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The Genus *Ototropis* (Leguminosae-Papilionoideae) in Thailand

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ABSTRACT.– This taxonomic study of the genus *Ototropis* in Thailand is based on the specimens from 30 European and Asian herbaria and field surveys. We recognize six species: *O. amethystina*, *O. hayatae*, *O. kingiana*, *O. megaphylla*, *O. multiflora* and *O. sequax*. We provide a key to the species, species descriptions, lists of specimens examined, distribution, ecology and vernacular names for all six species. Eight names are lectotypified: *Desmodium amethystinum*, *D. angulatum*, *D. hamulatum*, *D. mairei*, *D. megaphyllum*, *D. multiflorum*, *D. pseudarthrioides* and *D. sequax*.

KEY WORDS: Desmodieae, Desmodium, Fabaceae, taxonomy

INTRODUCTION

Ototropis is a genus of the Leguminosae subfamily Papilionoideae with 14 species. It is distributed in Western Asia, the Indian Subcontinent, China, Indo-China, Malesia, and Papuasia (Ohashi, 1971, 1973 and 2005; Ohashi and Ohashi, 2012 and 2013). Since the original publication of the name *Ototropis* Nees (1838), it has never been accepted but instead mentioned as a synonym of *Desmodium* Desv. (Ohashi, 1971 and 1973). The species of *Ototropis* were treated as members of *Desmodium* at different, widely used infrageneric ranks, such as section *Dollinera* (*e.g.*, Bentham, 1852; Bentham and Hooker, 1865; Baker, 1876; Taubert, 1894; Merrill, 1910) or subgenus *Dollinera* (*e.g.*, Schindler, 1926; Ohashi, 1971 and 1973). Even though an earlier name, *Tetranema* Sweet (1830), was proposed, it became a homonym of a conserved name, *Tetranema* Bentham (1843) which is in the family Scrophulariaceae. The name *Dollinera* Endlicher (1840) was validly published but it is a superfluous name of the genus *Ototropis*. Therefore, *Ototropis* has been reinstated. The genus is classified into four sections *viz Hayataea*, *Kingiana*, *Ototropis*, and *Sequax*. Section *Ototropis* is further subdivided into three series *viz Ototropis*, *Khasianae* and *Tiliifoliae* (Ohashi and Ohashi, 2012). This genus is characterized by a combination of characters as follows: small to large shrubs with tri-foliolate leaves, monadelphous stamens, articulate pods and pollen grains with microreticulate exine sculpturing (Ohashi, 1971 and 1973; Ohashi and Ohashi, 2012). This present work provides taxonomic information of Thai *Ototropis* which will be a basis for the treatment of the genus for the Flora of Thailand.

MATERIALS AND METHODS

We studied specimens from Thai, Asian and European herbaria (AAU, ABD, BCU, BK, BKF, BM, BO, C, CMU, CMUB, E, FOF, G, G-DC, HN, HNL, HNU, K, K-W,

KEP, KKU, KYO, L, NUOL, P, PSU, QBG, SING, TCD, TI). Digital images of type specimens from A, K, LAE, MO and US herbaria were also cited. All herbarium acronyms follow Index Herbariorum (Thiers, continuously updated) except for the herbarium of Department of Biology, National University of Lao PDR which is abbreviated to NUOL in this present work. All cited type specimens that have been seen by authors are indicated by either an exclamation mark (!) or the phrase "photo seen", in case of online photograph examination. Field surveys in several parts of Thailand were carried out during the study. A key to species is made and plant morphology is described. Distributions, ecology and vernacular names are recorded.

RESULTS

Ototropis Nees, Del. Sem. Hort. Vratisl.: 3. 1838, *in adnot*. Type species: *O. sambuensis* (D.Don) Nees (=*O. multiflora* (DC.) H.Ohashi & K.Ohashi).

Dollinera Endl., Gen. Pl.: 1285. 1840. Type species: *D. sambuensis* (D.Don) Endl.— *Desmodium* sect. *Dollinera* (Endl.) Benth. in Miq., Pl. Jungh.: 225. 1852.— *Desmodium* subgen. *Desmodium* [unranked] *Dollinera* (Endl.) Baker in Hook.f., Fl. Brit. Ind. 2: 166. 1876, *pro parte*, *excl. D. oblongum* Wall. ex Benth. & *D. oblatum* Baker ex Kurz.— *Desmodium* subgen. *Dollinera* (Endl.) Schindl. in Fedde, Repert. Spec. Nov. Regni Veg. 22: 262. 1926.

Desmodium sect. *Heteroloma* Benth. [unranked] *Laxiflora* Benth. in Miq., Pl. Jungh.: 224. 1852, *pro parte*, *excl. D. wightii* Graham ex Wight & Arn. & *D. walkeri* Arn.— *Desmodium* subgen. *Desmodium* [unranked] *Heteroloma* (Benth.) Baker in Hook.f., Fl. Brit. Ind. 2: 168. 1876, *pro parte*, *incl. D. sequax* Wall.

Tetranema Sweet, Hort. Brit., ed. 2: 149. 1830, *nom. rej*. Type species: *T. nutans* Sweet.

Shrubs, 1–3 m tall. *Leaves* 3-foliolate, spirally arranged; stipules 2, free, appressed. *Leaflets* stipellate and petiolulate; lamina coriaceous; venation pinnately netted; margins entire or sinuate to undulate, either straight or revolute; lateral veins reaching the leaf margins. *Inflorescences* pseudo-racemose or forming panicle-like, terminal or axillary. *Primary bract* 1, caducous or persistent, linear or ovate, distinctly veined. *Secondary bract* 0 or rarely 1, caducous or persistent, linear, oblong, triangular, narrowly ovate to obovate. *Flowers* papilionaceous, 8–16 mm long, in 2–4 in fascicle; bracteoles 0 or rarely 2, caducous or persistent; pedicels puberulous to pubescent, with simple or uncinate hairs. *Calyx* pale green to yellowish green or dull red, campanulate; tube puberulous to appressed pubescent; teeth 4, upper one entire or shallowly divided. *Petals* 5, light yellow, light pink to whitish purple or blue or reddish purple; standard 1, clawed, not auriculate; wings 2, free, clawed, auriculate; keels 2, connate, clawed, auriculate. *Stamens* 10, diadelphous (verxillary stamen adjacent to other stamens) or monadelphous (not in Thai species); anthers dorsifixed, longitudinally dehiscent. *Ovary* oblong, laterally compressed, with 6–8 ovules. *Pods* indehiscent, lomentaceous, laterally compressed or moniliform-like, reticulate or not reticulate, sessile, constricted between seeds; articles detached from each other when dried. *Seeds* elliptic to reniform, with rim arils around hilum.

A genus of 14 species distributed from Afghanistan eastward to South China and Southeast Asia to Papua New Guinea. Six species indigenous to Thailand.

Key to the species

1. Leaflet margin distinctly revolute. Primary and secondary bracts and bracteoles persistent ……..……..……...…**2. *O. hayatae***
1. Leaflet margin not revolute. Primary and secondary bracts and bracteoles absent, if present then caducous…….……..……...2
2. Pods moniliform-like……..…….……..…**6. *O. sequax***
2. Pods laterally compressed……..…….……3
3. Pod surfaces reticulate……...……4
3. Pod surfaces not reticulate……...……...5
4. Lower surface of mature leaves puberulous to pubescent……..…..…**4. *O. megaphylla***
4. Lower surface of mature leaves very densely sericeous……..**1. *O. amethystina***
5. Terminal leaflets very broadly ovate or rarely narrowly ovate, base very broadly cuneate. Pod articles 4.5–5 mm broad, puberulous to densely pubescent……...**3. *O. kingiana***
5. Terminal leaflets ±oblanceolate, narrowly obovate or elliptic, base obtuse. Pod articles 2.5–3 mm broad, very densely and appressed pubescent toward the central part…...……. ……..…...……**5. *O. multiflora***

1. ***Ototropis amethystina*** (Dunn) H.Ohashi & K.Ohashi, J. Jap. Bot. 87(2): 112. 2012.— *Desmodium amethystinum* Dunn, Gard. Chron. 32: 210. 1902. Type: China, Yunnan, Szemao. Seeds collected from plant growing in the mountains near Szemao at 5,000–6,000 ft alt. and then cultivated at the Royal Botanic Gardens, Kew, *Henry 12614A* (lectotype **K** [K000628208] photo seen, designated here; isolectotypes **A** [A00053817] photo seen, **MO** [MO-277065] photo seen, **US** [01108254] photo seen). Figs. 1A–B.

