

## 19. Tribe PHASEOLEAE

菜豆族 cai dou zu

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Herbs, erect, twining, or prostrate, rarely trees. Leaves pulvinate, usually pinnately 3-foliolate, rarely 1- or 5–7-foliolate; leaflets entire or lobed, sometimes gland-dotted; stipules and stipels present. Inflorescence mostly axillary, racemelike, with fascicles of flowers scattered along an axis, sometimes reduced to solitary flowers or expanded into panicles, often with swollen nodes; bracts usually small, very caducous, rarely densely imbricate. Calyx 4- or 5-toothed, rarely truncate. Corolla papilionaceous; petals normal or keel long beaked or spirally twisted. Stamens diadelphous (9+1); vexillary filament usually free, or partly or completely connate with others into an adaxially split sheath; anthers usually uniform. Ovary with 1 to many ovules; style bearded lengthwise on adaxial side, or pilose only around stigma. Legumes 2-valved, partitioned or not between seeds, but not jointed. Seeds strophiolate or not.

About 90 genera and ca. 1,570 species: throughout the tropics and warm-temperate regions of the world, more numerous in drier regions; 37 genera (seven introduced) and 169 species (43 endemic, 15 introduced) in China.

Modern investigations strongly suggest that the Phaseoleae in the traditional sense as followed here is not natural with some genera, including *Canavalia*, *Galactia*, and *Ophrestia* in this account, which are more closely related to the Millettieae and Abreae than to the other genera in the tribe and with the Desmodieae and Psoraleae embedded within the Phaseoleae proper (Schrire in Lewis et al., Legumes World, 393–394. 2005).

*Physostigma venenosum* Balfour, native to tropical W Africa, is cultivated in China.

This tribe includes species of great importance as food plants, cover crops, forage, green manure, ornamentals, medicine, dyes, etc.

- 1a. Leaflets abaxially and calyx generally with colored sessile glands; bracteoles absent; inflorescence nodes not swollen, 1-flowered (subtribe Cajaninae).
- 2a. Legumes 3- or more seeded.
  - 3a. Legumes not depressed between seeds ..... 93. *Dunbaria*
  - 3b. Legumes depressed between seeds ..... 94. *Cajanus*
- 2b. Legumes 1- or 2-seeded.
  - 4a. Leaves 1-foliolate; seeds with funicle attached at end of linear hilum ..... 92. *Eriosema*
  - 4b. Leaves 3-foliolate, or simple (not 1-foliolate); seeds with funicle attached at middle of hilum.
    - 5a. Twining herbs or shrublets; leaves clearly pinnately 3-foliolate; legumes compressed ..... 91. *Rhynchosia*
    - 5b. Erect shrubs or prostrate herbs (*F. procumbens*); leaves apparently digitately 3-foliolate or simple; legumes tergid ..... 95. *Flemingia*
- 1b. Leaflets and calyx without glands; bracteoles often present; inflorescence nodes often swollen, bearing more than 1 flower.
  - 6a. Style flattened, thickened or twisted, mostly bearded, if not bearded and terete, then standard and keels with minute appendages; hilum usually covered with spongy strophiole (subtribe Phaseolinae).
    - 7a. Style flattened laterally ..... 110. *Lablab*
    - 7b. Style terete or flattened dorsiventrally.
      - 8a. Hooked hairs present on vegetative parts ..... 115. *Phaseolus*
      - 8b. Hooked hairs absent.
        - 9a. Petal wings longer than standard; style twice ca. 90° incurved ..... 114. *Macroptilium*
        - 9b. Petal wings shorter than standard; style various but not as above.
          - 10a. Legumes 4-winged ..... 98. *Psophocarpus*
          - 10b. Legumes not 4-winged.
            - 11a. Stigma lateral or oblique; stipules produced below point of attachment (except in *V. adenantha*) ..... 113. *Vigna*
            - 11b. Stigma terminal; stipules not produced below point of attachment.
              - 12a. Standard appendages absent; corolla purple-blue ..... 97. *Dysolobium*
              - 12b. Standard appendages present; corolla white, violet, or yellowish.
                - 13a. Standard appendages short; corolla white or violet ..... 111. *Dolichos*
                - 13b. Standard appendages long and narrow; corolla yellowish ..... 112. *Macrotyloma*
        - 6b. Style generally terete and unbearded (sometimes a few hairs below stigma), occasionally coiled (in Erythrinae), sometimes bearded or flattened (in Clitoriinae); hilum rarely covered with spongy tissue (some *Erythrina* excepted).
          - 14a. Flowers generally resupinate; calyx naked inside; style narrowed, penicillate or bearded distally; corolla often hairy; leaflets 1, 3, or 5–9, with minute hooked hairs (subtribe Clitoriinae).

- 15a. Standard without spur on back ..... 82. *Clitoria*  
 15b. Standard with a conspicuous spur on back ..... 83. *Centrosema*
- 14b. Flowers not resupinate, or if resupinate then differing from above in other respects.
- 16a. Standard silky hairy outside, rather small, without appendages inside; seeds smooth, with a prominent aril; inflorescence not or only slightly nodose (subtribe Ophrestinae) ..... 81. *Ophrestia*
- 16b. Standard glabrous, or if hairy then inflorescence generally nodose or flowers much modified.
- 17a. Flowers mostly adapted to birds or bats for pollination, petals generally unequal in length, sometimes with small bee-type flowers but then either coiled (*Apios*, *Cochlianthus*) or flowers in extensive panicles and legume samaroid (*Spatholobus*) (subtribe Erythrinae).
- 18a. Trees or shrubs; stems with prickles; keels much shorter than standard ..... 96. *Erythrina*
- 18b. Climbers, rarely trees (*Butea monosperma*); stems without prickles; keels usually largest petals.
- 19a. Style spirally coiled.  
 20a. Leaves (3 or)5- or 7(or 9)-foliolate, green when dried ..... 84. *Apios*  
 20b. Leaves 3-foliolate, black when dried ..... 85. *Cochlianthus*
- 19b. Style not spirally coiled.  
 21a. Legume with many seeds, 2-valved; irritant hairs usually present ..... 88. *Mucuna*  
 21b. Legume samaroid with 1 apical seed, empty below; irritant hairs absent.  
 22a. Flowers purple, rose, or white, 0.5–1 cm ..... 89. *Spatholobus*  
 22b. Flowers yellow to scarlet, 1.5–8 cm ..... 90. *Butea*
- 17b. Flowers mostly adapted to bees for pollination, or if bird-type flowers then petals subequal in length.
- 23a. Inflorescences generally with nodes swollen; seeds diverse, with short to long hilum (subtribe Diocleinae).  
 24a. Stigma lateral to subterminal; ovary hirsute, hairs extending up style, forming a false beard ..... 100. *Pachyrhizus*  
 24b. Stigma terminal; style naked.  
 25a. Calyx 2-lipped, upper lip large, entire or 2-lobed, lower lip small; stamens monadelphous; legumes ligulate to oblong ..... 79. *Canavalia*  
 25b. Calyx not strongly 2-lipped; stamens diadelphous; legumes linear.  
 26a. Upper calyx lobes completely united (calyx appearing 4-lobed) ..... 80. *Galactia*  
 26b. Upper calyx lobes  $\pm$  separate (calyx 5-lobed) ..... 99. *Calopogonium*
- 23b. Inflorescences with nodes not or only slightly swollen; seeds smooth or granular, with short hilum (subtribe Glycininae).  
 27a. Legumes indehiscent.  
 28a. Bracts caducous; fruit many seeded; seeds with filiform funicle ..... 87. *Mastersia*  
 28b. Bracts enlarging after anthesis, leaflike, boat-shaped; fruit 1-seeded; seeds without filiform funicle ..... 109. *Phyllacium*
- 27b. Legumes dehiscent.  
 29a. Anthers alternately small and sterile or large and fertile; legume with persistent style forming a hook ..... 107. *Teramnus*  
 29b. Anthers all similar, fertile; legume without hooked style.  
 30a. Stems strongly 4-angled, angles with descending brown hairs; flowers 5–7 mm ..... 101. *Teyleria*  
 30b. Stems not strongly 4-angled, angles without brown hairs; flowers mostly longer than 7 mm.  
 31a. Leaves 1-foliolate ..... 104. *Nogra*  
 31b. Leaves 3-foliolate.  
 32a. Claws of wings and keel longer than blade; seeds smooth, without a scarious strophiole; ovary walls often transparent.  
 33a. Calyx truncate, lobes  $\pm$  obsolete; flowers yellow ..... 102. *Dumasia*  
 33b. Calyx lobes distinct, triangular; flowers usually red-purple, purple, blue, or white, never yellow.  
 34a. Legumes septate between seeds; bracteoles present; bracts rather large and persistent ..... 86. *Shuteria*  
 34b. Legumes not septate; bracteoles absent ..... 106. *Amphicarpa*
- 32b. Claws of wings and keel shorter than blade; seeds usually rough; hilum often with a scarious strophiole; ovary walls opaque.  
 35a. Flowers 2 or more per node of inflorescence ..... 103. *Pueraria*  
 35b. Flowers 1 per node of inflorescence.  
 36a. Flowers 12 mm or more ..... 105. *Sinodolichos*  
 36b. Flowers 9 mm or less ..... 108. *Glycine*

## 79. CANAVALIA Adanson, Fam. Pl. 2: 325, 531. 1763 [*“Canavali”*], nom. cons.

刀豆属 dao dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Herbs, annual or perennial. Stems twining, prostrate, or suberect. Leaves pinnately 3-foliolate; stipules small, wartlike or inconspicuous; stipels present, deciduous. Racemes axillary; bracts and bracteoles minute, deciduous. Flowers purple-violet, rose, or whitish, solitary or 2–6 clustered at swollen nodes. Calyx campanulate, 2-lipped, upper lip larger, truncate or 2-lobed, lower lip small or minute, entire or 3-toothed. Corolla longer than calyx; petals shortly clawed; standard large, suborbicular, reflexed; wings narrow, falcate, sometimes slightly twisted, free; keel broader than wings, incurved, obtuse or beaked, beak inflexed or spirally twisted, shorter than standard. Stamens monadelphous; anthers uniform. Ovary shortly stipitate, many ovuled; style incurved, beardless. Legumes large, ligulate or linear-oblong to oblong, compressed or slightly turgid, with prominent rib along ventral suture and extra ribs parallel and close to it, dehiscent by twisting of valves. Seeds 10–15, elliptic or oblong; hilum linear.

About 50 species: distributed in tropical and subtropical regions; five species (two introduced) in China.

- 1a. Plants subshrubby, erect or almost so; calyx upper lip subequal to calyx tube; seeds white ..... 1. *C. ensiformis*  
 1b. Plants twining; calyx upper lip shorter than calyx tube; seeds brown or red.  
 2a. Leaflets with acuminate apex; legumes 20–35 × 3.5–6 cm; seeds ca. 3.5 cm ..... 2. *C. gladiata*  
 2b. Leaflets with acute, truncate, or rounded apex; legumes 6–12 × 2–4.5 cm; seeds 1.3–1.8 cm.  
 3a. Upper lobes of calyx with apiculate apex ..... 3. *C. lineata*  
 3b. Upper lobes of calyx without apiculate apex.  
 4a. Leaflets with acute or rounded apex, not emarginate; legumes oblong, 7–9 × 3.5–4.5 cm; seeds brown-black, ca. 1.8 cm ..... 4. *C. cathartica*  
 4b. Leaflets with rounded or truncate apex, often emarginate, rarely acuminate; legumes linear-oblong, 8–12 × 2–2.5 cm; seeds brown, 1.3–1.5 cm ..... 5. *C. rosea*

**1. *Canavalia ensiformis*** (Linnaeus) Candolle, Prodr. 2: 404. 1825.

直生刀豆 zhi sheng dao dou

*Dolichos ensiformis* Linnaeus, Sp. Pl. 2: 725. 1753.

Herbs, annual, subshrubby, 0.6–1(–2) m, wholly pubescent or glabrescent. Stipules small, deciduous; leaflets thin, ovate or elliptic, 8–18 × 5–8 cm, base cuneate or rounded, apex acute. Racemes solitary, 15–25(–40) cm including peduncle. Flowers 1–5 at nodes of rachis. Calyx ca. 1.5 cm, upper lip truncate, as long as calyx tube, lower lip with deltoid lobes. Corolla purplish or white and purple; standard ca. 2.2 cm in diam., base with 2 semiorbicular, reflexed auricles, claw flat and broad, ca. 5 mm; wings obovate-oblong; keel auriculate and clawed. Legumes thickly leathery, ligulate, 20–30 × 2.5–4 cm, each valve with extra rib ca. 5 mm from sutural rib. Seeds white, elliptic, ca. 3 × 2 cm; hilum not more than 1.5 cm. Fl. May–Jul, fr. Oct.

