattpha 271* (**KKU**); *ibid.*, 28 Jul. 2012, *Saisorn 28* (**KKU**) & 29 (**KKU**); *ibid.*, 27 Dec. 2012, *Saisorn 108* (**KKU**); *ibid.*, 28 Dec. 2012, *Saisorn 114* (**KKU**) & 115 (**KKU**); Ping Grove, 5 Jan. 1960, *Smitinad & Abbe 6308* (**BKF, K**); Wichian Buri-Khao Kho, 19 Jul. 1986, *Thaithong et al. 250* (**BCU-3 sheets**); Loei [Na Haeo, Phu Suan Sai National Park, 7 Aug. 2008, *Maknoi 2463* (**QBG**); Phu Kradueng, 28 Aug. 1948, *Bungpheng 213* (**BKF**); *ibid.*, 4 Nov. 1984, *Murata et al. T-42991* (**BKF**); *ibid.*, 1 Sept. 1970, *Phusomsaeng & Nimanong 223* (**BKF**); Phu Pha Man National Park, Pha Nok Khao, 6 Nov. 1970, *Charoenphol et al. 4572* (**AAU, C, P**); *ibid.*, 2 Sept. 1977, *Shimizu et al. T-8731* (**BKF**); *ibid.*, 22 Mar. 1958, *Sørensen et al. 2443* (**C, E**); *ibid.*, 26 Nov. 1965, *Tagawa et al. T-321* (**AAU, BKF, P**); Si Than, Jul., *Floto 7729* (**BKF, C**); unknown locality, 22 Jun. 1952, *Plernchit 579* (**BKF**); Udon Thani [Nong Saeng, *Sidajium 47* (**BKF**); Sakon Nakhon [Phu Phan National Park, 3 Aug. 1999, *Leeratiwong 99-94* (**KKU**); *ibid.*, 11 Nov. 1999, *Leeratiwong 99-144* (**KKU**); Khon Kaen [Chum Phae, Ban Na Chan, 23 Aug. 2011, *Norsaengsri et al. 8046* (**QBG**); Phu Pha Man, 9 Nov. 2002, *Mattpha 94* (**KKU**); Phu Pha Man National Park, Pha Nok Khao, 22 Sept. 2002, *Mattpha 02* (**KKU**); *ibid.*, 4 Aug. 2011, *Norsaengsri et al. 8009* (**QBG**); *ibid.*, 15 Aug. 2012, *Norsaengsri et al. 9895* (**QBG**); Phu Pha Man National Park, Sam Nam Yoi, 25 Feb. 2011, *Norsaengsri et al. 7584* (**QBG**); Wiang Kao, Phu Wiang National Park, 20 Sept. 1999, *Leeratiwong 99-118* (**PSU**); EASTERN: Nakhon Ratchasima [Ban Kaeng Khlo, 17 Sept. 1971, *Vidal 5116* (**AAU, P**); Chaiyaphum [Nam Phrom, 11 Dec. 1971, *van Beusekom et al. 4148* (**BKF,**

**K, L, P**]; CENTRAL: Saraburi [Phra Chaya, 23 Aug. 1958, *Nantavorn 3* (**BCU**); Sam Lan, 10 Aug. 1974, *Maxwell 74-762* (**AUU, BK**); Tab Kueng, 13 Sept. 1958, *Keosangsee 3* (**BCU**)].

**Distribution.**— Laos, Cambodia.

**Ecology.**— Dry evergreen, lower montane pine-oak, mixed deciduous and dry dipterocarp forests, 100–1000 m alt. Flowering: June–November.

**Vernacular.**— Kham phi thai (จามผีไทย), nat yai (หนาดใหญ่) (Loei); khao mai (ข้าวไหม้), khueang khao mai (เขียงข้าวไหม้) (Lampang); thong mong (ทองหมอง) (Sakon Nakhon).

**Notes.**— This species is similar to *Dendrolobium olivaceum* but differs in its larger calyx and standard petal. Also, the tomentose hairs of *Dendrolobium thorelii* are usually denser and longer than they are on *D. olivaceum*.

6. *Dendrolobium triangulare* (Retz.) Schindl. in Fedde, Repert. Spec. Nov. Regni Veg. 20: 279. 1924.— *Hedysarum triangulare* Retz., Observ. Bot. 3: 40. 1783. Type: Indonesia. Java, *Thunberg s.n.* (holotype **LD** [LD1739813!, digital image]).— *Desmodium triangulare* (Retz.) Merr., J. Arnold Arbor. 23(2): 170. 1942.— *Hedysarum cephalotes* Roxb. [Hort. Bengal.: 57. 1814, *nom. nud.*], Fl. Ind. 3: 360. 1832. Type: Bengal, introduced into the Botanical Garden by Dr. W. Carey, *Roxburg s.n.* (syntypes **BR** [BR0000005172511!, digital image] & **BR** [BR0000005172849!, digital image]).— *Desmodium cephalotes* (Roxb.) Wight & Arn., Prodr. Fl. Ind. Orient.: 224. 1834.— *Dendrolobium cephalotes* (Roxb.) Benth. in Miq., Pl. Jungh.: 216 & 218. 1852.— *Meibomia cephalotes* (Roxb.) Kuntze, Revis. Gen. Pl. 1: 195. 1891.— *Desmodium congestum* Wall. ex Wight et Arn., Prodr.: 224. 1834. Type: *Wallich 5723*