Shrub, 1.5–2.5 m tall; stem and twigs terete, densely tomentose. *Leaves*: stipules narrowly triangular or lanceolate, *ca* 10 × 2.5 mm, apex long acuminate, abaxial surface densely tomentose, adaxial surface glabrous; petioles 6–6.5 cm long, densely tomentose; rachis *ca* 2 cm long, densely tomentose. *Leaflets* coriaceous; stipels narrowly triangular, 1–2 × 0.5–1 mm, apex acuminate, surface pubescent to tomentose; petiolules 2.5–7 mm, densely tomentose. *Terminal leaflet* narrowly to broadly elliptic, 11–14 × 6–12 cm, apex shallowly emarginate to acute, base subcordate to rounded, margin entire, upper surface sparsely pubescent, lower surface very densely appressed and whitish sericeous, inconspicuously reticulate -veined; lateral veins 4–6 per side, reaching the margin. *Lateral leaflets* lanceolate, 5–12 × 4–5.5 cm, apex acute, base obtuse to rounded, margin entire, both upper and lower surfaces like terminal leaflet; lateral veins 6–7, reaching the margin. *Inflorescences* pseudoracemose or paniculate, up to 30 cm long, terminal or axillary; rachis and rachilla puberuous to tomentose and minutely uncinate. *Primary bract* cauducous, narrowly ovate to broadly ovate, 5–8 × 1–5 mm, apex acute to acuminate, surface densely velutinous. *Secondary bract* caducous, narrowly ovate, 3–4 × 0.5–1 mm, apex acuminate. *Flowers* 0.9–1.3 mm long, borne in 2(–3) in fascicle; bracteoles absent; pedicels 4–6 mm long, puberulent. *Calyx* 2.2–4 mm long, campanulate, base obtuse; puberulent mixed with sparsely long hairs, tube *ca* 1 mm long; teeth 4, 1.2–2 mm long,

FIGURE 1. Morphology of genus *Ototropis*. *O. amethystina* (A.–B.): A. leaves and B. pods; *O. hayatae* (C.–D.): C. leaves and D. pod; *O. megaphylla* (E.–F.): E. leaves and inflorescences and F. flowers.

upper tooth entirely or minutely 2-divided. *Corolla* light pink to pinkish purple; standard obovate, 8–10 × 5–6 mm, apex emarginate; wings narrowly elliptic, 10–11.5 × 3–3.5 mm; keels 8–10.5 × 2.5–3 mm, apex acute. *Stamens* 7–9 mm long. *Gynoecium* 9–10 mm long, puberulent. *Pods* greenish brown, lateraly compressed,

sessile, indehiscent, lomentaceous, curved or straight, 0.4–0.5 cm broad, surface glabrous, reticulate, upper and lower sutures ±equally constricted, 1–1.5 mm deep, isthmus *ca* 1/2 as broad as the pod; articles ±rectangular or slightly elliptic, 5–7 mm long; fruiting pedicels 5–7 mm long. *Seeds* brown, elliptic, *ca* 3 × 2 mm, *ca* 1 mm thick.

Thailand.— NORTHERN: Mae Hong Son [Mueang Mae Hong Son, Huai Bu Ling subdistrict, 29 Oct. 2007, *Maxwell 07-681* (**CMUB**); Pai, Huai Nam Dang, 22 Oct. 2010, *Pongamornkul 2970* (**QBG**)]; Chiang Mai [Chiang Dao, Mae Taman, 27 Sept. 1994, *BGO. Staff 1942* (**QBG**); Chiang Dao, Doi Chiang Dao Wildlife Sanctuary, 12 Nov. 2011, *Clark et al. 234* (**K**, **QBG**); ibid., 7 Nov. 2013, *Clark et al. 349* (**K**-2 sheets); ibid., 5 Nov. 1995, *Maxwell 95-1070* (**CMUB**, **L**); ibid., 17 Oct. 1994, *Pooma 877* (**BKF**, **CMUB**); ibid., 18 Dec. 2014, *Saisorn 337* (**KKU**); Chom Thong, Mae Klang Luang (Karen) village, 23 May 2011, *Georgiadis 617* (**CMUB**); Chom Thong, Doi Inthanon National Park, 17 Dec. 1998, *Konta et al. 4693* (**BKF**, **L**); ibid., 30 Oct. 2000, *Chayamarit et al. 2216* (**BKF**); ibid., 1 Nov. 1930, *Put 3294* (**C**, **P**); ibid., 24 Sept. 1910, *Garrett 53* (**ABD**, **BKF**, **BM**, **K**); Doi Lo, Doi Lo subdistrict, 29 Dec. 2007, *Maxwell 07-727* (**CMUB**, **QBG**); Fang, Doi Ang Khang, 8 Sept. 1999, *Srisanga et al. 995* (**CMUB**, **KEP**, **QBG**); ibid., 8 Sept. 1999, *Srisanga et al. 1003* (**QBG**); Mae Chaem, Doi Inthanon National Park, 19 Oct. 1988, *B.O.T. 28* (**BCU**-3 sheets); Mae Chaem, 13 Oct. 1986, *Smitinand s.n.* (**BKF**-2 sheets)]; Chiang Rai [northern slope of Doi Pacho (Doi Langka), 27 Dec. 1965, *Iawatsuki & Fukuoka T-3664* (**BKF**, **KYO**, **L**, **TI**); Wiang Pa Pao, Mae Cha Di subdistrict, Huai Nam Rin village, Sept.-Oct. 1993, *Vial-Debas s.n.* (**CMUB**)]; Phayao [Mueang Phayao, Doi Luang National Park, 9 Feb. 2016, *Muangyen 670* (**QBG**)]; Lampang [Mueang Pan, Chae Son National Park, hill above Lahng Gah village, 16 Dec. 1996, *Maxwell 96-1634* (**BKF**, **CMUB**, **L**); Wang Nua, Doi Luang National Park, summit ridge of Doi Mawk, 7 Nov. 1998, *Awkah 301* (**CMUB**)]; Phitsanulok [Phu Hin Rong Kla, 27 Oct. 2013, *Clark et al. 263* (**K**-2 sheets); ibid., 9 Oct. 1987, *Sridith 48* (**BCU**); ibid., 21 Oct. 1987, *Sridith 48* (**BCU**); ibid., 30 Oct. 1987, *Sridith 48* (**BCU**); ibid., 14 Oct. 1998, *Suksathan 117* (**QBG**-2 sheets)].

Distribution.— China.

Ecology.— Open places, lower montane pine-oak forest mixed with dry dipterocarp and lower montane rain forests; 375–2000 m alt.; flowering Sept.–Nov.

Vernacular.— Khruea chan dong (เครือจานดง).

Notes.— According to protologue, *Desmodium amethystinum* Dunn was based on two specimens: *Henry 12614* and *Henry 12614A*. A duplicate of the second one kept at K herbarium is selected here as the lectotype.

2. ***Ototropis hayatae*** (H.Ohashi) H.Ohashi & K.Ohashi, J. Jap. Bot. 87(2): 116. 2012.— *Desmodium hayatae* H.Ohashi in H.Hara, Fl. E. Himalaya 2: 308. 1971. Type: Thailand, Pang Kiah-Me Ka Chian, 31 Oct. 1921, *Hayata s.n.* (holotype **TI!**). Figs. 1C–D.

Shrub, 1.5–2.5 m tall; stem and twigs 3–5-ridged, densely long pubescent along ridges and minutely uncinate. *Leaves*: stipules narrowly triangular, 4–7 × 2–3 mm, apex long acuminate, surface glabrescent to pubescent and minutely uncinate; petioles 1–2.5 cm long, densely pubescent along petiolar ridges; rachis 4–8 mm, densely pubescent. *Leaflets* coriaceous; stipels narrowly triangular, 2–4 × 0.5–0.8 mm,