Cultivated. Guangdong, Hainan, Taiwan [native to Central America and West Indies; widely cultivated in tropical and subtropical regions].

This species is used as a green manure and forage.

**2. *Canavalia gladiata*** (Jacquin) Candolle, Prodr. 2: 404. 1825.

刀豆 dao dou

*Dolichos gladiatus* Jacquin, Collectanea 2: 276. 1788; *Canavalia ensiformis* (Linnaeus) Candolle var. *gladiata* (Jacquin) Kuntze; *C. gladiolata* Sauer.

Herbs, climbing, several meters tall. Leaflets ovate, 8–20 × 8–12 cm, sparsely whitish or brown pubescent on both surfaces, base rounded or cuneate, apex acuminate. Racemes 10–20-flowered; peduncles 20–25 cm. Flowers 2 or 3 clustered at

each node. Calyx 15–16 mm, slightly pubescent, upper lip rounded, lower lip with 3 acute teeth. Corolla white or pink, 3–3.5 cm; petals clawed and auriculate; standard broadly elliptic, 3–3.5 × ca. 2.5 cm, emarginate; wings and keel oblong, incurved, smaller than standard. Legumes linear-oblong, slightly curved, 20–35 × 3.5–6 cm, thickly leathery, each valve with extra rib ca. 5 mm from sutural rib. Seeds reddish brown, elliptic-oblong, ca. 3.5 × 2 cm; hilum ca. 1.5 cm. Fl. Jul–Sep, fr. Oct.

Widely cultivated in areas S of the Chang Jiang [domesticated in Asia; widely cultivated in the tropics].

Originally cultivated in E Asia and now widely cultivated in the tropics, this plant is not known out of cultivation, except as an escape.

The legumes and seeds are edible. It is also grown as a green manure and forage.

**3. *Canavalia lineata*** (Thunberg ex Murray) Candolle, Prodr. 2: 404. 1825.

狭刀豆 xia dao dou

*Dolichos lineatus* Thunberg ex Murray, Syst. Veg., ed. 14, 658. 1784.

Herbs, perennial, twining. Leaflets ovate or obovate, 6–14 × 4–10 cm, sparsely pubescent on both surfaces, base truncate or cuneate, apex rounded or cuspidate. Racemes axillary. Calyx ca. 12 mm, pubescent, upper lip broadly 2-lobed and lobes apiculate at apex, lower lip 3-lobed, small, subtruncate. Corolla purplish red; standard broadly ovate, ca. 2.5 cm, emarginate, base with 2 thickenings, auriculate; wings linear-oblong, slightly falcate; keel obovate-oblong. Legumes oblong, compressed, 6–10 × 2.5–3 cm, each valve with extra rib ca. 3 mm from sutural rib. Seeds brown, 2 or 3, ovate, ca. 1.7 × 0.7 cm, blotched. Fl. and fr. Jun–Oct.

Sandy beaches. Fujian, Guangdong, Guangxi, Taiwan, Zhejiang [Cambodia, Indonesia, Japan, Korea, Philippines, Vietnam].

**4. *Canavalia cathartica*** Thouars, J. Bot. Agric. 1: 81. 1813.

小刀豆 xiao dao dou

*Canavalia ensiformis* (Linnaeus) Candolle var. *turgida* (Graham ex A. Gray) Baker; *C. microcarpa* (Candolle) Piper; *C. turgida* Graham ex A. Gray; *Lablab microcarpus* Candolle.

Herbs, biennial, robust, twining. Stems and branches sparsely pubescent. Leaflets ovate, 6–10 × 4–9 cm, sparsely white pubescent on both surfaces, base broadly cuneate, truncate, or rounded, apex acute or rounded. Racemes with 1–3 flowers at each node of rachis. Calyx ca. 12 mm, pubescent, upper lip with rounded lobes, shorter than tube, lower lip with 3 teeth. Corolla pink or purplish, 2–2.5 cm; standard orbicular, ca. 2 × 2.5 cm, with 2 thickenings near base, clawed, apex emarginate; wings and keel curved, ca. 2 cm. Legumes oblong, 7–9 × 3.5–4.5 cm, turgid, apex rostrate. Seeds brownish black, elliptic, ca. 18 × 12 mm, hard and smooth; hilum 10–14 mm. Fl. and fr. Apr–Oct.

Seashores, riverbanks. Guangdong, Hainan, Taiwan [widely distributed in tropical Asia and some areas of Africa and Australia].

**5. *Canavalia rosea*** (Swartz) Candolle, Prodr. 2: 404. 1825.

海刀豆 hai dao dou

*Dolichos roseus* Swartz, Prodr. 105. 1788; *Canavalia maritima* Thouars; *C. obcordata* (Roxburgh) Voigt; *C. obtusifolia* (Lamarck) Candolle; *D. maritimus* Aublet; *D. obcordatus* Roxburgh; *D. obtusifolius* Lamarck.

Herbs, robust, twining. Stems sparsely puberulent. Leaflets obovate, ovate, elliptic, or suborbicular, 5–8(–14) × 4.5–6.5(–10) cm, pilose on both surfaces, base cuneate to rounded, apex rounded, truncate, emarginate, or mucronate. Racemes axillary, to 30 cm including peduncle. Flowers 1–3 clustered at each node. Calyx 1–1.2 cm, pubescent, upper lip semiorbicular, 3–4 mm. Corolla purple; standard orbicular, ca. 2.5 cm, apex emarginate; wings falcate, auriculate; keel oblong, curved, auriculate. Legumes linear-oblong, 8–12 × 2–2.5 cm, apex rostrate, each valve with extra rib ca. 3 mm from sutural rib. Seeds brown, elliptic, 13–15 × ca. 10 mm; hilum ca. 10 mm. Fl. Jun–Jul.

Sandy beaches. Fujian, Guangdong, Guangxi, Hainan, Taiwan, Zhejiang [tropical coastal areas].

For the nomenclature of *Canavalia rosea*, see Aymard in Ernstia (8: 19–25. 1998).

**80. GALACTIA** P. Browne, Civ. Nat. Hist. Jamaica, 298. 1756.

乳豆属 ru dou shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

Herbs or subshrubs, prostrate or twining. Leaves pinnately 3-foliolate, rarely 1–7-foliolate; stipules small, deciduous or persistent; stipels persistent. Racemes axillary; rachis with remote and slightly swollen nodes; bracts small, setaceous; bracteoles minute. Flowers solitary, paired, or several clustered at nodes of rachis. Calyx lobes linear or lanceolate, upper 2 entirely connate into 1, lateral slightly smaller, lowest often longest. Corolla slightly exerted; petals subequal in length; standard orbicular, ovate, or obovate-orbicular, margin slightly inflexed or appendaged; wings narrow or obovate, adherent to keel; keel obtuse and almost straight, subequal to or longer than wings. Stamens diadelphous; vexillary stamen free or connate from middle downward; anthers uniform. Ovary sessile; ovules numerous; style filiform, glabrous; stigma small, capitate, terminal. Legumes linear, compressed, straight or slightly incurved, ± septate between seeds. Seeds small, compressed, estrophiolate.

About 60 species: tropical and subtropical Asia, Africa, and America; two species in China.

- 1a. Leaflets thicker, subleathery, broadly elliptic or broadly obovate to suborbicular, midrib and lateral veins impressed adaxially, veinlets obscure ..... 1. *G. tashiroi*  
 1b. Leaflets thinner, papery, elliptic or lanceolate, midrib and lateral veins slightly raised adaxially, veinlets conspicuous ..... 2. *G. tenuiflora*

**1. *Galactia tashiroi*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 31: 34. 1886.

琉球乳豆 liu qiu ru dou

Herbs, perennial, trailing or climbing. Stems densely whitish villous. Petiolules 1.5–2 mm, hairy; stipels minute and obscure; leaflets broadly elliptic or broadly obovate to suborbicular, 1.3–2.7 × 1–1.8 cm, thick, subleathery, adpressed whitish villous abaxially, glabrous adaxially, lateral veins 3–5 pairs, together with midrib raised abaxially, impressed adaxially, veinlets reticulate, obscure, base rounded, apex rounded or emarginate. Racemes axillary, 1–4 cm, nodes slightly swollen. Calyx 4–5 mm, densely villous. Corolla red; standard ca. 10 mm. Legumes linear, compressed, ca. 3 × 0.6–0.7 cm. Fr. Aug–Sep.

Open forests. Taiwan [Japan (Ryukyu Islands)].

This species is used for herbage and also grown for erosion control.

**2. *Galactia tenuiflora*** (Klein ex Willdenow) Wight & Arnott, Prodr. Fl. Ind. Orient. 206. 1834.

乳豆 ru dou

*Glycine tenuiflora* Klein ex Willdenow, Sp. Pl. 3: 1059. 1802; *Galactia elliptifoliola* Merrill; *G. formosana* Matsumura; *G. lanceolata* Hayata.

Herbs, perennial, climbing. Stems puberulent to densely villous with grayish white or grayish yellow hairs. Petiolules ca. 2 mm; stipels subulate, 1–1.5 mm; leaflets elliptic, oblong, or

lanceolate, 2–7 × 1.3–4 cm, papery, sparsely puberulent to densely villous abaxially, sparsely puberulent to subglabrous adaxially, lateral veins 4–8 pairs, slender, slightly raised on both surfaces, veinlets reticulate, conspicuous on both surfaces, base and apex rounded, apex sometimes emarginate, mucronate. Racemes axillary; rachis slender, 2–20 cm. Flowers solitary or often 2–4 clustered at nodes of rachis. Calyx ca. 7 mm, subglabrous to pubescent, tube ca. 3 mm, lobes narrowly lanceolate, apex acuminate. Corolla light blue or pink; standard obovate, ca. 10.5 × 7 mm, base attenuate, with 2 small auricles,

apex rounded; wings oblong, ca. 9 × 2 mm, base with a pointed auricle; keel as long as or longer than wings, slightly curved on back, base with a small auricle. Legumes linear-oblong, 2–6.5 × 0.6–0.7 cm, puberulent to villous at first, glabrescent. Seeds brown, reniform, slightly compressed, 2–3.5 × 3–5 mm, smooth. Fl. and fr. Jul–Dec.

Forests, scrub, hillsides. Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Taiwan, Yunnan [India, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam; Africa].

## 81. OPHRESTIA H. M. L. Forbes, *Bothalia* 4: 1003. 1948.

拟大豆属 ni da dou shu

Sa Ren (萨仁); Michael G. Gilbert

Perennial herbs, subshrubs, or shrubs, twining or rarely erect. Leaves pinnately (1–)3–9-foliolate; stipules linear, small; stipels small or absent. Inflorescence axillary, racemose, solitary, paired, or clustered. Bracts styliiform or linear. Calyx membranous, campanulate, sometimes cylindrical-campanulate, 5-lobed; lobes subequal, all shorter than tube, upper 2 ± connate. Corolla longer than calyx; standard pandurate, sometimes reniform, ovate-oblong, or almost circular, silky hairy outside, base acuminate to wide and short stipe; wings usually narrowly elliptic, with stipe and auricles; keels oblong or obovate, equal to or shorter than wings. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary sessile; ovules 2–8; style thick; stigma small, capitate. Legume oblong or linear-oblong, dehiscent, obovate, margins slightly thickened, 2–5-seeded. Seeds oblong-ovate, smooth; hilum short, central; aril spongy, with strophiole.

About 13 species: tropical Africa, Asia; one species in China.

### 1. *Ophrestia pinnata* (Merrill) H. M. L. Forbes, *Bothalia* 4: 1003. 1948.

羽叶拟大豆 yu ye ni da dou

*Glycine pinnata* Merrill, *Lingnan Sci. J.* 14: 15. 1935; *Cruddasia pinnata* (Merrill) Niyomdham; *Paraglycine pinnata* (Merrill) F. J. Hermann.