(partly) (syntype **K** [K001121867!]) and Peninsular Ind. Orietalis. *Herb. Wight pror* 789 (syntype **G!** & **G!**).— *Desmodium cephalotoides* Craib, Bull. Misc. Inform. Kew 1912(3): 150. 1912. Type: Thailand. Me Ping Rapids, Ban Kaw, in mixed jungle, *Kerr 2022* (lectotype **K** [K000880970!], designated here; isolectotypes **BM** [BM000839663!], **E** [E00275854!] & **K!**).— *Dendrolobium cephalotoides* (Craib) Schindl. in Fedde, Repert. Spec. Nov. Regni Veg. 20: 279. 1924.— *Dendrolobium triangulare* subsp. *cephalotoides* (Craib) H.Ohashi, Ginkgoana 1: 80. 1973.— *Dendrolobium triangulare* subsp. *cephalotoides* (Craib) H.Ohashi f. *villosum* H.Ohashi, Ginkgoana 1: 81. 1973. Type: Myanmar. Maymyo, 1000 m alt., 15 Jul. 1967, *Kanai s.n.* (holotype **TI**, n.v.; isotypes **A** [A00053707!, digital image], **K** [K00088-0974!] & **TI**, n.v.). Fig. 2D–F.

Shrub 0.5–2 m tall; stem and twigs triangular, pubescent to silvery tomentose. *Leaves*: stipules curved, triangular, 10–15 by 2–5 mm, glabrescent to villose; petioles 1–5 cm long, glabrescent to tomentose; rachis 0.5–2.5 mm long, glabrescent to tomentose. *Leaflets* subcoriaceous; stipels linear, 5–10 by 0.5 mm, glabrescent; petiolules 1–5 mm long, glabrescent to tomentose. *Terminal leaflet* elliptic to obovate, 5–18 by 2–8 cm, apex acute to acuminate, base attenuate to obtuse, margin entire, upper surface glabrescent, lower surface puberulent to silvery tomentose; lateral veins 12–15 per side. *Lateral leaflets* elliptic to lanceolate, 3.5–13 by 1.5–4.5 cm, apex acuminate, base asymmetrical, margin entire, upper surface puberulent, lower surface puberulent to silvery tomentose; lateral veins 10–15 per side. *Inflorescences* racemose, ca. 1 cm long, terminal or axillary, with more than 20 flowers; peduncle 3–5 mm long. *Secondary bract*

narrowly ovate, 3.5–4 by 1–1.5 mm, apex acute, glabrescent, margin villose. *Flowers* 11–13 mm long; bracteoles narrowly ovate, curved, ca. 5 by 1.5 mm, glabrescent, margin villose; pedicels 4–5 mm long, tomentose. *Calyx* light green, 5–6 mm long, persistent; each tooth 3–4 mm long, upper one bifid, outside tomentose, inside puberulent. *Corolla* white; standard obovate, ca. 11 by 8.5–9 mm, apex slightly emarginate, claw ca. 1 mm long; wings obovate, 11–12 by 3–3.5 mm, apex obtuse, base auriculate, claw 2.5–3 mm long; keel ca. 12 by 3 mm, apex obtuse, base auriculate, claw ca. 3 mm long. *Stamens* 11–12 mm long; anthers ca. 0.6 mm long. *Gynoecium*: ovary oblong, ca. 2 mm long, puberulent; style 11–12 mm long, puberulent. *Pods* laterally compressed, curved, 10–20 by 3–4 mm, indehiscent, lomentaceous, 3–6-articulate, pubescent to silvery tomentose, not reticulate; articles 3–4 mm long. *Seeds* brown to dark brown, reniform to quadrangular, 2.2–2.9 by 1.7–1.9 mm, with arillate rim.

**Thailand.**— NORTHERN: Mae Hong Son [Khun Yuam, 19 Jul. 1997, *Chusie KY399* (**QBG-2** sheets); *ibid.*, 6 Sept. 1974, *Larsen & Larsen 34213* (**AAU, BKF, K**); Me Lan, 23 May 1921, *Kerr 5489* (**ABD, BK, BM, K**); Mueang, Doi Huai Pu Ling, 24 Sept. 1995, *BGO. Staff 4757* (**QBG**); unknown locality, 9 Sept. 1974, *Larsen & Larsen 34304* (**AAU, BKF, K**); Chiang Mai [Ang Ka Noi, 26 Jun. 1978, *Phengklai et al. 4111* (**BKF-2** sheets, **K, L**); Chiang Dao, 11 Dec. 1961, *Bunchuai 1246* (**BKF, K**); *ibid.*, 13 Sept. 1995, *Maxwell 95-708* (**BKF, CMUB**); Chiang Dao, Ban Hua Thung, 20 Jul. 2008, *Pongamornkul 2413* (**QBG-2** sheets); Chiang Dao, Doi Chiang Dao Wildlife Sanctuary, 9 Aug. 1935, *Garrett 964* (**ABD, BKF, E, K, L-2** sheets, **P**); *ibid.*, 24 Jul. 1958, *Khantchai 952* (**BKF**);

