

The Genus *Hylodesmum* H.Ohashi & R.R.Mill (Leguminosae-Papilionoideae) in Thailand

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ABSTRACT.– Taxonomic study of genus *Hylodesmum* H.Ohashi & R.R.Mill in Thailand is revised. Three species are recognised, *H. laxum* (DC.) H.Ohashi & R.R.Mill subsp. *laxum*, *H. leptopus* (A.Gray ex Benth.) H.Ohashi & R.R.Mill and *H. repandum* (Vahl) H.Ohashi & R.R.Mill. A key to species, descriptions, ecological data, phenology, vernacular names and distribution maps for all species are provided.

KEY WORDS: Desmodieae, Fabaceae, Papilionoideae, taxonomy

INTRODUCTION

Hylodesmum H.Ohashi & R.R.Mill (Leguminosae) is a genus of 14 species distributed from United States of America, Mexico, Africa, Yemen, India, East and South-East Asia (Ohashi & Mill, 2000; Lewis *et al.*, 2005; Woods, 2008). The distinguish characters are herbaceous plant with pseudo-racemose inflorescences, monadelphous stamens and deeply constricted pod articles (Ohashi, 1973). The genus has been studied by several authors and treated as different taxonomic levels. The name, *Desmodium* Desv. section *Podocarpium* was firstly recognized by Bentham (1852). Then, this section was treated as subsection under section *Heteroloma* by Bentham and Hooker (1865). It was also recognized as subgenus by Ohashi (1973) as well as genus by Yang and Huang (1979). However, genus *Podocarpium* Y.C.Yang & P.H.Huang was a homonym of two earlier generic names, *Podocarpium* A.Braun and *Podocarpium* Unger. These are the names of fossil in Leguminosae and Podocarpaceae, respectively.

Ohashi and Mill (2000) proposed a new name, *Hylodesmum* H.Ohashi & R.R.Mill instead to avoid confusion among them. The taxonomic study of this genus in Thailand is needed and all data provided in this work will be contributed to the forthcoming account in Thai flora.

MATERIALS AND METHODS

The revision is based on studies of material from the herbaria, viz. AAU, ABD, BCU, BK, BKF, BM, BO, C, CMU, CMUB, E, FOF, HN, HNU, K, KEP, KYO, KKKU, L, NHL, P, PSU, QBG, SING and TI. We have seen all types and also examined online type collections cited in this work from website of BR, E, G, GH, K, MO, TUB and US (herbarium acronyms follow Thiers, continuously updated). A key to species, plant descriptions, ecological data, phenology, vernacular names and distribution maps are presented.

TAXONOMIC TREATMENT

Genus *Hylodesmum*

H. Ohashi & R.R. Mill, Edinb. J. Bot. 57(2): 173. 2000. Type species: *H. podocarpum* (DC.) H. Ohashi & R.R. Mill (= *Desmodium podocarpum* DC.).

Desmodium sect. *Podocarpium* Benth. in Miq., Pl. Jungh.: 226. 1852, pro parte, excl. *D. axillare* & *D. securiforme*. Type species: *D. podocarpum* DC.

Desmodium sect. *Heteroloma* Benth. subsect. *Podocarpia* (Benth.) Benth. & Hook.f., Gen. Pl. 1: 520. 1865.

Desmodium subgen. *Podocarpium* (Benth.) H. Ohashi, Ginkgoana 1: 120. 1973, pro parte, excl. sect. *Monarthrocarpus* (Merr.) H. Ohashi, pro parte, excl. *D. dolabriforme* Benth.

Podocarpium (Benth.) Y.C. Yang & P.H. Huang, Bull. Bot. Lab. N.-E. Forest. Inst., Harbin 4: 1. 1979, non *Podocarpium* A. Braun nec *Podocarpium* Unger.