Vines. Stems twining, herbaceous or almost woody, hirsute. Leaves pinnately 5–7-foliolate, 10–15 cm; stipules lanceolate; petiole 3–6 cm; stipels filiform, ca. 1 mm, deciduous; petiolules 1–2 mm; leaflets oblong or elliptic, 2.5–7(–9) × 1.4–3.8 cm, papery, abaxial surface densely clothed with white coarse hairs, adaxial surface glabrous or sparsely clothed with coarse adpressed hairs, lateral veins 5 or 6 pairs, base rounded,

apex obtuse to acuminate, sometimes with mucro. Raceme axillary, 4–10 cm; peduncles 6–10 mm. Flowers small, solitary or paired, ca. 6 mm; bracts filiform, ca. 1 mm, persistent; bracteoles filiform or linear, ca. 1 mm. Calyx membranous, 2.5–3.5 mm, 5-lobed, upper 2 lobes connate to broadly triangular, lower lanceolate, all shorter than tube. Corolla purple to pink; standard pandurate, 5.5–6 mm; wings usually narrowly elliptic, with auricles and stipe; keels oblong, equal to wings, with auricles and stipe. Ovary 2–8-ovuled. Legume oblong, 2.5–4 × 6–8 cm, compressed, apex with short beak, densely hirsute, reflexed after dehiscence. Seeds 2–5, brown or black, suborbicular, compressed, ca. 4.5 mm in diam.; strophiole dry membranous, scalelike. Fl. Jul–Aug, fr. Aug–Sep.

Open scrub; below 1200 m (in Vietnam). Hainan [Vietnam].

## 82. CLITORIA Linnaeus, *Sp. Pl.* 2: 753. 1753.

蝶豆属 die dou shu

Sa Ren (萨仁); Michael G. Gilbert

Perennial herbs or subshrubs, twining. Leaves pinnately 3–7-foliolate; stipules and stipels persistent. Inflorescence axillary, 1- or 2-flowered. Flowers large and beautiful; bracts paired, stipulelike, persistent; bracteoles similar to bracts or slightly larger, or sometimes leaflike. Calyx membranous, tubular, 5-lobed; lobes lanceolate or triangular, equal to or shorter than tube. Corolla longer than calyx; standard large, almost applanate or sometimes cucullate, abaxially minutely hairy, base clawed, without auricles; wings and keels much shorter. Stamens diadelphous; vexillary stamen free, or ± connate; anthers uniform. Ovary with stipe, with sheathing disk at base; ovules many; style complanate, long, curved, interior with beard. Legume stipitate, linear or linear-oblong, dehiscent, compressed or inflated, filled with soft tissue but not septate. Seeds subglobose or ellipsoid, compressed; hilum small, central or subcentral, strophiole absent.

About 70 species: tropics and subtropics of the world; five species (one introduced) in China.

- 1a. Leaves 5–7-foliolate; bracteoles almost circular, membranous ..... 1. *C. ternatea*  
 1b. Leaves 3-foliolate; bracteoles ovate-lanceolate or elliptic, leathery.

- 2a. Erect or almost erect shrublets; petiole 0.5–2.5 cm.  
 3a. Lateral veins of leaflet 5–7 pairs; legume inflated, each valve with a raised midrib; corolla light purple ... 2. *C. laurifolia*  
 3b. Lateral veins of leaflet 9–12 pairs; legume compressed, without ribs; corolla white or light yellow ..... 3. *C. hanceana*  
 2b. Climbing shrublets or vines; petiole (1.5–)2–11.5 cm.  
 4a. Corolla light blue; legume without ribs ..... 4. *C. mariana*  
 4b. Corolla often absent, when present white; legumes longitudinally ribbed ..... 5. *C. falcata*

**1. *Clitoria ternatea*** Linnaeus, Sp. Pl. 2: 753. 1753.

蝶豆 die dou

Herbs. Stems twining, slender, densely deciduous adpressed shortly villous. Leaves 2.5–5 cm, pinnately 5–7-foliolate, usually 5-foliolate; stipules small, linear, 2–5 mm; petiole 1.5–3 cm; stipels small, bristlelike; petiolules 1–2 mm; leaflets broadly elliptic or almost ovate, 2.5–5 × 1.5–3.5 cm, thinly papery or almost membranous, adpressed shortly villous or sometimes glabrous on both surfaces, lateral veins 4 or 5 pairs, base obtuse, apex obtuse, slightly emarginate, usually with mucro. Flowers large, solitary in axil; bracteoles green, small, suborbicular or obovate, membranous, with obvious reticulate veins. Calyx membranous, 1.5–2 cm, 5-lobed; lobes lanceolate, less than 1/2 of tube, apex acuminate. Corolla sky blue, pink, or white, to 5.5 cm; standard faintly white or orange in middle, broadly obovate, ca. 3 cm, base shortly clawed; wings and keels much shorter than standard, both clawed; wings obovate-oblong; keels elliptic. Ovary villous. Legume brown, linear-oblong, 5–11 × 0.7–1 cm, compressed, with long beak. Seeds 6–10, black, oblong, ca. 0.6 × 0.4 cm, with obvious strophiole. Fl. and fr. Jun–Nov.  $2n = (14, 15), 16$ .

Fujian, Guangdong, Guangxi, Hainan, Taiwan, Yunnan, Zhejiang [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Singapore, Sri Lanka, Thailand, Vietnam; Africa, Americas, SW Asia, Australia, Indian Ocean islands, Pacific islands].

This species is grown as a green manure and as an ornamental. It is very widely distributed throughout the tropics such that the native distribution is now obscure.

**2. *Clitoria laurifolia*** Poiret, Encycl., Suppl. 2: 301. 1811.

棱荚蝶豆 leng jia die dou

?*Clitoria cajanifolia* Benth.

Shrublets, erect or almost erect, 0.8–1 m tall. Branchlets subterete, densely pubescent, glabrescent. Leaves pinnately 3-foliolate; stipules ovate to ovate-lanceolate, pubescent; petiole 2–7 mm, pubescent; stipels small, bristlelike; petiolules 2–3 mm, pubescent; leaflets obovate-oblong to oblong, 4.5–7 × 1.5–2.8 cm, almost leathery, abaxially densely adpressed pubescent, adaxially glabrous, lateral veins 5–7 pairs, obvious, reticulate veins dense, visible, base rounded or cuneate, apex rounded, slightly emarginate. Raceme axillary, 2.5–5 cm, sparsely shortly villous; peduncle ca. 3 cm; bracts small, ovate. Flowers large, ca. 4 cm, usually paired; bracteoles 2, elliptic, 7–8 mm. Calyx membranous, 5-lobed; lobes ovate, much shorter than tube. Corolla light purple, 2 × or more as long as calyx; standard almost orbicular, base clawed, apex emarginate; wings rhomboid, base long clawed with small auricles; keels semicircular, base long clawed. Legume brown or light brown, linear-ellipsoid, 3–4 cm, inflated, with short beak, near ventral suture with 1 longi-

tudinal rib at each side, clothed with micro-villous hairs. Seed dark brown, suborbicular. Fl. Jul, fr. Aug–Dec.

Below 600 m. Guangdong [India, Indonesia, Malaysia, Myanmar, Singapore, Sri Lanka, Thailand, Vietnam; Africa, Americas].

This species has been grown as a green manure and as an ecological plant for soil restoration.

**3. *Clitoria hanceana*** Hemsley, J. Linn. Soc., Bot. 23: 187. 1887.

广东蝶豆 guang dong die dou

Shrublets, with several succulent fusiform roots. Stems cylindrical, slightly zigzag, internode short, pubescent. Leaves pinnately 3-foliolate; stipules ovate or ovate-lanceolate to oblong, ca. 1 cm, pubescent; petiole 0.5–2.5 cm, villous; stipels linear-lanceolate, 5–6 mm; petiolules ca. 2 mm, villous; leaflets subequal to each other or terminal larger, oblong, 6.5–14 × 2.8–5.5 cm, papery or almost leathery, adaxially glabrous, lateral veins 9–12 pairs, base obtuse or almost cuneate, apex acute or sometimes rounded, usually with mucro, villous. Raceme axillary, 1–2.5 cm, (1 or)2- or 3-flowered, villous; peduncle 0.5–2.5 cm; bracts ovate, 3–5 mm. Flowers ca. 3 cm; bracteoles ovate-lanceolate, 4–5 mm. Calyx membranous, ca. 2 cm, 5-lobed; lobes lanceolate, subequal to tube, hairy, apex acuminate. Corolla white or pale yellow, ca. 3 cm; standard obovate, densely pubescent; wings and keels small, with claws. Ovary with short stipe, hairy, many ovuled. Legume light brown, linear-oblong, 3.5–6 × ca. 0.6 cm, glabrous or pubescent, apex long beaked, shortly stipitate. Seeds 2–7, black, elliptic, ca. 4 × 3 mm. Fl. Apr–Oct.

Deserts, wastelands on slopes, roadsides. Guangdong, Guangxi [Cambodia, Laos, Thailand, Vietnam].

Hance (J. Bot. 16: 9. 1878) applied the name "*Clitoria macrophylla* Wallich" to this species, but that name is a nomen nudum and was therefore not validly published.

This species is used medicinally.

**4. *Clitoria mariana*** Linnaeus, Sp. Pl. 2: 753. 1753.

三叶蝶豆 san ye die dou

Herbs, 45–60 cm tall. Stems lianescent, sparsely villous. Leaves pinnately 3-foliolate; stipules ovate-lanceolate or ovate-triangular, 5–13 mm; petiole 2.8–11.5 cm; stipels linear or linear-lanceolate, 3–7 mm; petiolules short, 1–2 mm; leaflets elliptic to ovate-elliptic, 2.5–11 × 1.5–5 cm, thinly papery, abaxially sparsely villous or sometimes glabrous, adaxially glabrous, lateral veins 7–11 pairs, obviously convex abaxially, base rounded, apex obtuse or acute, rarely acuminate, with mucro. Peduncle with 4 or 5 or more bracts at base; bracts ovate to ovate-lanceolate, 2–4 mm. Flowers axillary, usually solitary, 2.5–5 cm; bracteoles similar to bracts but larger, 4–8 mm. Calyx large,

tubular, membranous, usually glabrous, 5-lobed; lobes lanceolate to ovate-lanceolate, ca. 1/4 as long as to equal to tube, apex acuminate. Corolla light blue or purple, 2.5–5 cm; standard broadly elliptic or almost obovate, base acuminate; wings and keels similar and subequal, much shorter than standard, with slender claws. Ovary and style villous. Legume linear-oblong, 2.5–10 × 0.5–0.8 cm, apex beaked, both ventral and dorsal sutures with ribs. Seeds 2 to many, dark brown, almost cylindrical or reniform. Fl. May–Sep, fr. Sep–Jan.

Shrubs, roadsides, forests; 100–2000 m. Guangxi, Yunnan [Bhutan, India, Laos, Myanmar, Thailand, Vietnam; North America].

**5. *Clitoria falcata*** Lamarck, Encycl. 2: 51. 1786.

镰刀荚蝶豆 lian dao jia die dou

Herbs. Stems twining, ca. 2 mm thick, pubescent. Leaves imparipinnately 3-foliolate; stipules broadly ovate, 3–3.5 × ca. 2 mm, pubescent; petiole (1.5–)2–5 cm, pubescent; stipels per-

sistent; petiolules 1–2.5 mm; leaflets oblong-elliptic to ovate, (1.8–)2–5.5(–7.5) × (0.8–)2.5–3.5 cm, abaxially pale green and densely pubescent, adaxially dark green and glabrous, lateral veins 6 or 7 pairs, base rounded, apex obtuse or slightly emarginate, mucronate. Inflorescence axillary, 1–4-flowered; peduncle 2–15 cm; bracts ca. 2 mm; bracteoles 7–17 mm. Flowers often cleistogamous. Calyx tube 3–4 mm; lobes narrowly lanceolate, 4–5 mm. Corolla often not developed [when present white, 3–4(–5) cm; standard very finely puberulent appearing glabrous; staminal sheath 20–40 mm]. Legume slightly curved, 3–4 × 0.8–1.1 cm, compressed, usually longitudinally ribbed, minutely puberulent, apex aristate. Seeds 4 or 5, dark reddish brown, ellipsoid to subglobose, ca. 3[–4] × 2 mm.

Among bushes, in open grasslands. Taiwan [native to Central and South America and West Indies; introduced elsewhere].

*Clitoria falcata* has been misidentified as *C. rubiginosa* Persoon. The collections from Taiwan are cleistogamous and lack any corolla, so the description of the corolla is taken from Fantz (Vulpia 4: 43. 2005).

### 83. **CENTROSEMA** (Candolle) Benth, Comm. Legum. Gen. 53. 1837, nom. cons.

距瓣豆属 ju ban dou shu

Sa Ren (萨仁); Michael G. Gilbert

*Clitoria* sect. *Centrosema* Candolle, Prodr. 2: 234. 1825.

