

A revision of *Mucuna* (*Leguminosae:Phaseoleae*) in Thailand, Indochina and the Malay Peninsula

C. M. WILMOT-DEAR

Summary. An account of the 13 species of *Mucuna* Adans. found in Thailand, Indochina and the Malay Peninsula is offered, with keys and distribution maps. Three new species, *M. stenoplax* and *M. revoluta* Wilmot-Dear, and *M. thailandica* Niyomdham & Wilmot-Dear, are described. One previously recognized species, *M. brevipes* Craib, is reduced to synonymy under *M. bracteata* DC. ex Kurz. New species records for E. Asia and Burma, and additions to E. Asian distributions, are also noted. All specimens cited have been seen.

As a continuation of studies in Asian (including Malesian) and Pacific *Mucuna*, this account, which completes the revision of species found on the Asian mainland, is offered.

***Mucuna* Adans.**, Fam. Pl. 2: 325 (1763); Prain, Journ. Asiat. Soc. Bengal 66: 404 (1897), nom. conserv.

For synonymy and generic description see Wilmot-Dear (1984: 23).

The thirteen accepted species, including three considered new, found in Thailand, Cambodia, Laos, Vietnam and the Malay Peninsula are described below; one further species, *M. brevipes* Craib, is reduced to synonymy under *M. bracteata* DC. ex Kurz. A non-native species, *M. warburgii* Lauterb. & K. Schum., cultivated in Thailand, is also mentioned.

The Malay Peninsula and the Thailand-Indochina regions do not have many species of this genus in common, and the external distributions of their species are rather different. Only five of the thirteen species mentioned above occur in the Malay Peninsula; of these, two otherwise occur only in Indonesia; of the three which are found also in the Thai-Indochinese region two, *M. pruriens* (L.) DC. var. *pruriens* and *M. gigantea* (Willd.) DC., are very widespread, and the remaining one, the new species *M. stenoplax*, is endemic to the region as a whole. Of the remaining eight (Thai-Indochinese) species, two, *M. gracilipes* Craib and the new species *M. thailandica*, are endemic to this region (the latter most closely related to a species endemic to S. China) and the other six are found only in parts of the two adjacent regions, the Indian Subcontinent (especially E. Himalayas) and/or S and W China. The new species *M. revoluta* constitutes a new record also for China, and *M. interrupta* Gagnep. is here recorded for the first time from Burma. Details of the distribution of *M. macrocarpa* Wall. in Japan (omitted from Wilmot-Dear (1984)), are noted.

KEYS TO SPECIES OF *MUCUNA* IN THAILAND, INDOCHINA AND THE
MALAY PENINSULA

A. *Flowering material*

1. Standard and wing petal margins with short but distinct border of cilia in apical region up to $\frac{1}{4}$ or $\frac{1}{3}$ length; leaflets without persistent stipels **1. macrocarpa**
Standard and wing glabrous in apical part, pubescent only in basal (claw) region; stipels persistent or not 2
2. Corolla bright fiery red-orange, wings and keel very long, 6–8 cm, and all uniformly curved throughout their length to give distinct scimitar-shape to flower (cultivated) **i. warburgii**
Corolla purple or greenish white, usually shorter and never scimitar-shaped 3
3. Flowers very large, standard \pm 5–5.5 cm, wings 7.5 cm long, keel 7.8 cm long; persistent stipels absent **2. thailandica**
Flowers smaller, standard up to 3.5(–3.8) cm, wings and keel up to 6(–6.3) cm long; persistent stipels present 4
4. Lateral veins of leaflets gently curved throughout most of their length but near margin considerably more sharply curved and becoming indistinct or running parallel to margin; terminal leaflet elliptic or ovate; wings tapering to apex 5
Lateral veins straight or uniformly curved through their length and clearly running into margin; terminal leaflet often rhombic or rhombic-ovate; wing apex broadly rounded, not tapering 12
5. Inflorescence axis with flower-bearing side-branches and pedicels all of very varying lengths decreasing towards apex so as to form a pseudumbel; flowers greenish-white, small, 3–4.5 cm long 6
Inflorescence not pseudumbellate, flower-bearing side-branches all of similar length or all completely reduced and knob-like, pedicels all of similar length; flowers various 7
6. Axis of inflorescence unbranched, usually at least 8 cm and often up to 25 cm long, with flowers all crowded at apex and remainder of axis devoid of bracts or scars; standard relatively large, $\frac{2}{3}$ – $\frac{3}{4}$ keel length, wings and keel 2.8–4 cm long; calyx lobes very short and quite broad, lowest lobe 1–3 mm, laterals 1–2 mm long **3. gigantea**
Axis of inflorescence very short, 2.5–3 cm long (very rarely (Java) –6 cm and branched), without long naked basal portion; standard relatively shorter, \pm $\frac{1}{2}$ keel length, keel \pm 4.5 cm long, wings often shorter than keel; calyx lobes much longer and relatively narrower, lowest 6–9 mm, laterals 3–6 mm long (Malay Peninsula) **4. acuminata**
7. Pubescence on stems, petioles and inflorescence deep red, spreading; leaflets abruptly acuminate often with abundant red indumentum on veins beneath; calyx lobes short, lowest 4.5 mm, laterals 2 mm long, acuminate; flowers small up to 4.4 cm, pedicels up to 1 cm, bracts early-deciduous **5. monosperma**

- Pubescence on stems and leaves, where present, pale or golden, adpressed or spreading, that on inflorescence pale or dark brown; (leaflet shape, calyx-lobes, flowers and bracts various) 8
8. Calyx lobes small, lowest 1.5–4 mm, laterals up to 2 mm long; bracts small and early-deciduous (Malay Peninsula) **10. biplicata**
Calyx lobes larger, at least 6 mm and 4 mm respectively; (bracts various) . . . 9
9. Flower-bearing side-branches lengthened, \pm 3 mm long; pedicels very long, 2 cm; flowers small, 4.5 cm long; bracts early-deciduous . **6. stenoplax**
Flower-bearing side-branches reduced, knob-like, pedicels up to 1 cm long; (flowers and bracts various) 10
10. Hairs on inflorescence-axis and calyx spreading, very short, 0.1–0.2 mm long and almost velvety; flowers 4.5–4.8 cm long; bracts small, 5–17 \times (2–)5–7 mm, fairly early-deciduous **8. revoluta**
Hairs on inflorescence axis and calyx adpressed, longer, the majority at least 0.4 mm long, not velvety; flowers usually 5–6 cm long; at least the lower bracts often persistent, large and broad, 20–40 \times 10–20 mm 11
11. Calyx lobes relatively broad and broadly acute at apex, the lowest 6–10 \times c. 5 mm; all bracts broadly ovate, (22–)30–40 mm long . . . **9. interrupta**
Calyx lobes relatively narrow and long-acuminate, the lowest 8–10 \times 2–3 mm; upper (flower-subtending) bracts elliptic or obovate with broadly rounded often hooded apex, 10–20 mm long **7. hainanensis**
12. Flowers long, wings 6–6.3 \times 1.5 cm, keel \pm equalling wings **11. gracilipes**
Flowers short, wings 2.5–3.5 \times 0.6–0.8 cm; keel usually distinctly longer, up to 4(–4.5) cm 13
13. Inflorescence axis with many bracts throughout length including lower (flowerless) part, these medium or large, 8–24 mm long but always some considerably over 8 mm, persistent to mature flowering and often to fruiting stage; leaflets beneath with veins usually conspicuously darker and less densely pubescent than surface **13. bracteata**
Inflorescence axis without bracts or scars in lower, flowerless part; bracts earlier-deciduous, up to 8(–10) mm long; leaflets beneath with surface no more densely pubescent nor paler than veins 14
14. Bracts and bracteoles usually fairly broad and never acuminate; pubescence on stem, leaflets and inflorescence axis rather orange-brown giving distinct yellowish-orange tinge, especially to leaflet-veins beneath **12b pruriens** var. **hirsuta**
Bracts and bracteoles narrow, long-acuminate; pubescence on all parts of plant, where present, silvery (scattered irritant orange bristles often also present) 15
15. Irritant orange bristles present on stems, inflorescence axis or calyx **12a pruriens** var. **pruriens**
Irritant orange bristles completely absent from plant **12c pruriens** var. **utilis**
- B. *Fruiting material* (excluding *M. gracilipes* and *M. thailandica* for which no fruit known).

1. Fruits either woody and large, at least 26 cm long and linear oblong, or leathery and medium-sized to large, oblong; leaflets with lateral veins gently curved but near margin more sharply curved and becoming indistinct or running \pm parallel to margin 2
Fruits fleshy, small (not over 10 cm long), linear (but sometimes misshapen and swollen in parts); leaflets with lateral veins straight or uniformly curved throughout length and running right into margin 11
2. Fruits large, woody, linear-oblong and often swollen around seeds, very much longer than wide, 23–45 \times 3–5 cm; (margins winged or not) . 3
Fruits medium or large, leathery, oblong, length up to 4 \times width, up to 17 cm long; each margin with pair of wings 4
3. Surface of fruit shallowly ridged but otherwise unornamented; margins unwinged **1. macrocarpa**
Surface of fruit ornamented with very low transverse lamellae; margins narrowly winged (cultivated) **i. warburgii**
4. Fruit surface patterned with reticulation of raised lines but otherwise unornamented 5
Fruit surface ornamented with 5–18 raised lamellae running obliquely transversely across face 6
5. Reticulation of raised lines so distinct, fine and close as to give surface almost a pitted appearance; fruit straight and oblong, often broadly so, (3.5–) 4–5.5(–6) cm wide **3. gigantea**
Reticulation coarser and often indistinct; fruit distinctly curved, up to 3 cm wide **4. acuminata**
6. Lamellae on fruit surface each a simple raised flap, usually continuous across face 7
Lamellae each bifurcated to give a “T” shape in cross-section and all interrupted along mid-line of fruit 9
7. Fruit 1 (very rarely 2)-seeded, asymmetrically oblong to elliptic, often broader than long and never over 1½ times as long as broad; surface lamellae tending to converge towards centre of pod; pubescence on stems, petioles and fruit (also leaflet veins beneath if there present), fine, deep red, spreading; fruit with coarse red bristles also **5. monosperma**
Fruit (1–)2–3-seeded, asymmetrically oblong to linear-oblong, at least twice as long as broad; lamellae \pm parallel; pubescence on vegetative parts absent or pale to golden; fruits with bristles but without conspicuous short fine pubescence 8
8. Lamellae on fruit of very irregular height (width) 1–2 mm but widening to 4 mm in places and all running to distal edge of wing; wing of irregular width 3–4 mm but widening sharply to 5–6 mm at points where lamellae occur, resulting in a jaggedly dentate appearance **6. stenoplax**
Lamellae on fruit of fairly uniform height, 4–5 mm; wing very wide and even, 8–14 mm **7. hainanensis**
9. Lamellae all extending to distal edge of marginal wings at which point wing widens sharply to give a jaggedly toothed appearance **10. biplicata**
Lamellae never extending into wings, these of \pm uniform width 10

10. Fruit (1-)2-seeded, moderate-sized, 6-9 × 4-4.5 cm; lamellae 8-12 in number with strongly revolute apical halves; marginal wings strongly inrolled; bracts never persistent **8. *revoluta***
 Fruit 3-seeded, large, 13-14 × 6-7 cm; lamellae ± 18 in number with spreading or ± upcurved apical halves; marginal wings ± flat; some floral bracts often persistent to fruit-stage, these large and conspicuous
 **9. *interrupta***
11. Indumentum of fruit silky, not irritant nor deciduous, usually adpressed and pale, often dense **12c *pruriens* var. *utilis***
 Indumentum of fruit a bristly, spreading, dense covering of irritant deciduous reddish or brown bristles 12
12. Lower (non-fruit-bearing) part of infructescence with numerous bract-scars, some bracts often still present especially near base, these conspicuous, 8-24 mm long; leaflets beneath usually with veins conspicuously darker and less pubescent than surface **13. *bracteata***
 Lower part of infructescence lacking bracts and scars, bracts never persistent to fruit stage; leaflet surface not more pubescent nor paler than veins . . . 13
13. Stems, petioles, leaflets beneath and infructescence-axis with orange-brown pubescence giving distinct yellowish-orange tinge especially to leaflet-veins beneath **12b *pruriens* var. *hirsuta***
 Stems leaves and infructescence, if pubescent, silvery
 **12a *pruriens* var. *pruriens***

Subgenus *Mucuna*

Woody; seeds discoid, large and strongly laterally flattened with hilum extending around three quarters of the circumference.

1. *Mucuna macrocarpa* Wall., [Cat. no. 5618 &] Pl. Asiat. Rar. 1: 41 t. 47 (1830); Gagnepain in Lecomte, Fl. Indo-Chine: 317 (1916); Van Thuan, Fl. Camb. Laos Vietnam 17: 35 (1979). Type: Nepal, *Wallich* 5618 (holotype K!)

M. collettii Lace in Bull. Misc. Inf., Kew 1915: 398 (1915); Craib, Fl. Siam. 1: 443 (1925); Schmid, Veg. Vietnam in Mem. O.R.S.T.O.M. 74: 129 (1974).

Types: Burma: *Collett* 458, *Lace* 5866 (syntypes K!), *Hauxwell* s.n., *Rogers* 19 (syntypes not found); China: Yunnan, *Henry* 11702 (syntype K!; isosyntype A!).

See Wilmot-Dear (1984: 36 & fig. 1) for a complete list of synonyms and more detailed description. Only diagnostic features, and additional details not there included, are given here.

Huge climber to 70 m; stems and petioles sometimes glabrescent with age, more often with sparse to dense light brown or red-brown fine short adpressed or longer somewhat spreading pubescence. *Leaves* of very varying sizes, terminal leaflet (7-)10-19 × (3-)5-10 mm, elliptic to ovate (to obovate), acute or shortly acuminate, laterals usually markedly asymmetrical with ratio of widths of abaxial to adaxial 2:1; lateral veins 5-6(-7), gently curved; thinly chartaceous to thickly coriaceous, glabrous to densely adpressed-hairy like the stem, especially on veins; persistent stipels absent. *Inflorescences* arising from old wood, often very

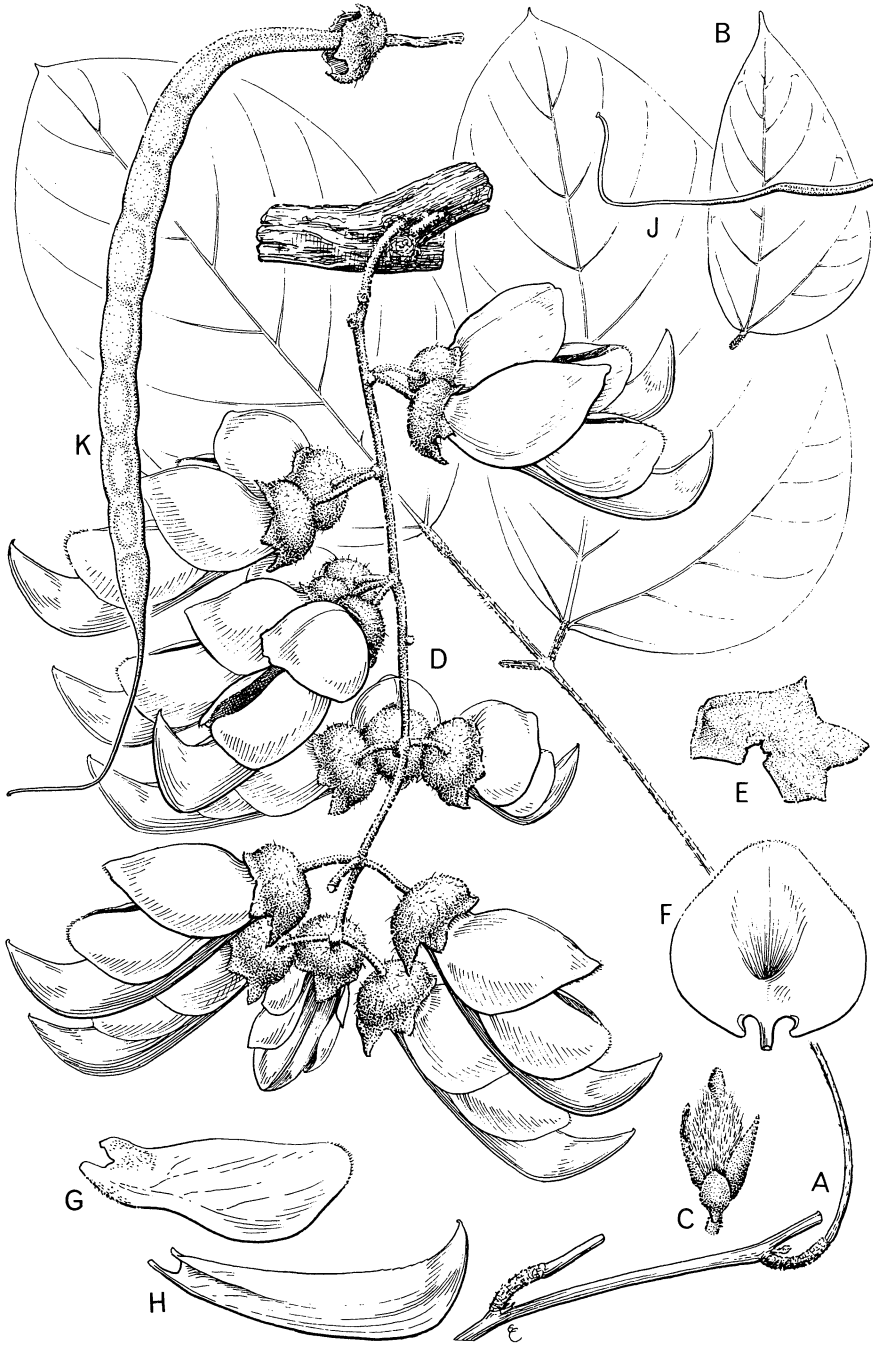


FIG. 1. *Mucuna macrocarpa*. A stem & leaf; B lateral leaflet; C bud with bract & bracteoles; D inflorescence; E calyx; F standard; G wing, H keel; J pistil; K young fruit. A from Garrett 1172; B, K from Henry 490; C from Henry 11631; D-J from Furuse 5532; (E Asian material). B $\times \frac{1}{4}$, C $\times 2$, rest $\times \frac{2}{3}$. Drawn by Eleanor Catherine.

long, 5–23 cm, unbranched and bearing 5–17 reduced, knob-like, flower-bearing side-branches (secondary axes) spaced throughout their length but more crowded towards apex; pedicels medium-sized, 8–10 mm long, these and main axis with pubescence like that of the stem but always short and often spreading, and also fine brownish bristles; bracts and bracteoles all of similar shape, very small but bracteoles larger, ovate, 2–5 × 1–4 mm, hairy like the axis, bracteoles shorter than calyx. *Calyx* hairy like the axis; tube and lobes medium to large, tube broadly cup-shaped 8–12 × 12–20 mm, lowest lobe 5–6 (–8) mm long, laterals usually half this length, all narrowly to broadly triangular; upper lip indistinct. *Corolla* large, two-coloured, standard pinkish or greenish white or “dirty” white, wings deep violet, keel lighter more reddish-violet with greenish tip; standard 3–3.5 cm long, just over ½ keel length, wings 4–5.2 (–5.6) cm long and fairly broad ± 1.5 cm wide, keel distinctly longer 5–6.3 (–6.5) cm long, (in W. Japan only, petals up to 4.5, 6 and 7 cm long, respectively); margins of standard and wings conspicuously ciliate in apical region up to ¼ or ½ length. *Fruit* woody, green in living state, 6–15-seeded, very long, 26–45 × 3–5 cm, markedly laterally flattened 7–10 mm in thickness, linear-oblong with margins often constricted between seeds, straight or slightly curved, broadly acute at apex; surface densely pubescent like the axis (rarely glabrescent with age), ornamented with many irregular ± longitudinal wrinkles and ridges of varying length and thickness; both margins thickened without central groove, often with irregular woody ridge running along surface close and parallel to margin but without pair of flap-like wings. *Seeds* black, very large, 2.2–3.2 × 1.8–2.8 cm, reniform-discooid and markedly laterally flattened 5–10 mm in thickness; hilum dark brown or black. (Figs. 1, 7E–F. Map 1).