apex long acuminate, surface pubescent, margin fimbriate; petiolules 2–3 mm, densely pubescent and minutely uncinate. *Terminal leaflet* ±oblanceolate or obovate, 5.5–9 × 3–6 cm, apex shallowly emarginate, rounded to obtuse, shortly mucronate, base cuneate, margin distinctly revolute, upper surface with densely uncinate and sparsely simple hairs, lower surface pubescent; lateral veins 9–10 per side, reaching the margin. *Lateral leaflets* ±elliptic, 2–4.5 × 1.5–2.5 cm, apex rounded and shortly mucronate, base obtuse, margin distinctly revolute, both upper and lower surfaces like terminal leaflet; lateral veins 6–9, reaching the margin. *Inflorescences* pseudoracemose or paniculate, up to 35 cm long, terminal or axillary; rachis and rachilla angular, densely pubescent and minutely uncinate. *Primary bract* persistent, ovate, 2.5–3.5 × 1.5–2 mm, apex acuminate, margin fimbriate, surface glabrescent, distinctly veined, enclosing 4-immature flowers and secondary bracts. *Secondary bract* persistent, triangular, 1.5–2 × 0.5 mm, pubescent. *Flowers* 13–16 mm long, 4 in fascicle; bracteoles 2, mostly persistent, triangular, 1.5–2.5 × 0.5 mm; pedicels 3–4 mm long, long puberulous and minutely uncinate. *Calyx* light green to yellowish green, 7–9 mm long, campanulate, base obtuse; outside puberulous, minutely uncinate, inside glabrescent, tube 3–4.5 mm long; teeth 4, 3–5.5 mm long, ±equal to tube length, two lateral teeth shorter than others. *Corolla* light yellow; standard oblanceolate, 14–15 × 6–7 mm, apex acute, base attenuate, not auriculate, claw 3.5–4.5 mm long; wings narrowly elliptic, 12.5–13 × 2.3–2.5 mm, apex obtuse, base auriculate, *ca* 1 × 0.8 mm, claw 5.5–6 mm long; keels narrowly elliptic, 14–14.5 × 3.5–4 mm, apex beaked, 1.2–2 mm long, base auriculate, *ca* 0.8 mm long, claw *ca* 6 mm long. *Stamens* 13–14 mm long, vexillary stamen completely free, seemingly united with other stamens, other ones united, free part of long filaments and short filaments, alternately arranged; anthers ellipsoid, *ca* 0.5 × 0.3 mm. *Gynoecium* 13.5–14 mm long; ovary oblong, laterally compressed, densely pubescent, stipitate, *ca* 2 mm long; style 8–9 mm long, pubescent; stigma minutely capitate. *Pods* indehiscent, lateraly compressed, lomentaceous, 4–7-articulate, oblong, 2.5–3.5 × 0.4–0.6 cm, surface densely brownish white pubescent and minutely uncinate, smooth, upper suture less constricted, lower suture more constricted than upper, *ca* 1 mm deep; isthmus more than *ca* 1/2 as broad as the pod; articles ±quadrangular, 4.5–6 mm long; pod stipe 3–4 mm long, glabrescent; fruiting pedicels 4–5 mm long, pubescent, with both simple and minutely uncinate hairs. *Seeds* no data.

Thailand.— NORTHERN: Chiang Mai [Chiang Dao, 22 Dec. 1931, *Put 4487* (**BK**, **BM**, **K**); Chiang Dao, Doi Chiang Dai Wildlife Sanctuary, 12 Nov. 2011, *Clark et al. 224* (**K**, **QBG**); ibid., 7 Nov. 2013, *Clark et al. 352* (**K**-2 sheets); ibid., 12 Sept. 1995, *Maxwell 95-679* (**CMUB**, **L**); ibid., 19 Dec. 2015, *Pisuttimarn 408-1* (**KKU**); ibid., 18 Dec. 2014, *Saisorn 336* (**KKU**); Chom Thong, Mae Soi ridge, Mae Soi subdistrict, 12 Aug. 1991, *Maxwell 91-727* (**AAU**, **CMU**, **E**, **P**, **L**); Mae Rim, QSBG., 3 Oct. 1995, *BGO. Staff 4819* (**QBG**)]; Lamphun [Mae Tha, Doi Khun Tan National Park, 19 Nov. 1993, *Maxwell 93-1396* (**CMUB**, **L**)].

Distribution.— Endemic to northern Thailand.

Ecology.— Open grassy places, primary evergreen forests, pine-deciduous forests; 975−1,502 m alt.; flowering Aug.−Nov.

Vernacular.— Thua hae thai (ถั่วแฮะไทย).

Notes.— *Ototropis hayatae* is recognized by its densely pubescent stem and twigs which have 3–5 ridges with long hairs along them. A distinctly revolute leaflet margin and keel petals with a beaked apex are the diagnostic characters for this species.

3. ***Ototropis kingiana*** (Prain) H.Ohashi & K.Ohashi, J. Jap. Bot. 87(2): 116. 2012.— *Desmodium kingianum* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 398. 1897. Type: Myanmar, Southern Shan State, Saga, 1893, *Khalil s.n.* (holotype **K!** [K000858867]; isotype **CAL**, n.v.).

Desmodium pseudarthrioides Schindl. in Engl., Bot. Jahrb. Syst. 54(1): 61. 1916. Type: Laos, *Massie s.n.* (lectotype **P!** [P02938978], designated here; isolectotype **P!** [P02938979]).

Shrub, *ca* 1 m tall; stem and twigs terete or angular, densely pubescent, with uncinate hairs prominently longer than simple hairs. *Leaves*: stipules narrowly triangular, 5–7 × 2–3 mm, apex long acuminate, surface pubescent and minutely uncinate hairy; petioles (0.5–)3–5 cm long, densely pubescent and uncinate hairy; rachis (0.3–)1–3 mm, densely pubescent and uncinate hairy. *Leaflets* coriaceous; stipels narrowly triangular, 1–5 × 0.5–1 mm, apex long acuminate, pubescent and uncinate hairy; petiolules 2–7 mm, densely pubescent and uncinate hairy. *Terminal leaflet* very broadly ovate or rarely narrowly ovate, 2.5–13.5 × 2–13.5 cm, apex acute and shortly apiculate, base very broadly cuneate, margin entire to repand, upper surface pubescent and uncinate hairy, lower surface pubescent, more densely than lower surface, without uncinate hair; lateral veins 6–9 per side, reaching the margin; tertiary veins and veinlets conspicuous. *Lateral leaflets* ±obliquely ovate, 1–7.5 × 0.5–5.5 cm, apex acute and shortly mucronate, base obliquely rounded to truncate, margin entire to repand, both upper and lower surfaces like terminal leaflet; lateral veins 4–8, reaching the margin; tertiary veins and veinlets conspicuous. *Inflorescences* paniculate, 10–30 cm long, terminal or axillary; rachis and rachilla densely pubescent and uncinate hairy. *Primary bract* caducous, ovate, 1–2.5 × 0.5–1 mm, apex acuminate, surface pubescent, distinctly veined, enclosing 2-immature flowers and secondary bracts. *Secondary bract* caducous, oblong to obovate, 0.5–0.8 × 0.3 mm, hairy. *Flowers* 5–6 mm long, 2 in fascicle; bracteoles absent; pedicels 1–2.5 mm long, pubescent and uncinate hairy. *Calyx* pale green, 3–5 mm long, base obtuse; outside pubescent and uncinate, inside glabrous, tube 1–1.5 mm long; teeth 4, 1.5–4 mm long, prominently longer than tube length, lower tooth longer than others, upper one shallowly divided. *Corolla* pale pink to purple; standard obovate, 5.5–6 × 4–4.5 mm, apex obtuse to rounded, base attenuate, not auriculate, claw 1–1.5 mm long; wings ±oblong, 5–5.5 × 1–1.5 mm, shorter than keels, apex obtuse, base auriculate, 0.3–0.5 mm long, claw *ca* 1.5 mm long; keels curved, 5–6 × 1.5–2 mm, apex obtuse, base auriculate, *ca* 0.2 mm long, claw 2–2.5 mm long. *Stamens* 5–6 mm long, vexillary stamen completely free, seemingly united with other stamens, other stamens united, free part of long filaments and short filament, alternately arranged; anthers ellipsoid, *ca* 0.4 × 0.2 mm. *Gynoecium* 5.5–6 mm long; ovary oblong, sessile, laterally compressed, densely appressed pubescent; style *ca* 3 mm long, appressed pubescent; stigma minutely capitate. *Pods* dark brown to black, lateraly compressed, sessile, indehiscent, 3–6-articulate, oblong, 1.5–3 ×

4.5–5.5 cm, surface puberulous to densely pubescent, with both straight and uncinate hairs, not reticulate, upper suture straight to slightly repand, lower suture undulate, more constricted than lower, *ca* 1 mm deep; isthmus more than *ca* 9/11–8/9 as broad as the pod; articles ±quadrangular, 4–5 mm long; fruiting pedicels 2–3 mm long, pubescent, with both simple and minutely uncinate hairs. *Seeds* dark brown, *ca* 3 × 2–2.5 mm, *ca* 1 mm thick.