Shrubs or herbs, procumbent or climbing. Leaves pinnately 3(–7)-foliolate; stipules striate, basifixed, persistent; stipels small. Inflorescence axillary, clustered to racemose, 1- to many flowered; bracts similar in shape to stipules; bracteoles 2, adnate to calyx, persistent, striate, larger than bracts. Calyx shortly campanulate, 5-lobed; lobes unequal. Corolla white, purple, red, or blue, longer than calyx; standard ± circular, abaxially hairy, base clawed, with short abaxial spur above claw. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary sessile; ovules many; style compressed, spatulate at apex, pubescent or bearded at apex; stigma terminal. Legume linear, dehiscent, compressed, filled between seeds. Seeds to 20, oblong or globose; hilum linear to narrowly elliptic; strophiole small or absent.

About 45 species: worldwide but mostly in the New World; one (or possibly two) species (introduced) in China.

**1. *Centrosema pubescens*** Benth, Comm. Legum. Gen. 55. 1837.

距瓣豆 ju ban dou

*Bradburya pubescens* (Benth) Kuntze; *B. schiedeana* (Schlechtendal) Rose; *Centrosema ferrugineum* A. Richard; *C. intermedium* A. Richard; *C. molle* Martius ex Benth; *C. salzmannii* Benth; *C. schiedeana* (Schlechtendal) R. J. Williams & R. J. Clements; *Clitoria schiedeana* Schlechtendal; *Ternatea schiedeana* (Schlechtendal) Kuntze.

Herbs, perennial. Stems twining or trailing, sometimes rooting at nodes, slender, villous. Leaves pinnately 3-foliolate; stipules ovate to ovate-lanceolate, 2–3 mm, with longitudinal striations, persistent; petiole 2.5–6 cm; stipels small, setiform; petiolules short, 1–2 mm, terminal one longer; leaflets thinly papery, terminal leaflet elliptic, oblong, or subovate, 2.6–10 × 1.5–6.8 cm, sparsely villous on both surfaces, lateral veins 5–7 on each side, slender, merging near margin, base obtuse or rounded, apex acute; lateral leaflets slightly small, slightly oblique. Raceme with 2–4 flowers near apex; peduncle 2.5–7 cm; bracts similar to stipules in shape; bracteoles broadly ovate to broadly elliptic, obviously striate, adpressed to calyx, larger than bracts. Calyx 5-lobed; upper 2 lobes ± connate, lowest

longest, linear. Corolla white, pink, or light purple, 2–3 cm; standard broadly orbicular, densely villous abaxially, with short spur near base; wings falcate-obovate, one side with curved auricle, almost semicircular, each petal shortly clawed. Legume linear, 7–13 × 0.5–0.6 cm, compressed, apex acuminate, beak straight, slender, 8–15 mm; valves convex to ridge from both sutures, twisting at dehiscence. Seeds 7–15, brownish black or yellowish green with dark mottling, oblong, 4–5 mm; hilum short. Fl. Nov–Apr, fr. Jan–Jul.  $2n = 22$ .

Introduced forage plant; near sea level to 100 m. Guangdong, Hainan, Jiangsu, Taiwan, Yunnan [native to Central America (extending to 22° N in Mexico) and South America (Colombia)].

Fantz (Sida 17: 321–332. 1996) showed that the material widely used for herbage and as a green fertilizer by agronomists under the name *Centrosema pubescens* belongs to two distinct species: the majority to *C. molle* and the remainder to *C. pubescens* sensu stricto. However, because the identity of the available Chinese material is not clear, the name *C. pubescens* is used here in its old, inclusive sense. Wiersma and Kirkbride (Taxon 54: 209–210. 2005) proposed conservation of the name *C. pubescens* with a conserved type. If this proposal is successful, the correct name for the taxon currently known as *C. pubescens* sensu stricto will be *C. schiedeana*, and that for *C. molle* will be *C. pubescens*. There is ongoing debate on the desirability of such a change, and

it is possible that the name *C. pubescens* might instead be rejected to avoid confusion resulting from a change in its correct usage, in which case the name *C. schiedeanum* would again be correct, while *C. molle* would remain in use. The two species may be distinguished as follows:

*C. molle*: bracts 4–6 × 1–2 mm, puberulous; pedicels 6–9 mm at anthesis; bracteoles 6–9 × 4–6 mm; seeds brownish black; *C. pubescens*: bracts 6–9 × 3–6 mm, sericeous; pedicels 3–6 mm at anthesis; bracteoles 10–16 × 6–9 mm; seeds yellowish green.

## 84. APIOS Fabricius, Enum. 176. 1759, nom. cons.

土圞儿属 tu luan er shu

Sa Ren (萨仁); Michael G. Gilbert

Herbs, twining, with root tubers. Leaves pinnately (3 or)5- or 7(or 9)-foliolate; stipels small. Inflorescence axillary or subterminal and grouped into terminal panicle, racemelike; nodes swollen. Bracts and bracteoles small, caducous. Calyx campanulate; lobes shorter than tube, upper 2 connate, lowest 1 linear and other 2 much shorter. Standard ovate or circular, reflexed; wings obliquely obovate, shorter than standard; keels longest and inflexed or coiled. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary subsessile; ovules many, upper part reflexed, usually thickened, glabrous; stigma terminal. Legume linear, almost flat, dehiscent, compressed, 2-cleft. Seeds without strophiole.

About eight species: mostly in E Asia, two species in E North America; six species (four endemic) in China.

- 1a. Flower red, reddish purple, or orange; leaflets usually more than 5 cm ..... 6. *A. carnea*  
 1b. Flower green, yellow, or purple; leaflets usually less than 5 cm.  
 2a. Leaflets 0.5–1.9 cm wide; inflorescences shorter than or subequal to leaves.  
   3a. Leaflet 0.5–1.2 cm wide; flowers purple ..... 5. *A. gracillima*  
   3b. Leaflet 1.1–1.9 cm wide; flowers pale yellow ..... 4. *A. delavayi*  
 2b. Leaflets usually more than 2 cm wide; inflorescences longer than leaves.  
   4a. Leaflets ovate or rhomboid-ovate, usually 3–7 ..... 1. *A. fortunei*  
   4b. Leaflets usually lanceolate, narrowly lanceolate, or ovate-lanceolate, 5 or 7.  
     5a. Leaflets lanceolate to ovate-lanceolate; inflorescence with 2 flowers per node ..... 2. *A. macrantha*  
     5b. Leaflets ovate-lanceolate to ovate; inflorescence with 3 or 4 flowers per node ..... 3. *A. taiwaniana*

**1. *Apios fortunei*** Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 18: 396. 1873.

土圞儿 tu luan er

*Apios cavaleriei* H. Léveillé.

Herbs, twining. Root tuber spherical or ovoid. Stems slender, sparsely hirsute. Leaves pinnately 3–7-foliolate, 10–25 cm; stipules linear-triangular, to 4 mm, very inconspicuous; petiole 3–6.6 cm, glabrous; stipels inconspicuous; petiolules sometimes hairy; leaflets ovate or rhomboid-ovate, 3–7.5 × 1.5–4 cm, papery, abaxially sparsely hirsute, adaxially glabrous, base broadly cuneate or rounded, apex acute, mucronate. Raceme axillary, 6–26 cm; bracts and bracteoles minute, lanceolate, ciliate, deciduous. Calyx bowl-like, shallowly 2-lipped. Corolla yellowish green or light green; standard orbicular, 1–1.5 cm; wings almost half as long as standard; keels much longer than standard, curled into semicircle. Ovary sparsely shortly hairy; style coiled, glabrous. Legume light brown, ca. 8 × 0.6 cm, glabrous, compressed. Fl. Jun–Aug, fr. Sep–Oct.

Mountain slopes; 300–1000 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Zhejiang [Japan].

The root tuber is a source of starch, sometimes used to make alcohol.

**2. *Apios macrantha*** Oliver, Hooker's Icon. Pl. 20: t. 1946. 1890.

大花土圞儿 da hua tu luan er

Vines. Stems slender, twining, glabrous or almost glabrous

except for nodes. Leaves pinnately 5- or 7-foliolate, 15–20 cm; stipules deciduous, triangular, ca. 4 mm, pilose; petiole 2.5–5.5 cm, glabrous; stipels deciduous; petiolules ca. 2 mm, hirsute; leaflets lanceolate to ovate-lanceolate, ca. 5.5 × 2.2–3.2 cm, papery, both surfaces glabrous, lateral veins ca. 5 on each side, slender, base broadly cuneate to almost rounded, apex acuminate, mucronate. Raceme longer than leaves, pedunculate, with 2 flowers per node. Upper lip of calyx entire, ovate-orbicular, apex mucronate, lateral lobes obliquely lanceolate, apex acuminate, bottom lobe ovate. Corolla yellow or light green; standard 1.7–2 cm; wings almost half as long as standard; keels longest, curved into semicircle. Ovary stipitate, pilose, 8-ovuled. Legume ca. 15 × 0.7 cm, beltlike, compressed, sparsely shortly villous. Fl. Aug–Sep, fr. Sep–Oct.

• River valleys, roadsides; 1800–2400 m. Guizhou, Sichuan, Xizang, Yunnan.

**3. *Apios taiwaniana*** Hosokawa, J. Soc. Trop. Agric. 4: 310. 1932.

台湾土圞儿 tai wan tu luan er

Herbs, twining, like shrublets. Stems sparsely villous. Leaves pinnately (5 or)7-foliolate; petiole 5–12 cm, glabrous; stipels 1.5–2 mm, hirsute; petiolules ca. 2 mm, with fine downy hairs; leaflets ovate or ovate-lanceolate, 4–5 × 1.5–2.2 cm, both surfaces almost glabrous, base rounded or cuneate, apex obtuse or acuminate, mucronate. Raceme to 15 cm; nodes 3- or 4-flowered. Flowers yellowish light purple, ca. 1.2 cm. Calyx lobes subequal. Standard suborbicular, ca. 1.1 cm; wings narrowly oblong; keels extending, inflexed. Ovary shortly velutinous; style twisted. Legume not seen.



- 700–1500 m. Taiwan.

**4. *Apios delavayi*** Franchet, Pl. Delavay. 180. 1890.

云南土圞儿 yun nan tu luan er

Herbs. Stems twining, slender, almost glabrous. Leaves pinnately 5-foliolate, 8–32 cm; stipules subulate, sparsely pubescent, 2–6 mm; petiole 2–8 cm, almost glabrous; petiolules sericeous; leaflets ± lanceolate, 2–5 × 1.1–1.9 cm, papery, both surfaces sparsely hirsute, base orbicular, margin shortly ciliate, apex acuminate, mucronate. Raceme shorter than to sometimes slightly longer than leaves, sparsely 5–10-flowered; peduncle 2.5–6 cm; nodes 1–3-flowered. Calyx broadly campanulate, ca. 1/6 as long as corolla, membranous, 2-lipped; upper 2 lobes connate into triangle, mucronate, lateral 2 lobes linear-subulate, bottom lobe broadly triangular, inflexed, mucronate. Corolla light yellow, ca. 2 cm; standard orbicular; keels narrow, slightly longer than standard. Legume to 15 cm, linear, erect, glabrous, compressed. Seeds up to 12. Fl. Jul–Aug, fr. Sep.

- Shrublands; 1300–3500 m. Sichuan, Xizang, Yunnan.

**5. *Apios gracillima*** Dunn, J. Linn. Soc., Bot. 35: 488. 1903.

纤细土圞儿 xian xi tu luan er

Herbs. Stems twining, slender, sometimes hairy on nodes. Leaves pinnately 5- or 7-foliolate, 5–10 cm, glabrous or shortly pubescent at base of petiole; stipules setiform, 1–3 mm, hairy; petiole 1.8–3 cm; glabrous; leaflets oblong-linear or narrowly lanceolate, 2–4.5 × 0.5–1.2 cm, membranous, both surfaces glabrous, base rounded, apex mucronate. Inflorescences shorter than leaves; peduncle 1.5–2.5 cm. Flowers at top of common

pedicel, usually paired, 1.2–1.5 cm. Lateral calyx lobes acuminate, reflexed, lower lobes almost triangular. Corolla purple; standard orbicular; keel apex inflexed. Ovary shortly villous. Fl. Aug–Oct.

- About 1500 m. Yunnan (Mengzi).

**6. *Apios carnea*** (Wallich) Bentham ex Baker in J. D. Hooker, Fl. Brit. India 2: 188. 1876.

肉色土圞儿 rou se tu luan er

*Cyrtotropis carnea* Wallich, Pl. Asiat. Rar. 1: 50. 1830.