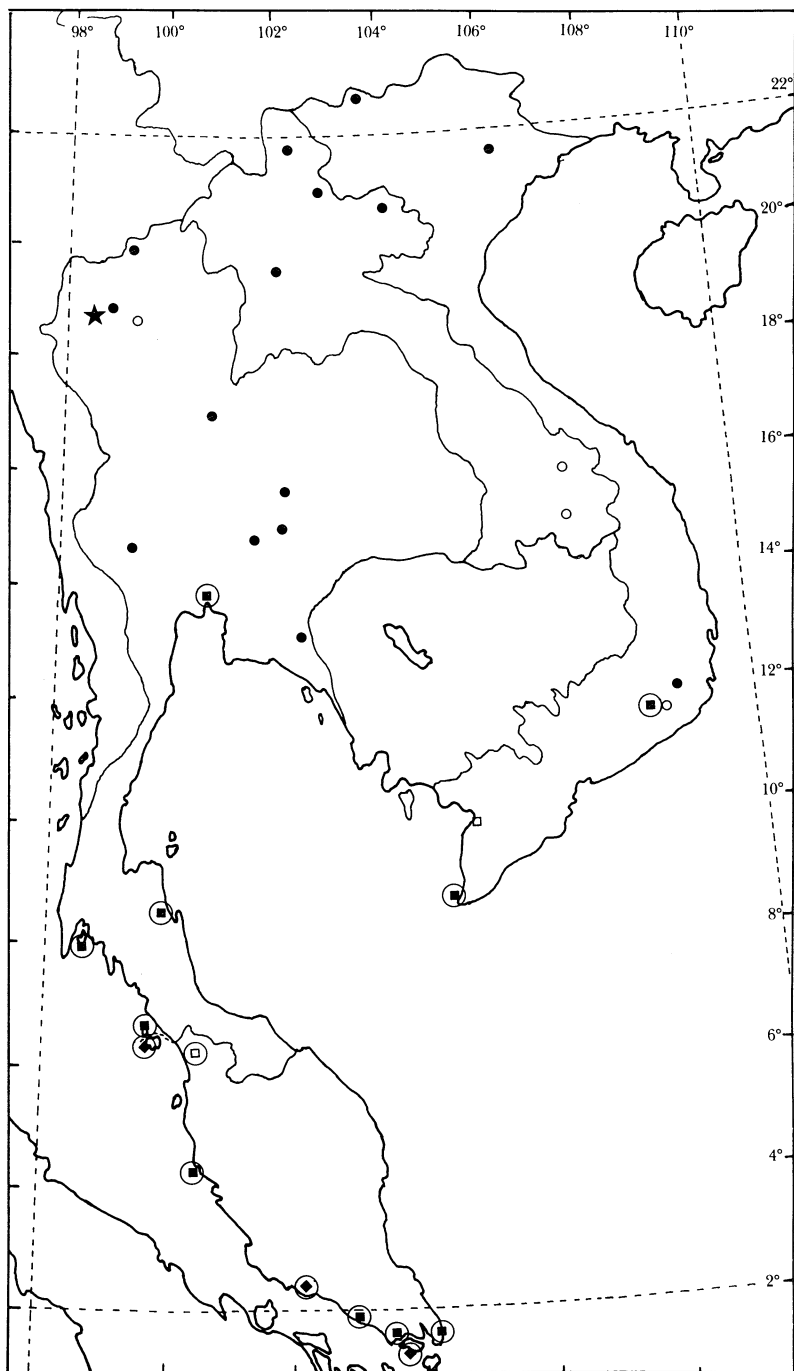
THAILAND. N: Chiang Mai: Doi Chiengdao, 1940, *Garrett* 1172 (K, L) & 1987, *Niyomdham et al.* 1372 (AAU, K); Doi Suthep; 1987, *Smitasiri & Elliotte* BG1–BG6 (K) & 1913, *Kerr* 2929 (E, K). Me Nga, Me Kang, 1913, *Garratt* 101 (E, K). NE: Loei: Phu Kradung, 1924, *Kerr* 8701 (K). E: Nakhon Ratchasima: Khao Yai Nat. Park, *van Beusekom et al.* 32 (E, K, L, P); Kao Lem, 1925, *Kerr* 9964 & 9964A (AAU, K). Chaiyaphum: Ban Man Phrom, 1974, *Geesink et al.* 6913 (K, L). SW: Kanchanaburi: Lieu Long, 1968, *van Beusekom et al.* 435 (AAU, E, K, L, P); Sri Sawat, 1974, *Larsen & Larsen* 33895 (AAU). SE: Chon Buri: Siricha, Kow Kieo, 1976, *Maxwell* 76–108 (AAU, L) & 76–384 (L). Chanthaburi: Pong Nam Rawn, Soy Dow, 1974, *ibid.* 74–688 (AAU, L).

LAOS. Phuong Saly: *Poilane* 25882 (AAU, P). Luang Prabang: Nam Minh, 1932, *Poilane* 20373 (AAU) & Muong Ngai, 1932, *Poilane* 20707 (AAU, P). Houa Phan: Sam Neua, 1920, *Poilane* 2108 (AAU). Saravane: Tateng, 1928, *Poilane* 15558 (AAU, K). Attopeu, *Harmand* 1423 (K, P).

VIETNAM. Huang Lien Son (Muong Hum): Lao Cai, 1931, *Poilane* 18838 (AAU, K P). Ha Bac: Phocam, 1886, *Balansa* 1207 (K). Lam Dong: Langbian Peaks, April 1918, *Boden Kloss* s.n. (BM); Dalat, *Schmid* s.n. (P); Braian, Djiring: 1932, *Poilane* 24092 (AAU) & 1935, *Poilane* 24276 (AAU, K, P).

EXTERNAL DISTRIBUTION. E Himalayas, Burma; China (SW, S & Taiwan); Japan (S: Kyushu & Ryukyu Is.; omitted in error from Wilmot-Dear 1984: 36).

HABITAT. Evergreen or mixed forest; often by rivers; 600–1600 m alt. A



MAP 1. Distribution of *Mucuna macrocarpa* ● and *M. gigantea* ■ (◆ = in literature) in Thailand, Indochina and the Malay peninsula, and of *M. thailandica* ★. (○ □ indicates exact locality uncertain); *gigantea* records all circled for clarity.

species widely distributed through the region in high altitude areas.

2. *Mucuna thailandica* Niyomdham & Wilmot-Dear sp. nov. *M. birdwoodiana*e Tutcher valde affinis sed vexillo alisque in parte apicali glabris nec pilosomarginatis pedicellis etiam longioribus 2–3 cm longis nec usque 1.5 cm longis differt. Typus: Thailand: Chiang Mai, Doi Inthanon, 1 March 1978, Niyomdham 5 (holotypus BKF!; isotypus K!).

Climber, large and robust, at least 25 m high, somewhat resembling *M. macrocarpa* in vegetative characters with sparsely pale-adpressed-hairy stems, petioles and leaflets. *Leaves* of moderate size (only one, fairly young, seen), \pm 25 cm long, petiole 13 cm; leaflets relatively narrowly elliptic with abruptly acuminate tip and slightly cuneate base, terminal leaflet \pm 10 \times 6 cm, laterals with width of abaxial half $1\frac{1}{2}$ – $1\frac{3}{4}$ \times that of adaxial half; membranous to thinly chartaceous; persistent stipels absent. *Inflorescence* arising from old wood, unbranched but several axes arising from same point, 20–50 cm with rather few, \pm 8, reduced, knob-like flower-bearing side-branches absent from basal part but evenly-distributed through remainder of length; pedicels very long, (1.7–)2–3 cm with very dense short fine brown \pm spreading pubescence; similar but shorter and sparser hairs present on axis increasing towards apex; bracts and bracteoles very early deciduous, ovate-elliptic, \pm 7 \times 5 mm, acute. *Calyx* pubescent like the pedicels and with abundant fine orange bristles, large; tube very wide, 1 \times 2.5 cm; lowest lobe triangular, 13 \times 6 mm, laterals broadly triangular but sharply narrowing to short wide acumen, 8 \times 8 mm, upper lip not well marked. *Corolla* greenish white, very large indeed, standard 5–5.5 cm long, 4.2 cm wide with basal claw and auricle \pm 3 mm long; wing 7.5 cm long, 2.3 cm wide, with basal claw \pm 5 mm and auricle 4 mm long; keel \pm 7.8 cm long, 1.3 cm wide with basal claw 8 mm and auricle 3 mm long, sharply upcurved apical part very large \pm 2.5 cm long and horny in apical 8–15 mm; petals not pubescent on the margin in the apical half. Ovary hairy, linear-oblong with \pm 18 ovules. *Fruit* unknown but (from appearance of ovary) probably large, linear-oblong and many-seeded. (Fig. 2. Map 1).

THAILAND. N: Chiang Mai: Doi Inthanon, 1 March 1978, Niyomdham 5 (BKF holotype, K isotype).

HABITAT. 1800 m.

Despite the lack of fruit and the presence of only one (rather young) leaf, the flowers of this collection are sufficiently distinct to justify its recognition as a new species. It is very similar to the Chinese species *M. birdwoodiana* Tutcher from which it differs florally only in the absence of any pubescence on the margin in the apical half of either standard or wings, and in its slightly longer pedicels. *M. macrocarpa* and *M. sempervirens* Hemsl. form a similar species pair, in which lack of apical pubescence on the corolla is the only character providing an absolute distinction of the latter from the former, although they are good species differing (not strictly definably) in general appearance and in their geographical distribution. It is a pity that mature leaves and fruit are not known. The mature leaflets of *M. birdwoodiana* are distinctive; they are narrow, thick, coriaceous



FIG 2. *Mucuna thailandica*. A leaf; B inflorescence; C bud with bract & bracteoles; D bract; E bracteole; F flower; G calyx; H standard; J wing; K keel; L pistil. All from *Niyomdham* 5. A, F-L $\times \frac{3}{4}$, B $\times \frac{1}{2}$, C $\times 1$, D & E $\times 2$. Drawn by Eleanor Catherine.

and bright pale green when dry. Its fruit is long and woody with narrow thick marginal wings. It would be interesting to see whether the resemblance between *M. birdwoodiana* and *M. thailandica* extends to these characters.

3. *Mucuna gigantea* (Willd.) DC., Prodr. 2: 405 (1825); Ridley, Fl. Lower Siam in J. Straits Branch Roy. Asiat. Soc. 51: 93 (1911); Gagnepain in Lecomte, Fl. Indo-Chine 2: 318 (1916); Ridley, Fl. Malay Penins. 1: 577 (1922); Craib, Fl. Siam. 1: 443 (1928); Merrill in Trans. Amer. Philos. Soc. 24: 210 (1935); Van Thuan, Fl. Camb. Laos Vietnam 17: 35 & 37, fig. 3 (1979). Type : Rheede, Hort. Malab. 8: 63 t. 36 (1688).

For synonymy and more detailed description see Wilmot-Dear (1984: 56 & 1990 figs 1 & 8). Only diagnostic features, and additional details not there included, are given here.

Large sprawling climber; stems, petioles and leaflets glabrous or sparsely fine-adpressed-hairy, usually small or medium, up to 27 cm long, terminal leaflet elliptic-ovate, less often elliptic, rhombic or ovate, 7–13 × 4–8.5 cm; lateral veins 4–6, gently curved; rather thinly chartaceous; stipels 3–5 mm long. *Inflorescence* axillary, 8–25 cm long, branched or not at apex and with flower-bearing side-branches few, up to 6, all crowded at apex, these and pedicels of very varying lengths (decreasing towards apex) such that inflorescence forms a corymb or “pseudumbel”, this shape usually visible even in very young bud state; pedicels with dense, axis with sparse, short fine pale pubescence; bracts deciduous, very small, 3–5 mm long, lanceolate or elliptic, bracteoles more persistent to well-developed bud-stage, larger, 16–18 × 5–7 mm, distinctly exceeding calyx, ovate-lanceolate. *Calyx* small, with dense short fine brown pubescence and abundant irritant bristles, tube 8–12 × 11–15 mm, lobes short and broad, lowest (1–) 2–3 mm, laterals 1–2 mm long, upper lip fairly indistinct. *Corolla* white, tinged yellow, green or pinkish, small; standard rather large for overall flower size, 2.5–3 (–3.8) cm, 2/3–3/4 keel length, wings and keel 2.8–4 cm long, wings 8–10 mm wide. *Fruit* leathery, (1–)3(–6)-seeded, asymmetrically elliptic-oblong to linear-oblong, ± straight, with acute or shortly acuminate apex and convex margins much or little swollen around each seed; markedly laterally flattened but faces convex around each seed; surface with sparse fine brown pubescence and scattered bristles but glabrescent with age, also ornamented with a pattern of strongly-raised vein-lines so close and fine as to give surface almost a pitted appearance; each margin with a pair of conspicuous wings. *Seeds* dark brown or black, reniform or discoid in outline, 2–3 × 1.8–2.5 cm, flattened but faces convex, 8–10 mm in thickness.

subsp. ***gigantea***

Calyx tube up to 10 mm long. *Fruit* (1–)2–3(–4)-seeded, (7–)10–15(–18) × (3.5–)4–5.5(–6) cm, 0.5 cm in thickness; marginal wings (5–)7–10 mm wide. Map 1.

THAILAND. C: Bangkok: 10 Oct. 1920, *Marcan* 456 (K), 10 Dec. 1920, *Kerr* 4516, 29 April 1919, *Kerr* 3679 & 9 Jan. 1920, *Kerr* 3918 (K). Pen: [Na Kown

Sritamarat] Nakhon Si Thammarat; Kiriwong, 18 Dec. 1952, *P. Suvanakoset* 439 (L); Pang-Nga, [Kaw] Koh Yao Yai, 5 March 1929, *Kerr* 17349 (K, L); Ko Kraden, 11 Nov. 1966, *Hansen & Smitinand* 12225 (K). Satun: Tarutao: 6 June 1980, *Congdon* 581 (A, AAU) & 20 Dec. 1980, *Congdon* 1010 (A). Unlocalised: 1859, *Schomburgk* s.n. (mixture with *M. pruriens*) (K).

VIETNAM. Lang Dong: Lang Hanh Forest, Nov. 1967, *Vu Van Cuong* 104 (P). Ha Tien [Kien Giang]: April 1877, *Godefroy-Lebeuf* 934 (K). Minh Hai: Poulo Condor [Con Son I.], 1875–77, *Harmand* 926 (E, P). Unlocalised: *Thorel* s.n. (K).

MALAY PEN. Kedah: Pulau Tengau, April 1894, *Ridley* 15748 (K). Perak: Pangkor I., 19 Aug. 1981, *Chin & Kusen* 3140 (K). Johore: Simpang Kanan, Nov. 1900, *Ridley* 11097; Tg. Penawar, 21 Feb. 1968, *Cockburn* in F.R.I. 7566 (K); Sungai Pontian Besar, 25 June & 25 July 1938, *Corner* in S.F.N. 36957 (K). Also (fide *Ridley*) in Lankawi, Malacca & Singapore.

EXTERNAL DISTRIBUTION. Widespread throughout Asia and the Pacific, especially seacoasts and islands: Japan (Bonin & Ryukyu), India, Burma, Malaysia, Australia, Pacific Is.

HABITAT. Islands, seashores, river banks, rainforest; always near coast; low alt.

The coastal distribution of this species here, as elsewhere, is partly a reflection of the fact that its seeds can be dispersed by sea.

A collection, bearing immature fruits, from E. Malay coast: Pahang, Katapong, May 1890, *Ridley* 1227 (BM) is probably of this species but in some characters appears intermediate between it and the following species, *M. acuminata*; calyx lobes are of intermediate size and the fruit somewhat downcurved. Since the fruits are too immature to show their vein-patterning or their relative lengths and widths at maturity, (which would together be diagnostic) it seems best not to assign a definite determination to this collection.

4. *Mucuna acuminata* Grah. ex J. G. Baker in Hook. f., Fl. Brit. India 2: 185 (1876); Prain in J. Asiat. Soc. Bengal 66, 2: 408 (1897); *Ridley*, Fl. Malay Penins. 1: 577 (1922). Type: Malay Peninsula, Penang, 1822, *Wallich* Cat. No. 5621 (holotype K-WALL!; isotypes BM! K!).