Thailand.— NORTHERN: Lamphun [Mae Ping, 18 Nov. 1997, *Pongamornkul 7* (**QBG**-2 sheets)]; Lampang [Mae Mo, Mae Mo lignite mine, 26 Nov. 1993, *Maxwell 93-1442* (**BKF**-2 sheets, **CMUB**, **L**-2 sheets)]; Phrae [Song, Mae Yom National Park, 6 Nov. 1991, *Maxwell 91-970* (**E**, **L**)]; NORTH-EASTERN: Khon Kaen [Pha Nang Norn, Phu Pha Man National Park, 12 Jan. 2010, *Norsaengsri 0020* (**QBG**); Sum Pak Nam, Phu Pha Man National Park, 24 Oct. 2007, *Norsaengsri 2778* (**QBG**)]; EASTERN: Buri Ram [Khao Phanom Rung, near Buri Ram, 3 Oct. 1984, *Murata et al., T-37321* (**BKF**)]; SOUTH-WESTERN: Kanchanaburi [Sai Yok, Mahidol University Kanchanaburi campus, 26 Oct. 2006, *Chongko 611* (**CMUB**, **QBG**); ibid., 18 Dec. 2005, *Maxwell 05-714* (**CMUB**); Wang Po, 26 Oct. 1969, *Kasem 646* (**BK**, **TI**)]; CENTRAL: Lop Buri [Chai Badan, 8 Oct. 1926, *Lakshnakara 251* (**BK**, **K**)]; Saraburi [Kaeng Khoi, 9 Dec. 1924, *Kerr 7959* (**ABD**, **BK**, **BM**, **E**, **K**); Muak Lek, 31 Aug. 1924, *Kerr 9086* (**ABD**, **BK**, **BM**-2 sheets, **K**, **SING**); Mueang Saraburi, Sam Lan Forest, 28 Dec. 1974, *Maxwell 74-1129* (**AAU**, **L**)]; SOUTH-EASTERN: Sa Kaeo [Aranyaprathet, 19 Oct. 1928, *Put 2052* (**AAU**, **ABD**, **BK**, **BM**, **K**); unknown localty, 16 Sept. 1930, *Put 3151* (**AAU**, **ABD**, **BK**, **BM**, **C**, **E**, **K**, **L**); Aranyaprathet, Ban Nong Pru, 3 Jan. 1967, *Sutheesorn 1991* (**BK**, **TI**)].

Distribution.— Myanmar, Laos and Cambodia.

Ecology.— Evergreen and mixed deciduous forests; 50–850 m alt.; flowering Aug.–Dec.

Vernacular.— Om tom (ออมตอม).

Notes.— A type collection with two sheets of *Desmodium pseudarthrioides* Schindl. is kept at P herbarium. One of them (P02938978) is selected here as a lectotype because this sheet is more perfect and firmly mounted than the other on the herbarium sheet the other.

4. ***Ototropis megaphylla*** (Zoll. & Moritzi) H.Ohashi & K.Ohashi, J. Jap. Bot. 87(2): 114. 2012— *Desmodium megaphyllum* Zoll. & Moritzi, Natuur-Geneesk. Arch. Ned.-Indië. 3: 58 & 77. 1846.— *Meibomia megaphylla* (Zoll. & Moritzi) Kuntze, Revis. Gen. Pl. 1: 196 & 198. 1891. Type: Indonesia, Java, *Zollinger* 2522 (lectotype **G!**, designated here).

Desmodium scandens Blume ex Miq., Fl. Ned. Ind. 1(1): 246. 1855, *pro syn.*

Desmodium rubescens Blume ex Miq., Fl. Ned. Ind. 1(1): 246. 1855, *pro syn.*

Desmodium karensium Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 45(4): 232. 1876. Type: Myanmar, Martaban, at 4,000–5,000 ft alt., *Kurz s.n.* (syntype **K**, n.v.); Ava, Khakyen hills east of Bhamo, *Kurz s.n.* (syntype **K**, n.v.), *fide* Ohashi (2004).

Desmodium prainii Schindl. in Fedde, Repert. Spec. Nov. Regni Veg. 21: 2. 1925. Type: *Wray* 1441 (syntypes **CAL**, n.v. & **K**, n.v.), *fide* Schindler (1925). Figs. 1E–F.

Shrub, up to 3 m tall; stem and twig terete or angular, glabrous to sparsely pubescent and minutely uncinate. *Leaves*: stipules narrowly ovate, 7–13 × 3–5 mm, apex long acuminate, surface puberulous

and minutely uncinate; petioles 1.5–6.5 cm long, pubescent and uncinate; rachis 1.5–3 mm, pubescent and uncinate hairy. *Leaflets* coriaceous; stipels narrowly triangular, 3–7 × 0.5–1 mm, apex pointed, surface puberulous; petiolules 1–5 mm, densely pubescent and uncinate hairy. *Terminal leaflet* broadly ovate or broadly elliptic, 4–20 × 2.5–13.5 cm, apex acuminare, base usually cuneate or often obtuse, margin entire to slightly repand, upper surface puberulous to pubescent and not uncinate hairy, lower surface puberulous to densely soft pubescent, conspicuously reticulate-veined; lateral veins 4–8 per side, reaching the margin; veinlets conspicuous. *Lateral leaflets* obliquely lanceolate to ovate, 3.5–13.5 × 2–8.5 cm, apex acuminate, base obtuse, margin entire, both upper and lower surfaces like terminal leaflet; lateral veins 4–7, reaching the margin; veinlets conspicuous. *Inflorescences* paniculate, 10–30 cm long, many branched, terminal or axillary; rachis and rachilla sparsely pubescent and uncinate hairy. *Primary bract* caducous, ovate, 3.5–6 × 1.5–2.5 mm, apex long acuminate, margin fimbriate, surface soft pubescent, distinctly-veined, enclosing 3-immature flowers and secondary bracts. *Secondary bract* caducous, narrowly triangular, 2–3 × 0.5–1 mm, margin fimbriate hairy. *Flowers* 9–10 mm long, 3 in fascicle; bracteoles 2, caducous, ±ovate, 0.5–0.8 × 0.2 mm, long hairy; pedicels 3–7 mm long, sparsely to densely uncinate hairy. *Calyx* dull red, 3–4 mm long, base obtuse; outside pubescent, inside glabrous, tube 2–2.5 mm long; teeth 4, ±equal, 2–2.3 mm long, ±equal to tube length, upper one entire or shallowly divided. *Corolla*: standard yellow, wings blue, keels white; standard slightly lanceolate to obovate, 9–13 × 4.5–7 mm, apex shallowly emarginate, acute or obtuse, base attenuate, not auriculate, claw *ca* 2 mm long; wings oblong, curved, 11–12 × 2–3 mm, prominently longer than keels (1–2.5 mm long), apex acute, base auriculate, 1–1.3 mm long, claw 1.8–3 mm long; keels oblong, curved, 9–10 × 2.5–3 mm, apex shortly mucronate or shortly beaked, *ca* 0.1 mm long, base auriculate, *ca* 1 mm long, claw 3–3.5 mm long. *Stamens* 9–10 mm long, vexillary stamen completely free, seemingly united with them, other ones united, free part of long filaments and short filaments, alternately arranged; anthers narrowly ovate, *ca* 0.5 × 0.3 mm. *Gynoecium* 10–10.5 mm long; ovary oblong, laterally compressed, puberulous, stipitate, *ca* 1 mm long, 6–7-ovulate; style 4–4.5 mm long, glabrous, bent upward; stigma minutely capitate. *Pods* dark brown, laterally compressed, indehiscent, 2–7-articulate, straight or slightly curved, 1.5–4.5 × 0.4–0.6 cm, surface straight and uncinate hairy, inconspicuously reticulate, upper and lower sutures equally constricted, thickened; isthmus 1/2–5/8 as broad as the pod; articles broadly elliptic, 4–8 mm long; pod stipe 1–2 mm long; fruiting pedicels 6.5–9 mm long, glabrescent, with both simple and uncinate hairs. *Seeds* dark brown to black, reniform, 3.5–4 × 2.5–2.8 mm, *ca* 1.5 mm thick.