Vines, 3–4 m. Stems twining, slender, hairy when young. Leaves pinnately 5-foliolate, 12–25 cm; stipules narrowly triangular, 2–4 mm, hairy, caducous; petiole 5–8(–12) cm, glabrous; leaflets oblong to ovate-oblong, 3.5–13 × 2–7 cm, papery, glabrous, base obliquely cuneate to nearly rounded, apex acuminate or acute, shortly caudate. Raceme 15–40 cm; peduncle 4–20 cm; nodes 2- or 3-flowered. Bracts and bracteoles small, linear, deciduous. Calyx campanulate, 2-lipped; lobes triangular, shorter than tube. Corolla red, reddish purple, or orange, ca. 2 × as long as calyx; standard longest, 1–2 cm; wings shortest, 0.6–1.2 cm; keels linear, curved to semicircular. Filament to 2 cm. Style curved to circular or semicircular. Legume linear, 8–19 × 0.6–0.7 cm, straight or slightly curved, compressed, glabrous, apex beaked. Seeds 12–21, dark brown, reniform, lustrous. Fl. Jul–Sep, fr. Aug–Nov.

Forests, riversides, roadsides, rocks; 600–2600 m. Fujian, Guangxi, Guizhou, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, N India, Nepal, Thailand, Vietnam].

The seeds contain oil.

**85. COCHLIANTHUS** Bentham in Miquel, Pl. Jungh. 234. 1852.

旋花豆属 xuan hua dou shu

Chen Dezhaio (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

Herbs, climbing, turning black when dry. Leaves pinnately 3-foliolate, stipellate. Racemes axillary; rachis slender, nodose. Flowers usually clustered at swollen nodes; bracts and bracteoles minute, subulate, caducous or subsistent. Calyx campanulate, 2-lipped, upper 2 teeth connate into a larger upper lip, apex emarginate or entire, lower lip with 3 teeth, middle tooth longest, lateral 2 shorter. Petals subequal in length or standard shorter, with long or short claws; standard broadly ovate, with inflexed auricles at base; wings oblong or subspatulate, slightly longer than standard, base with long auricle; keel linear, as long as or longer than wings, coiled inward in upper part. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary shortly stipitate, many ovuled; style filiform, glabrous, upper part coiled inward into 1 or 2 circles; stigma large, peltate-dilated, terminal. Legumes linear-oblong, incurved, compressed, obscurely septate. Seeds quadrate; hilum short, estrophiolate.

Two species: S and SW China, Nepal; two species (one endemic) in China.

- 1a. Leaflets broadly ovate-rhomboid, apex broadly acute, mucronate ..... 1. *C. montanus*  
 1b. Leaflets ± narrowly ovate-rhomboid, apex caudate-acuminate ..... 2. *C. gracilis*

**1. *Cochlianthus montanus*** (Diels) Harms, Repert. Spec. Nov. Regni Veg. 17: 136. 1921.

高山旋花豆 gao shan xuan hua dou

*Mucuna montana* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 247. 1912.

Herbs, robust, twining and climbing. Stems densely villous with grayish white hairs. Terminal leaflet broadly ovate-rhomboid, symmetric, lateral ones slightly oblique, 5.5–8 ×

4.5–8 cm, densely silky pubescent on both surfaces, base rounded or broadly cuneate, apex broadly acute, mucronate. Calyx densely adpressed pubescent outside; upper 2 teeth connate to an emarginate lip, lowest tooth lanceolate, ca. 7 mm. Corolla pink or rose-red; standard broadly ovate, ca. 18 mm, shortly clawed; wings slightly longer than standard, base with auricle as long as claw; keel longest, linear, coiled inward. Legumes narrowly oblong, compressed, hirsute. Fl. Jul.

- Dry rocky scrub on mountain slopes; ca. 3000 m. Yunnan (Lijiang).

**2. Cochlianthus gracilis** Benth in Miquel, Pl. Jungh. 234. 1852.

细茎旋花豆 xi jing xuan hua dou

Herbs, slender, twining and climbing. Stems hairy at first, later glabrescent. Leaflets membranous or papery, strigose on both surfaces, terminal leaflet ± narrowly ovate-rhomboid, symmetric, lateral ones oblique, 5–9 × 2–6 cm, base broadly cuneate or obtuse, apex caudate-acuminate. Calyx densely hispidulous; upper 2 teeth connate into an entire or emarginate lip; lowest tooth lanceolate, 6–7 mm. Corolla pink or light purple; standard obovate-orbicular or suborbicular, ca. 2 × 1.7 cm; wings broadly spatulate, slightly longer than or as long as standard, base with auricle as long as claw, apex rounded; keel much longer than wings, upper part coiled inward, base with long claw and short auricle. Ovary with 2–4 mm stipe, with or without small cup-shaped disk at base. Style and filaments coiled inward for 1 or 2 turns in upper part. Legumes linear-oblong, densely hirsute with brownish black long hairs.

Open forests, mountain slopes, scrub, roadsides; 1400–1800 m. Sichuan, Xizang, SW Yunnan [Bhutan, Nepal].

- 1a. Upper 2 calyx teeth connate into an entire lip; stipe of ovary ca. 4 mm, with a small cup-shaped disk at base; style and filaments coiled inward for 1 turn in upper part ..... 2a. var. *gracilis*  
 1b. Upper 2 calyx teeth connate into an

emarginate lip; stipe of ovary ca. 2 mm, without disk at base; style and filaments coiled inward for 2 turns in upper part ..... 2b. var. *brevipes*

**2a. Cochlianthus gracilis** var. *gracilis*

细茎旋花豆(原变种) xi jing xuan hua dou (yuan bian zhong)

Leaflets strigose on both surfaces. Upper 2 calyx teeth connate into an entire lip. Ovary with ca. 4 mm slender stipe and cup-shaped disk at base. Style and filaments coiled inward for 1 turn in upper part. Fl. Sep.

Open forests, mountain slopes; ca. 1400 m. Xizang, SW Yunnan [Bhutan, Nepal].

**2b. Cochlianthus gracilis** var. *brevipes* C. F. Wei, Bull. Bot. Res., Harbin 5(2): 49. 1985.

短柄旋花豆 duan bing xuan hua dou

Leaflets densely hairy. Upper 2 calyx teeth connate into an emarginate lip. Ovary with thick, short stipe, without cup-shaped disk at base. Style and filaments coiled inward for 2 turns in upper part. Fl. Aug–Sep.

• Scrub, roadsides, mountain slopes; ca. 1800 m. Sichuan (Baoping).

One of us (Thulin) has seen no material of *Cochlianthus gracilis* var. *brevipes*, but, judging from the description, it seems so different from typical *C. gracilis* that it would perhaps be better treated as a distinct species. Further study is needed.

**86. SHUTERIA** Wight & Arnott, Prodr. Fl. Ind. Orient. 207. Oct 1834, nom. cons., not *Shutereia* Choisy (Aug 1834).

宿苞豆属 su bao dou shu

Sa Ren (萨仁); Michael G. Gilbert

Perennial twining or climbing herbs or subshrubs. Leaves pinnately 3-foliolate; stipules and stipels deciduous or persistent; leaflets sessile or shortly petiolulate. Raceme axillary; flowers small, paired, clustered, or sparsely arranged; bracts and bracteoles 2, small, acute, persistent. Calyx campanulate; lobes shorter than tube, unequal, upper 2 connate. Corolla usually purple, light purple, or red, longer than calyx, 7–8 mm in diam.; standard ovate or broadly ovate, almost erect, without auricles, longer than other petals; wings narrow, oblique, with auricles, longer than keels and connate with them; keels straight and with blunt auricles and stipe. Stamens diadelphous; anthers small, uniform. Ovary sessile or shortly stipitate; style inflexed, filiform, glabrous; stigma terminal, capitate. Legume linear, compressed, slightly curved, 4–5 cm, shortly stipitate or sessile, 4–11-ovuled, septate. Seeds suborbicular, oblong, or reniform; hilum short, without strophiole.

About six species: tropics and subtropics of Asia; four species (one endemic) in China.

*Shuteria suffulta* Wallich ex Benth, native to India, Myanmar, and Thailand, has been recorded from Yunnan (Index Fl. Yunnan. 1984), but we have not seen any material.

- 1a. Leaflet apex acuminate.  
 2a. Hairs on stems and leaves ± adpressed; corolla ca. 8 mm ..... 1. *S. ferruginea*  
 2b. Hairs on stems and leaves spreading; corolla 14–16 mm ..... 2. *S. lancangensis*  
 1b. Leaflet apex obtuse or slightly emarginate.  
 3a. Lower part of inflorescence axis with small, sessile, rounded or reniform leaflets ..... 3. *S. involucrata*  
 3b. Lower part of inflorescence axis without sessile leaflets ..... 4. *S. vestita*

**1. Shuteria ferruginea** (Kurz) Baker in J. D. Hooker, Fl. Brit. India 2: 182. 1876.

硬毛宿苞豆 ying mao su bao dou

*Pueraria ferruginea* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 232. 1874; *P. anabaptis* Kurz; *Shuteria anabaptis* (Kurz) C. Y. Wu; *S. hirsuta* Baker.

Herbs, 1–3(–4) m. Stems twining, slender, many branched,

brown hirsute. Leaves pinnately 3-foliolate; stipules lanceolate, persistent; petiole 2.5–9 cm; stipels small; petiolules ca. 4 mm, hairy; leaflets ovate, 6–9 × 3.5–6 cm, membranous, both surfaces adpressed villous, base rounded, apex acuminate. Raceme axillary, axis 5.5–16 cm; peduncle 2–3 cm, densely hairy. Bracts lanceolate, 6–8 mm, hirsute, persistent; bracteoles linear, hairy, persistent. Calyx tubular, ca. 4 mm, 5-lobed, hairy; upper 2 lobes nearly connate, triangular, ca. 1.5 mm, lower 3 lanceolate, shorter than tube. Corolla light purple to purple, ca. 8 mm; standard obovate, without auricle, with stipe; wings linear, with auricles and stipe; keels slightly shorter than wings, auriculate. Ovary hairy. Legume oblong, compressed, slightly curved, 4.5–6 × 0.3–0.7 cm, densely hairy, apex rostrate, 5–11-seeded. Seeds dark brown. Fl. Jul–Dec, fr. Sep–Dec.

Mountains, forests, roadsides; 200–2300 m. Yunnan [Bhutan, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

*Shuteria ferruginea* is used for food. It is more widely known as *S. hirsuta*, but that name was published three years later than *Pueraria ferruginea*.

**2. *Shuteria lancangensis*** Y. Y. Qian, Guihaia 23: 307. 2003.

澜沧宿苞豆 lan cang su bao dou

Herbs, 2–4 m. Stems twining, slender, striate, spreading villous. Leaves 3-foliolate; stipules lanceolate, 8–10 mm, persistent; petiole 4–7 cm; stipels small, subulate, ciliate; petiolules 3–5 mm, villous; leaflets broadly ovate-rhomboid, 4.5–8.5 × 3–7 cm, papery, both surfaces spreading villous, adaxial surface dark green, lateral veins 3–5 pairs, base cuneate, apex acuminate. Raceme axillary, 10–14 cm, 30–50-flowered; nodes 1–4-flowered; peduncle ca. 3 cm. Bracts linear or linear-lanceolate, 6–8 mm; pedicel ca. 3 mm; bracteoles linear, ca. 2 mm, ciliate, persistent. Calyx tubular; lobes 4, ovate, 1.5–2 mm, shorter than tube, uppermost longest. Corolla purple, 14–16 mm; standard obovate, with 2 auricles; wings oblong, auriculate; keel as long as wings, auriculate. Ovary villous. Legume oblong, 6–6.5 cm × 3–3.5 mm, compressed, apex beaked. Seeds ca. 11.

- Thickets; ca. 1900 m. Yunnan.

This species is known to us only from the protologue.

**3. *Shuteria involucrata*** (Wallich) Wight & Arnott, Prodr. Fl. Ind. Orient. 207. 1834.

宿苞豆 su bao dou

*Glycine involucrata* Wallich, Pl. Asiat. Rar. 3: 22. 1832; *Shuteria sinensis* Hemsley; *S. vestita* Wight & Arnott var. *involucrata* (Wallich) Baker.

Herbs, 1–3 m. Stems twining, slender, densely pubescent or glabrous. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, persistent; petiole 2.5–7.5 cm; stipels linear; leaflets broadly ovate, ovate, or suborbicular, 1.5–6.5 × 1.1–5.5 cm, membranous to thinly papery, base rounded, apex rounded, slightly concave, with small mucro. Raceme axillary, axis 9–15 cm, lower 2 or 3 nodes with reduced, sessile, circular or reniform leaflets; peduncle 1–2.5 cm. Flowers ca. 10 mm; bracts and bracteoles lanceolate, persistent. Calyx tubular, 4-lobed; lobes lanceolate, shorter than tube. Corolla red, purple, or light purple; standard elliptic-obovate, apex slightly obtuse, slightly emarginate; wings oblong, subequal to keels. Ovary sessile. Legume linear, compressed, 3–5 × 0.2–0.6 cm, apex beaked, dehiscent or indehiscent. Seeds 5 or 6, brown, lustrous. Fl. Sep–Mar, fr. Nov–Mar.