- ibid., 30 Sept. 1989, *Maxwell* 89-1174 (**E**);  
 ibid., 11 Nov. 1996, *Maxwell* 96-1529 (**BKF, CMUB**); ibid., 1 Dec. 2012, *Saisorn* 97 (**KKU**) & 98 (**KKU**); ibid., 3 Dec. 2012, *Saisorn* 99 (**KKU**); ibid., 11 Sept. 1967, *Tagawa et al.* T-9798 (**BKF, L**-2 sheets) & T-9813 (**BKF, L**); ibid., 19 Jun. 1968, *van Beusekom & Phengklai* 1308 (**AAU, E, K, L, P**); Chiang Dao, Tham Chiang Dao, 15 Feb. 1958, *Larsen* 1143 (**BKF**); ibid., 30 Nov. 2012, *Saisorn* 94 (**KKU**); Chom Thong, Ban Mae Klang Luang, 30 May 1979, *Vidal et al.* 6188 (**AAU, BKF, P**); Doi Inthanon National Park, 15 Sept. 1995, *BGO. Staff* 4326 (**QBG**); ibid., 29 Oct. 2000, *Chayamarit et al.* 2148 (**BKF**); ibid., 8 Sept. 1910, *Garrett* 39 (**AAU, BM, C, E, K**-2 sheets, **P**); ibid., 23 Nov. 1998, *Hara & Noguchi* C350 (**CMUB**); ibid., 13 Sept. 1974, *Larsen & Larsen* 34487 (**AAU, BKF**); ibid., 2 Oct. 1971, *Murata et al.* T-15641 (**BKF, P**); ibid., 3 Aug. 1988, *Phengklai et al.* 7456 (**BKF**); Fang, Doi Ang Khang, 4 Jun. 1973, *Sadakorn* 203 (**BK**); ibid., 5 Jul. 1975, *Sadakorn s.n.* (**BK**); ibid., 5 Aug. 1974, *Sutheesorn* 3067 (**BK**); Fang, Fang to Chiang Rai, 26 Jul. 1968, *Larsen et al.* 2722 (**AAU, E, P**) & 2748 (**E, K, P**); Mae Chaem, Huai Bong village, 18 Jul. 1999, *Maxwell* 99-76 (**BKF, CMUB**); Mae Rim, Huai Paa Lai, QBG, 20 Aug. 1997, *Nanakorn et al.* 9532 (**QBG**-2 sheets); Mae Rim, Huai Paan See, QBG, 9 Oct. 2002, *Clannaewwong* 248 (**QBG**); ibid., 1 Sept. 1998, *Serm* 124 (**QBG**); Mae Rim, Mae Sa valley, *Jackson* 6178 (**BKF**); Mae Rim, Mon Long, 18 Sept. 1995, *BGO. Staff* 4551 (**QBG**); Mae Rim, Pong Yaeng, 2 Sept. 1994, *Nanakorn et al.* 19031 (**QBG**); Mae Rim, QBG, 1 Jul. 1997, *BGO. Staff* 9330 (**QBG**); ibid., 15 Jul. 1999, *Nanakorn et al.* 14862 (**QBG**); ibid., 6 Dec. 2012, *Saisorn* 101 (**KKU**); Mae Rim to Samoeng, 5 Dec. 1989, *Maxwell* 89-1516 (**E**); Me Ping, Doi Noi, 5 Sept. 1911, *Kerr* 2008 (**BM, K**-2 sheets); Mueang, 27 Sept. 1914, *Kerr* 3391 (**BM, E, K**); ibid., Chiang Mai University, 1 Oct. 1988, *Ahngjereunpon* 171 (**CMUB**); Mueang, Doi Suthep, 1 Oct. 1988, *Maxwell* 88-1143 (**BKF**); ibid., 14 Sept. 1985, *Sarunrat* 167 (**CMUB**); ibid., 23 Aug. 1951, *Soradet* 136 (**BKF**); ibid., 14 Sept. 1958, *Sørensen et al.* 4974 (**BKF, C**); Samoeng, 19 Jul. 1997, *Maxwell* 97-778 (**BKF, CMUB**); ibid., 13 Sept. 1958, *Sørensen et al.* 4954 (**BKF, C, K, L**); ibid., Ban Pok-kongkhak, 24 Sept. 1997, *Nanakorn* 9639 (**QBG**-2 sheets); unknown locality, 12 Dec. 1990, *Dy Phon* 85/90 (**P**-2 sheets); Chiang Rai [Chiang Khan, 17 Dec. 1967, *Prayad* 1134 (**BK**); Mae Sai, Doi Tung, 25 Sept. 1967, *Iwatsuki et al.* T-11054 (**AAU, BKF, P**); ibid., 28 Jan. 1989, *Smitinand* 167 (**BKF**); Phayao [Chiang Kham, Doi Pha Dam, 14 Aug. 2013, *Lanongsri et al.* 3020 (**QBG**); Pong, Doi Pha Chang Wildlife Sanctuary, 31 Jul. 1998, *Maxwell* 98-737 (**CMUB**); Nan [Doi Phu Kha, 31 Dec. 2013, *Clark et al.* 304 (**K**); Lamphun [Ban Kaw, Me Ping Rapids, 7 Sept. 1911, *Kerr* 2022 (**BM, E, K**-2 sheets); Me Lee, 10 Jul. 1915, *Winit* 361 (**K**); Pa Sang, Erawan Cave, 14 Sept. 2004, *Maxwell* 04-481 (**CMUB, BKF**); ibid., 5 Dec. 2004, *Maxwell* 04-771 (**BKF, CMUB**); Lampang [Huai Tak to Ngao, 23 Sept. 1967, *Shimizu et al.* T-10693 (**BKF, P**); Huai Tak, 16 Jun. 1954, *Bunyarataphand* 101 (**BKF**); Wang Nuea, Chae Son National Park, 26 Oct. 1995, *Maxwell* 95-1030 (**BKF, CMUB**); ibid., 26 Jul. 1996, *Maxwell* 96-1015 (**CMUB**); Phrae [Mae Phaek, 25 Oct. 1939, *Surajaa* 70 (**BK**); Me Ban, 10 Sept. 1929, *Franck* 187 (**P**); ibid., 26 Sept. 1929, *Franck* 423 (**P**); Song, Mae Yom National Park, 13 Oct. 1991, *Maxwell* 91-896 (partly) (**E, P**); unknown locality, 10 Aug. 1910, *Vanpruk* 117 (**BKF, K**); Tak [Keng Soi, Me Ping