Thailand.— NORTHERN: Mae Hong Son [Kieo Lom, border between Pai and Mueang Mae Hong Son districts, 16 Jan. 1983, *Koyama et al. T-32616* (**L**); Mueang Mae Hong Son, along the trail to the peak of Doi Pui, 16 Dec. 2007, *Tanaka et al. HN8528* (**KYO, QBG**); Pai, 13 Dec. 1998, *Konta & Khao-Iam 4473* (**BKF**-3 sheets); Pang Ma Pha, Kieo Lom, 12 Dec. 2007, *Tanaka et al. HN8199* (**KYO**, **QBG**)]; Chiang Mai [unknown locality, 11 Jan. 1986, *Paisooksantivatana y1749-86* (**BK**);

Chiang Dao, 2 Feb. 1990, *Maxwell 90-153* (**CMU**, **L**); ibid., 22 Dec. 1931, *Put 4496* (**ABD**, **BK**, **BM**, **K**); Chiang Dao, Doi Chiang Wildlife Sanctuary, 27 Jan. 1996, *BGO. Staff 13* (**QBG**-2 sheets); ibid., 4 Dec. 2002, *Chamchumroon et al. V.C.1714* (**BKF**-2 sheets); ibid., 7 Nov. 2013, *Clark et al. 351* (**K**); ibid., 16 Dec. 1983, *Fukuoka & Ito T-35211* (**BKF**, **KYO**); ibid., 18 Dec. 2003, *Mattapha 477* (**KKU**); ibid., 4 Mar. 1995, *Maxwell 95-201* (**BKF**, **CMUB**, **L**); ibid., 14 Jan. 1973, *Sutheesorn 2258* (**BK**); ibid., 5 Jan. 1966, *Tagawa & Iwatsuki T-4390* (**BKF**, **KYO**, **L**, **TI**); Chom Thong, 29 Mar. 1992, *Maxwell 92-113* (**CMUB**, **E**); Chom Thong, Mae Soi Valley, 13 Dec. 1990, *Maxwell 90-1334* (**AAU**, **CMU**, **E**, **L**); Doi Inthanon National Park, *Dy Phon 57/90* (**P**); ibid., 6 Dec. 1969, *van Beusekom & Phengklai 2341* (**AAU**, **BKF**, **C**, **E**, **L**, **P**); ibid., 7 Dec. 1984, *Koyama & Phengklai T-40045* (**AAU**, **KYO**, **L**); ibid., 14 Dec. 1978, *Nasongkhla et al. 472* (**BCU**-2 sheets); ibid., 6 Jan. 1998, *Srisanga et al. 59* (**QBG**); ibid., 18 Dec. 1965, *Tagawa et al. T-2629* (**AAU**, **BKF**, **KYO**, **L**, **TI**); ibid., 19 Dec. 1983, *Fukuoka & Ito T-35335* (**BKF**, **KYO**); ibid., 21 Dec. 1988, *Konta et al. 4952* (**BKF**-2 sheets); ibid., 10 Feb. 1998, *Konta et al. 4167* (**BKF**); ibid., 20 Jan. 1970, *Worawoat 16* (**BKF**); ibid., 10 May 1969, *Worawoat 103* (**BKF**); ibid., 13 Dec. 1984, *Yahara & Yahara T-19986* (**BKF**); Doi Pha Hom Pok, 5-7 Feb. 1978, *Løjtnant & Niyomdham 196* (**AAU**, **K**); Doi Pui, 16 Dec. 1984, *Koyama & Nagamasu T-40128* (**BKF**, **KYO**); Fang, 11 Feb. 1983, *Koyama et al. T-33389* (**BKF**, **KYO**); Fang, Ang Khang, 3 Dec. 1974, *Sadakorn 377* (**BK**-2 sheets); ibid., 3 Dec. 1974, *Sadakorn 352* (**BK**); Huai Tat waterfall, Mon Chong, 6 Dec. 1983, *Smitinand s.n.* (**BKF**-2 sheets); Mae Chaem, 8 Dec. 1998, *Maxwell 98-1448* (**BKF**, **CMUB**); ibid., 24 Dec. 1985, *Paisooksantivatana y1694-85* (**BK**); Mae Chaem, Doi Inthanon National Park, 23 Dec. 1996, *Hara et al. A081* (**CMUB**); ibid., 18 Nov. 1998, *Hara et al. C011* (**CMUB**); Mae On, 21 Jan. 2008, *Maxwell 08-14* (**CMUB**); Mae Rim, 17 Nov. 2001, *Maxwell 01-613* (**BKF**, **CMUB**); ibid., 23 Feb. 2002, *Maxwell 02-40* (**BKF**, **CMUB**); Mae Rim, Mon Long, 21 Dec. 1995, *BGO. Staff 5508* (**QBG**-2 sheets); ibid., 20 Nov. 2001, *Glamwaengwong 57* (**QBG**, **KYO**); Mae Taeng, 19 Feb. 2001, *Maxwell 01-115* (**BKF**, **CMUB**); ibid., 27 Feb. 2002, *Maxwell 02-63* (**BKF**, **CMUB**); Mae Taeng, Doi Sang Liang, 17 Dec. 1997, *Maxwell 97-1515* (**BKF**, **CMUB**, **L**); Mae Taman reforestation, 28 Nov. 1984, *Koyama et al. T-39666* (**BKF**, **KYO**-2 sheets); Mae Wong and Mae Chaem, 18 Dec. 1998, *Konta et al. 4714* (**BKF**-2 sheets); Mueang Chiang Mai, 21 Dec. 1994, *Nanakorn et al. 2842* (**AAU**); Mueang Chiang Mai, Doi Suthep, 21 Dec. 1994, *BGO. Staff 2842* (**QBG**-2 sheets); ibid., 20 Apr. 1966, *Chermsirivathana 566* (**BK**); ibid., 14 Dec. 1904, *Hosseus 258a* (**BM**, **C**, **E**, **G**-2 sheets, **K**, **L**, **P**-2 sheets); ibid., 23 Dec. 1965, *Iwatsuki & Fukuoka T-3210* (**AAU**, **BKF**, **KYO**, **L**, **TI**); ibid., 20 Nov. 1910, *Kerr 1577* (**BK**, **BM**, **E**, **K**); ibid., 10 Dec. 1911, *Kerr 1577B* (**ABD**, **BM**, **E**, **K**-2 sheets); ibid., 22 Dec. 1992, *Maxwell 92-896* (**AAU**, **CMUB**, **L**, **P**); ibid., 9 Mar. 1994, *Maxwell 94-334* (**BKF**, **CMUB**, **L**); ibid., 5 Dec. 1987, *Maxwell 87-1553* (**AAU**, **BKF**, **CMU**, **L**); ibid., 28 Feb. 1988, *Maxwell 88-250* (**BKF**, **CMU**, **L**-2 sheets); ibid., 13 Mar. 2000, *Maxwell 00-120* (**BKF**, **CMUB**); ibid., 12 Apr. 1992, *Maxwell 92-141* (**CMUB**); ibid., 22 Feb. 1987, *Niyomdham & Kubat 1345* (**BKF**); ibid., 8 Jan. 1969, *Nooteboom et al. 634* (**BKF**, **C**, **K**, **L**-2 sheets, **P**); ibid., 8 Feb. 1957, *Smitinand 3768* (**L**); ibid., 9 Feb. 1958, *Sørensen et al. 927* (**BKF**, **C**); Om

Koi, Ban Mae Sa Ngia, 18 Nov. 2015, *Pongamornkul 5230* (**QBG**); Om Koi, Ban Mae Sa Ngia Nuea, 27 Jan. 2016, *Pongamornkul 5634* (**QBG**); Om Koi, Ban Ou Toon, 17 Nov. 2015, *Pongamornkul 5173* (**QBG**); Samoeng, 27 Dec. 1996, *Maxwell 96-1692* (**BKF**, **CMUB**); San Pa Wia, 23 Jan. 1981, *S.N.* (**BKF** no 72290)]; Chiang Rai [Khun Kon waterfall, 15 Feb. 1999, *KK 1331* (**BCU**-2 sheets); Mae Fa Luang, 2 Feb. 2006, *Maxwell 06-112* (**CMUB**, **QBG**); Mae Sai, 13 Feb. 2012, *Norsaengsri & Tathana 8871* (**QBG**); Mae Sai, Ban San Pa Sak, 19 Dec. 2010, *Norsaengsri & Tathana 7407* (**QBG**); ibid., 13 Feb. 2012, *Norsaengsri & Tathana 8871* (**QBG**); Mae Sai, Doi Tung, 12 Jan. 1975, *Geesink et al. 8263* (**BKF**, **C**, **K**, **L**-2 sheets); ibid., 27 Jan. 2011, *van de Bult 1143* (**BKF**, **CMUB**); ibid., 4 July 1967, *Sinchai 160* (**BKF**); Mae Suai, 14 Dec. 1998, *Konta & Khao-Iam 4473* (**BKF**-2 sheets); Phu Chi Fa, 20 Oct. 2000, *Chueachom 488* (**BKF**); Wiang Pa Pao, Khun Chae National Park, 1 Jan. 1998, *Maxwell 98-6* (**CMUB**, **L**); ibid., 3 Dec. 1997, *Maxwell 97-1440* (**BKF**, **CMUB**, **L**)]; Phayao [Mueang Phayao, Doi Luang National Park, 27 Dec. 1997, *Petrmitr 209* (**BKF**, **CMUB**, **L**); ibid., 9 Feb. 2016, *Muangyen 674* (**QBG**)]; Nan [Doi Phu Kha, 31 Oct. 2013, *Clark et al. 296* (**K**-2 sheets)]; Lamphum [Mae Tha, Doi Khun Tan National Park, 1 Feb. 1994, *Maxwell 94-167* (**CMUB**, **L**); ibid., 27 Dec. 1993, *Maxwell 93-1561* (**CMUB**, **L**)]; Lampang [Mueang Pan, Chae Son National Park, 7 Jan. 1996, *Maxwell 96-31* (**BKF**, **CMUB**, **L**)]; Uttaradit [Phu Soi Dao National Park, 19 Nov. 2009, *Norsaengsri & Intamusik 6255* (**QBG**)]; Phitsanulok [Phu Miang, 4 Oct. 1967, *Shimizu et al. T-11644* (**AAU**, **BKF**, **KYO**-2 sheets, **L**, **TI**)]; NORTH-EASTERN: Phetchabun [Phu Miang, 7 Oct. 1967, *Shimizu et al. T-11741* (**BKF**, **KYO**)]; Loei [Phu Kradueng, 30 Nov. 1965, *Tagawa et al. T-917* (**AAU**, **KYO**-2 sheets, **TI**)]; SOUTH-WESTERN: Kanchanaburi [Huai Bankau, 9 Nov. 1971, *van Beusekom et al. 3580* (**BKF**, **C**, **K**, **L**); Thong Pha Phum, 21 Feb. 1967, *Chermsirivathana 680* (**BK**-2 sheets); Thong Pha Phum, Pilok, 10 Dec. 1969, *Chermsirivathana 1584* (**BK**, **TI**)]; Phetchaburi [Kaeng Krachan, 29 Jan. 2005, *Williams et al. 1192* (**E**)].