Papilionopsis Steenis, Nova Guinea, Bot. 3: 17. 1960. Type species: *P. stylidioides* Steenis, *nom. rej.*

Erect or prostrate herb. *Leaves* spirally arranged, trifoliolate; stipules 2, free. *Leaflets* stipellate and petiolulate; lamina

subcoriaceous to coriaceous; venation pinnately netted, lateral veins reaching or not reaching the leaf margins. *Inflorescence* pseudo-racemose or rarely 2-branched, either terminal or axillary or both. *Primary bract* 1, caducous. *Secondary bract* 1, at the base of pedicel. *Flowers* papilionaceous, 6–7 mm long, in a fascicle of 3–5 flowers; bracteoles 2, caducous or absent; pedicels accrescent. *Calyx* campanulate; lobes 4 with probably 2-divided lobes on upper one. *Corolla* 5; standard 1, clawed, not auriculate; wings 2, free, clawed, auriculate; keels 2, connate, clawed, auriculate. *Stamens* 10, monadelphous, vexillary stamen connate above the half length of filament; anthers dorsifixed, longitudinally dehiscent. *Ovary* laterally compressed, 4–6-ovulate; stipe accrescent. *Pods* loment; lower suture very deeply constricted between articles.

Fourteen species are distributed in Eastern, Northern and Central USA, Mexico, Yemen, Pakistan, Russia, India, Sri Lanka, Nepal, Bhutan, China, Taiwan, Korea, Japan, Myanmar, Thailand, Indo-China and Malesia. One species is extending to Africa. Three species are indigenous in Thailand.

KEY TO SPECIES

1. Lateral veins of leaflets reaching the leaf margin. Calyx lobes equal to or longer than calyx tube.....**3. *H. repandum***
1. Lateral veins of leaflets looped, not reaching the leaf margin. Calyx lobes shorter than calyx tube.....**2**
2. Veinlets on lower surface of leaflets conspicuously reticulate. Pod articles 9–10 mm long.....**1. *H. laxum* subsp. *laxum***
2. Veinlets on lower surface of leaflets inconspicuously reticulate. Pod articles 15–22 mm long.....**2. *H. leptopus***