M. acuminata Grah. in Wall. Cat. no. 5621 (nomen).

M. lucidula Burck in Ann. Jard. Bot. Buitenzorg 11: 190 (1893). Type: Sumatra, *Beccari* 621 (isotypes K! L!).

Climber closely resembling *M. gigantea* in vegetative parts and fruit, differing mainly in inflorescence details; differences as follows. *Inflorescences* very short indeed, 2.5–3 cm long, unbranched (rarely 6 cm and branched in Java), with usually 3 flower-bearing side-branches at apex, these and pedicels of varying lengths up to 2 cm such that inflorescence appears pseudumbellate but less markedly so than in *M. gigantea*; pedicels and whole axis with dense pale or brown pubescence; bracts much larger, $\pm 15 \times 7$ mm, narrowly elliptic and acute, bracteoles of similar form to bracts but often smaller or relatively narrower, slightly smaller than in *M. gigantea*, 10–15 \times 4–5 mm, slightly exceeding calyx. *Calyx* tube similar to that of *M. gigantea* but lobes much longer and relatively narrower, at least twice, often 3 times as long as in that species, lowest 6–9 \times

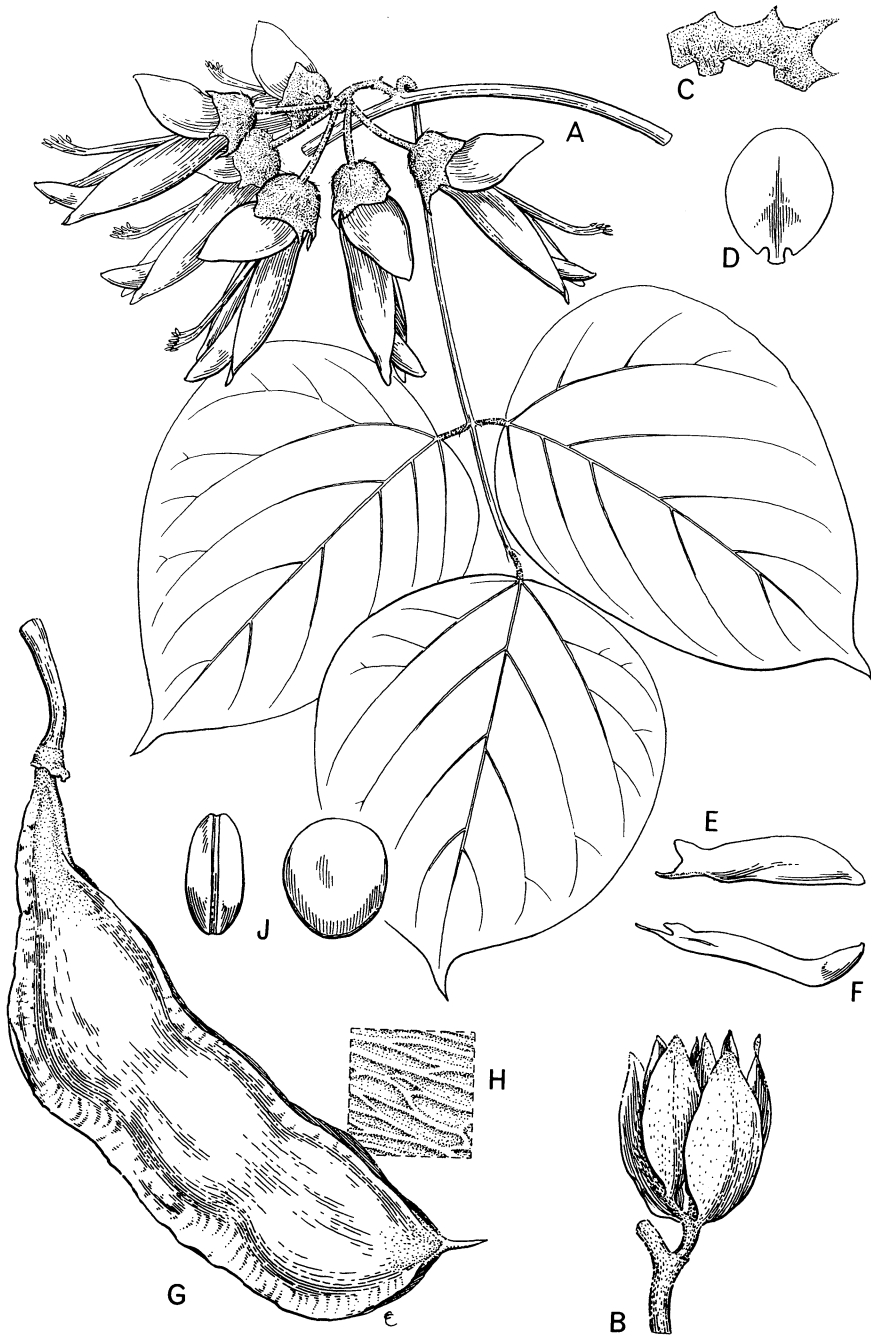
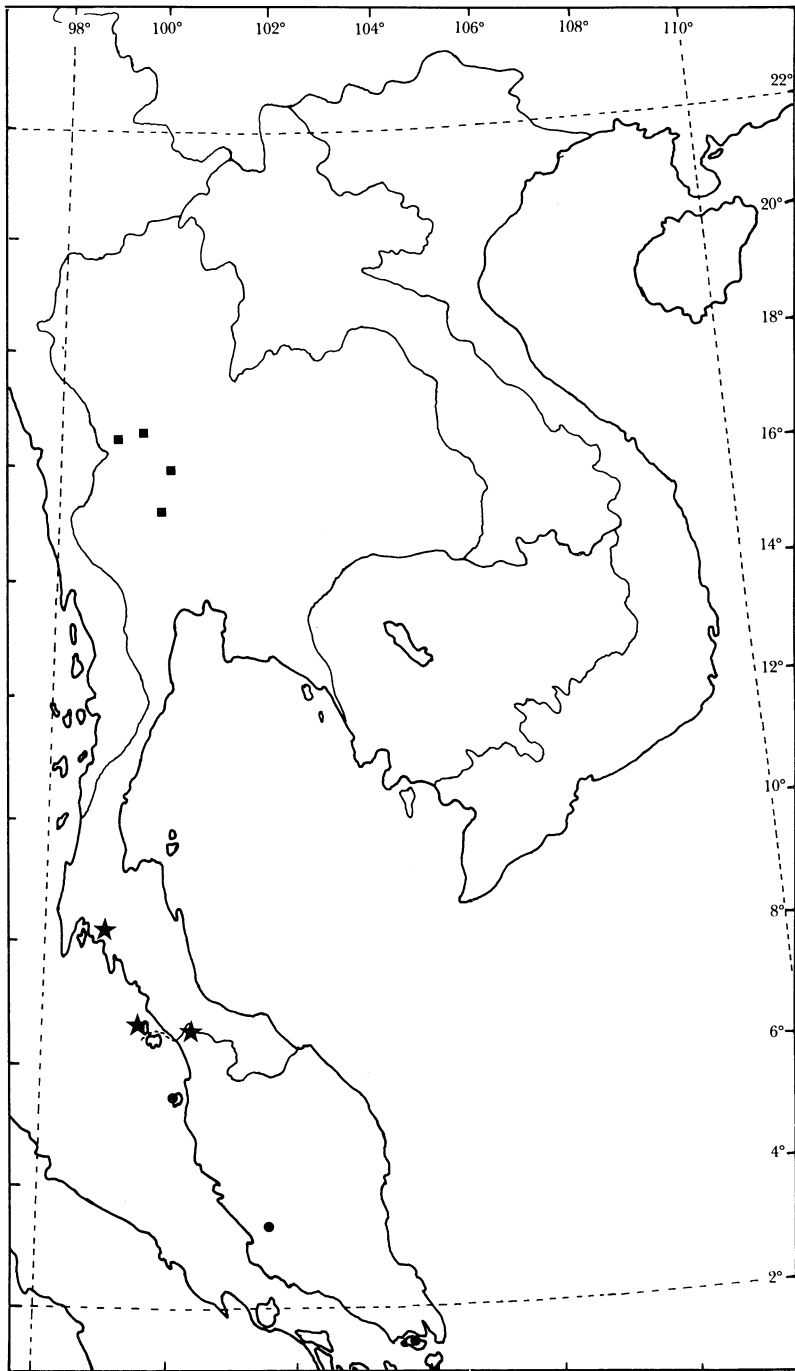


FIG. 3. *Mucuna acuminata*. A leaf & inflorescence; B buds with a bract and bracteoles; C calyx; D standard; E wing; F keel; G fruit; H fruit, surface detail; J seed. H, C - F from King's Collector 7038; B from Wallich 5621; G - J from Alston 16008. B $\times 1\frac{1}{2}$, H $\times 4$, rest $\times \frac{1}{3}$. Drawn by Eleanor Catherine.



MAP 2. Distribution of *Mucuna acuminata* ● and *M. monosperma* ■ in Thailand and the Malay peninsula (absent from Indochina) and of *M. stenoplax* ★.

3–4 mm, laterals 3–6 × 2–3 mm; upper lip well-marked. *Corolla* longer but with parts of different relative lengths; standard relatively much shorter, 2.5–2.7 cm long, just over ½ keel length (basal auricles 1.5 mm long); wings often shorter than keel, 4–4.5 cm long (basal claw 6 mm and auricle 2.5 mm long); keel always ± 4.5 cm (basal claw 6 mm and auricles 1.5 mm long). *Fruit* 3–5-seeded, ± 12 × 3 cm, linear-oblong, rather long and narrow and markedly downcurved throughout length; surface with abundant fine bristles and vein-patterning, but veins forming a much more indistinct and open network often only visible on wings; marginal wings rather narrow, ± 6 mm wide, and with rather irregular ± undulate rather than ± straight distal edge. *Seeds* ?smaller (mature ones not seen). (Fig. 3. Map 2).

MALAY PEN. Penang: 1822, *Wallich* 5621 (K-WALL holotype; BM, K isotypes). Selangor: Batu Caves, Dec. 1920, *Ridley* s.n. (K); Gunong Malacca, Jan. 1886, *King's collector* 7038 (BM, K). Singapore: Chan Chu Kan, *Ridley* 2075 (BM).

EXTERNAL DISTRIBUTION. Java.

HABITAT. Open places; scrub; often by rivers; low alt. to 100 m.

A species of very restricted distribution closely related to the widespread *M. gigantea*.

5. *Mucuna monosperma* DC. ex Wight in Hook., Bot. Misc. 2: 346 (1831); Craib, Fl. Siam. 1: 444 (1928). Type: Eastern India, Kungence Hill, March 1910, *Roxburgh* 276 (lectotype BM!; ? isolectotype K!).

For synonymy and more detailed description see Wilmot-Dear (1987: 28–30 & fig. 1); only diagnostic features and additional details not there included, are given here.

Stems and petioles with fairly conspicuous abundant to dense quite long somewhat spreading pubescence. *Leaves* of quite variable size, up to 28 cm long; terminal leaflet 7–13(–15.5) × (3–)5–7(–9) cm, elliptic or ovate (rarely obovate), usually broad, narrowing abruptly at apex to short wide acumen up to 3 mm long with mucronate tip; lateral leaflets with ratio of widths of abaxial: adaxial halves ± 2:1; lateral veins (4–)5–6, gently curved; membranous to thinly chartaceous, sometimes glabrous, usually with indumentum at least beneath, this red and spreading on veins, paler and more adpressed elsewhere, longer and sparser above; stipels often inconspicuous, 0.5–3 mm long. *Inflorescences* very short, 3–6 cm long, often branched once or more times at or near base, flower-bearing side-branches 2–5, knob-like or rarely 3–4 mm long; pedicels often fairly short, 6–10 mm, these and axis hairy like the stem and with sparse irritant bristles; bracts not seen; bracteoles early-deciduous, linear-lanceolate, rather long 1.5–3 cm long [not “mm” as given in Wilmot-Dear (1987)], acute. *Calyx* with hairs like the axis but much shorter and finer, irritant bristles very abundant; small, tube ± 7 × 10 mm, lobes short and wide, lowest ± 4.5 × 1.5–4 mm, laterals ± 2 × 2 mm, upper lip not well-marked. *Corolla* dark purple, standard ± 2.5 cm, wings 4–4.4 × 0.6 cm with narrowly rounded apex; keel ± equalling wing. *Fruit* leathery, 1–(in literature very rarely 2–)seeded, asymmetrically oblong to elliptic in outline, often broader than long, with very convex margins,

4.5–7.5 × 3.5–5 cm, laterally flattened but swollen around the large seed, up to 2 cm in thickness, with sparse to abundant hairs like the stem and abundant bristles; also with 5–6 lamellae running obliquely transversely from either margin but tending to converge towards centre of pod face and in this area often completely interrupted, of slightly irregular height (width) up to 5 mm high but usually at least 3 mm high throughout most of length; both margins with a pair of somewhat undulating wings ± 5 mm wide into which some lamellae extend. *Seed* red-brown, very large, ± 2.8 × 2.4 cm, reniform or ellipsoid, markedly laterally flattened 0.8–1.2 cm in thickness; hilum black. (Map 2).

THAILAND. N: Tak [Raheng]: to Pang Ma Kham Pom, Dec. 1920, *Rock* 1005 & to Mesawt [Mae Sot], Dec. 1920, *Rock* 676 & 1081 (US). Kamphaeng Pet [Kampeng]: 23 March 1913, *Kerr* 2993 (E, K). SW: Uthai Thani: Ban Rai Dist., Ban Poo Bon, 1 Feb. 1976, *Maxwell* 76–51 (AAU).

EXTERNAL DISTRIBUTION. Indian subcontinent, Burma, Sri Lanka. References in literature to its occurrence in Borneo relate to the very similar species *M. elmeri* Merrill.

HABITAT. Thickets and disturbed forest; clearings; c. 300 m. alt.

This species appears here to be restricted to a small part of N and SW Thailand (adjacent to the rather small part of Burma where it also occurs), which represents the easternmost extent of its range.

6. *Mucuna stenoplax* Wilmot-Dear sp. nov. caulibus foliisque *M. hainanensi*, *M. interruptae* et *M. revolutae* persimilis, *M. revolutae* floribus etiam non grandibus similis, sed axibus secundariis inflorescentiae extensis iis distat et ab omnibus speciebus asiaticis lamellis simplicis fructus usque marginem distalem alarum extensis et alis ibi (ut in *M. biplicata*) in dentibus valdis productis differt. Typus: Malay Peninsula: Perlis, *Chan* in F.R.I. 19916 (holotypus K!; isotypus KEP).

Stems and petioles with sparse fine adpressed pale hairs; old stems with prominent warty lenticels. *Leaves* up to 27 cm long, petiole up to 12 cm; terminal leaflet of moderate size 9–11 × 5–7 cm, elliptic with gradually shortly acuminate apex and broadly cuneate base; laterals moderately asymmetrical with width ratio of abaxial to adaxial halves 3:2; lateral veins 4–5 pairs, gently curved but near margin more sharply curved and becoming indistinct, prominent both sides, lesser venation indistinct; thinly chartaceous, adpressed-hairy like the stem, fairly abundantly (but inconspicuously and never densely) so beneath and more sparsely so (or leaves glabrescent) above; stipels fine, 4–5 mm long. *Inflorescence* very short, 2–7 cm long, main axis unbranched and bearing 2–5 flower-bearing side-branches, these lengthened to 3–4 mm and relatively robust, 1.5 mm in thickness; pedicels rather long, 2 cm, these and whole axis with hair covering like that of stem but more dense and hairs less closely adpressed (the majority at least 0.4 mm long); bracts not seen, bracteoles slightly exceeding calyx, fairly narrowly ovate 12 × 6 mm, acute, sparsely hairy like the stem. *Calyx* densely hairy like the pedicels; tube medium to broadly cup-shaped, ± 8 × 14 mm; lowest lobe 7–8 mm, laterals 4–5 mm long, all narrow up to 2 mm wide and long-acuminate; upper lip well-marked, equalling laterals. *Corolla* purple, small; standard ±

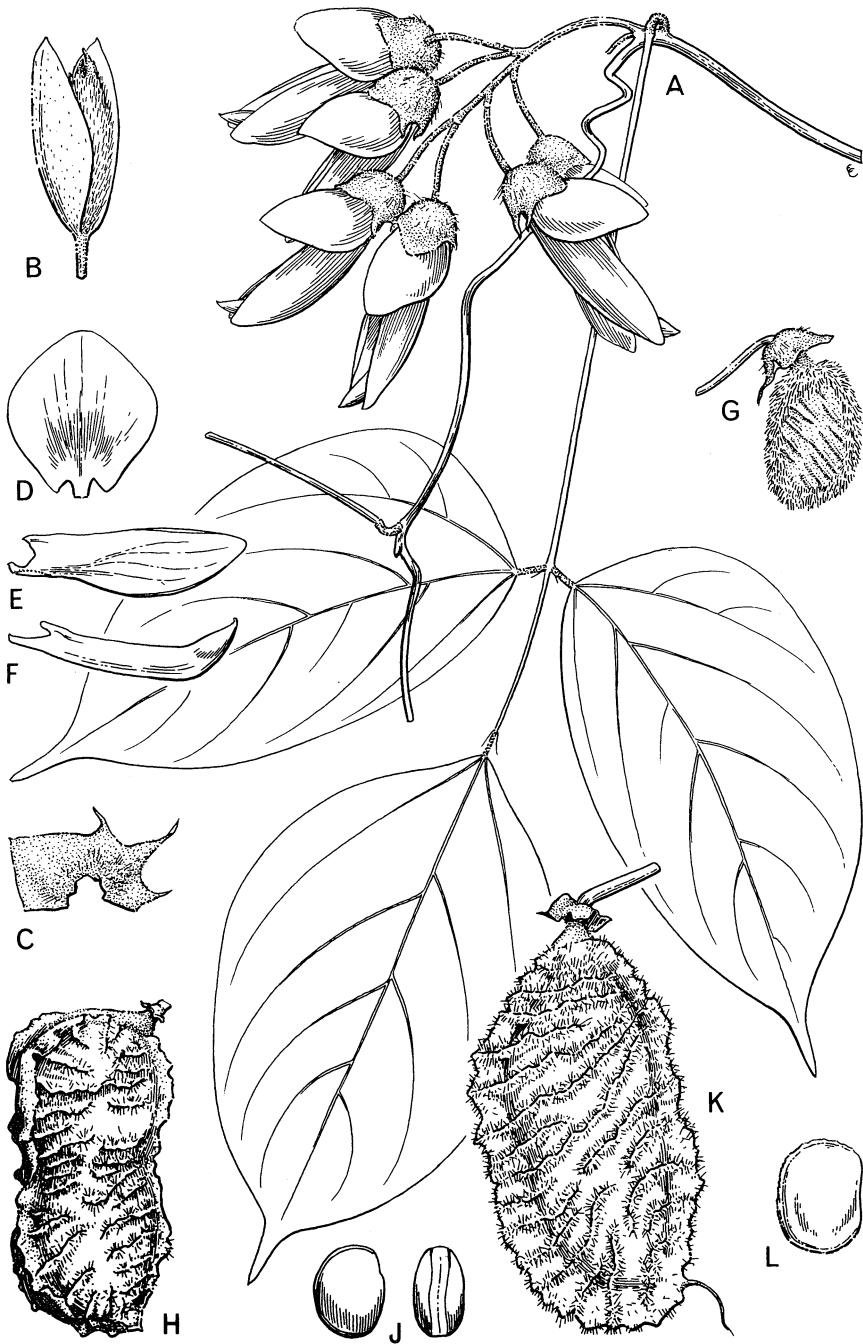


FIG 4. *Mucuna stenoplax*. A habit; B bud with bracteoles; C calyx; D standard; E wing; F keel; G young fruit (indumentum partly removed); H, K fruits; J, L, seeds. A-G from *Phusomsaeng & Pinnin* 49; H, J from *Chan, FRI*. 19916; K, L from *Congdon & Hamilton* 296. B \times 2, G \times 1, rest \times $\frac{1}{2}$. Drawn by Eleanor Catherine.