Distribution.— India, Myanmar, China (Yunnan), Laos, Vietnam, Malaysia and Indonesia.

Ecology.— Open places on limestone, hill evergreen, pine forest mixed with dry dipterocarp, dry evergreen and dry dipterocarp forests; 750–1,800 m alt.; flowering Oct.–Feb.

Vernacular.— Katuet maeo (กะตืดแมว).

5. ***Ototropis multiflora*** (DC.) H.Ohashi & K.Ohashi, J. Jap. Bot. 87(2): 111. 2012.— *Desmodium multiflorum* DC., Ann. Sci. Nat. (Paris) 4: 101. Jan. 1825. Type: Nepal, *Wallich* s.n. (lectotype **G-DC!** [G00479865], designated here; isolectotype **G-DC**! [G00479825]).

Desmodium angulatum DC., Ann. Sci. Nat. (Paris) 4: 101. Jan. 1825. Type: Nepal, *Wallich* s.n. (lectotype **G-DC**! [G00479834], designated here; isolectotype **G-DC**! [G00479830]).

Hedysarum sambuense D.Don, Prodr. Fl. Nepal.: 243. Feb. 1825.— *Desmodium sambuense* (D.Don) DC., Prodr. 2: 335. 1825.— *Ototropis sambuensis* (D.Don) Nees, Del. Sem. Hort. Vratisl.: 2 & 4. 1838, *in adnot*.— *Dollinera sambuensis* (D.Don) Endl. in Walp., Repert. Bot. Syst. 1: 736. 1842. Type: Nepal, *Buchanan-Hamilton s.n.* (holotype **BM!** [BM000521601]).

FIGURE 2. Morphology of genus *Ototropis*. *O. multiflora* (A.–B.): A. leaf and B. infructescence.

Hedysarum floribundum D.Don, Prodr. Fl. Nepal. 244. Feb. 1825.— *Desmodium floribundum* (D.Don) Sweet, Hort. Brit., part 2: 479. 1826.— *Meibomia floribunda* (D.Don) Kuntze, Revis. Gen. Pl. 1: 198. 1891. Type: Nepal, in Gosaingsthan, *Wallich s.n.*, *fide* Ohashi (1971).

Desmodium dubium Lindl., Bot. Reg. 12: t. 967. 1826. Type: Cultivated at Hortcultural Society, in whose Garden at Chiswick, from seeds sent by Dr. Wallich in 1823, originated from Himalaya Mountains.

Desmodium mairei Pamp., Nuovo Giorn. Bot. Ital. 17(1): 13. 1910. Type: China, Yunnan, *Maire 200* (lectotype **P!** [P02939539], designated here).

Desmodium nepalense H.Ohashi, J. Jap. Bot. 40(12): 363. 1965. Type: Nepal, Garhi Danra-Linkim-Tuwa, 4 Nov. 1963, *Hara et al. 6301484* (holotype **TI!** [TI00021623]). Figs. 2A–B.

Shrubs, up to 1.5 m tall; stem and twig subterete or 3–4-ridged, brown pubescent along ridges and sparsely pubescent, young parts more densely pubescent than mature parts. *Leaves*: stipules triangular, 5–10 × 2–3 mm, apex long acuminate, surface glabrescent, margin fimbriate; petioles 2.5–5.5 cm long, pubescent; rachis 0.5–1.5 mm, pubescent. *Leaflets* coriaceous; stipels narrowly triangular, 2–4 × 1 mm, apex long acuminate, surface pubescent; petiolules 3–5 mm, densely pubescent. *Terminal leaflet* ±oblanceolate, narrowly obovate or elliptic, 3.5–12.5 × 2–6 cm, apex acute, shortly mucronate, base obtuse, margin entire, upper surface sparsely pubescent and minutely uncinate, lower surface more densely pubescent than upper surface; lateral veins 6–8 per side, conspicuous, reaching the margin. *Lateral leaflets* obliquely lanceolate, ovate to elliptic, 2–11.5 × 1.5–4.5 cm, apex acute, base obtuse to subcordate, margin entire, both upper and lower surfaces like terminal leaflet; lateral veins 5–8, conspicuous, reaching the margin. *Inflorescences* pseudoracemose or paniculate, 8–30 cm

long, terminal or axillary; rachis and rachilla angular, densely pubescent and uncinate hairy. *Primary bract* early caducous, narrowly ovate, 6–10 × 2.5–3 mm, apex long acuminate, margin fimbriate, surface pubescent, distinctly veined, enclosing 2-immature flowers and secondary bracts (when developed). *Secondary bract* 1, variable in shape and size, 1–3 × 0.5 mm, glabrous to hairy at the apex or absent. *Flowers* 7–11 mm long, 2 in fascicle; bracteoles absent or rarely present (*ca* 0.8 mm long); pedicels 5–7 mm long, densely uncinate. *Calyx* 3–4 mm long, base obtuse; abadxial surface of calyx and lower calyx tooth usually long pubescent, other areas minutely hairy, tube *ca* 2 mm long; teeth 4, 1.5–2.5 mm long, upper and lower teeth equal to or longer than lateral teeth, upper one shallowly divided (less than 0.3 mm long). *Corolla* reddish purple; standard narrowly oblanceolate, 3.5–4 × 8.5–9 mm, apex emarginate, base attenuate, not auriculate, claw *ca* 1 mm long; wings slightly oblong, 9.5–10 × 2–2.5 mm, apex obtuse, base auriculate, *ca* 1 mm long, claw 1.5–2 mm long; keels curved, 9–9.5 × 2–2.5 mm, distinctly shorter than wings, apex obtuse, base auriculate, *ca* 0.3 mm long, claw 3.5–4 mm long. *Stamens ca* 10 mm long, vexillary stamen connate below the half length of filaments (but surrounded by other stamens, seemingly united with them), other stamens united, free part of them alternately a little longer and shorter; anthers ellipsoid, *ca* 0.5 × 0.3 mm. *Gynoecium* 10.5–11 mm long; ovary oblong, laterally compressed, sparsely puberulous, sessile or shortly stipitate, 6–8-ovulate; style 5–5.5 mm long, appressed puberulous; stigma minutely capitate. *Pods* dark brown, lateraly compressed, indehiscent, 3–7-articulate, usually straight, 1.2–2.6 × 2.5–3 cm, surface very densely appressed pubescent toward the central part, not reticulate, upper suture nearly straight to repand, lower suture more constricted than lower suture, 1–1.5 mm deep; isthmus 3/5–2/3 as broad as the pod; articles elliptic, 3.5–5 mm long; pod stipe short or absent; fruiting pedicels 6–7 mm long, uncinate hairy. *Seeds* brown to dark brown, reniform, *ca* 2.2 × 1.5 mm, *ca* 1 mm thick.