Mountains, roadsides, forest margins, under thickets; 900–2200(–2800) m. Guangxi, Yunnan [Bhutan, Cambodia, India, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

*Shuteria involucrata* is used medicinally.

**4. *Shuteria vestita*** Wight & Arnott, Prodr. Fl. Ind. Orient. 207. 1834.

西南宿苞豆 xi nan su bao dou

*Shuteria glabrata* Wight & Arnott; *S. involucrata* (Wallich) Wight & Arnott var. *glabrata* (Wight & Arnott) H. Ohashi; *S. involucrata* var. *villosa* (Pampanini) H. Ohashi; *S. pampaniniana* Handel-Mazzetti; *S. vestita* var. *villosa* Pampanini.

Herbs, 1–3 m. Stems twining, slender, densely pubescent or glabrous. Leaves pinnately 3-foliolate; stipules lanceolate; petiole 2–4 cm; stipels small, linear; terminal leaflet elliptic to almost rhomboid, 1.5–6 cm, base rounded, apex slightly emarginate, with short mucro; lateral leaflets elliptic and slightly oblique, 2.5–5 × 1.5–4 cm, both surfaces pubescent, base rounded, apex emarginate, with small mucro. Raceme axillary, flowers clustered at base; peduncle 2.5–10 cm; bracts lanceolate; bracteoles lanceolate, persistent. Calyx tubular, lobes shorter than tube. Corolla purple to light purple, ca. 8 mm; standard obovate-elliptic, with stipe; wings and keels oblong, curved, all auriculate. Ovary hairy. Legume linear, 2–4.5 × 0.3–0.5 cm, compressed, slightly curved, 3–8-seeded. Fl. Nov–Jan, fr. Jan–Apr.

Mountains, forests, grasslands, roadsides; 500–2000 m. Guangxi, Hainan, Yunnan [Bhutan, India, Indonesia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

This plant is used medicinally.

**87. MASTERSIA** Bentham in Bentham & J. D. Hooker, Gen. Pl. 1: 535. 1865.

闭荚藤属 bi jia teng shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Woody climbers. Leaves pinnately 3-foliolate; stipules caducous; leaflets large, stipellate. Racemes axillary and terminal. Flowers borne in clusters of 2 or 3 at small nodes; bracts 2, caducous; bracteoles obovate, sheathing base of calyx, persistent. Calyx lobes longer than tube, upper 2 connate into a broad entire lip. Standard suborbicular, very shortly clawed, not auriculate; wings obliquely oblong; keel broad, slightly incurved, obtuse, subequal to wings. Stamens diadelphous; vexillary stamen free, remainder connate; anthers linear, versatile. Ovary sessile; ovules numerous; style shortly filiform, incurved, not barbate; stigma capitate. Legumes ob-

long-linear, compressed, narrowly winged along upper suture, indehiscent. Seeds numerous, oblong, transversely arranged; hilum lateral, small; funicle filiform.

Two species: Bhutan, China, India, Indonesia, Malaysia; one species in China.

**1. *Mastersia assamica*** Bentham, Trans. Linn. Soc. London 25: 300. 1865.

闭荚藤 *bi jia teng*

Woody climbers, young parts pubescent. Leaf rachis 6–15 cm; stipels linear, 7–8 mm; leaflets subrhombic, elliptic, or ovate, 8–14 × 6–12.5 cm, lateral ones smaller than terminal one, appressed pubescent abaxially, glabrous adaxially, base

rounded, apex acuminate. Racemes 30 cm or more. Bracts ovate-lanceolate, 7–8 mm, ciliate; bracteoles 5–7 mm. Calyx campanulate, 4-lobed; tube 4–5 mm; lobes 7–12 mm. Corolla purplish, 10–18 mm. Legumes blackish, 10–12 × 2.5–3 cm, thinly leathery, glabrous. Seeds brown, reniform, ca. 5 × 2.5 mm.

Semi-evergreen rain forests; below 900 m. SE Xizang (Médog) [Bhutan, India].

## 88. *MUCUNA* Adanson, Fam. Pl. 2: 325, 579. 1763, nom. cons.

豇豆属 *li dou shu*

Sa Ren (萨仁); C. Melanie Wilmot-Dear

*Stizolobium* P. Browne; *Zoophthalmum* P. Browne.

Vines, perennial or annual, woody or herbaceous. Leaves pinnately 3-foliolate; stipules usually caducous; stipels sometimes caducous; leaflets large. Inflorescences axillary or on old stems, condensed panicles or often compound pseudoracemes through reduction of ultimate peduncles to small knobs, usually with 3 flowers. Flowers large and beautiful; bracts small or caducous. Calyx campanulate, 5-lobed, upper 2 lobes connate into a broad lip. Corolla dark purple, red, light green, or almost white, usually dark when dry, longer than calyx; standard usually shorter than wings and keel, with stipe, with 2 auricles at base; wings oblong or ovate, inflexed, usually attached to keel; keel petals partially connate along lower margin, slightly longer than or equal to wings, apex inflexed with horny, often hooked, apical beak. Vexillary stamen free; anthers dimorphic, usually with beard, longer 5 almost basifixed, shorter 5 dorsifixed. Ovary 1- to many ovuled; style filiform, inflexed, sometimes hairy, without beard; stigma small, capitate. Legume ovoid, oblong, or linear, swollen around seeds or laterally flattened, margin often winged, surface often ribbed or ornamented with winglike lamellae sometimes simple or divided into 2 wings along their distal margins (T-shaped in cross section), often clothed with red-brown irritant bristles, dehiscent; valves thick. Seeds reniform, orbicular, or elliptic; hilum linear; strophiole absent.

About 100 species: worldwide; 18 species (nine endemic) in China, including two incompletely known taxa and one possibly extinct species (*Mucuna championii*).

### Key based on flowering specimens

- 1a. Terminal leaflet broadly triangular, base ± cordate, length ca. 1.3 × width; lateral leaflets obliquely truncate-cordate ..... 15. *M. cyclocarpa*
- 1b. Terminal leaflet broadly or narrowly ovate or rhombic, base cuneate or rounded, length 1.5–2.5 × width, lateral leaflets obliquely rounded or only outer side with truncate base.
  - 2a. Mature leaves abaxially with dense pale silky adpressed hairs, lateral veins dark and conspicuously less pubescent.
    - 3a. Terminal leaflet relatively narrow (length 2–2.5 × width), apex with conspicuous narrow acumen 10–20 mm; leaflet hairs abaxially ca. 1 mm, closely adpressed, pale and fine, giving surface a conspicuously shiny-silvery silky appearance, lateral veins more sharply curved near margin and becoming indistinct or arching and joining; lowest calyx lobe shorter than or equaling tube ..... 5. *M. calophylla*
    - 3b. Terminal leaflet relatively broad (length 1.5–1.75 × width), apex acute or with short broad acumen to 5 mm; leaflet hairs at most half-adpressed and either much shorter, less than 0.5 mm, or coarser, yellowish orange and surface not shiny silky, lateral veins uniformly straight or slightly curved, clearly joining margin; lowest calyx lobe often to twice tube length.
      - 4a. Abaxial hairs on leaflets ca. 1 mm; lowest calyx lobe 8–10 mm, longer than tube; corolla wing ca. 4 × 1.4 cm, almost as long as keel ..... 17. *M. incurvata*
      - 4b. Abaxial hairs on leaflets less than 0.5 mm; lowest calyx lobe (3–)5–6 mm, slightly shorter or longer than tube; corolla wing 2.5–3.3 × 0.6–0.8 cm, conspicuously shorter than keel ..... 18. *M. bracteata*
  - 2b. Mature leaves glabrous or spreading hairy, or if hairs adpressed then veins ± similarly hairy, not with conspicuously dark lines among pale pubescence.
    - 5a. Standard and wings with apical 1/4–1/3 of margin pubescent.
      - 6a. Flowers 5.5–6.5 cm, standard greenish white, wings and keel reddish or purple; wings 4–5.2(–5.6) cm ..... 3. *M. macrocarpa*

- 6b. Flowers 7–9 cm, purple, red, and/or whitish; wings 6–7 cm.
- 7a. Stipels persistent; corolla entirely purple or standard white.
- 8a. Standard, wings, and keel purple; wing relatively broad (length:width ratio 2.5–3:1) ..... 10. *M. macrobotrys*
- 8b. Standard white, wings and keel purple; wing often relatively narrow ..... 3. *M. macrocarpa* (large-flowered form)
- 7b. Stipels not persistent; corolla purple, white, or bicolored.
- 9a. Leaflets abaxially glabrous or very sparsely hairy, often drying pale green; length:width ratio of terminal leaflet (2–)3–4:1; corolla greenish white ..... 1. *M. birdwoodiana*
- 9b. Leaflets abaxially with abundant to dense often colored hairs, drying brownish green or black; length:width ratio of terminal leaflet usually 1.5–1.75:1; corolla white or partly purple.
- 10a. Indumentum of leaflets red-brown; corolla purple with whitish or greenish standard; leaflets often with less than 5 lateral veins on either side ..... 3. *M. macrocarpa* (large-flowered form)
- 10b. Indumentum of leaflets pale; corolla usually deep purple; leaflets with 5–8 lateral veins on either side ..... 2. *M. bodinieri*
- 5b. Standard and wings with margin not pubescent or pubescent only in basal 1/3.
- 11a. Flowers crowded in upper 2/3 of axis, lower flowerless part of axis with conspicuous bracts and scars; leaflets thickly papery or leathery, markedly discoloured, greenish gray abaxially in dry state and with lateral veins conspicuously stout, dark, prominent, less pubescent than rest of surface,  $\pm$  straight, running into margin ..... 18. *M. bracteata*
- 11b. Flowers evenly spaced throughout inflorescence length, or if only in upper 2/3 then lower flowerless part of axis without bracts or scars; leaflets papery or membranous, not markedly discoloured, venation neither conspicuously stout nor less pubescent than surface, running into margin or not.
- 12a. Flowers crowded into upper 1/4 of axis, lower pedicels and ultimate peduncles to 2 cm, progressively shorter toward inflorescence apex, inflorescence pseudoubellate; corolla white, to 4.4 cm; calyx teeth very short, lowest (1–)2–3 mm ..... 6. *M. gigantea*
- 12b. Flowers well spaced or crowded near apex but pedicels all of similar length, ca. 1 cm or less, ultimate peduncles knoblike or rarely to ca. 0.4 cm, inflorescence racemose; corolla purple or white, often more than 5 cm; calyx teeth mostly long, lowest 5–15 mm (3–4 mm in *M. lamellata*).
- 13a. Wing of corolla with abundant long adpressed hairs 1–2 mm in upper 2/3 of inner surface; corolla purple or reddish brown.
- 14a. Flowers 4–4.5 cm; terminal leaflet usually angular, rhombic, lateral veins straight throughout most of length and almost reaching margin ..... 14. *M. lamellata*
- 14b. Flowers 5–5.5 cm; terminal leaflet rounded in outline, lateral veins curved, more sharply so near margin and becoming indistinct ..... 11. *M. hirtipetala*
- 13b. Wing of corolla glabrous except for short hairs in claw region; corolla purple or white.
- 15a. Leaflets with lateral veins clearly running into margin; lateral leaflets often very asymmetric, outer half 2–3  $\times$  as wide as inner.
- 16a. Calyx with lateral teeth ca. 6  $\times$  5 mm, lowest tooth relatively broad, 8–10  $\times$  4–5 mm, keel apex clawlike and convex, shiny on both surfaces in apical ca. 1 cm; leaflets abaxially with dense adpressed pale hairs ca. 1 mm ..... 17. *M. incurvata*
- 16b. Calyx with lateral teeth 2–4  $\times$  1.5–3 mm, relatively short compared to lowest tooth, lowest tooth narrow, 6–10  $\times$  2–3 mm (ratio of lowest tooth to lateral teeth usually 2–3:1); keel apex less clawlike; leaflets abaxially glabrous or shortly pubescent ..... 16. *M. pruriens*
- 15b. Leaflets with lateral veins curving and becoming indistinct or arching and joining near margin; lateral leaflets markedly asymmetric or not.
- 17a. Keel 4.8–7 cm.
- 18a. Stipels caducous; wing 2–3  $\times$  as long as wide, wing apex  $\pm$  acute and horny, usually shiny and often pale; keel 6–7 cm; inflorescences arising from old wood; corolla purple ..... 4. *M. sempervirens*
- 18b. Stipels persistent; wing 4–5  $\times$  as long as wide, wing apex not horny, rarely extreme tip slightly pale, usually  $\pm$  rounded; keel to 5.7 cm; inflorescences on leafy stems; corolla purple or white.
- 19a. Wing ca. 2 cm wide; leaflets rather angular in outline, terminal leaflet rhombic-ovate or rhombic-elliptic, narrowing gradually to evenly tapering acumen and relatively broad (length:width ratio ca. 1.5:1); corolla purple ..... 9. *M. membranacea*
- 19b. Wing to 1.3 cm wide; leaflets with very curved outline, terminal leaflet elliptic or slightly obovate, narrowing abruptly to short broadly rounded acumen and often relatively narrower (length:width ratio (1.5–)2–2.5:1); corolla pink, purple, or white.