2.8 × 2 cm with basal auricles 1 mm and claw 3 mm long; wings ± 4.5 cm long, ± straight, of moderate width ± 1.2 cm wide but tapering gradually to narrower tip, with basal claw 6 mm and auricle 2 mm long; keel ± equalling wing, markedly upcurved at apex, basal claw 7 mm and auricles 2 mm long. *Fruit* leathery, 2-seeded, 5–9 × 2.5–4 cm, laterally flattened up to 1 cm in thickness, narrowly oblong, somewhat constricted between seeds and with broadly acute apex and rounded base; surface with dense very coarse irritant yellow bristles and scattered shorter finer bristles; also with 12–15 obliquely transverse ± parallel simple (non-bifurcated) lamellae, these narrow but of irregular height, 1–2 mm for the most part but increasing to 4 mm in places and the majority (but not all) interrupted near middle of pod, all continued to distal edge of marginal wing; both margins with a pair of wings of irregular width 3–4 mm for the most part but at points where lamellae run into it extended to 5–6 mm, thus appearing irregularly jaggedly dentate. *Seeds* black, of moderate size, 2–2.4 × 1.5–1.8 cm, ellipsoid, laterally flattened but faces convex, ± 1 cm in thickness; hilum black. (Fig. 4. Map 2).

Endemic to Malay Peninsula and Peninsular Thailand.

THAILAND. Pen: Trang: Khaó Chong, 2 Feb. 1969, *Phusomsaeng & Pinnin* 49 (AAU, K, L). Satun: Tarutao I., 19 Feb. 1979, *Congdon & Hamilton* 296 (A).

MALAY PEN. Perlis: Kaki Bukit, 1 March 1972, *Chan* FRI 19916 (holotype K).

HABITAT. Evergreen forest; secondary forest; low alt. to 150 m.

A species apparently of very restricted distribution. It is very distinct in fruit from all others in the region (and in Asia generally) with a superficial resemblance to the group of bifurcated-lamellate species, (represented in this region by *M. buplicata* with which it was hitherto confused) whose lamellae extend to the distal edge of the marginal wing which at these points is produced into jagged teeth. Its lengthened side-branches make it easy to distinguish in flower from the three species mentioned in the diagnosis above (nos 7–9), to which it is virtually identical vegetatively. The name chosen indicates the narrow fruit-lamellae.

7. *Mucuna hainanensis* Hayata, *Icon. Pl. Formos.* 3: 72 (1913); Van Thuan, *Fl. Camb. Laos Vietnam* 17: 39 (1979); Wilmot-Dear in *Kew Bull.* 46: 205–212 (1991). Type: Hainan, May 1910, *Katsumada* s.n. (holotype TI; ? isotype HK!).

See note on p. 244 and also Wilmot-Dear 1991 (b): 205–212 & 1991 (c) for discussion of nomenclatural questions and taxonomic status.

Climber strongly resembling *M. stenoplax* in vegetative characters; stems and leaves glabrous or sparsely adpressed-hairy. Leaflets elliptic, elliptic-ovate or elliptic-obovate, varying greatly in size. Inflorescences short or up to 40 cm long, sometimes bearing bracts on lower (non-flower-bearing) part of axis, these of very different form from those (upper) bracts subtending buds or bud groups, broadly ovate, long-acuminate; upper (flower-subtending) bracts broadly elliptic or obovate with rounded and often hooded apex. *Corolla* purple. *Fruit* leathery, ornamented with a pair of wings running along either margin and 8–25 simple, flap-like, raised lamellae running ± parallel somewhat obliquely transversely across either face, at least some of which extend into the wings.

This species comprises two subspecies; subsp. *multilamellata* Wilmot-Dear occurs in the Indian subcontinent and Philippine Is.

subsp. *hainanensis*

M. suberosa Gagnep. in Notul. Syst. (Paris) 3: 27 (1914) & in Lecomte, Fl. Indo-Chine 2: 319 (1916). Types. Vietnam: Tonkin, *D'Alleizette* 345, *Balansa* 2260, *Bon* 2925 & 332 (syntypes P!), *Balansa* 2257, (syntype P!; isosyntypes AAU! K!), *Balansa* 4402, *Bon* 2938 (syntypes P!; isosyntypes K!) [Note. Some isosyntypes omitted in Wilmot-Dear in Kew Bull. 39: 43 (1984)].

M. nigricans sensu auct.; ? Merrill in Trans. Amer. Philos. Soc. 24: 209 (1935) (see Wilmot-Dear (1991 (c): 518) for discussion of the identity of the plant there mentioned); Van Thuan, Fl. Camb. Laos Vietnam 17: 36 (1979) (description only, not cited specimens); Tateishi & Ohashi in Bot. Mag. (Tokyo) 94: 99 (1981); (*non* (Lour.) Steud.; see note on this name below, p. 244).

M. nigricans sensu auctt. *non* (Lour.) Steud. var. *hainanensis* (Hayata) Wilmot-Dear in Kew Bull. 39: 43 (1984).

M. nigricans sensu auctt. var. *hongkongensis* Wilmot-Dear in Kew Bull. 39: 45 (1984).

? *M.* "*sp.*" in Pham Huang Ho, Fl. S. Vietnam: 320 & fig. (1960).

M. interrupta sensu Averyanov in Averyanov et al., Contrib. Viet. Isl. Fl. Veg.: 58 (1988).

See Wilmot-Dear (1984: 43 & fig. 2; 1991(b): 206–207 & fig. 1) for more complete description although many additional details appear here.

Leaves of small to moderate size, up to 25 cm long; terminal leaflet very variably sized, 4.5–12 × 2.5–5.5 cm, lateral veins (3–)5(–7) pairs, similar in form to those of *M. stenoplax*; stipels 1–2 mm long. *Inflorescences* unbranched apart from bearing 5–18 reduced, knob-like, flower-bearing side-branches scattered throughout most of length but absent from region near base; lower (non-flower-subtending) bracts where present 20–30 × 10–16 mm; upper bracts 10–20 × 8–18 mm; pedicels 0.8–1.3 cm long, these and main axis with dense adpressed pale fine pubescence; bracteoles linear-oblancheolate or narrowly elliptic, 9–13 × 2–4 mm. *Calyx* hairy like the axis and with abundant red bristles; moderate-sized; tube broadly cup-shaped, 0.6–1 × 1–1.3 cm; lobes long and narrow, lowest 8–10 mm, laterals 5–6 mm long, all 2–3 mm wide and acuminate; upper lip often well-marked. *Corolla* of (small-) moderate size (see note below), standard 2.7–3.2 cm long; wing (4.2–)5–5.5 × (8–)12–15 mm, relatively broad but narrowed to acute apex; keel ± equalling wing. *Fruit* varying widely in shape from broadly asymmetrically oblong with very convex upper margin, straight lower margin and containing usually 2 seeds, to linear-oblong but strongly indented between 3–4 seeds; 7–17 × 3–5 cm, length to width ratio ranging from 2–4: 1; apex acute with long and persistent remnant of style; lamellae 18–12(–14), very oblique, rather thin in texture, 4–5 mm high (wide); surface bearing abundant irritant red bristles but otherwise glabrescent and rather shiny; marginal wings wide, 8–14 mm. *Seeds* moderate to large, black, oblong or ± reniform, 1.7–2 (–2.5) × 1.5(–2) cm, strongly laterally flattened 5–7(–10) mm in thickness;

hilum black, encompassing $\frac{1}{2}$ – $\frac{3}{4}$ circumference. (Fig. 7C – D. Map 3).

As noted in earlier work (Wilmot-Dear 1991 (1): 237), flowers in this species can be misleading when dried, since immature ones are easily mistaken for mature ones. I suspect that the true mature keel length range, were live material to be examined, would be no more than 5 – 5.5 cm.

THAILAND. SW: Prachuap Khiri Khan: Hui Yang, 4 Oct. 1930, *Put* 3198 (K, L). Pen: Surat Thani: Koh Samui, 16 Nov. 1927, *Put* 1280 (K, L).

VIETNAM. Ha Son Binh [Hao Binh]: Muong Thon, April 1933, *Petelot* 4937 (NY, P), Tu Phap, March 1887, *Balansa* 2260 (P); Kien Khe, *Bon* 2925 (P). Quang Ninh: Quang Yen, 1908, *D'Alleizette* 345 (P). Ha Nam Ninh: Ninh Binh, May 1886, *Balansa* 2257 (K, P); Lat Son, June 1885, *Bon* 2938 (K, P); Khang Chuong, April 1881, *Bon* 447 (P); Tho Mat, March 1881, *Bon* 332 (P). Binh Tri Thien: Hue, *Eberhardt* 3226 (P) (cited under *M. interrupta* by Van Thuan (1978)). Quang Nam-Da Nang: Cu Hao Cham, 27 March 1987, *Averyanov et al.* 592 (LE) (cited as *M. interrupta* by Averyanov, see above).

EXTERNAL DISTRIBUTION. China: Hong Kong & Hainan.

HABITAT. Forests, thickets, rocky areas, hedges; low altitude.

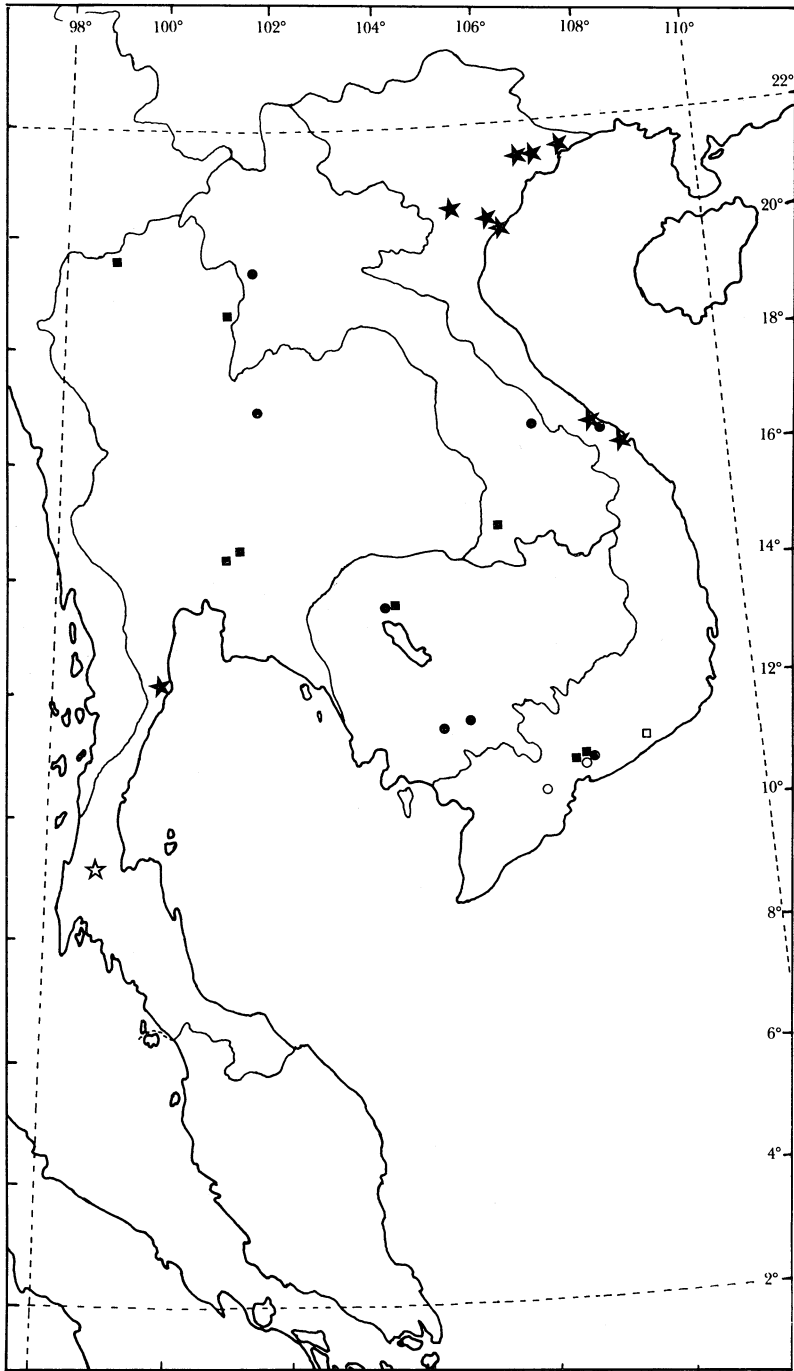
A subspecies with a rather patchy distribution in the region, occurring mainly in that part of Vietnam nearest to Hainan, but otherwise only (apparently uncommonly) in Peninsular Thailand. This could be due to the fact that heavy rainfall allows the presence of very wet evergreen forest in these regions, although one might for the same reason expect this plant to occur also in SE Thailand and Cambodia.

Although the syntypes of *M. suberosa* represent one extreme in the considerable range of variation shown by the fruit, being linear-oblong and usually 4 times as long as wide, and the type of *M. hainanensis* represents the other extreme, there appears to be no absolute distinction, and *M. suberosa* is therefore retained in synonymy. However, it is worth noting that relatively long and narrow fruits tend to occur in Vietnam and Hong Kong while wider often shorter ones are found in Thailand and Hainan.

8. *Mucuna revoluta* Wilmot-Dear sp. nov. caulibus foliisque *M. hainanensi*, et *M. stenoplaci* persimilis, *M. stenoplaci* floribus etiam non grandibus similis, sed lamellis fructuum bifurcatis iis differt et *M. interruptae* valde affinis sed partibus apicalibus lamellarum revolutis et alis marginalibus involutis ea distat. Typus: Vietnam: [Dong Nai Prov.] Trian, Feb. 1877, *Pierre* s.n. (holotypus P!).

M. interrupta Gagnep. in Lecomte, Fl. Indo-Chine 2: 321 (1916), pro parte, collection by *Harmand* 272; see note on p. 228; Van Thuan, Fl. Camb. Laos, Vietnam 17: 38 (1979) pro parte (some citations and part of flower description); sensu Wilmot-Dear in Kew Bull. 39: 46 pro parte & fig. 3b (collection by *Wang* 8065); non Gagnep. sensu stricto.

M. imbricata DC. ex Bak. var. *bispicata* Gagnep., op. cit.: 320 (1916). Types: Vietnam: Delta, *Harmand* s.n., & Trian, *Pierre* s.n. (syntypes P!). See Wilmot-Dear 1991 (c): 518 concerning Gagnepain's reference to *M. imbricata* in



MAP 3. Distribution of *Mucuna hainanensis* subsp. *hainanensis* ★, *M. revoluta* ● and *M. interrupta* ■ in Thailand and Indochina (absent from Malay peninsula). (☆○□ indicate exact locality uncertain).

Indochina.

M. nigricans sensu Van Thuan, Fl. Camb. Laos Vietnam 17: 38 (1979) (citations only, excl. *Loureiro* collection); *non* (Lour.) Steud.

M. biphlicata sensu Van Thuan, op. cit.: 40 (1979) (all citations and part of description); *non* Teijsm. & Binnend. ex Kurz.

Stems and petioles glabrous or with sparse fine adpressed pale hairs. *Leaves* up to 20 cm long, petiole to 9 cm; terminal leaflet small to medium-sized, 8–10 × 4–5.5 cm, elliptic or ovate with abruptly acuminate apex and narrowly rounded base, laterals markedly asymmetrical with width ratio of abaxial to adaxial 1 ¾–2: 1; lateral veins 4–5 pairs, gently curved, minor veins inconspicuous; thinly chartaceous, with sparse fine adpressed hairs both sides, rarely ± glabrous; stipels 2–4 mm long. *Inflorescence* of moderate length, (3–)8–16 cm, unbranched or once-twice branched near base, and bearing 5–13 reduced, knob-like flower-bearing side-branches evenly-distributed in upper 2/3 of axis; pedicels short or medium, 5–10 mm, these and main axis with dense very fine short (0.1–0.2 mm long) almost velvety spreading pale pubescence; bracts and bracteoles sparsely hairy like the axis, all of similar range of shapes and sizes, (5–)10–17 × (2–)5–7 mm, elliptic or narrowly obovate to linear-oblong with broadly rounded to acute apex, bracteoles slightly or greatly exceeding calyx. *Calyx* densely hairy like the axis and with irritant red bristles, fairly narrowly cup-shaped, 8 × 8–10 mm; lobes large, lowest 8–9 mm, laterals 4–6 mm long, all fairly broadly triangular and broadly acute with abrupt fine acumen; upper lip well-marked. *Corolla* purple, small; standard ± 3 cm long, basal auricles 1 mm; wings 4.5–4.8 cm long, moderately wide ± 1 cm, basal claw 5–6 mm and auricle 2–3 mm long; keel ± equalling wing, markedly upcurved at apex, basal claw 8 mm and auricles 1–2 mm long. *Fruit* leathery, small or medium sized, (1–)2-seeded, 6–9 × 4–4.5 cm, somewhat laterally flattened up to 2.5 cm in thickness, broadly oblong sometimes asymmetrically so, with markedly convex margins hardly or not at all indented between seeds, ± acute at apex, rounded at base; surface with spreading pubescence like the axis and abundant irritant bristles; also with 8–12 very obliquely transverse lamellae bifurcated at apex to give “T”-shape in cross-section and all interrupted along mid-line of pod and none continued onto marginal wings; apical halves of lamellae fairly broad up to 5 cm but strongly revolute and thus appearing narrower; both margins of pod with a pair of strongly inrolled wings ± 4 mm wide. *Seeds* shiny, red-brown with black mottling, very large, 2.5–2.8 × 2 cm, ellipsoid, laterally flattened but with convex faces, 1.5 cm in thickness. (Figs 5, 6K. Map 3).