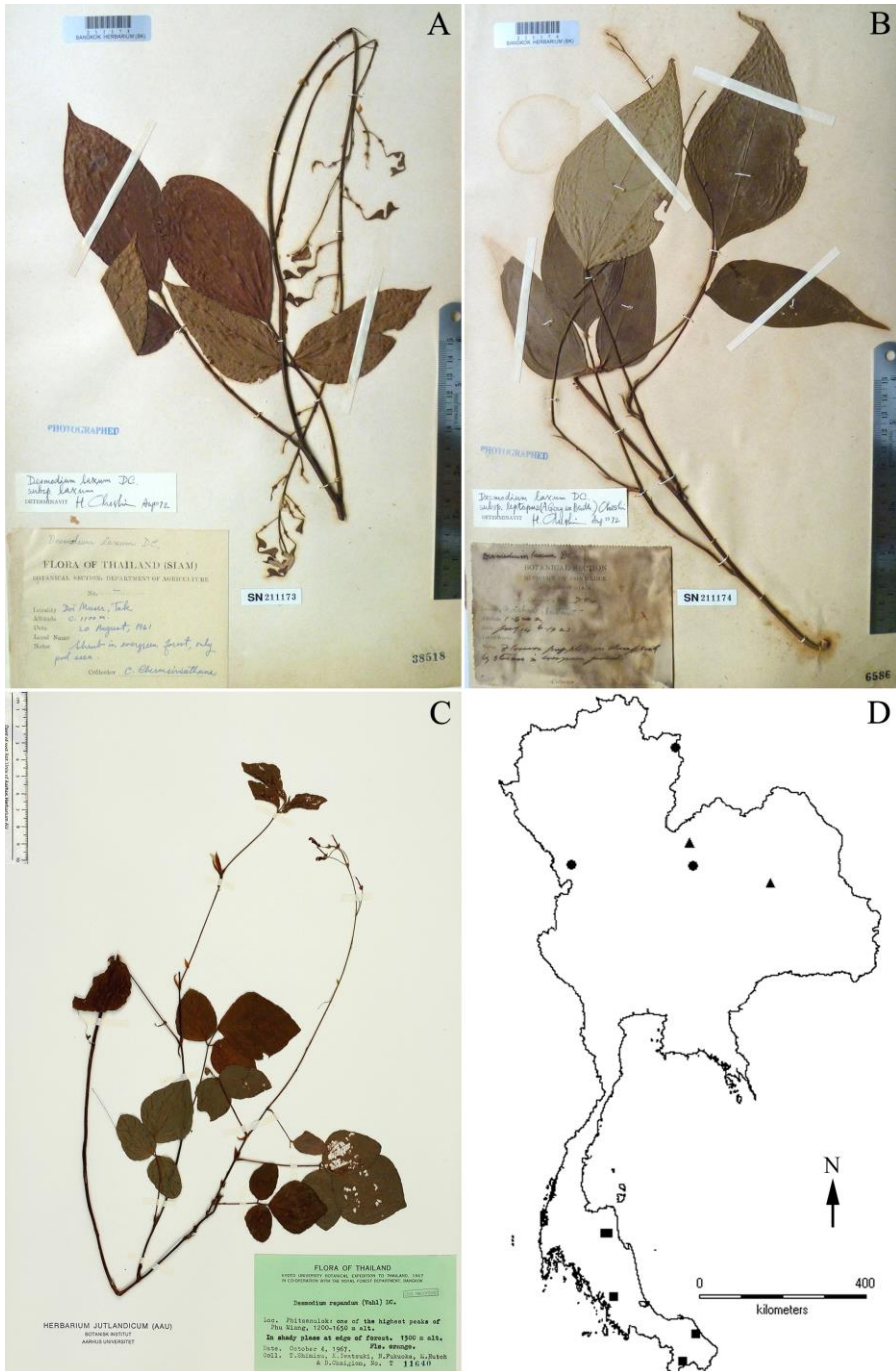


FIGURE 1. Photographs of dried specimens: A. *Hylodesmum laxum* subsp. *laxum*, C. Chemsirivathana s.n. (BK), collected from Doi Muser, Tak Province; B. *H. leptopus*, A.F.G. Kerr 7194 (BK), collected from Bacho District, Pattani Province; C. *H. repandum*, T. Shimizu et al. T-11640 (AAU), collected from Phu Miang, Phitsanulok Province and Distribution map: D. distribution of *H. laxum* subsp. *laxum* (closed circle), *H. leptopus* (closed square) and *H. repandum* (closed triangle) in Thailand. (A and B taken by the first author from BK; C provided by AAU herbarium database).

1. *Hylodesmun laxum* (DC.) H.Ohashi & R.R.Mill subsp. *laxum*, Edinb. J. Bot. 57(2): 178. 2000. Figs. 1A & 1D.

Desmodium laxum DC., Ann. Sci. Nat. 4: 102. 1825. Type: Nepal. Wallich s.n. (holotype G-DC G00312177 [digital image]; microfiche E, n.v., fide Ohashi & Mill, 2000).

Desmodium podocarpum DC. var. *laxum* (DC.) Baker in Hook.f., Fl. Brit. India 2: 165. 1876.

Podocarpium laxum (DC.) Y.C.Yang & P.H.Huang, Bull. Bot. Lab. N.-E. Forest. Inst., Harbin 4: 7. 1979.

Desmodium bambusetorum Miq., Fl. Ned. Ind. 1(1): 256. 1855. Type: Indonesia. Java, Tusschen de Bamboes-struiken op de hellingen van Amprong bij Gebok Klakka, Herb. Zoll. 2537 (holotype L0062940!).

Shrub 30–60 cm high; stems and twigs subterete, glabrescent, with both simple and uncinete hairs. *Leaves*: stipules narrowly triangular, 7–10 by 1.5–3 mm, apex slightly acuminate, glabrescent; petioles 8–9 cm long, spreading uncinete mixed with sparsely straight hairs; rachis 2–2.5 cm long, spreading uncinete mixed with sparsely straight hairs. *Leaflets* coriaceous; stipels filiform, 3–4 mm long, apex long pointed, puberulous; petiolules 3–5 mm long, sparsely pubescent. *Terminal leaflet* narrowly elliptic to lanceolate, 9.5–11.5 by 5–6 cm, apex attenuate, base cuneate, margin entire, upper surface glabrescent, with both straight and uncinete hairs along midrib and lateral veins, lower surface puberulous, spreading with both straight and uncinete hairs; lateral veins 4–5 per side, looped, not reaching the margin, veinlets on lower surface of leaflets conspicuously reticulate. *Lateral leaflets* obliquely lanceolate, 8–9 by 3.5–4 cm, apex attenuate, base asymmetrical, margin entire, both upper and lower surfaces like terminal