- 20a. Hairs on inflorescence axis and calyx spreading, very short, 0.1–0.2 mm and almost velvety; corolla usually pink or purple, rarely white, 4.5–4.8 cm; bracts small, (5–)10–17 × (2–)5–7 mm, fairly early deciduous ..... 8. *M. revoluta*
- 20b. Hairs on inflorescence axis and calyx adpressed, majority at least 0.4 mm, not velvety; corolla white or purple, usually 5–6 cm; at least lower bracts often persistent, large and broad, 20–40 × 10–20 mm.
- 21a. Calyx lobes relatively broad, apex broadly acute, lowest ca. 5 mm wide; all bracts of similar form, broadly ovate, (22–)30–40 mm; corolla always white ..... 7. *M. interrupta*
- 21b. Calyx lobes relatively narrow and long acuminate, lowest 2–3 mm wide; bracts subtending flowers elliptic or obovate, apex broadly rounded, often hooded, 10–20 mm; corolla usually dark purple ..... 12. *M. hainanensis*
- 17b. Keel 3.5–4.8 cm.
- 22a. Persistent stipels absent; terminal leaflet relatively narrow (length:width ratio (2–)2.5:1), apex with very marked 1–2 cm acumen ..... 5. *M. calophylla*
- 22b. Persistent stipels present; terminal leaflet usually relatively wide (length:width ratio rarely over 1.75:1), apex shortly, or not at all, acuminate.
- 23a. Flowering pedicels 2–4 mm; pedicel and leaflet abaxially, especially on veins, with fine red-brown hairs; outer half of lateral leaflets ca. 1.5 × as wide as inner; corolla purple ..... 13. *M. championii*
- 23b. Flowering pedicels 8–20 mm; lateral leaflets sometimes more asymmetric, outer half of lateral leaflets ca. 2 × as wide as inner; corolla purple or white.
- 24a. Corolla wings relatively wide, ca. 2 cm wide; leaflets rather angular in outline, terminal leaflet rhombic-ovate or rhombic-elliptic, narrowing gradually to evenly tapering acumen and relatively broad (length:width ratio ca. 1.5:1); lateral leaflets often quite asymmetric with ratio of widths of 2 sides ca. 2:1 ..... 9. *M. membranacea*
- 24b. Corolla wings narrow, to 1.3 cm wide; leaflets with very rounded outline, terminal leaflet elliptic or slightly obovate, narrowing abruptly to short wide rounded acumen and often relatively narrower (length:width ratio (1.5–)2–2.5:1); lateral leaflets less asymmetric with ratio of widths of 2 sides ca. 1.5:1.
- 25a. Hairs on inflorescence axis and calyx spreading, 0.1–0.2 mm, indumentum almost velvety; flowers usually pink or purple, rarely white; bracts (5–)10–17 × (2–)5–7 mm, fairly early deciduous ..... 8. *M. revoluta*
- 25b. Hairs on inflorescence axis and calyx adpressed, majority at least 0.4 mm, indumentum not velvety; flowers purple; at least lower bracts often persistent, 20–40 × 10–20 mm ..... 12. *M. hainanensis*

**Key based on fruiting specimens** (excluding *Mucuna hirtipetala* and *M. incurvata* for which no fruit was seen)

- 1a. Mature leaves abaxially with dense pale silky hairs conspicuously sparser on primary veins; legume length 4–6 × width, surface without lamellae.
- 2a. Terminal leaflet narrow (length:width ratio (2–)2.5:1), apex with very well-marked 1–2 cm acumen, ca. 2 mm wide for most of length, abaxial hairs adpressed, ca. 1 mm; legume ± woody or thickly leathery, more than 12 cm, silky hairy ..... 5. *M. calophylla*
- 2b. Terminal leaflet relatively broad (length:width ratio 1.25–1.75:1), apex with acumen absent or rarely to 5 mm, abaxial hairs often erect, shorter; legume fleshy, less than 10 cm, with irritant bristles ..... 18. *M. bracteata*
- 1b. Mature leaves glabrous or variously hairy with hairs at least as dense on veins; legume often relatively wider and/or with surface lamellae.
- 3a. Legume without lamellae, sometimes wrinkled on surface or with winged margins.
- 4a. Legume linear, often torulose, woody, usually at least 30 cm when mature.
- 5a. Legume margins each with a pair of thick woody wings ± evenly 3–5 mm wide and with definite edges, legume markedly torulose, each segment ± oval with rounded apex and base ..... 1. *M. birdwoodiana*
- 5b. Legume margins not winged, at most wrinkled into irregularly thickened ridge to 2 mm wide and then legume not torulose, segments ± rectangular in outline.
- 6a. Legume glabrous, not torulose, only slightly swollen around seeds, segments ± rectangular, apical and basal edges ± straight; leaflets broadly rounded abaxially with dense short pale spreading hairs ..... 2. *M. bodinieri*
- 6b. Legume glabrous or with dense short erect red-brown pubescence, markedly torulose, width at septa between seeds usually 1/2–2/3 width at widest point; leaflets acute or acuminate, abaxially often glabrous or sparsely hairy or with red-brown hairs.

- 7a. Mature legume without firm rounded raised margin, surface wrinkled or with coarse raised rugose-reticulate patterning, often without fine hairs; leaflets with fine reticulate venation, partially visible, clearly distinct from coarser reticulation, indumentum sometimes dense ..... 3. *M. macrocarpa*
- 7b. Mature legume surface with firm rounded raised margin, surface with rather fine conspicuous but shallow reticulate patterning, and fine hairs; leaflets with reticulate venation fine and prominent, coarse reticulation often hardly distinct from fine, indumentum never dense ..... 4. *M. sempervirens*
- 4b. Legume either broadly oblong or small and fleshy, or if linear and  $\pm$  woody then always less than 16 cm when mature.
- 8a. Mature legume 2–3  $\times$  as long as wide, never less than 4 cm wide, leathery, with marginal wing 5–7 mm wide, surface glabrous or sparsely hairy with fine and regular reticulate pattern of raised lines giving a pitted appearance ..... 6. *M. gigantea*
- 8b. Mature legume at least 4–6  $\times$  as long as wide, fleshy or leathery, margin sometimes thickened and sometimes longitudinally ridged but never winged, surface often hidden beneath dense hairs, where visible wrinkled or with irregular much coarser patterning of raised lines, never apparently pitted.
- 9a. Mature legume  $\pm$  woody or thickly leathery, 13–15 cm, surface clearly visible beneath covering of short erect hairs and longer caducous irritant bristles; terminal leaflet 2–2.5  $\times$  as long as wide, apex with distinct long narrow acumen 1–2 cm; lateral veins curving more sharply and becoming indistinct or looping and joining near margin ..... 5. *M. calophylla*
- 9b. Mature legume fleshy, 5–9 cm, surface usually nearly invisible beneath dense covering of silky hairs or caducous irritant bristles; terminal leaflet usually ca. 1.5  $\times$  as long as wide, apex acute or with short broad acumen to 0.5 cm; lateral veins uniformly straight or slightly curved, clearly reaching margin.
- 10a. Legume with pale silky hairs, not rigid or irritant; calyx with short pale hairs, rarely also with a few longer hairs but without longer irritant bristles ..... 16. *M. pruriens*
- 10b. Legume with dense ferruginous or brown rigid caducous irritant bristles; calyx with short brown hairs and often longer irritant bristles.
- 11a. Lower 1/3 of infructescence axis always without fruit but with bract scars or with persistent bracts; leaflets quite thickly papery or  $\pm$  leathery, markedly discolorous, abaxially pale greenish gray in dry state, midrib and veins conspicuously prominent, dark and less pubescent than rest of surface ..... 18. *M. bracteata*
- 11b. Infructescence axis either with fruit throughout length or without fruit or scars in lower part; bracts all caducous before flowers open; leaflets much thinner, papery or membranous, abaxially not or only slightly paler, veins neither prominent nor dark and less pubescent than rest of surface ..... 16. *M. pruriens*
- 3b. Legume surfaces each with 8–16 conspicuous obliquely transverse lamellae.
- 12a. Stem (at least when young), petiole, and leaves abaxially with conspicuous soft ferruginous hairs; legume over 16 cm when mature; torulose ..... 13. *M. championii*
- 12b. Stem, petiole, and leaves glabrous or with sparse pale hairs; legume size and shape various.
- 13a. Legume relatively small and narrow, to 10 cm, ca. 4  $\times$  as long as wide, margins  $\pm$  parallel, marginal wings to 4 mm wide.
- 14a. Legume with septa clearly visible as marked indentations; seeds almost spherical; terminal leaflet broadly triangular-cordate, 12–15 cm, base cordate ..... 15. *M. cyclocarpa*
- 14b. Legume with septa just visible as indefinite indentations; seeds markedly laterally flattened, to 1/2 as thick as long; terminal leaflet rhombic-ovate, 6–13 cm, base cuneate ..... 14. *M. lamellata*
- 13b. Legume length only 2–3  $\times$  width, or if relatively narrow then legume much larger, at least 16 cm or at least with one margin convex, or marginal wings 1 cm or more wide.
- 15a. Legume lamellae erect, 2-winged along their margins to give T-shaped cross section, all lamellae clearly interrupted along midline of legume.
- 16a. Legume (1 or)2-seeded, 6–9  $\times$  4–4.5 cm, lamellae 8–12 per valve, with strongly revolute apical halves, marginal wings strongly inrolled; bracts never persistent; hairs on inflorescence axis and calyx erect, very short, 0.1–0.2 mm, velvety ..... 8. *M. revoluta*
- 16b. Legume 3-seeded, 13–14  $\times$  6–7 cm, lamellae ca. 18 per valve, with spreading or  $\pm$  upcurved apical halves, marginal wings  $\pm$  flat; some bracts large and conspicuous, often persistent to fruiting stage; hairs on calyx and inflorescence axis adpressed, 0.4 mm or more ..... 7. *M. interrupta*
- 15b. Legume lamellae often partly adpressed, each a simple raised flap not dividing to give T-shaped cross section, sometimes erratically discontinuous, joined or branched near middle of legume but not creating a longitudinal midline.
- 17a. Legume to 2  $\times$  as long as wide, oblong, usually asymmetric, often with both sides convex, never parallel.