THAILAND. NE: Loei: Ban Na Luang, 16 Jan. 1920, *Van Beusekom & Phengkklai* 3034 (L). E: Nakhon Ratchasima: Pak Thong Chai, Nov. 1970, *Charoenphol et al.* 4541 (K). SE: Chonburi: Siricha, Kow Kieo; 4 Oct. 1975, *Maxwell* 75–1020 (AAU, L) & 16 Dec. 1974, *Maxwell* 74–1054 (L). Chanthaburi: Khao Soi Dao: 9 Nov. 1969, *Van Beusekom & Smitinand* 2058 & *Geesink & Hiepko* 7907 (mixture with *M. pruriens*) (K, L); Kao Sabap, 9 Jan. 1930, *Kerr* 18022 (BM, K). Peninsula: Krabi: Ban Keng, 9 Nov. 1930, *Kerr* 19813 (K, L).

CAMBODIA. Siem Reap: Angkor, 12 Dec. 1911, *Lecomte & Finet* 1752 (P); Beng

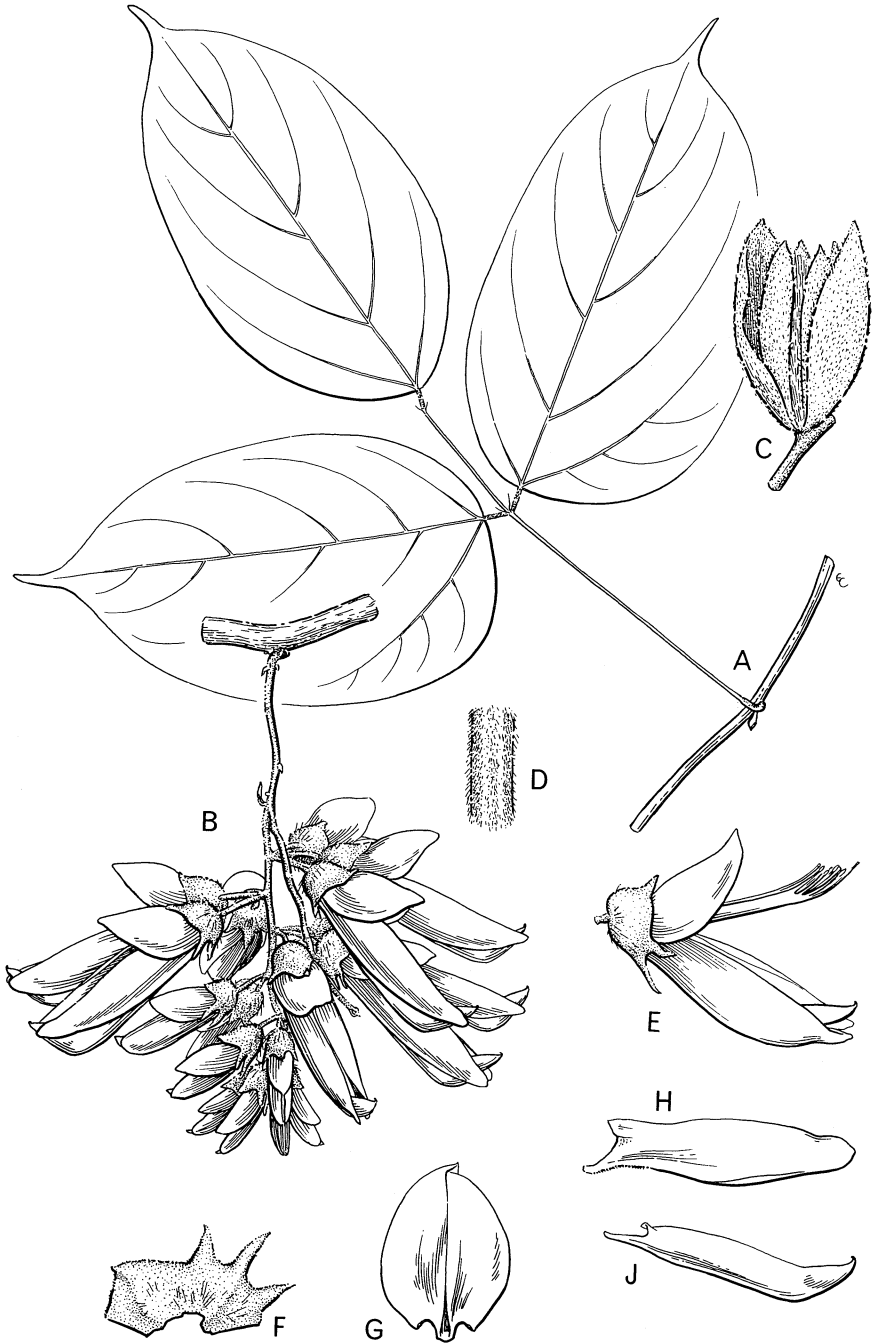


FIG. 5. *Mucuna revoluta*. A leaf; B inflorescence; C bud with bract and bracteoles; D part of inflorescence axis; E flower; F calyx (opened out); G standard; H wing; J keel. A, B, D from Kerr 19813; C from Poilane 678; E-J from Charoenphol et al. 4541. C $\times 2$, D $\times 6$, rest $\times \frac{3}{5}$. Drawn by Eleanor Catherine.

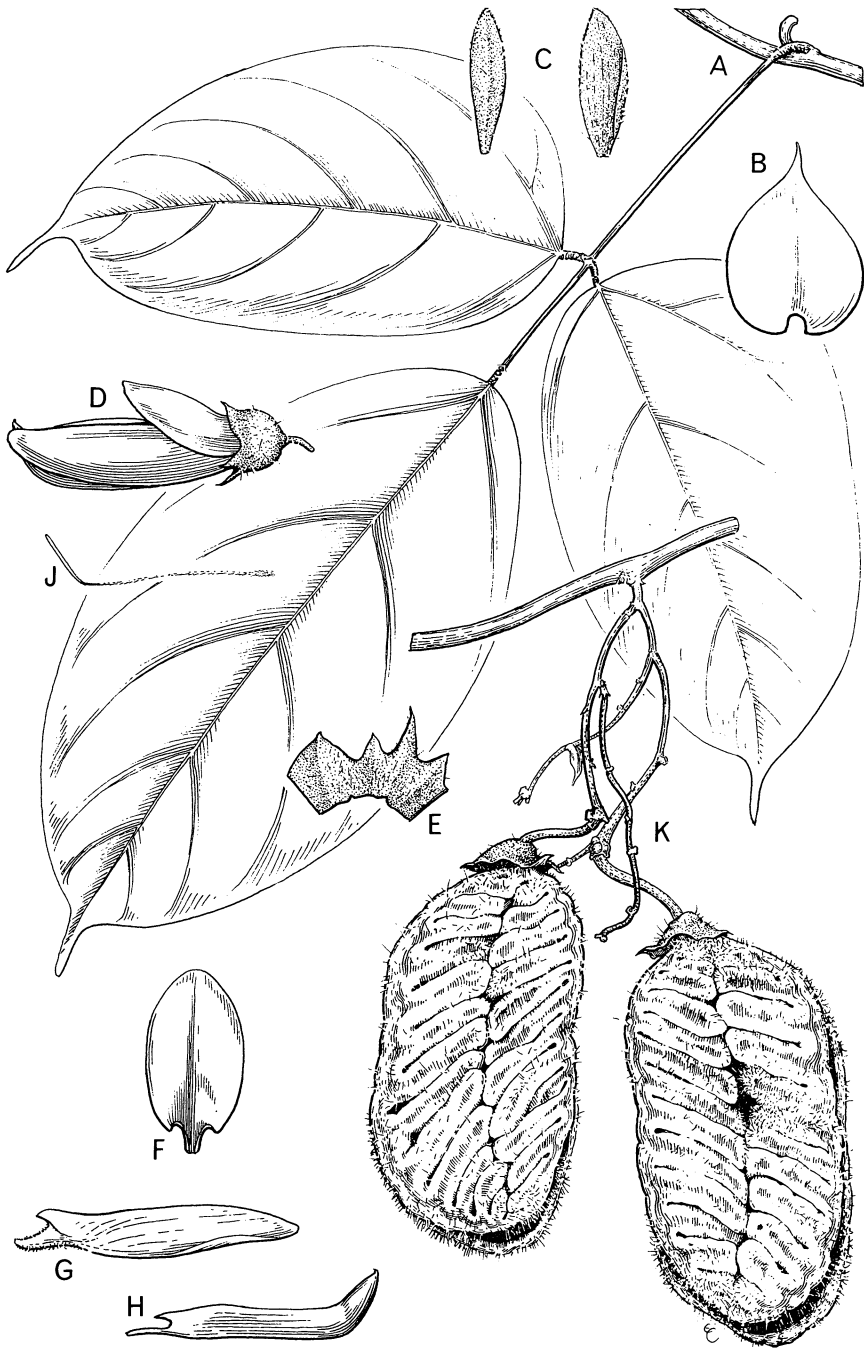


FIG 6. *Mucuna interrupta*. A leaf; B bract; C bracteoles; D flower; E calyx; F standard; G wing; H keel; J pistil. *M. revoluta*. K infructescence. A from Larsen 3083; B from Maxwell 74-689; C-J from Pierre s.n. (1866); K from Kerr 18022. All $\times \frac{1}{3}$. Drawn by Eleanor Catherine.

Malea, March 1866, *Martin* 518 (P). Kandal: Phnom Penh, June 1909, *D'Alleizette* s.n. (P).

LAOS. Sayabouri: Houey Nam Sak, 1 Jan 1853, *Vidal* 2059 (P), Savannakhet: Se-Moun, Jan. 1876, *Harmand* 272 (P).

VIETNAM. Binh Tri Thien: Hue, Sept. 1877, *Harmand* 1922 (P), Phu Khanh: Nha Trang, March 1911, *Robinson* 1345 (P); Phu Hu, 19 & 23 Jan. 1923, *Poilane* 5351 & 5494 (P). Tan Ninh: 3 Nov. 1919, *Poilane* 678 (P); Ninh Thanh, 23 April 1938, *Muller* 42 (P). Dong Nai: Dinh Quan, 27 & 29 Nov. 1932, *Poilane* 21505 & 21530 (P); Trian, Feb. 1877, *Pierre* s.n. (P holotype). 3 Frontiers region: *Schmid* 112 (P).

EXTERNAL DISTRIBUTION. SW China (Yunnan).

HABITAT. Roadsides; scrub; forest and disturbed areas; 300–800 m alt.

The separation of this species from *M. interrupta* alters and adds to the information given concerning Chinese species in Wilmot-Dear (1984: 46) since one collection there cited under *M. interrupta*, *Wang* 80655, is *M. revoluta*. Most of the description there given (except for a few fruit details) relates to *M. interrupta* but the problem of white flower-colour there remarked is now solved, since *M. interrupta* sensu stricto does indeed have white, not pink, flowers. See note below, p. 228, under *M. interrupta*.

The name chosen indicates the distinctly revolute lamellae.

9. *Mucuna interrupta* Gagnep. in Lecomte, Fl. Indo-Chine 2: 321 (1916) (see note (2) below); Craib, Fl. Siam. 1: 444 (1928); Van Thuan, Fl. Camb. Laos Vietnam 17: 38 (1979) pro parte (some citations should correctly be referred to *M. revoluta*; see note above, p. 00); Wilmot-Dear in Kew Bull. 39: 46 & fig. 4 pro parte (see note above) (1984). Type: Cambodia: Angkor, *Thorel* 2098 (lectotype P!) (lectotypified by Van Thuan 1979).

M. nigricans (Lour.) Steud. var. *cordata* Craib, Fl. Siam. 1: 444 (1925). Type: Thailand, 17 July 1925, *Noe* 125 (holotype K!).

Climber closely related to *M. revoluta*, in vegetative characters \pm identical to both it and *M. hainanensis*; differing from *M. revoluta* as follows. Hairs on petiolules and petioles, especially near base, often abundant and \pm spreading; terminal leaflet often larger, up to 12 \times 6.5 cm, laterals slightly less asymmetrical; lateral veins 5–6 pairs; leaflet surface fine-addressed-hairy both sides, inconspicuously but often fairly abundantly (but never densely) so beneath. *Inflorescence axis* 10–14 cm long, unbranched and bearing few or up to 6 knob-like flower-bearing side-branches towards apex, pedicels \pm 10 mm long, these and axis with dense addressed pale pubescence much finer than that on stem (where present); bracts very large, some usually persistent, often even with mature fruit and some present on lower, flowerless, part of axis, all of same shape, broadly ovate, acute or shortly acuminate, increasing in size towards apex of axis, (22–)30–40 \times (7–)18–20 mm; bracteoles considerably longer than calyx, linear-oblancoelate, acute at apex, 22–30 \times 5 mm. *Calyx* addressed-pubescent like the axis and with irritant bristles; tube fairly broadly cup-shaped, 10 \times 15 mm; lowest lobe 6–10 mm, laterals 5–6 mm long, all rather broad 5–6 mm wide, broadly triangular

narrowing to a broadly acute and never acuminate tip; upper lip not well marked. *Corolla* white or creamy, said to have purple base, medium to large; standard 3.2–3.5 × 2.4 cm; wings 5.5–6 cm long, narrower than in *M. revoluta*, 8–10 (rarely –15) mm wide; keel ± equalling wing. Fruit considerably larger than in *M. revoluta*, 3-seeded (rarely said to be 2-seeded), 13–14 × 6–7 cm, markedly laterally flattened ± 2.5 cm in thickness, broadly oblong, rounded at apex and base; surface with abundant fine spreading red-brown pubescence and irritant bristles; surface lamellae similarly oblique and bifurcated but apical halves somewhat upcurved, never revolute; marginal wings very wide, 1.2–1.5 cm, flat, not inrolled. *Seeds* orange-brown, even larger than in *M. revoluta*, 3 × 2.5 cm, reniform-discoid, markedly laterally flattened only ± 1 cm in thickness; hilum black. (Figs 6A–J, 7A–B. Map 3).

THAILAND. N: Nan: Pa Sing, 5 Dec. 1957, *Walker* 7949 (US); Chiang Mai: Doi Chiang Dao, Teentok., 3 Aug. 1968, *Larsen et al.* 3083 (AAU, E, L, P). C: Saraburi: Muak Lek, 17 July 1925, *Noe* 125 (K) & Sahn Lahn, 20 Nov. 1973 & 13 July 1974, *Maxwell* 73–682 (AAU) & 74–696 (L).

CAMBODIA. Siem Reap: Angkor, 1866–68, *Thorel* 2098 p.p. (P).

LAOS. Champassak: Bassac, 1866–68, *Thorel* 2098 p.p. (P).

VIETNAM. Thuan Hai: Ca Na, 25 Oct. 1925, *Poilane* 12501 (P). Dong Nai: Bien Hoa, 14 Oct. 1921, *Poilane* 19685 (P). [Ho Chi Minh City] Saigon: 1875, *Godefroy* s.n. (P) & Cholon, Aug. 1866, *Pierre* s.n. (A, BM, E, K, L).

EXTERNAL DISTRIBUTION. SW China; Burma; ? NE Indian subcontinent; see note (1) below.

HABITAT. Evergreen forests and open thickets; 75–600 m alt.

A collection from Burma: Shan States, *Lace* 4155 (DD, K), was referred earlier (Kew Bull. 42: 37 (1987)) to *M. nigricans* auctt. non (Lour.) Steud. (= *M. hainanensis* Hayata subsp. *multilamellata* Wilmot-Dear; see Kew Bull. 46: 205 (1991)); it seems, on re-examination of very immature fruit and calyx and in the light of the greater number of specimens since seen, to be referable to *M. interrupta*. This constitutes a new record for Burma. Two other collections, unfortunately of fruit only, Bhutan, *Grierson & Long* 3647 (E, K) and India, Meghalaya, "Upper Assam", *Hume* s.n. (K), referred earlier to *M. imbricata* DC. ex Bak. (tom cit. 34 (1987)) may possibly also belong here; their two-seeded but not undulate-lamellate fruits present an appearance rather intermediate between the two species which are not readily distinguishable without bracts, calyx lobes or flowers (see key to lamellate-fruited Asian species in Kew Bull. 46: 205 (1991)).

Gagnepain originally confused two taxa under his name, citing specimens which included one flowering and fruiting specimen of *M. revoluta*. His description, presumably for this reason, includes certain characters which belong to the latter species, notably the pink flowers, but is for the most part appropriate to *M. interrupta* sensu stricto.

The species appears to be restricted to rather few and small areas, but this may merely reflect the under-collected nature of the region as a whole.