- Rapids, 23 Nov. 1920, *Kerr 4631* (**ABD, BK, BM, E, K**); Umphang, Ti Lo Su trail, 19 Sept. 2003, *Mattapa 331* (**KKU**); *ibid.*, 9 Nov. 2012, *Saisorn 70* (**KKU**); Wiang Djaio, 10 Oct. 1904, *Hosseus 71* (**E, G-2 sheets, P**); unknown locality, 10 Sept. 1972, *Phengklai 3126* (**BKF, K, P**); Nakhon Sawan [Takhli, 26 Nov. 1928, *Put 2132* (**ABD, BK, BM, E, K**)]; NORTH-EASTERN: Phetchabun [Nam Nao, Nam Nao National Park, 6 Jul. 2003, *Chantaranothai s.n.* (**KKU**); *ibid.*, 19 Aug. 2003, *Mattapa 259* (**KKU**); *ibid.*, 4 Sept. 2005, *Mattapa 946* (**KKU**); *ibid.*, 22 Jun. 2012, *Ninkaew et al. 23-1* (**KKU**); *ibid.*, 28 Jul. 2012, *Saisorn 25* (**KKU**), 26 (**KKU**) & 27 (**KKU**); *ibid.*, 29 Jul. 2012, *Saisorn 31* (**KKU**); *ibid.*, 28 Dec. 2012, *Saisorn 111* (**KKU**); Loei [Na Haeo, Phu Suan Sai National Park, 1 Sept. 2008, *Maknoi 2683* (**BKF**); Phu Kradueng, 1 Jul. 1948, *Dee 55* (**BKF, P**); *ibid.*, 22 Jun. 1942, *Dee 295* (**BKF**); *ibid.*, Jul. 1959, *Floto 7754* (**BKF, C**); *ibid.*, 31 Aug. 1969, *Sangkhachand 2049* (**BK**); *ibid.*, 3 Sept. 1967, *Shimizu et al. T-12951* (**AAU, BKF, P**); Phu Kradueng, Phu Kradueng National Park, 22 Jul. 1949, *Dee 378* (**BKF**); *ibid.*, 12 Jul. 1959, *Floto 7755* (**BKF, C, K**); *ibid.*, 14 Nov. 1979, *Shimizu et al. T-22556* (**BKF**) & *T-22631* (**BKF**); Phu Luang, 24 Aug. 1967, *Phusomsaeng & Bunchuai 13* (**BKF-2 sheets, K**); Phu Pha Man, near Pha Nok Khao, 29 Aug. 1985, *Smitinand 4806* (**BKF, K**); Sakon Nakhon [Phu Phan National Park, 1 Aug. 1999, *Leeratiwong 99-87* (**KKU**); *ibid.*, 13 Nov. 1999, *Leeratiwong 99-157* (**KKU**); *ibid.*, 14 Dec. 2002, *Mattapa 89* (**KKU**); Kalasin [Sakon Nakhon to Kalasin, 12 Nov. 1984, *Murata et al. T-51376* (**BKF**)]; Maha Sarakham [Kosum Phisai, Kosum Phisai Park, 19 May 1999, *Leeratiwong 99-104* (**PSU**)]; Khon Kaen [Phu Pha Man National Park, Tat Hong waterfall, 22 Nov. 2007, *Norsaengsri & Lakoet 3064* (**QBG**); *ibid.*, Tat Yai waterfall, 18 Nov. 2011, *Lakoet 234* (**QBG**)]; EASTERN: Chaiyaphum [Chatturat, Ban Plap, 29 Aug. 2001, *Pooma et al. 2926* (**BKF-2 sheets, L**); Phu Khiao, Thung Kramang, 9 Aug. 1972, *Larsen et al. 31634* (**AAU, BKF, K**)]; SOUTH-WESTERN: Uthai Thani [Ban Rai, Ban Dong, 27 Oct. 1974, *Sutheesorn & Sangkhachand 3106* (**BK**); Lan Sak, Huai Kha Kaeng Wildlife Sanctuary, 1 Aug. 2013, *Meeboonya et al. 219* (**AAU, K**); *ibid.*, 12 Nov. 1979, *Shimizu et al. T-22246* (**BKF**)]; Kanchanaburi [Erawan National Park, 31 Aug. 1995, *Parnell et al. 95-596* (**K**); Huai Bankau, 9 Nov. 1971, *van Beusekom et al. 3583* (**BKF, C, K**); Khao Buing, 16 Aug. 1971, *Phengklai 3000* (**BKF, C, K**); Sai Yok, 29 Jan. 2000, *Phengklai & Niyomdham 14105* (**BKF**); *ibid.*, 1 Aug. 1928, *Put 1814* (**AAU, ABD, BK, BM, C, K**); *ibid.*, 5 Nov. 1979, *Shimizu et al. T-21665* (**BKF**); *ibid.*, Sai Yok National Park, 2 Mar. 2013, *Saisorn 127* (**KKU**); Sangkhla Buri, Thung Yai Naresuan Wildlife Sanctuary, 13 Oct. 1993, *Maxwell 93-1235* (**BKF-2 sheets, CMUB**); *ibid.*, 16 Jan. 1994, *Maxwell 94-72* (**BKF, CMUB, L**); Si Sawat, 26 Jun. 1974, *Larsen & Larsen 33811* (**AAU, BKF, K, P**); *ibid.*, Huag Bahn Gow, 11 Jul. 1973, *Sutheesorn 2591* (**BK**); Thong Pha Phum, Thong Pha Phum National Park, 2 Mar. 2013, *Saisorn 126* (**KKU**); Thum Pha, 14 Dec. 1916, *Phengklai 183* (**BKF, K**); Wang Pho, 15 Oct. 1967, *Chermsirivatana 785* (**BK**); unknown locality, 15 Aug. 1954, *Soonthorn 11* (**BCU**)]; Ratchaburi [Kao Chon waterfall, 5 Oct. 2002, *Niyomdham & Puudjaa 6986* (**AAU, K**)]; CENTRAL: Suphan Buri [Phu Toei National Park, 29 Jun. 2001, *Chayamarit et al. 2959* (**BKF-2 sheets**)]; Saraburi [Muak Lek, 18 Aug.