leaflet; lateral veins 7–8 per side, looped, not reaching the margin. *Inflorescence* pseudo-racemose, single or 2-branched, up to 55 cm long, terminal; rachis uncinete hairy. *Primary bract* enclosing 2–3-immature flowers and secondary bracts, 5–6 by 1 mm, uncinete hairy. *Secondary bract* narrowly triangular, ca. 1 mm long, uncinete hairy. *Flowers* ca. 5 mm long, in a fascicle of 2–3 flowers; bracteoles absent or probably present; pedicels 4–4.5 mm long, uncinete hairy. *Calyx* ca. 2 mm long, base obtuse, outside with uncinete and appressed hairs; tube ca. 1.5 mm long; lobes obtuse, ca. 0.5 mm long, conspicuously shorter than the tube, all lobes equal in length. *Corolla* white; standard broadly obovate, ca. 6 by 4.5 mm, apex emarginate, base cuneate, not auriculate, claw ca. 1 mm long; wings slightly curved and narrowly oblong, ca. 5 by 1.5 mm, apex obtuse, base auriculate, ca. 0.5 mm long, claw ca. 1.5 mm long; keels narrowly elliptic, ca. 5 by 1.8 mm, apex obtuse, base shortly auriculate, claw ca. 2 mm long. *Stamens* ca. 4 mm long. *Ovary* oblong, hairy, 3-ovulate; stipe ca. 1 mm long; style ca. 2 mm long, glabrescent; stigma minutely capitate. *Pods*: stipe 6–10 mm long; fruiting pedicels 7–10 mm long; isthmus 1/12–1/10 as broad as the pods; articles 2–3, asymmetrical, 9–10 by 5–6 mm; calyx persistent, lobes shorter than the tube. *Seeds* not seen.

Distribution.— India (eastern Himalaya to Assam), Sri Lanka, Nepal, China, Japan, Indo-China and Malesia.

Ecology.— Evergreen forest, 1,000–1,100 m alt. Flowering: July–August.

Vernacular.— tuet ma (ตืดหม).

Notes.— Three subspecies are proposed by Ohashi & Mill (2000) and only the typical subspecies is found in Thailand.

Specimens examined.— Nan. Nan watershaded, Doi Phu Kha National Park, 5 November 1998, *P. Srisanga* 310 (BKF, QBG), Pakam, 24 September 2000, *P. Thongson* 125 (QBG); Tak. Doi Muser, 20 August 1961, *C. Chermisrivathana* s.n. (BK); Phetchabun. Nam Nao National Park, 9 November 2003, *S. Mattapha* 897 (KKU), Nam Nao National Park, 19 August 2004, *S. Mattapha* 648 (KKU-2 sheets) & Nam Nao National Park, 14 August 1982, *T. Shimizu*, *F. Konta*, *T. Smitinand*, *T. Wongprasert* & *B. Sangkhachand* T-28551 (KYO).

2. *Hylodesmum leptopus* (A.Gray ex Benth.) H. Ohashi & R.R. Mill, *Edinb. J. Bot.* 57(2): 179. 2000. Figs. 1B & 1D.

Desmodium leptopus A.Gray ex Benth. in *Miq., Pl. Jungh.*: 226. 1852. Type: Philippines. Luzon, Los Baños, Laguna Prov., *Wilkes' Expl. Exped.* s.n. (lectotype K000555897 [digital image], designated by Ohashi & Mill (2000); isolectotype US00002040 [digital image]).

Podocarpium leptopus (A.Gray ex Benth.) Y.C. Yang & P.H. Huang, *Bull. Bot. Lab. N.-E. Forest. Inst., Harbin* 4: 6. 1979.

Desmodium laxum DC. subsp. *leptopus* (A.Gray ex Benth.) H. Ohashi, *Ginkgoana* 1: 141. 1973.

Desmodium gardneri Benth. in *Miq., Pl. Jungh.*: 226. 1852. Type: Sri Lanka. *Walker* s.n. (lectotype K000555891!, designated by Ohashi & Mill (2000); isolectotypes GH00242477 [digital image] & GH00242478 [digital image]).