10. *Mucuna biplicata* *Teijsm. & Binnend. ex Kurz* in J. Asiat. Soc. Bengal 43, 2: 186 (1874); Burck in Ann. Jard. Bot. Buitenzorg 11: 186, T. 14 fig. 1 (1893);

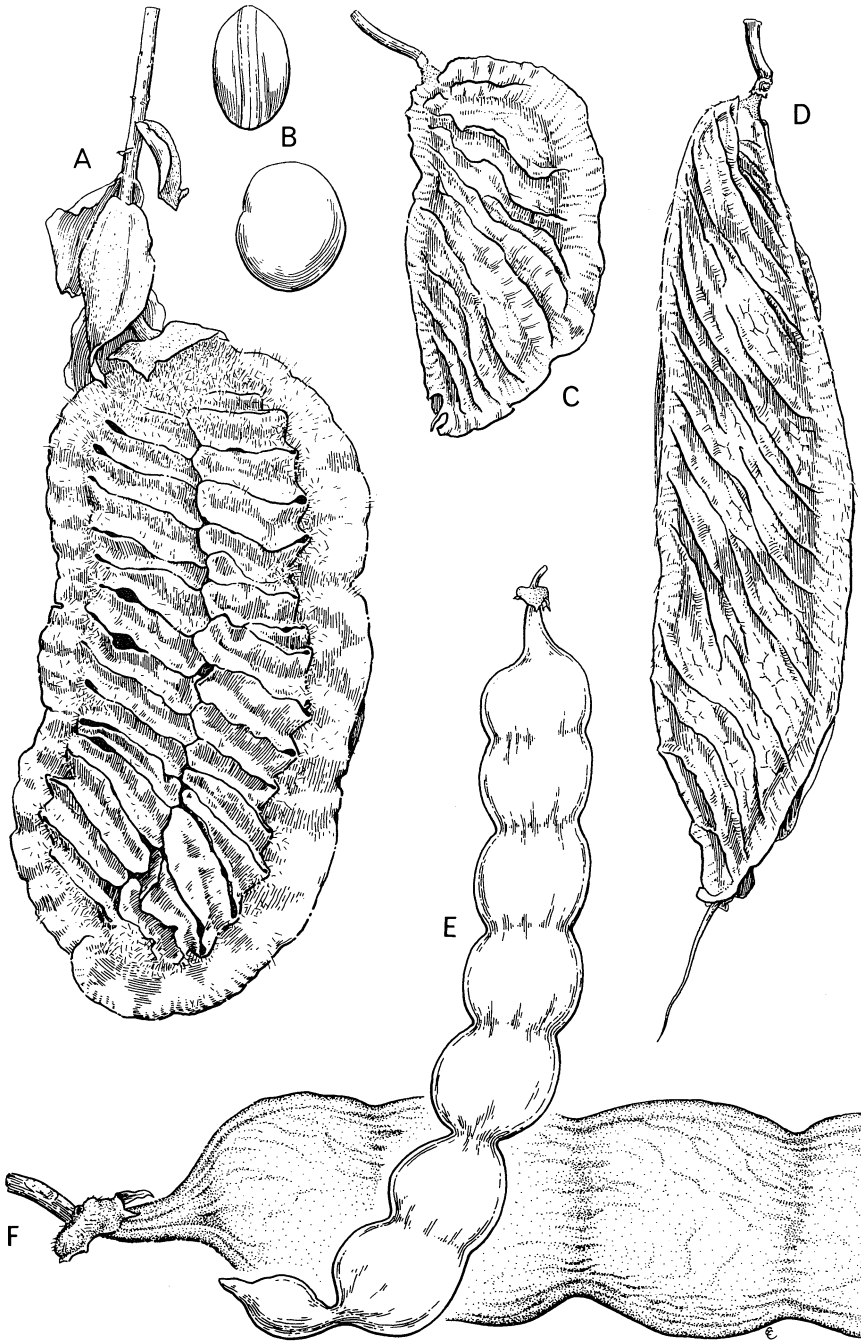


FIG. 7. *Mucuna interrupta*. A fruit; B seed. *M. hainanensis* subsp. *hainanensis*. C, D fruits. *M. macrocarpa*. E fruit; F part of fruit. A from Maxwell 73682; B from Pierre s.n.; C from Put 1280; D from Balansa 4402; E, F from van Beusekom & Phengkhlai 435. E $\times \frac{1}{3}$, rest $\times \frac{2}{3}$. Drawn by Eleanor Catherine.

Ridley, Fl. Malay Pen. 1: 576 (1922). Type: Teijsmann (cult. in Hort. Bot. Bogor ex Borneo, Kapuas) (holotype BO).

M. buplicata Teijsm. & Binnend., Cat. Hort. Bot. Bogor: 216 (nomen).

Stems glabrous. *Leaves* medium or large, in shape somewhat like those of *M. monosperma*, 20–25(–40) cm long; petioles 7–12(–20) cm; terminal leaflet 10–12(–18) × 5–7(–11) cm, broadly elliptic, narrowing fairly abruptly to short wide acumen, base broadly rounded; lateral veins 4–5 pairs, only very slightly curved through most of length (more sharply near margin); thinly or thickly chartaceous, ± glabrous; stipels fine, 2–3 mm long. *Inflorescence* short, 5–9 cm, with several branches at or near the base, many flowered, bearing 4–10 flower-bearing side branches on each branch, these reduced and knob-like or lengthened up to 2 mm; pedicels fairly long, 1·2–2 cm, these and axis with dark-brown spreading fine pubescence and scattered irritant bristles; bracts not seen, bracteoles narrow and short up to 4 mm long. *Calyx* pubescent like the pedicels, in shape rather like that of *M. monosperma*; tube medium cup-shaped, 5–6 × 8–10 mm; lobes all very small, lowest 1·5–4 × 1–3 mm, laterals up to 2 mm long; upper lip indistinct. *Corolla* purple, small, petals resembling those of *M. monosperma* in shape and size of slightly longer; standard ± 2·5 cm, wings and keel 4–4·8(–5·3 in lit.) cm long. *Fruit* leathery, 3–5 seeded, 7–10 × 2·5–5 cm, markedly laterally flattened not swollen around seeds, 1–2 cm in thickness, broadly oblong with ± rounded apex and base; surface with sparse short fine red-brown pubescence and very abundant irritant bristles, also with 12–15 slightly obliquely transverse lamellae 1–1·5 mm high, these (like those of *M. revoluta*) bifurcated to give “T” shape in cross-section with apical halves 1·5–2 mm wide and somewhat revolute; each lamella usually interrupted along mid-line of pod and continued at both ends to distal-edge of marginal wings; each margin of pod with pair of wings, these slightly revolute and of very varying width 3 mm for the most part but extending to 5–7 mm at points where lamellae appear and thus appearing raggedly dentate. *Seeds* dark brown, medium sized, 1·8 × 1·8 cm, oval in outline or discoid, markedly laterally flattened ± 9 mm in thickness. (Fig. 8. Map 4).

MALAY PEN. Perak: Larut. Feb. 1883, *King's Collector* 3915 (K); Sungai Ryah [Sungei Rayah], Oct. 1880, *King's Collector* 868 (K); Dec. 1885, *King's Collector* 8330 (K). Kelantan: Kuala Sameh, 22 Feb. 1924, *Foxworthy* 12139 (K). Pahang: Pahang R, Kampong Sanggong, 5 Dec. 1960, *Poore* 609 (K). Selangor: Bkt. Takun, 6 July 1965, *Ng* in KEP 80540 (K). Johore: Mt. Ophir, Aug. 1867–1868, *Maingay* 590/2742 (K).

Also (fide Ridley) occurs in Lankawi & Penang.

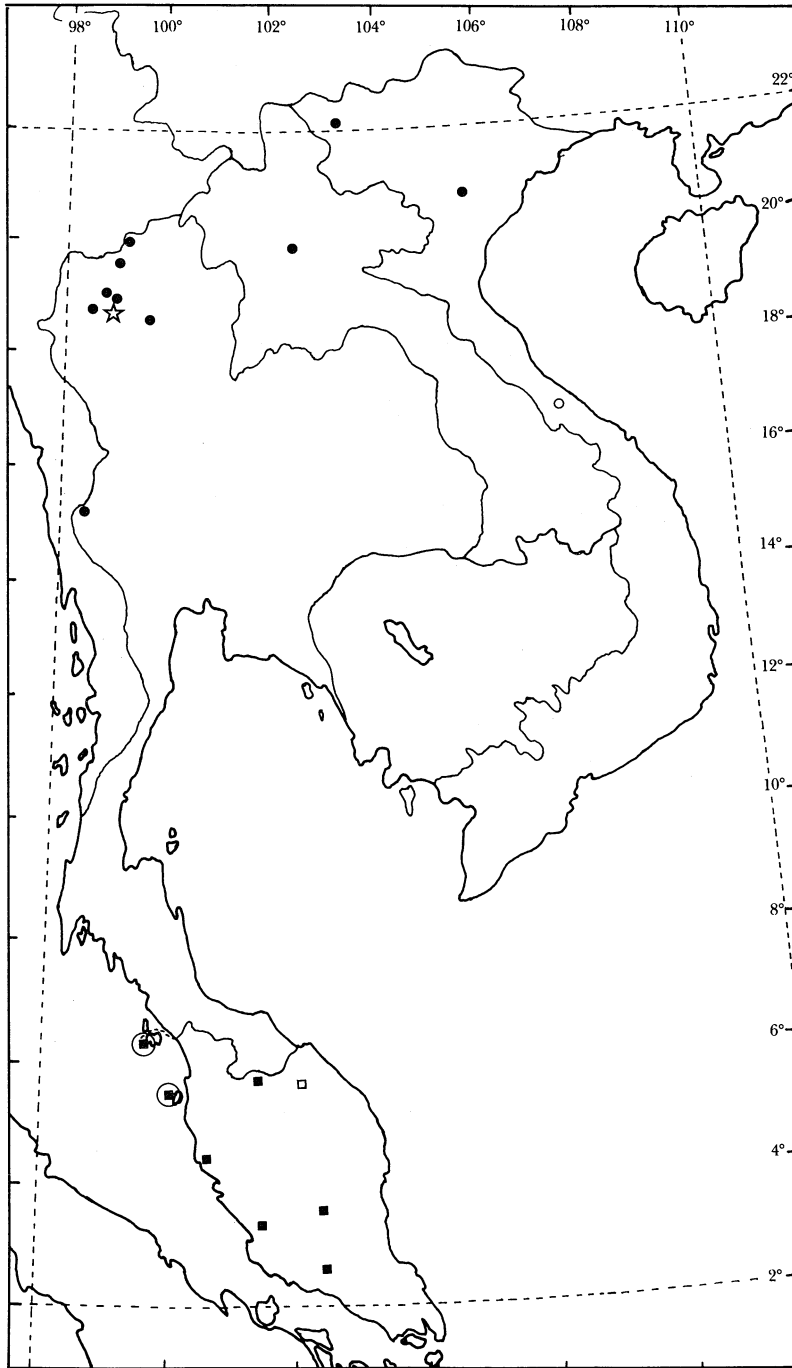
EXTERNAL DISTRIBUTION. Sumatra, Borneo.

HABITAT. Disturbed forest; open forest; full sun; low alt. to 70 M.

This species bears a strong superficial resemblance in fruit to *M. stenoplax* (which for this reason has hitherto been misidentified), having the same dentate fruit-wings and often lengthened flower-bearing side-branches. Although its



FIG 8. *Mucuna biplicata*. A leaf; B inflorescence; C bud with bracteoles; D calyx (opened out); E standard; F wing; G keel; H fruit; J seed. A, B, D-G from Poore 609; C from King's Collector 8330; H, J from Foxworthy 12139. C $\times 3$, J $\times 1$, rest $\times \frac{1}{2}$. Drawn by Eleanor Catherine.



MAP 4. Distribution of *Mucuna biplicata* ■ (circled in literature) and *M. bracteata* ● in Thailand, Indochina and the Malay peninsula and of *M. gracilipes* ☆. (○ □ indicate exact locality uncertain).

bilamellate fruit suggests a relationship with *M. revoluta* and *M. interrupta*, it resembles the fruit of the Philippine species *M. platyplekta* Quisumb. & Merr. much more closely. However, the Philippine species is vegetatively very distinct.

B. SUBGENUS STIZOLOBIUM (P. Br.) Prain

Annual or perhaps sometimes perennial as somewhat woody; pods often longitudinally ribbed; seeds compressed, oblong-ovoid, with a very short hilum surrounded by a conspicuous rim-aril.

11. *Mucuna gracilipes* Craib in Bull. Misc. Inf., Kew 1927: 378 (1927) and Fl. Siam. 1: 444 (1925). Type: Thailand: Lamphun: Me Kaw: *Winit* 1541 (holotype K!).

Trailing herb; stems longitudinally ridged and with abundant quite long weak spreading light orange hairs. Leaves in form like those of *M. pruriens* and *M. bracteata*, ± 20 cm long, petiole ± 8 cm, hairy like the stem; terminal leaflet of moderate size, $\pm 10 \times 5.5$ cm, elliptic with rounded and abruptly mucronate tip and rounded base; lateral leaflets slightly larger, markedly asymmetrical with ratio of widths of abaxial to adaxial $2\frac{1}{3}$ –3:1; lateral veins 6–7 pairs, gently curved and running right into margin, these and coarse (and often fine) reticulation thin but prominent beneath and conspicuous above; fairly thickly chartaceous; abundantly hairy like the stem, especially on veins, beneath, and sparsely so above; stipules 4–5 mm long. *Inflorescence* axillary, of moderate length ± 17 cm, main axis unbranched and rather few-flowered, bearing rather few, only 3–4, flower-bearing side-branches, these reduced, knob-like and all crowded in apical $\frac{1}{3}$ of axis; pedicels fairly short, ± 8 mm long, with short, dense, silvery \pm silky adpressed pubescence, main axis similarly pubescent in apical part but pubescence becoming longer and more like that of the stem lower down and \pm absent at the base; bracts and bracteoles (only one seen) fairly small for size of floral parts, 10×4 mm, oblanceolate, acute, with fairly sparse hairs like those of the stem but \pm adpressed. *Calyx* densely silvery-hairy like the pedicels, also with fine brownish bristles; tube medium cup-shaped $\pm 8 \times 12$ mm; lobes long, lowest ± 8 mm, laterals 6 mm long, all 2–3 mm wide, triangular, acute; upper lip very well-marked exceeding lateral lobes. *Flowers* very long and narrow, corolla two-coloured, standard and wings dark bluish purple, keel white; standard 3×2 cm with very insignificant basal claw and auricles 1.5 mm, and less than 1 mm, long, respectively; wings long and \pm straight, 6.3×1.5 cm, with broadly rounded not at all tapering apex and short basal claw and auricle 3 mm and 1 mm long respectively; keel \pm equalling wing, moderately upcurved at apex with basal claw 6 mm and auricles 3 mm long. *Fruit* unknown. (Fig. 9A–E).

Endemic to N. Thailand. (Map 4).

THAILAND. N: [Lampun] Lamphun: Me Kaw, 9 Nov. 1925, *Winit* 1541 (K).
HABITAT. Forest; 250 m alt.

Only, one, non-fruiting, collection of this strikingly distinct species is known. Despite its very long flowers and few-flowered inflorescence it resembles *M.*

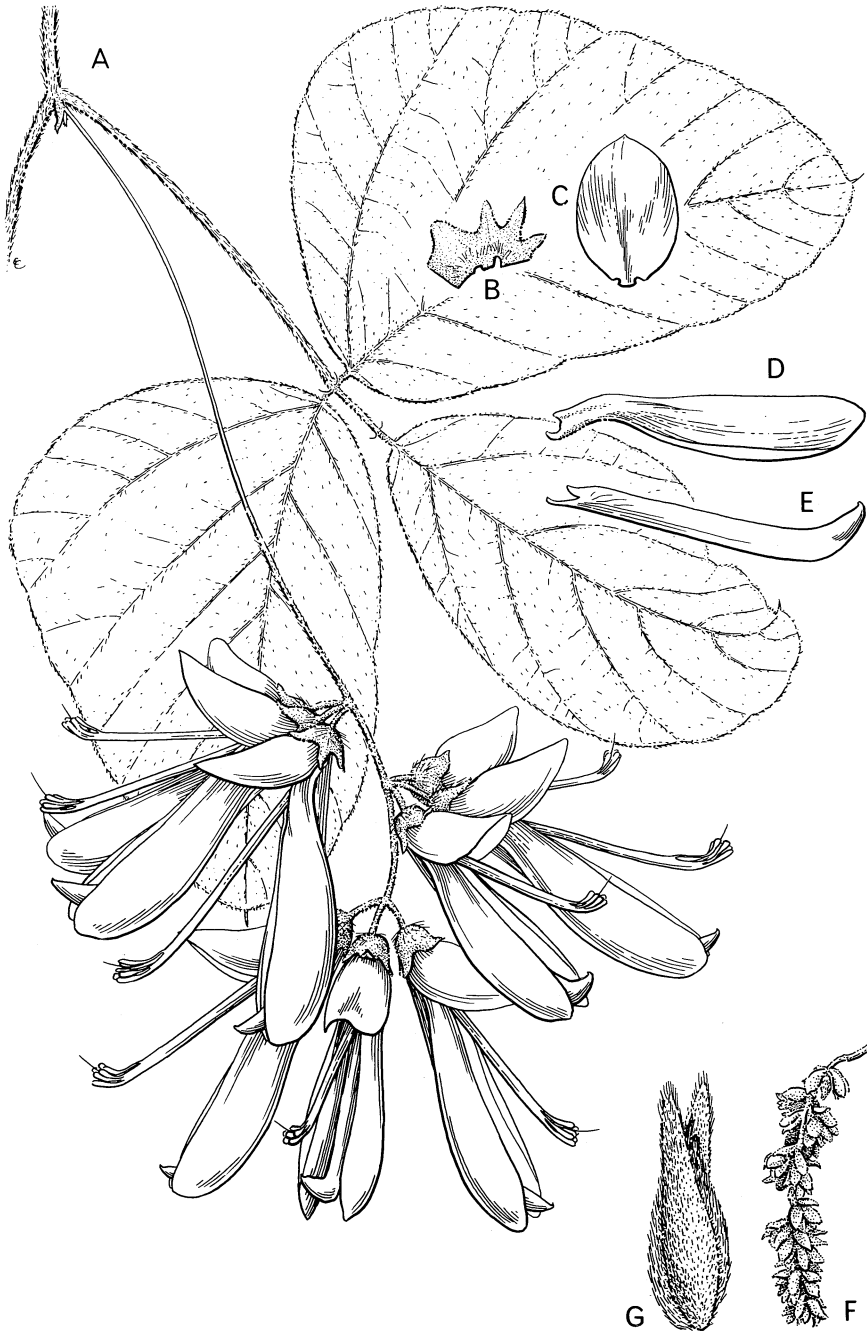


FIG. 9. *Mucuna gracilipes*. A leaf + inflorescence; B calyx (opened out); C standard; D wing; E keel. *M. pruriens* var. *hirsuta*. F young inflorescence; G bud with bracteoles. A–E from Winit 1541; F from Eberhardt 25621; G from Rock 149. G $\times 3$, rest $\times \frac{3}{5}$. Drawn by Eleanor Catherine.

pruriens so closely, especially in its leaf-venation, strongly asymmetrical lateral leaflets, and broadly rounded apex to the wing, that I have no hesitation in assigning it to this subgenus (and assuming it to have a small linear-oblong fleshy fruit).