1988, *Chutinthorn* 8 (**BCU**); *ibid.*, 2 Sept. 1924, *Kerr* 9116 (**AAU, ABD, BK, BM, C, K**); Mueang, Sam Lan forest, 27 Oct. 1973, *Maxwell* 73-552 (**AAU, BK, BKF**); Phra Phutthabat, *Nupangdee* 32 (**BKF**); Pukae, 3 Sept. 1967, *Hardial* 616 (**BKF, K**); Sahn Laha, 27 Oct. 1973, *S.N.* (**BKF**); Thap Kwang, 15 Aug. 1955, *Chermsirivatana* 11 (**BCU**); Bangkok [unknown locality, 15 Sept. 1920, *Kerr* 4473 (**ABD-2** sheets, **BM, E, K**); unknown locality, 15 Sept. 1920, *Marcan* 429 (**BM, K**); SOUTH-EASTERN: Chon Buri [Si Racha, 24 Oct. 1927, *Collins* 1676 (**ABD, BK, K**); *ibid.*, 30 Aug. 1975, *Maxwell* 75-945 (**AAU, BK**); *ibid.*, Khao Chalak, 29 Aug. 1926, *Collins* 1467 (**AAU, ABD, K**); *ibid.*, Khao Din, 12 Sept. 1922, *Collins* 1023 (**ABD, BK, K**); *ibid.*, Khao Khiao Open Zoo, 19 May 1975, *Maxwell* 75-537 (**AAU, BK**); *ibid.*, Khao Khiao, 18 Dec. 1974, *Maxwell* 74-1081 (**AAU, BK**); *ibid.*, Nah Kate, 7 Nov. 1926, *Collins* 1481 (**AAU, ABD, K**); unknown locality, 21 Oct. 1956, *Smitinand* 3584 (**BKF**); PENINSULAR: Chumphon [Siepyuan, 5 Sept. 1927, *Put* 947 (**AAU, ABD, BK, BM, C, E, K**); Ranong [Khlong Nang Yon, 25 Nov. 1974, *Geesink et al.* 7592 (**AAU, BKF, K, P**); Phangnga [Khura Buri, Nang Yon, 23 Nov. 1973, *Santisuk* 672 (**BKF, K, P**); Ko Kho Khao, 7 Dec. 1965, *Sangkhachand* 1192 (**BKF-2** sheets, **K**); Trang [Khao Kaup, 27 Jan. 1958, *Smitinand* 4134 (**BKF**)]; Unknown floristic region: [Ban Kao, 16 Dec. 1961, *Larsen* 8256 (**C**); Ban Taklee, 11 Dec. 1923, *Marcan* 1089 (**ABD, BM-2** sheets); unknown locality, 3 Nov. 1904, *Hede* 148 (**BKF**); unknown locality, 1859, *Schomburgk s.n.* (**P**)].