Desmodium tashiroi Matsum., *J. Coll. Sci. Imp. Univ. Tokyo* 12 (Tent. Fl. Lutchu.): 415. 1899. Type: Japan. Ryukyu Island, in Liuliu: insula Okinawa, 1887, *Y. Tashiro* s.n. (holotype TI!).

Herb up to 50 cm high; stems and twigs terete, spreading pubescent and uncinately hairy. *Leaves*: stipules narrowly triangular, 8–11 by 2–2.5 mm, apex long acuminate,

sparsely puberulous; petioles 3.5–9 cm long, puberulent and uncinately hairy; rachis 1–2 cm long, puberulent and uncinately hairy. *Leaflets* coriaceous; stipels filiform, 3–5 mm long, apex long pointed, puberulous; petiolules 4–5 mm long, ascending pubescent. *Terminal leaflet* lanceolate to narrowly lanceolate, 4.5–12 by 2.5–5.5 cm, apex attenuate, base cuneate, margin entire, upper surface glabrescent, with both straight and uncinately hairs along midrib and lateral veins, lower surface puberulous, spreading straight and uncinately hairy; lateral veins 4–5 per side, looped, not reaching the margin, veinlets on lower surface of leaflets inconspicuously reticulate. *Lateral leaflets* obliquely lanceolate, 5–9 by 1.5–4 cm, apex attenuate, base asymmetrical, margin entire, both upper and lower surfaces like terminal leaflet; lateral veins 5–6 per side, looped, not reaching the margin. *Inflorescence* pseudo-racemose, 15–35 cm long, terminal or axillary; rachis spreading uncinately hairy. *Primary bract* enclosing 3–5-immature flowers and secondary bracts. *Secondary bract* triangular to filiform, 0.5–1 by 0.1 mm, uncinately hairy. *Flowers* 6–7 mm long, in a fascicle of 3–5 flowers; bracteoles linear, ca. 0.5 mm long; pedicels 5–15 mm long, uncinately hairy. *Calyx* ca. 2 mm long, base obtuse, with uncinately hairs outside or straight hairs on the apex of calyx lobes and glabrous inside; tube 1.5–1.8 mm long; lobes obtuse, 0.2–0.8 mm long, conspicuously shorter than the tube, all lobes equal in length. *Corolla*: standard broadly elliptic or broadly obovate, ca. 7 by 5.5 mm, apex emarginate, base cuneate to obtuse, not auriculate, claw ca. 0.8 mm long; wings slightly curved and narrowly oblong, 6–7 by 1.5 mm, apex obtuse, base auriculate, ca. 0.8 mm long, claw ca. 2 mm long; keels narrowly elliptic or narrowly obovate, ca. 6 by 1.5 mm, apex obtuse, base shortly

auriculate, claw *ca.* 2 mm long. *Stamens ca.* 6 mm long; anthers ellipsoid, *ca.* 0.5 by 0.4 mm. *Ovary* oblong, with minute hairs, 4-ovulate; stipe, *ca.* 0.7 mm long; style *ca.* 2 mm long, glabrescent; stigma minutely capitate. *Pods:* stipe 16–17 mm long; fruiting pedicels 7–10 mm long; isthmus *ca.* 1/14 as broad as the pod; articles 2–3, asymmetrical, 15–22 by 6–7 mm. *Seeds* not seen.

Distribution.— Sri Lanka, South China, Taiwan, Japan, Indo-China and Malasia.

Ecology.— Evergreen forest, 150–800 m alt. Flowering: April–August.

Vernacular.— tua fak khot (ถั่วฝักคอด).

Notes.—The original description of *Desmodium gardneri* given by Bentham (1852) is based on two specimens, *Walker* s.n. and *Gardner* 220 (K000555895 and K000555896). Recently, the former is referred to *Hylodesmum leptopus* (A.Gray ex Benth.) H. Ohashi & R.R. Mill and the latter is referred to *H. laxum* (DC.) H. Ohashi & R.R. Mill. subsp. *laxum*. *Walker* s.n. kept at K was designated as lectotype of *D. gardneri* by Ohashi & Mill (2000).