12. *Mucuna pruriens* (L.) DC., Prodr. 2: 405 (1825); Hosseus, in Beih. Bot. Centralbl. 27 (2): 492 (1910) & 28 (2): 399 (1911); Gagnepain in Lecomte, Fl. Indo-Chine 2: 323 (1916); Merrill, Interpr. Herb. Amboin.: 277 (1917); Ridley, Fl. Malay Penins. 1: 577 (1922); Craib, Fl. Siam. 1: 444 (1925); Merrill in Trans. Amer. Philos. Soc. 24: 210 (1935); Pham Huang Ho, Fl. S. Vietnam: 322 & fig. (1960); Corner & Watanabe, Ill. Guide to Trop. Pl.: 289 (1969); Schmid, Veg. Vietnam in Mem. O.R.S.T.O.M. 74: 83 (1974); Van Thuan, Fl. Camb. Laos Vietnam 17: 31 (1979); Pinratana, Fl. in Thailand 9: 47 & fig. (1981). Type: Indonesia, Amboina, Rumphius, Herb. Amb. 3 t. 142 (1750).

Dolichos pruriens L. [in Stickman, Diss.] Herb. Amb: 23 (1754) & Syst. Nat., ed. 10: 1162 (1759); Loureiro, Fl. Cochinch.: 438 (1790).

For more complete synonymy and detailed descriptions of both the species as a whole and its varieties see Wilmot-Deer (1984: 61 & 1987: 46 & 1990: 245); diagnostic features are included here.

Long slender climber. *Leaves* and leaflets very variable in size from small to large in most varieties; lateral veins (straight or) gently curved throughout length and running clearly into margin; stipels very conspicuous, 4–5 mm long, filiform or fairly robust. *Inflorescence* usually long, up to 40 cm, unbranched and with (few–)10–20 knob-like flower-bearing side-branches usually all in upper half of axis; lower part of axis without either non-flower-subtending bracts or scars. *Calyx* with dense adpressed silvery to brownish pubescence and often also irritant red bristles; small, tube \pm 5–10 mm, lobes fairly long, upper lip well marked usually exceeding lateral lobes. *Flowers* small, corolla dark purple (rarely white); standard 1.6–2.5 cm long; keel 3–4(–4.5) cm long; wings usually distinctly shorter than keel and broad, \pm 1.2 cm, broadly rounded (and not at all tapering) at apex. *Fruit* fleshy with 3–6 seeds, small, narrowly linear-oblong but swollen around seeds and sometimes misshapen, usually with 1–2 longitudinal facial ridges. *Seeds* ellipsoid, small, 1–1.7(–2) \times 0.7–1.3 cm, 4–10 mm in thickness; hilum occupying \pm $\frac{1}{8}$ circumference.

a) var. *pruriens*

Stems and petioles glabrous or with sparse fine adpressed or spreading pale hairs and often darker bristles. *Leaflets* very variable in size, terminal 3–16 cm long, elliptic to rhombic-ovate, with acute or shortly mucronate apex; lateral veins and often reticulation thinly prominent beneath, visible above; thinly chartaceous or membranous, with fine pale hairs like those of the stem, especially on veins, these usually sparse, rarely abundant beneath, and more sparse or absent above (rarely both surfaces glabrous). *Inflorescence* axis and pedicels with dense fine silvery adpressed rather silky hairs and often also sparse red bristles; bracts and bracteoles small, early-deciduous seen only in young bud stage, bracts fairly narrow, ovate or lanceolate 6–10 \times 2–3 mm, usually distinctly acuminate

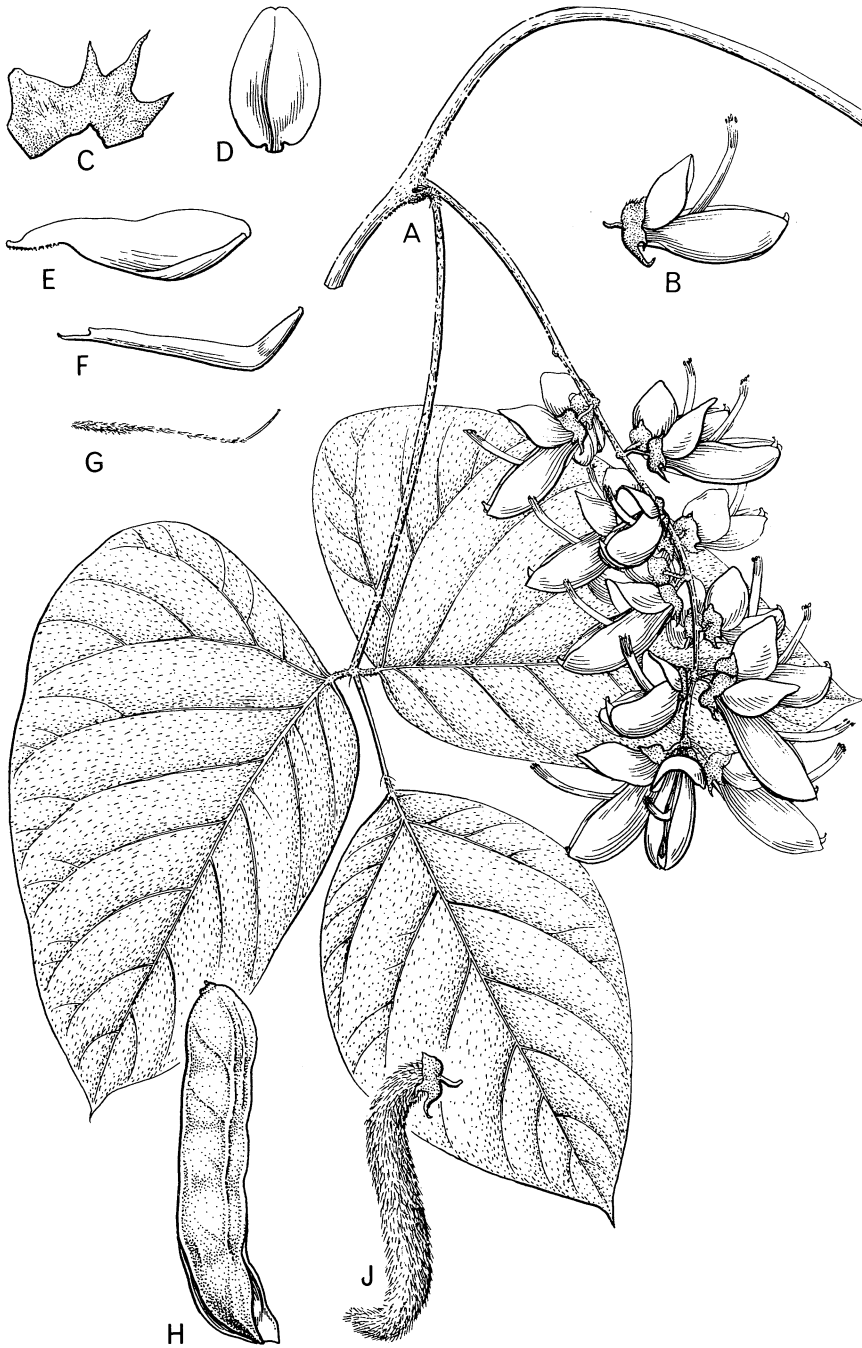


FIG 10. *Mucuna pruriens*. A-H var. *pruriens*. A habit; B flower; C flower; C calyx; D standard; E wing; F keel; G pistil; H fruit. J var. *utilis*, fruit. A, B from Gamble 1760A; C-G from Fernandez 10; H from Hort. Calc. s.n.; J from Henry 1719; (Indian & Chinese material). A, B, H, J $\times \frac{3}{4}$, C-G $\times 1$. Drawn by Eleanor Catherine.

often to up to $\frac{1}{2}$ total length; bracteoles of similar length but narrower, linear-lanceolate, acuminate. *Calyx* densely silky-hairy and bristly like the pedicels; lowest lobe narrower and acuminate, 6–10 × 2–3 mm, laterals fairly broadly triangular, 2–4 × 1.5–3.5 mm. *Corolla* purple but keel lighter than wings. *Fruit* narrowly linear-oblong, usually distinctly curved often into "S"-shape, 5–9 × 0.8–1 cm, somewhat laterally flattened \pm 5 mm in thickness; surface with dense covering of irritant deciduous bristles, red-gold or brownish (sometimes in longitudinal bands of alternating lighter and darker brown), completely concealing surface and ridges. *Seeds* fawnish-brown, hilum \pm 6 mm long, marginal aril orange. (Fig. 10A–H. Map 5).

THAILAND. N: Chiang Mai: Doi Chiengdao, Dec. 1953, *Garrett* 1422 (K, L); Nov. 1911, *Kerr* 2250 (E, K) & Doi Sutep, *Nooteboom* 725 (L). Chiang Rai: Mae Suai Akha, Feb. 1984, *Anderson* 5423 (A). Mae Hong Son: Olot, *Anderson* 5315 (A). Phitsanulok: Sawan Khalok, *Parry* 25 (K). Sukhothai: *Maxwell* 74–100 & 71–708 (AAU). SW: Uthai Thani: Khao Nang Rum, Nov. 1979, *Shimizu et al.* T. 22366 (L). Kanchanaburi: Bo Phloi, Nov. 1979, *Shimizu et al.* T. 22168 (L) & Nov. 1971, *van Beusekom et al.* 3724 & 3919 (K, L). Prachuap Khiri Khan: Hua Hin, 1927, *Marcan* 2228 (K). C. Saraburi: Sahn Lahn, Oct. 1973, *Maxwell* 73–506 (AAU). Muak Lek, 1924, *Marcan* 1884 (K). SE. Chanthaburi: Khao Soi Dao, *Geesink & Hiepko* 7889 (L).

CAMBODIA. Kampot, 30 Nov. 1903, *Geoffray* 201 (P).

VIETNAM. Vinh Phu (Phi Cho): La Pho, *Eberhardt* 4407 (P). Ha Son Binh: Tu Phap: Feb. 1889, *Balansa* 2263 (P) & Notre Dame, Jan. 1889, *Balansa* 2266 (K). Ha Nam Ninh (Binh Binh): Cho Ganh, Jan. 1923, *Petelot* 1114 (A, NY, P). Lam Dong: Dalat, 6 March 1932, *Squires* s.n. (NY). Dong Nai: Bien Hoa, Nov. 1867, *Pierre* s.n. (K, P) & Feb. 1919, *Chevalier* 39961 (P). Hau Giang: Can Tho, Dec. 1952, *Phan Hoang Ho* 5096 (P). Unlocalised (Tonkin): July 1908, *d'Alleizette* s.n. (L).

MALAY PEN. Perlis: Bukit Besin Hayat, 17 Nov. 1929, *Henderson* in SFN (22868) (K). Also (fide Ridley 1922) occurs in Perak.

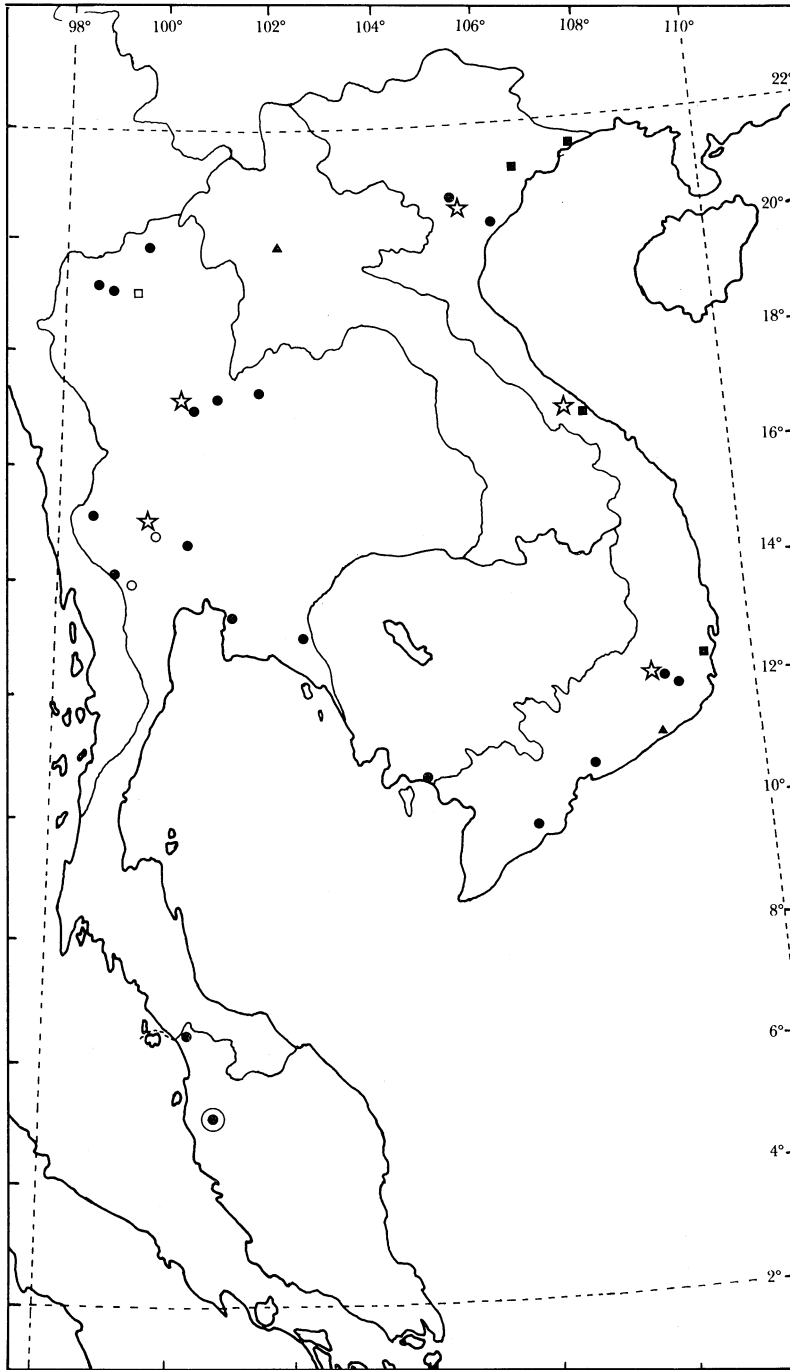
EXTERNAL DISTRIBUTION. Very widely distributed: tropical America, Malaysia, Asia, Tropical America.

HABITAT. Dry forest; bamboo forest and hedges; roadsides; 250–1100 m alt.

A species here, as elsewhere, apparently both common and widely distributed. Rumphius' figure and description, on which Linnaeus entirely based his name (Merrill 1917), gave no indication of, amongst other characters, the shape and size of bracts and bracteoles. Although no material has been seen from Ambon, *M. pruriens* worldwide (including Indonesia) almost always shows the details given above for var. *pruriens*. It therefore seems a reasonable assumption that this widespread and familiar form is the plant which Rumphius had in mind. This assumption has been made here, as well as in previous work (Wilmot-Dear 1984, 1987, & 1991(a)) when other varieties were described or known taxa reduced to varietal status under this name.

b) var. *hirsuta* (*Wight & Arn.*) *Wilmot-Dear* in *Kew Bull.* 42: 44 & fig. 4 (1987). Type: Pen. Ind. Or., *Wight* 750 (holotype K!; isotype E!).

M. hirsuta Wight & Arn., *Prod. Fl. Ind. Orient.* 1 (2): 254 (1834).



MAP 5. Distribution of *Mucuna pruriens* in Thailand, Indochina and the Malay Peninsula: *var. pruriens* ● (circled in literature), *var. hirsuta* ☆, *var. utilis* ■ and sens. lat. ▲. (○ □ indicates exact locality uncertain).

Plant differing from var. *pruriens* mainly in nature of pubescence and shape of bracts and bracteoles. Stems, petioles, inflorescence-axis and pedicels with distinctly orange-brown indumentum of long spreading hairs. *Leaflets* always rhombic-ovate, often rather broadly rounded at apex (extreme tip acute), rather thickly chartaceous and usually small to medium, rarely over 12 cm long; lower surface with a silky or \pm spreading usually dense covering of yellowish-orange hairs especially along veins which thus show as distinctly orange. Bracts slightly shorter than bracteoles, broadly ovate up to twice as long as wide, up to 9×7 mm, acute or broadly rounded; bracteoles later deciduous than in var. *pruriens*, relatively narrow, ovate-elliptic to narrowly ovate, $5-6(-11) \times 2(-3)$ mm. *Corolla* purple. *Fruit* linear, not or hardly curved through most of length, slightly downcurved at apex, with dense covering of dark brown irritant bristles. *Seeds* dark red-brown; aril and hilum black. (Fig. 9F-G. Map 5).

THAILAND. N: Chiang Mai: Doi Suthep, Hoi Chan Kiang, 26 Oct. 1920, *Rock* 149 (US). Phitsanulok: Ban Kek Yai, Dec. 1966, *B Sangkhachand* 615 (L). C: Uthai Thani: Ban Rai, Ban Poo Bon, 1 Feb. 1976, *Maxwell* 76-45 (AAU, L).

VIETNAM. Ha Son Binh: Tu Phap, 15 Dec. 1887, *Balansa* 2264 (P). Bin Tri Thien: Chua Thien, *Eberhardt* 2561 (P). Lam Dong: Dalat, 15 Dec. 1924, *Evard* 2232 (AAU, P).

EXTERNAL DISTRIBUTION. W. Peninsular India.

HABITAT. Dense or disturbed forest; 300-1200 m alt.

The few collections seen from this region are less distinct in general appearance than those of var. *hirsuta* found in India (being less strikingly orange-pubescent) but conform much better in bract and bracteole characters to this variety than to the typical one and are therefore included here. They represent an addition to the geographical distribution of a variety hitherto thought to be an Indian endemic.

c) var. *utilis* (*Wall. ex Wight*) *Bak. ex Burck* in *Ann. Jard. Bot. Buitenzorg* 11: 187 (1893); *Wilmot-Dear* in *Kew Bull.* 39: 63 (1984) & 42: 45 (1987) (q. v. for more complete list of synonyms). Referred to in Indochinese literature (under several different synonyms) as follows: *Gagenpain* in *Lecomte, Fl. Indo-Chine* 2: 321 (as *M. utilis*) & 322 (as *M. capitata*) (1915); *Merrill* in *Trans. Amer. Philos. Soc.* 29: 209 (1935) (as *M. cochinchinensis*); *Van Thuan, Fl. Camb. Laos Vietnam* 17: 32 (1979) (as *M. cochinchinensis*). Type not indicated.

Marcanthus cochinchinensis *Lour.*, *Fl. Cochinch.*, ed. 1: 461 (1790) & ed. 2: 563 (1793). Type: [Cochinchina] Vietnam: *Loureiro* s.n. (holotype BM!).