**Distribution.**— Africa, Sri Lanka, India, the Himalayas, Myanmar, China, Taiwan, Indo-China, Malesia.

**Ecology.**— Dry evergreen, lower montane rainforest, lower montane pine-oak forest, mixed deciduous, oak-dry dipterocarp and dry dipterocarp forests, 0–1800 m alt. Flowering: May–January.

**Vernacular.**— I-niao (อีหนี่ชา) (Kanchanaburi, Central); ka sam pik (กาสามปีท), ma hae dong (มะแฮดง), ma hae nok, (มะแฮนง) (Chiang Mai); kam phi (กำผี), kham hin (ขามหิน), kham (ขาม), kham phi phu (ขามผีภู) (Loei); kham phi (ขามผี) (Loei, Phetchabun); kraduk ueng (กระดุกอึ้ง) (Chiang Rai, Phetchabun, Saraburi); niao ma (หนี่ชาหมา) (Chumphon).

**Notes.**— *Dendrolobium triangulare* has a wide range of distribution and is found in various habitats. Therefore, it shows remarkable variability in its habit, leaf and indumentum characters.

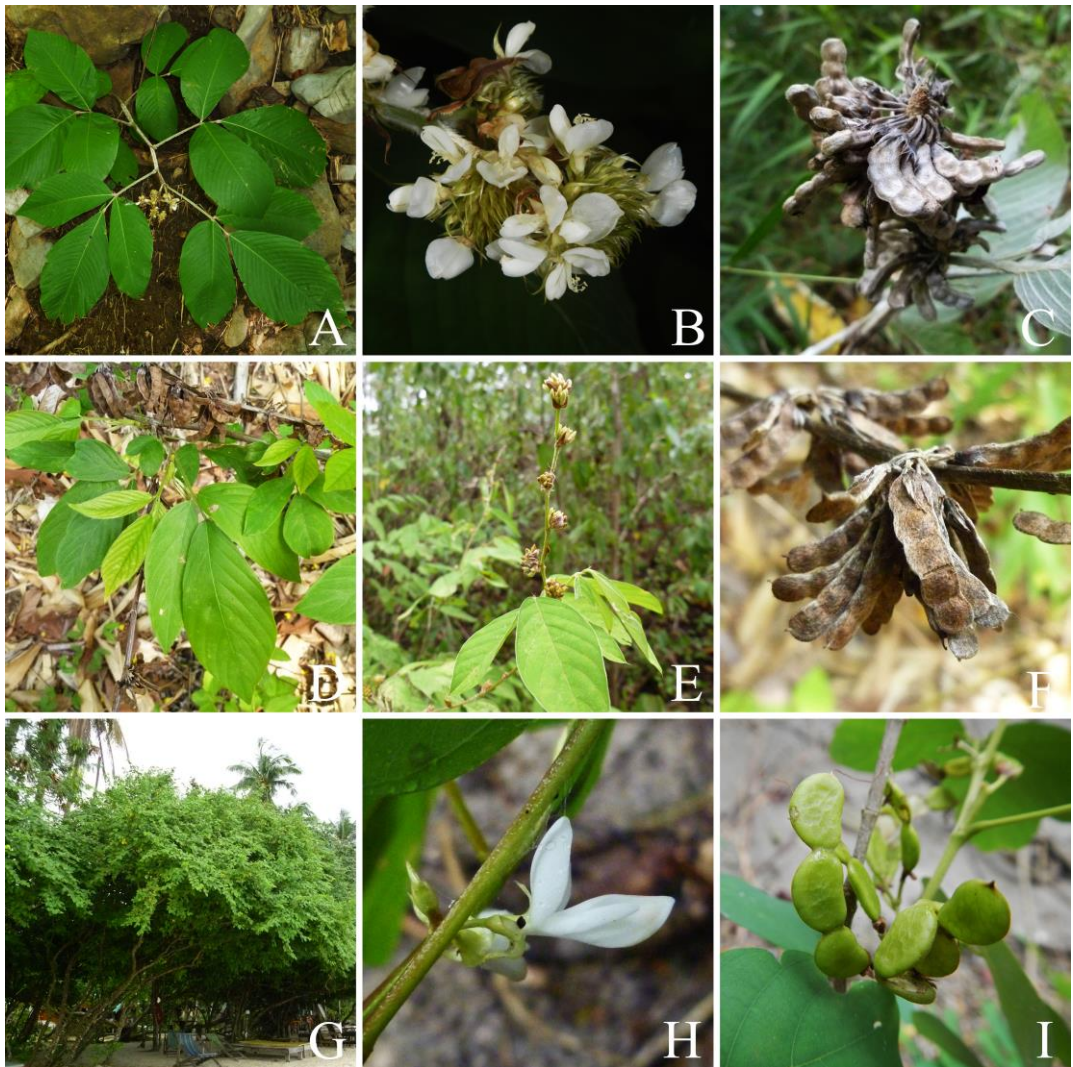
7. *Dendrolobium umbellatum* (L.) Benth. in Jungh. & Miq., Pl. Jungh.: 216 & 218. 1852.— *Hedysarum umbellatum* L., Sp. Pl. 2: 747. 1753. Type: India. Herb. Hermann 2: 26, No. 293 (lectotype **BM** [BM-000621598!, digital image], designated by Turland & Jarvis, 1997).— *Desmodium umbellatum* (L.) DC., Prodr. 2: 325. 1825.— *Ormocarpum umbellatum* (L.) Desv., Mém. Soc. Linn. Paris 4: 307. 1826.— *Meibomia umbellata* (L.) Kuntze, Revis. Gen. 1: 197. 1891.— *Hedysarum australe* Willd., Sp. Pl. 3(2): 1183. 1802. Type: Vanuatu. Insula Tanna, *Forster & Forster s.n.* (syntype **B** [B-W 13787 -01 0!, digital image]).— *Desmodium australe* (Willd.) DC., Prodr. 2: 326. 1825.— *Ormocarpum australe* (Willd.) Desv., Mém. Soc. Linn. Paris 4: 307. 1826.— *Dendrolobium australe* (Willd.) Benth. in Jungh. & Miq., Pl. Jungh. 2: 216. 1852.— *Desmodium umbellatum* (L.) Benth. var. *costatum* Craib, Fl. Siam. Enum. 1: 410. 1928. Type: Thailand. Bangkok,