Specimens examined.— Nakhon Si Thammarat. Khao Luang, *ca.* 700 m, 23 August 1995, *K. Larsen, S.S. Larsen, C. Tange, R. Moran, C. Niyomdham & P. Puudjaa* 45911 (AAU), Khao Luang National Park, *ca.* 400 m, 12 August 1986, *J.F. Maxwell* 86-577 (CMU), Khao Luang, *ca.* 600 m, 12 March 1952, *Ploenchit* 296 (BKF, L), Khao Luang, 29 August 1952, *Ploenchit* 402 (BKF), Khao Luang, 27 June 1953, *Ploenchit* 620 (BKF), Khao Luang National Park, 21 July 1999, *S. Watthana, S. Inthamusik & P. Suksathan* 447 (QBG); Trang. Khao Soi Dao, *ca.* 800 m, 18 April 1930, *A.F.G. Kerr* 19193 (ABD, BK, BM, C-2 sheets, E, K); Pattani. Bacho, *ca.* 600 m, 14 July 1923, *A.F.G. Kerr* 7194 (BK,

BM); Yala. Betong, Hala-Bala Wildlife Sanctuary, *ca.* 150 m, *C. Niyomdham & P. Puudjaa* 5729 (BKF) & Betong, Hala-Bala Wildlife Sanctuary, 5 August 1996, *P. Puudjaa* 242 (BKF).

3. *Hylodesmum repandum* (Vahl) H. Ohashi & R.R. Mill, *Edinb. J. Bot.* 57(2): 185. 2000. Figs. 1C & 1D.

Hedysarum repandum Vahl, *Symb. Bot.* 2: 82. 1791. Type: Yemen. 1763, *Forsskal* s.n. (holotype **C-Vahl**, *n.v.*, *fide* Hepper & Friis, 1994).

Desmodium repandum (Vahl) DC., *Prodr.* 2: 334. 1825.

Podocarpium repandum (Vahl) Y.C. Yang & P.H. Huang, *Bull. Bot. Lab. N.-E. Forest. Inst., Harbin* 4: 13. 1979.

Desmodium scalpe DC., *Prodr.* 2: 334. 1825. Type: Mauritius. in insul. Borbonia et forsan Madagascar (**G-DC**, *n.v.*, microfiche, *fide* Ohashi & Mill, 2000).

Desmodium strangulatum Wight & Arn., *Prodr.* 1: 228. 1834. Type: South India. *Wight* 774 (lectotype **K000858850** [digital image]; isolectotypes **BR0000009894327** [digital image], **E00174494** [digital image], **E00174492** [digital image], **G00020058** [digital image] & **P02938395!**).

Desmodium caffrum Eckl. & Zeyh., *Enum. Pl. Afric. Austral.*: 251. 1836. Type: South Africa. In locis humidis in hiatu montis sylvoso ad flumen “Makasanirivier” (Kafferland), Maio, *Ecklon & Zeyher* 1662 (holotype **MEL**, *n.v.*, *fide* Ohashi & Mill, 2000); isotype **K000418235** [digital image]).

Desmodium schimper Hochst. ex A. Rich., *Tent. Fl. Abyss.* 1: 205. 1847. Type: Ethiopia. In locis opacis umbrosis, in monte Taber, prope Adde-Tsela, provincia Semiène, 2 January 1840, *Schimper* 857 (isotypes **BR0000006253547** [digital image], **BR0000008365897** [digital image], **K000418262** [digital image], **K000418263**

[digital image], G00022110 [digital image], GH00053841 [digital image], MO1515567 [digital image], TUB001487 [digital image] & TUB001488 [digital image]).

Papilionopsis stylidioides Steenis, Nova Guinea, Bot. 3: 17. 1960. Type: *D. Bergman* 287 (lectotype S, designated by Ohashi & Mill, 2004).