Thailand.— NORTHERN: Chiang Mai [Chiang Dao, Doi Chiang Dao Wildlife Sanctuary, 18 Dec. 1988, *Fukuoka & Kato T-35206* (**KYO**); ibid., 10 Sept. 1995, *Maxwell 95-635* (**BKF**, **CMU**, **L**); ibid., 26 Sept. 1996, *Nanakorn et al. 18972* (**QBG**); ibid., Sept., *Vidal 5232* (**P**); ibid., 3 Oct. 1971, *Vidal 5330* (**AAU**, **BKF**, **P**); Mueang Chiang Mai, Doi Suthep-Pui National Park, 27 Sept. 1997, *BGO. Staff 9659* (**QBG**-2 sheets); ibid., 14 Oct. 1921, *Hayata s.n.* (**TI**-3 sheets); ibid., 8 Sept. 1967, *Iawatsuki et al. T-9379* (**BKF**, **KYO**); ibid., 5 Sept. 1909, *Kerr 782* (**BM**, **K**, **P**); ibid., 23 Oct. 1910, *Kerr 782A* (**BM**, **K**); ibid., 21 Sept. 1987, *Maxwell 87-1468* (**BKF**, **CMU**, **L**); ibid., 8 Sept. 1998, *Maxwell 88-1056* (**BKF**, **CMU**, **L**); ibid., 29 Sept. 1971, *Murata et al. s.n.* (**BKF**); ibid., 29 Sept. 1971, *Murata et al. T-15337* (**KYO**-2 sheets, **TI**); ibid., 3 Dec. 1975, *Sakdakorn 653* (**BK**); ibid., 9 Sept. 1958, *Sørensen et al. 4865* (**C**, **E**, **SING**); ibid., 9 Oct. 1958, *Sørensen et al. 5548* (**C**)]; North of Thailand, probably Chiang Mai or Phrae [unknown locality, Sept. 1910, *Kerr 1385* (**AAU**, **BM**, **K**)]; NORTH-EASTERN: Loei [Phu Kradueng, 17 Oct. 1953, *Bunpheng 681* (**L**); ibid., 12 Sept. 1990, *Chantaranothai et al. 90/105* (**KKU**-2 sheets, **K**); ibid., 4 Nov. 1948, *Dee 232* (**BKF**); ibid., 4 July 1950, *Dee 303B* (**BKF**); ibid., 17 Oct. 1953, *Din 681* (**BKF**); ibid., 11 Aug. 1946, *Din 139* (**BKF**); ibid., 11 July 1959, *Floto 7485* (**BKF**, **C**); ibid.,

31 Oct. 1984, *Murata & Phengklai T-42304* (**BKF**, **KYO**); ibid., 31 Oct. 1984, *Murata & Phengklai T-40235* (**KYO**); ibid., 30 Oct. 1984, *Murata et al. T-40225* (**KYO**); ibid., 16 Sept. 1969, *Pinnin et al. 82* (**BKF**, **P**, **L**); ibid., 5 Sept. 1988, *Pooma 60* (**BKF**); ibid., 12 Jan. 2016, *Saisorn 230* (**KKU**); ibid., 12 Jan. 2016, *Saisorn 231* (**KKU**); ibid., 8 Sept. 1969, *Sangkhachand 2087* (**BK**, **TI**); ibid., 4 Sept. 1967, *Shimizu et al. T-8935* (**BKF**, **KYO**, **TI**); ibid., 5 Sept. 1967, *Shimizu et al. T-9011* (**BKF**, **KYO**, **TI**); ibid., *Smitinand 1874* (**BKF**, **L**); ibid., 29 Oct. 1955, *Smitinand 3096* (**BKF**); ibid., 11 Sept. 1963, *Smitinand et al. 4765* (**L**); ibid., 1 Sept. 1988, *Takahashi & Tamura T-63315* (**AAU**, **L**); Phu Luang, 8 Aug. 1968, *Bunchuai 1726* (**BKF**, **L**); ibid., 13 Oct. 2000, *Norsaengsri 1034* (**QBG**); ibid., 5 Dec. 1965, *Tagawa et al. T-1545* (**BKF**); ibid., 19 Sept. 2008, *Wongprasert 089-5* (**BKF**); Phu Ruea, 12 Nov. 2005, *Hanmontri 9* (**KKU**); ibid., 19 Aug. 2003, *Mattapha 260* (**KKU**); ibid., *Triboun 3446* (**KKU**); Wang Saphung, 22 Aug. 1946, *Dee 194* (**BKF**)]; SOUTH-WESTERN: Kanchanaburi [Bo Phloi, Khao Kamphaeng Tham Than Lot National Park, 8 Nov. 1979, *Shimizu et al. T-22071* (**BKF**); ibid., 8 Nov. 1979, *Shimizu et al. T-22057* (**KYO**); Nong Prue, Khao Kampaeng mountain, Chalerm Rattanokosin National Park, 26 Sept. 2001, *van de Bult 479* (**BKF**, **CMU**)].

Distribution.— The Himalayas, Myanmar, China, Taiwan, Laos and Vietnam.

Ecology.— Grassland and open places in evergreen, lower montane pine, lower montane oak and dry evergreen forests; 1200–1685 m alt.; flowering July–Nov.

Vernacular.— Hang suea phu (หางเสือภู), khi katuet ma (ขี้กะตืดหมา), khi katuet ma tua phu (ขี้กะตืดหมาตัวผู้), khruea chan dong (เครือจานดง), mai katuet ma (ไม้กะตืดหมา), nat on (หนาดออน), thua hae phu (ถั่วแฮะภู).

Notes.— The type specimen of *Desmodium dubium* has not been seen by us, but an original publication was found which included a valid description and drawing of a plant belonging to that name. This confirms that the characteristics of *D. dubium* agree well with the recent accepted name, *Ototropis multiflora*.

6. ***Ototropis sequax*** (Wall.) H.Ohashi & K.Ohashi, J. Jap. Bot. 87(2): 117. 2012.— *Desmodium sequax* Wall., Pl. Asiat. Rar. 2: 46, t. 157. 1831.— *Meibomia sequax* (Wall.) Kuntze, Revis. Gen. Pl. 1: 197. 1891.— *Dollinera sequax* (Wall.) Schindl. ex Hochr., Candollea 6: 483. 1936. Type: India, in montibus Kamaon, unde in Hortum Calcuttensem introduxit Robertus Blinkworth, *Wallich, Numer. List. 5712* (lectotype **K-W!** [K001121834], designated here; isolectotypes **BM!** [BM000946771], **CAL**, n.v., **E!** [E00301251], **K!** [K000858792], **K!** [K000858793]).

Desmodium strangulatum Wight & Arn. var. *sinuatum* Miq., Fl. Ned. Ind. 1(1): 255. 1855.— *Desmodium sinuatum* (Miq.) Blume ex Baker in Hook.f., Fl. Brit. India 2: 166. 1876.— *Meibomia sinuata* (Miq.) Kuntze, Revis. Gen. Pl. 1: 198. 1891.— *Desmodium sequax* Wall. var. *sinuatum* (Miq.) Hosok., J. Soc. Trop. Agric. 4: 313. 1932. Type: Indonesia, Sumatra, *Korthals s.n.* (holotype **L!** [L0018953]).

Desmodium dasylobum Miq., Fl. Ned. Ind., Eerste Bijv.: 305. 1860.— *Meibomia dasyloba* (Miq.) Kuntze, Revis. Gen. Pl. 1: 197. 1891. Type: Indonesia, Sumatra occid., Prope Batang Barus, *Teijsmann s.n.*, *fide* Ohashi (2004).

Desmodium hamulatum Franch., Pl. Delavay.: 175. 1889. Type: China, Yunnan,

22 Sept. 1887, *Delavay 3130* (lectotype **P!** [P02938042], designated here; isolectotypes **P!** [P02937946], **P!** [P02937947], **P!** [P02938040]).

Desmodium ancistrotrichum K.Schum. & Lauterb., Fl. Schutzgeb. Südsee: 358. 1901. Type: Papua New Guinea, Kaiser Wilhelmsland, Oertzen-Gebirge, Nowuljafluss, 100 m. ü. M., 13 May 1896, *Lauterbach 2082*, *fide* Dy Phon et al. (1994).

Desmodium sp. A, Verdc., A Manual of New Guinea Legumes: 412. 1979. Specimens cited: Papua New Guinea, On Purari river, upstream from Pide river, Kikori subdistrict, Gulf district, at 100 m alt., 20 Aug. 1975, *Conn et al. 66341* (**C!** & **LAE** [224656] photo seen).