Plant very similar to var. *pruriens* but with complete absence of irritant bristles, this most obvious in the fruit; differences from var. *pruriens* as follows. *Stems*, petioles, inflorescence-axis and pedicels often pubescent but always without longer coarser hairs, or bristles, respectively. Terminal leaflet relatively broad, length rarely over $1\frac{1}{2} \times$ width; lateral leaflets often markedly larger and up to 20 cm long. *Calyx* lacking red bristles although finer long hairs often present; lowest lobe up to twice, never $3 \times$, as long as laterals. *Corolla* purple or white, often rather short; standard up to 1.8 cm, keel up to $3.5(-4.5)$ cm long. *Fruit* linear-oblong but often misshapen due to irregular sizes of swellings around

seeds, sometimes up to 2 cm broad in places; surface with dense or sparse short adpressed or spreading soft light-brown hairs, facial ridges usually clearly visible beneath. *Seeds* whitish, fawn, pale orange or black, sometimes marbled in these colours or obliquely dark-marked; aril orange. (Fig. 10J. Map 5).

THAILAND. N: Chiang Mai: Muang, 30 Nov. 1978, *Binn et al.* 458 (AAU).

VIETNAM. Quang Ninh: Uong Bi, 1885, *Balansa* 1206 (P). Ha Noi: Cai Kinh, 1914, *Lemaire* s.n. (P). Binh Tri Thien: Hue, Aug. 1900, *Jacquet* 607 (P). Phu Khanh: Nha Trang, Phu Hu, 25 Jan. 1923, *Poilane* 5453 (AAU, P).

EXTERNAL DISTRIBUTION. Cultivated widely in the tropics.

HABITAT. Cultivated (possibly also naturalised).

M. pruriens *sens. lat.* (flowering specimens of uncertain identification but probably var. *pruriens*). (Map 5).

THAILAND. NE: Loei: Phu Paek, 13 Jan. 1970, *van Beusekom et al.* 2992 (L). SE: Chon Buri: [Sriracha] Ban Si Racha, 1915, *Collins* 655 (K).

LAOS. Luang Prabang, *Dupuy* 119 (P).

VIETNAM. Ha Son Binh: Tu Phap, Feb. 1889, *Balansa* 2261 (L). Thuan Hai: Phan Thiet, 5 Nov. 1924, *Evrard* 1697 (P). Dong Nai: Bien Hoa, Feb. 1919, *Chevalier* 29998 (P).

13. *Mucuna bracteata* DC ex Kurz, J. Asiat. Soc. Bengal 42: 231 (1873); Gagnepain in Lecomte, Fl. Indo-Chine 2: 323 (1916); Van Thuan, Fl. Camb. Laos Vietnam 17: 33 (1979). Types: Burma: Pegu, Martaban, Ava, ? *Kurz* (syntypes CAL); Roxb. drawing 138 (syntypes ?CAL; ?copy K!).

M. brevipes Craib in Bull. Misc. Inform., Kew 1927: 378 (1927) & Fl. Siam. 1: 443 (1928); Van Thuan, loc. cit.: 34 (1979). Type: Thailand: Doi Sutep, *Kerr* 1572B (holotype K!). **synon. nov.**

See Wilmot-Dear (1984: 59) for complete list of synonyms and more complete description. Diagnostic features, or additional details not included there, are given here.

Climber very similar to *M. pruriens* var. *pruriens*, differing somewhat in shape, pubescence and venation of leaflets and greatly in nature and persistence of bracts. Stems and petioles glabrous to densely short pale adpressed-hairy. *Leaves* and leaflets very variable in size; terminal leaflet 7–14 × 5.6–11 (–13) cm, rhombic, rarely broadly elliptic, acute (rarely acuminate) and mucronate at apex, rounded at base; lateral veins of similar form to those of *M. pruriens* but less curved, usually dark and more thickly prominent, at least beneath; reticulation, especially coarse reticulation, running markedly transversely and parallel between lateral veins and usually prominent beneath; leaflets usually rather thickly chartaceous and markedly pale beneath at least in dry state, with sparse to abundant short fine somewhat spreading or adpressed pale hairs above, especially on veins, and similar but denser often silky hairs beneath which are conspicuously less dense on veins which thus show as conspicuous darker lines; rarely both surfaces glabrous; stipels 2–5 mm long, usually very thick and robust indeed.

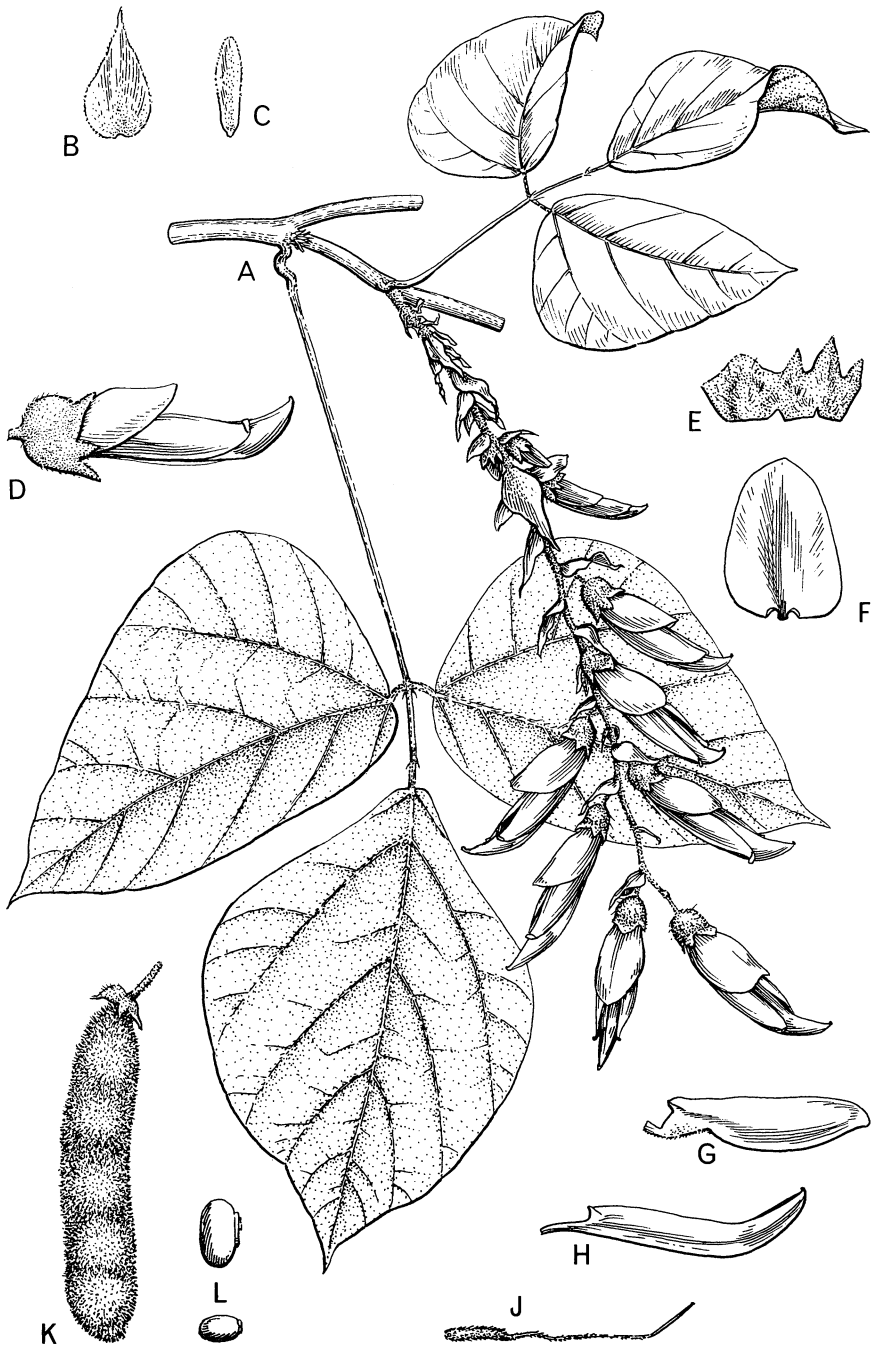


FIG. 11. *Mucuna bracteata*. A habit; B bract; C bracteole; D flower; E calyx; F standard; G wing; H keel; J pistil; K fruit; L seed. A–C from Clarke 37253A; D–J from Henry 10417; K from Clarke 43057A; Indian & Chinese material. A, K $\times \frac{3}{8}$, rest $\times 1$. Drawn by Eleanor Catherine.

Inflorescence 18–41 cm long, often very thick and robust, sometimes a pair arising from same axil but always unbranched, with 12–many knob-like flower-bearing side-branches all in upper 2/3 of axis but few to many non-flower-subtending bracts (or their scars) always present throughout lower, flowerless part; pedicels and axis with short dense pale or dark brown spreading pubescence and frequent fine bristles; both upper (flower-subtending) and lower bracts of similar, very varied, form, but lowermost ones tending to be longer, relatively narrower and triangular or ovate and gradually long-acuminate, also increasing in size towards flower-bearing part of axis, while upper (flower-subtending) bracts tend to be obovate and apically broadly rounded; bracteoles obovate, ovate, lanceolate or linear-lanceolate with apex rounded, acute or acuminate and dorsal surface with dense short pubescence like the axis; both bracts and bracteoles medium to very large, 8–24 × 2–10 mm [note: “8” & “2” reversed in Wilmot-Dear 1984: 59], conspicuous and some persistent with mature flowers and often even at fruiting stage. *Calyx* pubescent and bristly like the axis; lobes rather short and broadly triangular, lowest (3–)5–6 mm, laterals 2–4 mm long, upper lip well-marked often longer than laterals. *Corolla* dark purple, lobes very like those of *M. pruriens*. *Fruit* up to 6 cm long, very similar to that of *M. pruriens* var. *pruriens* but often almost straight and sometimes up to 1.6 cm broad. *Seeds* also very similar, brown or black usually with faint or conspicuous pinkish-brown mottling; marginal aril black. (Fig. 11. Map 4).

THAILAND. N: Chiang Mai: Doi Suthep: 10 Dec. 1911, *Kerr* 1572B (BM, K) & Nov. 1920, *Rock* 1128 & 1136 (US) & 6 Jan. 1962, *Nicholson* 1666 (K, L, US); Doi Buak Ha, 30 Nov. 1965, *Hennipman* 3180 (L); Doi Pui, *Nooteboom* 726 (L); Doi Inthanon, 7 Dec. 1969, *van Beusekom & Phengkklai* 2367 (AAU, E, L); Doi Angka, 21 Dec. 1935, *Garrett* 1021 (AAU, K, L). Lampang: Hui Tak, 25 Jan. 1965, *Hambalanda* 238 (BKF 30181) (L). SW: Kanchanaburi: Wangka, Neekeng, 1946, *Kostermans* 252 (A, K, L, PNH). E: Chaiyaphum: Koh Rameng, 15 Dec. 1971, *van Beusekom et al.* 4297 (K, L). Pen: Phuket: Kopah Janjan, 8 Dec. 1927, [illegible: ? collected for *Kerr*] 2070 (K).

LAOS. Khom Muok: Luang Prabang, 30 Dec. 1948, *Vidal* 761B (P). Lai Chau: Le Pon Nhou, 8 Jan. 1938, *Poilane* 27097 (AAU, P). Ha Sonh Binh: Tu Phap, Jan. 1889, *Balansa* 2258 (K) & Dec. 1887, *ibid.* 2261 (L). Unlocalised (Tonkin), Cholo, July 1908, *d’Alleizette* s.n. (L). Binh Tri Thien: Lao Bao, *Poilane* 11335 (P). Unlocalised (Annam), Vinh, 25 Jan. 1932, *Poilane* 19945 (AAU).

EXTERNAL DISTRIBUTION. S & SW China; Burma & E Himalayas.

HABITAT. Forest; scrub; roadsides; often dry or sandy soil; 150–1650 m alt.

Although the Indochinese and Thai material shows a much greater variety of bract and bracteole shapes than does that previously seen from China and India, there appears to be a continuous range of variation, and *M. brevipes* is therefore reduced here to synonymy even though its type represents one extreme of this range. The differences between the two quoted by Van Thuan, the only author to cite both names as referring to distinct species, do not hold up.

One collection from N Thailand (Doi Chieng Dao, 27 March 1940, *Garrett* 1177 (E, K, L, P)) has such a thick, short and spreading pubescence on its leaflet-undersides as to appear densely velvety with veins no less densely hairy, giving

the plant a very distinctive appearance. Since in inflorescence and fruit characters it appears to conform well to *M. bracteata* and since it is only the extreme density, not the nature, of the pubescence which gives so distinctive an appearance, I do not consider formal recognition appropriate based on this one collection.

A fairly widely distributed species, predominantly in those parts of the region adjacent to the rest of its range.

INTRODUCED SPECIES

Besides *M. pruriens* var. *utilis* (subgenus *Stizolobium*), one decorative species in subgenus *Mucuna* from New Guinea has been cultivated in the region.

i. *Mucuna warburgii* Lauterb. & K. Schum., Fl. Schutzgeb. Südsee: 365 (1910). Verdcourt, Man. New Guinea Leg.: 457 (1979).

M. bennettii sensu Polunin, Pl. & Fl. of Singapore: 132 & pl. 127 (1987) non F. Muell.

A plant very different indeed from all native species, with large bright orange-red flowers whose wings and keel are very long, 6–8 cm, narrow and curved throughout their length to give a scimitar shape.

Climber to 25 m; stems glabrous or sparsely hairy. *Leaves* not unlike those of *M. macrocarpa*; leaflets medium to large, elliptic, glabrous or with sparse fine short adpressed pubescence; persistent stipels absent. *Inflorescences* up to 35 cm long, borne on old wood, unbranched, flower-bearing side-branches knob-like; pedicels 1–2 cm long, they and axis with sparse to abundant pale very fine very short \pm spreading almost downy pubescence. *Calyx* with similar but longer \pm adpressed pubescence and bristles; large and broad, tube 0.6–1 \times 1–2.5 cm; lobes large and distinct, lowest 8–16 mm, laterals 4–12 mm long, all 3–5 mm wide, triangular; upper lip fairly well-marked. *Corolla* large, bright fiery orange-red, wings and keel very long 6–8 cm, narrow (10–15 and 6 mm respectively), and curved throughout their length. Fruit unknown, almost certainly identical to that of *M. novoguineensis* Scheff. which is large, linear-oblong at least 23 cm long, with very low obliquely transverse lamellae. Cultivated in Thailand: N: Chiang Mai City, 6 Oct. 1984, *Anderson* 5236 (A). Illustrated (Polunin, loc. cit. 1987) as cultivated in Singapore.

Native to Papua New Guinea, New Ireland, Moluccas and Celebes.

As indicated by Verdcourt (loc. cit. 1979), this species is very close to two other New Guinean species, *M. bennettii* (specimen cited originally misidentified under that name) and *M. novoguineensis*; more adequate material may eventually lead to these, together with the Pacific Is. species *M. elegans* Merr. & Perry, being considered as all variants of 1 or 2 species or perhaps a hybrid complex.

UNPLACED SPECIMENS

LAOS. Sayaboury: Paklai [Pak Lay], 1866–68, *Thorel* s.n. (P).

This collection consists of stem, petioles and detached leaves; it is too incomplete for certain identification but the appearance and size (up to 16 cm long) of leaflets

and apparent absence of stipels (unless these have been lost by damage from this rather broken material) suggests *M. macrocarpa* Wall. which has been collected in neighbouring areas.

THAILAND. N: Chiang Rai, Pooladda, 27 June 1954, *Smitinand* 1669 (L).

This specimen consists of stems, petioles and detached leaflets and flowers (no inflorescence axis). It is not a good match with any species but comes closest to *M. hainanensis* Hayata. However, flowers are clearly stated to be white. I am reluctant to consider it merely a white-flowered variant since neither the large (to 15 cm long) narrowly obovate leaflets, nor the small calyx lobes, are an exact match, and because no material of *M. hainanensis* has been collected anywhere near N Thailand. It is therefore best left unplaced.

A CONFUSED NAME

Mucuna nigricans (Lour.) Steud., Nomencl. Bot. ed. 2, 2: 163 (1841). Type: [Vietnam] Cochinchina, *Loureiro* s.n. (holotype BM!).

Citta nigricans Lour., Fl. Cochinch.: 456 (1770) excl. references to Rumphius & sius.

As discussed in detail elsewhere (Wilmot-Dear 1991 (b) & (c)), this name has had a very confusing history. In the literature it has been used predominantly for a taxon absent from Indochina (and one for which it has been necessary to publish a new name) (Wilmot-Dear 1991 (b)). Rejection of Loureiro's name has been proposed (Wilmot-Dear 1991 (c)).

It is not clear to which Indochinese species Loureiro intended his name to refer. The type specimen is useless for identification purposes since it consists only of stems and leaves which could belong to any one of the group of four vegetatively virtually identical species *M. stenoplax*, *M. hainanensis*, *M. revoluta* or *M. interrupta* (numbered here 6–9). Loureiro's fairly detailed fruit description suggests an interrupted-bifurcated type of lamella and therefore one of the last two, since he refers to a surface ornamentation of "cellulas subquadratas", which would be fairly appropriate to the appearance of either *M. revoluta* or *M. interrupta* but quite incomprehensibly obscure if applied to either of the others. Whether Loureiro intended his name to apply to *M. revoluta*, *M. interrupta* or (like Gagnepain in publishing *M. interrupta*) the two together considered as one species, is not clear, but I suspect the last since he mentions purple flowers (appropriate to *M. revoluta*) but a 3-seeded fruit (appropriate to *M. interrupta*). However, if the proposal for its rejection is accepted, there will be no need to decide this question.

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REFERENCES

- Merrill, E. D. (1917). An interpretation of Rumphius's Herbarium Amboinense. Manila.
- Wilmot-Dear, C. M. (1984). A revision of *Mucuna* (*Leguminosae-Phaseoleae*) in China & Japan. *Kew Bull.* 39: 23–65.
- (1987). A revision of *Mucuna* (*Leguminosae-Phaseoleae*) in the Indian sub-continent and Burma. *Kew Bull.* 42: 23–46.
- (1990). A revision of *Mucuna* (*Leguminosae-Phaseoleae*) in the Pacific: *Kew Bull.* 45: 1–35.
- (1991 (a)). A revision of *Mucuna* (*Leguminosae-Phaseoleae*) in the Philippines. *Kew Bull.* 46: 213–251.
- (1991 (b)). *Mucuna hainanensis* var. *multilamellata*, a new name for a well-known taxon and a key to related species. *Kew Bull.* 46: 205–212.
- (1991 (c)). A proposal for the rejection of the name *Citta nigricans* Lour. and all names based on it. *Taxon* 40: 517–520.

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