under 5 m alt., 9 Oct. 1920, *Kerr* 4507 (lectotype **K** [K000880967!], designated here; isoelectotypes **AAU**!, **K** [K000880968!]). Fig. 2G–I.

Large shrub, up to 7 m tall; stem and twigs pubescent to tomentose. *Leaves* spiral; stipules caducous; petioles 1–3 cm long, appressed puberulent; rachis 0.5–1 cm long, appressed puberulent. *Leaflets* subcoriaceous; stipels triangular, 1–1.5 by 0.5 mm, apex acuminate, glabrescent; petiolules 2–4 mm long, appressed puberulent. *Terminal leaflet* elliptic to ovate, 4–10 by 2.5–3.5 cm, apex acute to acuminate, base obtuse to rounded, margin entire, upper surface glabrescent, lower surface puberulent to pubescent; lateral veins 7–9 per side. *Lateral leaflets* narrowly lanceolate, 2–6 by 1–4 cm, apex acute, base asymmetrical, margin entire, upper surface glabrescent, lower surface puberulent to pubescent; lateral veins 5–6 per side. *Inflorescences* racemose, axillary, 1–1.5 cm long, with 10–15 flowers; peduncle 5–7 mm long. *Secondary bract* ovate, caducous, *ca.* 1.8 by 0.8 mm, apex acute, pubescent. *Flowers* 13–15 mm long; bracteoles ovate, 1.5–2.5 by 0.8–1 mm, apex acute, pubescent, margin villose; pedicels 4–5 mm long, appressed pubescent. *Calyx* light green, 5–7 mm long, caducous; each tooth 3–5 mm long, outside appressed pubescent, inside puberulent. *Corolla* white; standard suborbicular to ovate, 11–13 by 7–9 mm, apex retuse, claw 2–3 mm long; wings oblong, slightly curved, 10–11.5 by 2 mm, apex obtuse, base auriculate, claw 2.5–3 mm long; keel 12–13 by 3.5 mm, apex shortly beaked, base auriculate, claw 2.5–3.5 mm long. *Stamens* 11–13 mm long; anthers *ca.* 1 mm long. *Gynoecium*: ovary oblong, 2.5–3 mm long, pubescent; style 11–12 mm long, pubescent. *Pods* laterally compressed, curved, 15–35 by 4–6 mm, indehiscent, lomentaceous, 2–4-articulate,

appressed puberulent, not reticulate; articles 8–10 mm long. *Seeds* dark brown to black, reniform, 4–4.7 by 2.8–3 mm, with arillate rim.