Herb up to 50 cm high; stems and twigs subterete to terete, spreading glabrescent to ascending pubescent. *Leaves*: stipules narrowly triangular and slightly curved, 4–13 by 1.5–3 mm, apex slightly attenuate, sparsely pubescent and minutely uncinatae hairy, margin fimbriate; petioles 1.5–11.5 cm long, with both sparsely soft pubescent, ca. 1.5 mm long and short uncinatae hairs; rachis 0.3–2 cm long, both sparsely soft pubescent, ca. 1.5 mm long and short uncinatae hairy. *Leaflets* subcoriaceous; stipels narrowly triangular, 1–2.5 mm long, apex long pointed, hairy; petiolules 2–3 mm, ascending pubescent or uncinatae hairy. *Terminal leaflet* broadly elliptic to broadly obovate or rhomboid, 3–9 by 2.5–9 cm, apex acute, base cuneate, margin slightly repand, both upper and lower surfaces with sparsely appressed or ascending pubescent and spreading uncinatae hairs; lateral veins 4–5 per side, reaching the leaf margin. *Lateral leaflets* obliquely ovate, 2–8 by 1.5–6 cm, apex obtuse to acute, base asymmetrically obtuse, margin slightly repand, both upper and lower surfaces like terminal leaflet; lateral veins 5–6 per side, reaching the leaf margin. *Inflorescence* pseudo-racemose, single or rarely 2-branched, 15–35 cm long, terminal; rachis ascending pubescent mixed with uncinatae hairs. *Primary bract* narrowly ovate, ca. 6 by 2 mm, enclosing 3–5-immature flowers and secondary bracts. *Secondary bract* triangular, 0.5–1 by 0.1 mm, hairy. *Flowers*

7–9 mm long, in a fascicle of 3–5 flowers; bracteoles absent; pedicels 8–17 mm long, with ascending pubescent and uncinatae hairs. *Calyx* 3–3.5 mm long, base obtuse, outside with straight, uncinatae and bulbous-based hairs; tube 1–1.2 mm long; lobes acuminate, 1–2.1 mm long, equal to or longer than the tube, upper lobe shallowly divided, ca. 2 mm long. *Corolla*: standard obovate to narrowly oblanceolate, 6–8.2 by 4 mm, apex rounded, base attenuate, not auriculate, claw ca. 1 mm long; wings slightly oblong, ca. 7 by 1.8 mm, apex narrowly obtuse, base auriculate, ca. 1 mm long (ca. 0.3 mm shorter than claw), claw ca. 1.3 mm long; keels narrowly oblong and straight, ca. 9.5 by 2 mm (2.5 mm longer than wing petals), apex obtuse, base shortly auriculate, claw ca. 2 mm long. *Stamens* 7–9 mm long; anthers ellipsoid, ca. 0.5 by 0.4 mm. *Ovary* oblong, hairy, 6-ovulate; stipe, 1–1.5 mm long; style 3–5 mm long, glabrescent; stigma minutely capitate. *Pods*: stipe 2–4.5 mm long; articles 3, hairy.

Distribution.— Tropical and southern Africa, Mauritius, Yemen, India, Sri Lanka, China, Myanmar, Indo-China and Malesia.

Ecology.— In shaded place at the edge of forest, 1,300–1,562 m alt. Flowering: October–April.

Vernacular.— khi katuet ma (กึ่กะตึ่ดหมา).

Notes.— We did not find the specimen, *H.B.G. Garrett* 62 (BKF) which was cited by Ohashi (1973). It was collected from Doi Inthanon (= Doi Angka) at an elevation of 1,290 meters above sea level. Therefore, the distribution map of this species does not take this specimen into this account.

The duplicate from K herbarium was indicated by Prof. Hiroyoshi Ohashi in 1999 as a lectotype of *D. strangulatum* Wight & Arn., however we have not seen the publication of lectotypification of this name.

Thus, this paper follows his written label on herbarium sheet.

There are two species that are mixed on herbarium sheet and deposited at S herbarium. They are (1) the apical part of an inflorescence of *H. repandum* (= *Papilionopsis stylidioides* Steenis) and (2) foliage, roots and a young scape of *Burmania disticha* L., family Burmaniaceae. Lectotypification of *P. stylidioides* was based on an inflorescence part and has been made by Ohashi & Mill (2004).

Specimens examined.— Phitsanulok. One of the highest peak of Phu Miang, 1,200–1,650 m, 4 October 1967, *T. Shimizu, K. Iwatsuki, N. Fukuoka, M. Hutoh & D. Chaiglom* T-11640 (AAU, BKF, L TI-2 sheets); Loei. Phu Luang, 1,300–1,565 m, 5 December 1965, *M. Tagawa, K. Iwatsuki & N. Fukuoka* T-1541 (BKF, L, TI).

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