Shrub, 1–2.5 m tall; stem and twig terete, ascending whitish to rust-coloured pubescent and mixed with uncinate hairs. *Leaves*: stipules linear, 3–5 × 0.5–1.5 mm, apex acuminate, surface densely and whitish appressed pubescent; petioles 0.5–3 cm long, sparsely ascending pubescent and mixed with uncinate hairs; rachis 5–15 mm, sparsely ascending pubescent and mixed with uncinate hairs. *Leaflets*: stipels narrowly triangular, 1–2.3 mm long, apex pointed, surface glabrescent to puberulous, margin fimbriate; petiolules 1.5–3 mm, densely ascending pubescent and uncinate hairy. *Terminal leaflet* ±ovate to elliptic, 2.5–11 × 1.5–8.5 cm, apex acute, with or without shortly mucronate, base cuneate, margin sinuate to undulate, upper surface sparsely to densely appressed pubescent and uncinate hairy, lower surface ±densely pubescent than upper surface; lateral veins 5–6 per side, reaching the margin. *Lateral leaflets* ±obliquely ovate, 2–7 × 1–5.5 cm, apex acute, with or without shortly mucronate, base cuneate, margin sinuate to undulate, both upper and lower surfaces like terminal leaflet; lateral veins 4–5, reaching the margin. *Inflorescences* pseudoracemose or forming panicle-like, with 1 to many branches, up to 15 cm long, terminal or axillary; rachis and rachilla spreading pubescent and mixed with minutely uncinate hairs. *Primary bract* caducous, narrowly ovate to linear, 1.5–3 × 0.2–0.5 mm, apex pointed, margin fimbriate, surface shortly pubescent, conspicuously veined, enclosing 3-immature flowers and secondary bracts. *Secondary bract* caducous, linear, less than 1 mm long, pubescent. *Flowers ca* 8 mm long, 3 in fascicle; bracteoles 2, caducous, linear, *ca* 0.5 mm long, hairy; pedicels 2–4 mm long, densely ascending pubescent. *Calyx* red, 2.3–2.5 mm long, base obtuse; outside appressed pubescent, inside glabrous, tube 1.5–2 mm long; teeth 4, 0.8–1 mm long, shorter than tube length, upper tooth shallowly divided, less than 0.2 mm deep. *Corolla* purple; standard obovate, 6.5–8 × 4–4.5 mm, apex emarginate, base ±attenuate, not auriculate, claw very short; wings oblong to narrowly elliptic, 7–7.5 × 2 mm, equal to keel petal (in length), apex obtuse, auriculate on both side of lamina, claw 1.5–2 mm long; keels narrowly elliptic, *ca* 7.5 × 2 mm, apex obtuse, base auriculate, *ca* 0.5 mm long, claw *ca* 2.3 mm long. *Stamens* 7–7.5 mm long, vexillary stamen completely free, seemingly united with other stamens, other ones united, free part of long filaments and short filaments, alternately arranged; anthers ellipsoid, *ca* 0.4 × 0.2 mm. *Gynoecium* 7.5–8 mm long, sessile; ovary oblong, laterally compressed, puberulous and densely minutely uncinate, 10–11-ovulate; style *ca* 3 mm long, glabrous; stigma minutely capitate. *Pods* dark brown, sessile, indehiscent, 3–11-articulate, moniliform-like, 1.5–3.5 cm long, 2.5–3 mm broad, surface very densely

ferrugineous uncinate, not reticulate, both sutures equally constricted, less than 0.5 mm deep on each suture; isthmus 3/5–2/3 as broad as the pod; articles elliptic to quadrangular, 2.5–3.5 mm long; fruiting pedicels 4–5 mm long, densely ascending pubescent. *Seeds* brown to dark brown, reniform, 2–2.3 × 1.3 mm, *ca* 1 mm thick.

Thailand.— NORTHERN: Chiang Mai [Fang, Ang Khang, Sept. 1980, *Paisooksantivatana y326-80* (**BK**); ibid., 5 Nov. 1973, *Sadakorn 253* (**BK**); ibid., 3 Dec. 1974, *Sadakorn 362* (**BK**); ibid., 4 Dec. 1974, *Sadakorn 383* (**BK**); ibid., 9 Sept. 1975, *Sutharm s.n.* (**BK**)]; Nan [Pua, Doi Phu Kha National Park, 31 Oct. 2013, *Clark et al., 298* (**K**); ibid., 13 Sept. 1995, *BGO. Staff 4264* (**QBG**); ibid., 24 Sept. 1989, *Paisooksantivatana y2497-89* (**BK**); ibid., 31 Aug. 2000, *Srisanga 1514* (**CMUB**, **KEP**, **QBG**); unknown localty, 8 Sept. 1995, *Larsen et al., 46195* (**AAU**, **SING**)]; Lampang [Thoen, Wiang Mok subdistrict, 20 Nov. 2014, *Norsaengsri 11642* (**QBG**)].

Distribution.— India, the Himalayas, Myanmar, China, Taiwan, Laos, Vietnam, Indonesia, Philippines, Papua New Guinea.

Ecology.— Open ground, grassland or roadsides, mixed evergreen and hill evergreen forests; 500–1,680 m alt.; flowering Sept.–Dec.

Vernacular.— Thua luk pat (ถั่วลูกปัด).

Notes.— The distinquishing characters of this species are sinuate to undulate leaf margins and auriculate wing petals on both sides. The original description of *Desmodium hamulatum* Franch. was based on three collections: *Delavay 3015*, *3130* and *3186*. They are kept at P herbarium. One of two duplicates of *Delavay 3015* is mixed with another species of genus *Ototropis*. To avoid confusion, this collection should not be chosen as a lectotype. The *Delavay 3186* and *3130* have three and four duplicates, respectively. All duplicates of the latter collection are in perfect condition. One of them is selected here as a lectotype.

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LITERATURE CITED

Baker, J.G. 1876. Leguminosae. In: Hooker, J.D. (Ed.). The Flora of British India, L. Reeve & CO., London, 56-306.

Bentham, G. 1843. *Tetranema mexicanum* (Mexican *Tatranema*). In: Lindley, J. (Ed.). Edwards's Botanical Register, James Ridgway and Sons, Piccadilly, London, plate 52.

Bentham, G. 1852. Leguminosae. In: Miquel, F.A.W. (Ed.). Plantae Junghuhnianae, Lugduni-Batavorum, Leiden, 205-269.

Bentham, G. and Hooker, J.D. 1865. Sistens dicotyledonum polypetalarum ordines XI: Leguminosas-Myrtaceas. Genera Plantarum, 1(2): 434-735.

Dy Phon, P., Ohashi, H. and Vidal, J.E. 1994. Leguminosae (Fabaceae) Papilionoideae Desmodieae. In: Morat, P. (Ed.). Flore du Cambodge du Laos et du Viêtnam, Muséum National d'Histoire Naturelle, Paris, 1-154.

Endlicher, S.F.L. 1840. Genera Plantarum, Apud Fr. Beck Universitatis Bibliopolam, Vindononae, Austria, 1483 pp.

Merrill, E.D. 1910. An enumeration of Philippine Leguminosae, with keys to the genera and species.

The Philippine Journal of Science, C. Botany, 5(1): 1-94.

Nees, von E., C.G.D. 1838. Delectus Seminum in Horto Botanico Vratislaviensi Collectorum, Wroclaw (Breslau), Poland, 4 pp.

Ohashi, H. 1971. A monograph of the subgenus *Dollinera* of the genus *Desmodium*. In: Hara, H. (Ed.). Flora of Eastern Himalaya 2nd ed., University of Tokyo Press, Tokyo, 259-320.

Ohashi, H. 1973. Ginkgoana: the Asiatic species of *Desmodium* and its allied genera (Leguminosae), Academic Scientific Book Inc, Tokyo, 318 pp.

Ohashi, H. 2004. Taxonomy and distribution of *Desmodium* and related genera (Leguminosae) in Malesia (I). The Journal of Japanese Botany, 79(2): 101-139.

Ohashi, H. 2005. Tribe Desmodieae. In: Lewis, G., Schrire, B., Mackinder, B. and Lock, M. (Eds.). Legumes of the World, The Bath Press, UK, 433-445.

Ohashi, H. and Ohashi, K. 2012. *Ototropis*, a genus separated from *Desmodium* (Leguminosae). The Journal of Japanese Botany, 87(2): 108-118.

Ohashi, H. and Ohashi, K. 2013. A new combination in the genus *Ototropis* (Leguminosae: tribe Desmodieae). The Journal of Japanese Botany, 88(3): 182-183.

Schindler, A.K. 1925. Desmodii generumque affinium species et combinations novae. Repertorium Specierum Novarum Regni Vegetabilis, 21: 1-21.

Schindler, A.K. 1926. Desmodii generumque affinium species et combinations novae. II. Repertorium Specierum Novarum Regni Vegetabilis, 22: 250-288.

Sweet, R. 1830. Hortus Britannicus, 2nd ed., James Ridgway, 169, Piccadilly, London, 623 pp.

Taubert, P. 1894. Leguminosae. In: Engler, A. and Prantl, K. (Eds.). Naturlichen Pflanzenfamilien, Verlag von Wilhelm Engelmann, Leipzig, Germany, 70-381.

Thiers, B. continuously updated. Index Herbariorum: A Global Directory of Public Herbaria and Associated Staff, The New York Botanical Garden, New York. Available from http://sweetgum.nybg.org/science/ih/, 9 September 2019.