**Thailand.**— SOUTH-WESTERN: Prachuap Khiri Khan [Mueang, Pa Suan Wai, 9 Nov. 1944, *Thaus* 100 (**BKF**)]; SOUTH-EASTERN: Rayong [Kao Man Ni, 19 Nov. 1994, *BGO. Staff s.n.* (**QBG**); unknown locality, 23 Aug. 1977, *Phengklai et al.* 3819 (**BKF, PSU**)]; Chanthaburi [unknown locality, 10 Sept. 1964, *Adisai* 855 (**BK**)]; Trat [Khlong Yai, 2 Sept. 1972, *Larsen et al.* 32349 (**AAU, BKF, K, P**); Ko Chang, 3 Aug. 1973, *Murata et al.* T-17541 (**AAU, BKF, K, L**); *ibid.*, 30 Jun. 2013, *Saisorn* 137 (**KKU**); *ibid.*, Ban Dan, 9 Jun. 1925, *Rabil* 56 (**ABD, BK, BM-2 sheets, K**); *ibid.*, Ban Khlong Nonsi, 25 Aug. 1966, *Larsen et al.* 1781 (**AAU, BKF**); *ibid.*, Khlong Mayom, 2 Apr. 1923, *Kerr* 6797 (**AAU, ABD, BK, BM, K**); *ibid.*, Khlong Nonsi, 7 Sept. 1954, *Suvatabhandhu s.n.* (**BK**); *ibid.*, near Khlong Mayom, 3 Aug. 1973, *Maxwell* 73-328 (**AAU, BK**); *ibid.*, Salak Kawk, 27 Sept. 1924, *Kerr* 9215 (**AAU, ABD, BK, BM, E, K**); *ibid.*, Salak Phet, 27 Sept. 1924, *Kerr* 9215A (**AAU, ABD, BK, BM, K**); *ibid.*, Salak, 23 Feb. 1955, *Smitinand* 2292 (**BKF**); Laem Ngop, Laem Takaen, 11 Jul. 1955, *Sangkhachand* 478 (**BKF**)]; PENINSULAR: Chumphon [Lang Suan, Tako, 18 Jun. 1928, *Put* 1718 (**ABD, BK, BM, E, K**)]; Surat Thani [Don Sak, Hat Nang Ram, 19 Dec. 2006, *Pooma et al.* 6454 (**BKF, E**); Ko Mae-koh, 26 Apr. 2009, *Phengklai et al.* 15950 (**BKF-2 sheets**), 15979 (**BKF**) & 15990 (**BKF**); Ko Phaluai, 1 Jun. 1960, *Chirayupin* 146 (**BK**); Ko Pha-ngan, 7 Sept. 1973, *Phromdet* 21 (**BKF, E, K, P**); Ko Samui, 29 Aug. 1983, *Choathip* 93 (**PSU**); Ko Tae, 5 Dec. 1974, *Geesink et al.* 7795 (**AAU, BKF, K, P**); Ko Tao, 13 Apr. 1927, *Kerr* 12688 (**AAU, ABD, BK, BM, E, K**);



**FIGURE 2.** Photographs of living specimens of genus *Dendrolobium* in Thailand. A.–C. *D. thorelii*: A. Branch with leaves, B. Inflorescence and flowers and C. Fruits; D.–F. *D. triangulare*: D. Branch with leaves, E. Inflorescence and young flowers and F. Fruits; G.–I. *D. umbellatum*: G. Habit, H. Flower and I. Fruits. B and I taken by Ponprom Pisuttimarn and others taken by first author.

Ko Woa-talap, 24 Apr. 2009, *Phengkklai et al.* 15923 (**BKF**); Phangnga [Khura Buri, Ko Surin, 25 Apr. 2009, *Wattana & Srisanga* 3276 (**QBG**); Takua Pa, 27 Nov. 1987, *Smitinand & Santisuk s.n.* (**BKF**); *ibid.*, Khao Lak-Lam Ru National Park, 11 Jun. 2004, *Setsin ST0712* (**BKF, QBG**);

*ibid.*, 18 Oct. 2004, *Sidisunthorn & Tippayasri ST1052* (**QBG**); Thai Mueang, north of Thung Maphrao, 19 Jul. 1972, *Larsen et al.* 31120 (**AAU, E, K, P**); Phuket [unknown locality, 4 Jan. 1980, *H. 3 & C.* 499 (**PSU**)]; Krabi [Ao Nang to Krabi, 12 Jul. 1992, *Larsen et al.* 43318

(AAU, BKF, P); Ko Lanta, 21 Mar. 1998, *Chamchumroon PBG no. 147497* (BKF); Ko Lanta Yai, 22 Nov. 2002, *Phengkklai et al. 14829* (BKF); Ko Phu, 14 Feb. 1966, *Hansen & Smitinand 12331* (BKF, K); Lanta National Park, 7 Jan. 1992, *Niyomdham 2840* (BKF); Trang [Khao Kaup, 27 Jan. 1958, *Smitinand 4134* (K); Sikao, Chao Mai beach, 5 Jun. 1989, *Paisooksantivatana y2348-89* (BK); *ibid.*, 3 Jun. 2013, *Saisorn 136* (KKU)]; Satun [Tarutao Island, 20 Apr. 1969, *Chermsirivathana & Kasem 1424* (BK)]; Songkhla [Thepha, 23 Mar. 1928, *Lakshanakara 369* (BK, K)].

**Distribution.**— Africa, Sri Lanka, India, Myanmar, Japan (Ryukyu Islands), Cambodia, Vietnam, Malaysia, Indonesia, Philippines, New Guinea, Pacific islands, Australia.

**Ecology.**— Seashores and mangrove forest, 0–55 m alt. Flowering: April–November.

**Vernacular.**— Cha maep (ชะแมบ), thua rae thale (ถั่วระทะเล) (Trat); khamin nang (ขมิ้นนาง) (Chanthaburi); na nuan (หน้านวน) (Songkhla).

**Notes.**— *Dendrolobium umbellatum*, the only species of genus is restricted to coastal areas.

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