- 18a. Legume with at least some lamellae joined or branched near middle of legume; basal and sometimes apical 1/2 of terminal leaflet with rather straight outline ..... 9. *M. membranacea*
- 18b. Legume lamellae never branched, only a few short or discontinuous; terminal leaflet with very rounded outline ..... 12. *M. hainanensis*
- 17b. Legume 3–4 × as long as wide, linear or slightly curved, sides ± parallel in outline (swollen around seeds or not).
- 19a. Legume 2–2.5(–3) cm or less wide; leaflets with rather straight outline, terminal leaflet rhombic or rhombic-ovate ..... 14. *M. lamellata*
- 19b. Legume 4 cm or more wide; leaflets with rounded outline, terminal leaflet elliptic or slightly obovate.
- 20a. Wings on lower (abaxial) margin of legume 0.5(–0.8) × as wide as those of upper (adaxial) margin; terminal leaflet 13–15 × 7.5–8.5 cm ..... 10. *M. macrobotrys*
- 20b. Wings along both margins of legume ± equal in width; terminal leaflet 4.5–10.5(–16) × 2.5–6(–9) cm ..... 12. *M. hainanensis*

**1. *Mucuna birdwoodiana*** Tutcher, J. Linn. Soc., Bot. 37: 65. 1904.

白花油麻藤 bai hua you ma teng

Large woody vines. Young stems glabrous or with fine stiff adpressed pale hairs at nodes. Leaves 17–30 cm; petiole 8–20 cm, with sparse stiff spreading hairs; stipels not persistent; leaflets almost leathery, glabrous or sparsely hairy abaxially, often glossy adaxially, lateral veins 3–5 pairs, gently curved; terminal leaflet ovate, elliptic, or slightly obovate, usually long and narrow, 9–16 × 2–6 cm, base rounded or slightly cuneate, apex with ± distinct acumen 1.3–2.2 cm; lateral leaflets 9–16 cm, width ratio of abaxial to adaxial halves 1.7–2:1. Inflorescences on old branches or axillary, 20–38 cm, with 5–10 nodes spaced throughout most of length; bracts ovate, ca. 2 mm, caducous; bracteoles very early caducous; pedicels 1–1.5 cm, hairy. Calyx hairy; tube 1–1.5 × 1.5–2.5 cm; lateral lobes broadly triangular, 5–8 mm, lowest narrowly triangular, 5–15 mm, upper lip usually equal to lateral lobes. Corolla white or greenish white; standard 3.5–4.5 cm, apex with margin conspicuously brown pubescent in apical 1/3–1/2; wings 6.2–7.1 cm, margin pubescent like standard around apex; keel 7.5–8.7 cm. Legume linear but markedly constricted between seeds, 30–45 × 3.5–4.5 cm, 1–1.5 cm thick, woody, densely pubescent, young legume clothed with dense short fine spreading velvety dark or red-brown pubescence and reddish brown caducous bristles, both margins with pair of narrow woody wings 3–5 mm wide, woody septum between seeds ca. 4 mm thick. Seeds 5–13, black, almost reniform, to ca. 2.8 × 2 cm, 8–10 mm thick, usually glossy; hilum length 1/2–3/4 of seed perimeter. Fl. Apr–Jun, fr. Jun–Nov.

• Dense or open woodlands, rocky areas, moist hillsides and valleys; 800–2500 m. Fujian, Guangdong, Guangxi, Guizhou, Jiangxi, Sichuan.

*Mucuna birdwoodiana* is distinctive in its narrow leathery glossy often glabrous leaves without persistent stipels; large white, often drying pale green, flowers with conspicuously pubescent margins at their apex; and large woody narrowly linear velvety pubescent legume with narrow marginal wings. It is not easily confused with any other species.

This species is used medicinally and as a starch.

**2. *Mucuna bodinieri*** H. Léveillé, Bull. Soc. Bot. France 55: 408. 1908.

贵州豇豆 gui zhou li dou

*Mucuna corvina* Gagnepain; *M. terrens* H. Léveillé.

Large climbing woody vines. Stems with sparse short pale fine spreading hairs when young, later glabrous. Leaves 21–32 cm; petiole 7–14 cm, with sparse or abundant hairs like stem; stipels not persistent; leaflets papery or rather leathery, abaxially with dense short fine half-adpressed hairs, adaxially glabrous or with similar but sparse hairs, lateral veins 5–8 pairs, gently curved, often rather closely spaced; terminal leaflet broadly elliptic-ovate or elliptic to slightly obovate or almost rhombic, 11–14 × ca. 8 cm, base rounded or slightly cuneate, apex broadly rounded with abrupt minute acumen; lateral leaflets 10–13.5 cm, width ratio of abaxial to adaxial halves 1.6–2:1. Inflorescence on old stem, over 10 cm, with ca. 9 nodes; bracts ± ovate, ca. 2 × 1.5 mm, densely hairy, persistent. Calyx densely adpressed hairy and often with sparse caducous bristles; tube 1.1–1.4 × ca. 2 cm; lateral lobes 3–6 mm, lowest 6–10 mm, upper lip indistinct or almost equaling lateral lobes. Corolla deep purple (possibly sometimes white); standard 3.4–4 cm, margin conspicuously pale pubescent in apical 1/3; wings very narrow, 6–7 × 1.5–2 cm, margin pubescent like standard in apical 1/3; keel 7.2–7.7 × ca. 1 cm. Legume linear, slightly curved, 47–60 × 3–5 cm, ca. 1.5 cm thick, woody, margin not or only slightly constricted between seeds (segments rectangular) but internal septa visible as transverse grooves, apex acute, base without narrow neck, densely minute spreading hairy, surface with several irregular undulating interrupted longitudinal woody ridges, each margin thickened into 2 ridges up to 1 mm high with a median groove running along suture; septum thin inside, ± woody. Seeds ca. 16, dull black, oblong-disk-shaped; hilum ca. 1/3 length of seed circumference; strophiole ca. 4 mm wide.

• 1000–1500 m. Guizhou (Anshun).

*Mucuna bodinieri* is presumably rare, as it is known from only seven collections.

This species is distinctive in having leaflets broadly rounded, shortly acuminate, and densely softly pale hairy; stipels not persistent; large purple flowers with pubescent petal apices; and a large linear legume with rectangular segments. *Mucuna macrocarpa* has similar flowers and fruit but differs in its acute or acuminate leaflets with red-brown, often sparse, indumentum and often fewer veins.

The syntypes of *Mucuna bodinieri* and *M. terrens* were collected from adjacent localities only ca. 10 km apart. Those of *M. bodinieri* lack



fruit, but the ovary is similar; and they otherwise differ from those of *M. terrens* only in having the lowest calyx lobe longer and slightly broader and the leaflets thinner textured with a mucronate rather than shortly acuminate apex.

### 3. *Mucuna macrocarpa* Wallich, Pl. Asiat. Rar. 1: 41. 1830.

大果油麻藤 da guo you ma teng

*Mucuna castanea* Merrill; *M. collettii* Lace; *M. ferruginea* Matsumura; *M. ferruginea* var. *bungoensis* (Ohwi) Ohwi; *M. ferruginea* var. *irukanda* (Ohwi) Ohwi; *M. irukanda* Ohwi; *M. irukanda* var. *bungoensis* Ohwi; *M. subferruginea* Hayata; *M. wangii* Hu.

Large woody vines. Young stems usually with abundant fine brown adpressed or spreading hairs, later usually glabrous. Leaves 25–33 cm; petiole 8–13(–15) cm, usually hairy like stem; stipels usually not persistent even on young leaves but occasionally present, robust, 2–5 mm; leaflets papery or leathery, glabrous or with abundant light brown or reddish adpressed or spreading hairs especially on veins, lateral veins (3 or) 4–6 (or 7) pairs, gently curved; terminal leaflet ovate, elliptic, or slightly obovate, (7–)10–19 × (3–)5–10 cm, base rounded or slightly cuneate, apex broadly acute or shortly acuminate; lateral leaflets 10.5–17 cm, width ratio of abaxial to adaxial halves 2:1, base of abaxial half truncate. Inflorescence usually arising from old stems, 5–23 cm, with 5–17 nodes usually spaced throughout most of length; pedicels 8–10 mm, with dense minute brown spreading hairs and sparse fine bristles; bracts and bracteoles ovate, bracteoles 2–5 mm, shorter than calyx, caducous. Calyx with dense minute spreading hairs and pale caducous bristles; tube 8–12 × 12–20 mm; lateral lobes 3–4 mm, lowest 5–6 mm. Corolla bicolored, standard greenish or pinkish white, wings deep purple, keel lighter purple or sometimes yellowish green; flowers occasionally large with standard, wings, and keel up to respectively 4.5 cm, 6 cm, and 7 cm, but usually shorter: standard 3–3.5 cm, apex with margin conspicuously brown pubescent in apical 1/4–1/3; wings 4–5.2(–5.6) × 1.5–1.7 cm, margin around apex pubescent like standard; keel 5–6.3 cm. Legume linear, straight or slightly curved, 26–48 × 3–5 cm, 7–10 mm thick, woody, with margins often markedly constricted between seeds, base without narrow neck, with dense minute spreading hairs or partly glabrous with age, with irregular ribs and wrinkles, interior septum woody, 1–5 mm thick, margins not distinctly thickened and without median groove along suture but often with irregular woody ribs closely parallel to margin, apex acute. Seeds 6–15, dull black, disk-shaped, slightly asymmetric, laterally flattened, 2.2–3 × 1.8–2.8 cm, 5–10 mm thick; hilum deep brown or black, length ca. 3/4 of seed circumference or more. Fl. Nov–May, fr. Apr–Nov.

Evergreen or deciduous montane or riverine forests, open shrubs, dry sandy lands; 800–3000 m. Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bhutan, India, Japan, Laos, Myanmar, Nepal, Thailand, Vietnam].

*Mucuna macrocarpa* is distinctive in its leaves usually without persistent stipels, flowers usually bicolored with conspicuously pubescent petal margins at apex, and legume large and linear with thickened but unwinged margin. It is often confused in fruit with *M. sempervirens*, which differs by its indumentum sparse, pale; flowers not pubescent at

their apex; and fruit with finer, more regular, reticulate surface patterning and a distinct rounded margin along both sutures. *Mucuna bodinieri* also has similar flowers and fruit but differs markedly by its rounded leaflets with dense pale indumentum. Large-flowered forms of *M. macrocarpa* with persistent stipels can be confused in flower with *M. macrobotrys*, which is distinguished by the uniformly purple corolla, wings often relatively broader, and standard often shorter relative to keel. *Mucuna* “sp. B” of Wilmot-Dear (Kew Bull. 39: 39. 1984) is a variant of *M. macrocarpa*.

### 4. *Mucuna sempervirens* Hemsley, J. Linn. Soc., Bot. 23: 190. 1887.

常春油麻藤 chang chun you ma teng

?*Mucuna coriolarpa* Handel-Mazzetti; *M. japonica* Nakai; *M. mairei* H. Léveillé.

Woody vines, up to 25 m. Old stems over 30 cm in diam., young stems glabrous or rarely with sparse stiff pale hairs. Leaves 20–40 cm; petiole 7–16.5 cm, glabrous or with sparse hairs like stem; stipels not persistent; leaflets papery or thicker textured, glabrous or with fine pale stiff hairs, lateral veins 4 or 5 pairs, gently curved; terminal leaflet elliptic or elliptic-ovate, 8–15(–19) × 3.5–9 cm, base slightly cuneate, apex acuminate to 15 cm; lateral leaflets 7–14 cm, width ratio of abaxial to adaxial halves 1.25–1.5:1, abaxial half with base often truncate or slightly cordate. Inflorescences usually on old stems, 10–36 cm, with 5–10 nodes throughout length; bracts caducous, narrowly obovate, ca. 1.5 mm long and wide; bracteoles ovate or obovate, caducous; pedicels 1–2.5 cm, with stiff dark short adpressed hairs. Calyx with dense adpressed hairs on both sides and sparse caducous bristles outside; tube 8–12 × 18–25 mm; lateral lobes 5–8 mm, equaling lowest lobe or almost so, broadly triangular, upper lip often equaling lateral lobes. Corolla deep purple, black after drying; standard 3.2–4 cm; wings rather wide, 4.8–6 × 1.8–2 cm; keel 6–7 cm. Legume linear, straight or slightly curved, 30–60 × 3–3.5 cm, 1–1.3 cm thick, woody, with dense short fine red-brown hairs and sparse caducous reddish brown bristles, surface with conspicuous irregularly reticulate patterning, margins and surface constricted between seeds, base often with abrupt narrow neck, margin thickened into a well-defined smooth rounded ridge running along suture without a wing or median groove, apex acute. Seeds 4–12, shiny red, brown, or black, oblong or discoid, 2.2–3.2 × 2–2.8 cm, ca. 1 cm thick; septum woody; hilum black, length ca. 3/4 of seed circumference. Fl. Apr–May, fr. Aug–Oct.  $2n = 22, 44$ .

Forests, thickets, riversides; 300–3000 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang [Bhutan, NE India (W Bengal, Manipur, Sikkim), Japan, Myanmar].

*Mucuna sempervirens* is easily distinguished in flower from most other species with large purple flowers by its leaves without persistent stipels. It is often confused in fruit with *M. macrocarpa*, which differs by its legume without a distinct rounded margin and with a coarser surface patterning, its bicolored flowers with pubescent apex, and its leaves often with reddish hairs. *Mucuna calophylla* also lacks persistent stipels but has much smaller flowers and fruit and has leaves usually densely silky hairy abaxially.

This species is used medicinally and for paper-making, starch, and oil.

**5. *Mucuna calophylla*** W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 12: 216. 1920.

美叶油麻藤 mei ye you ma teng

Climbing vines, 1–3 m. Stems up to 2 cm in diam., red-brown, young stems with abundant fine long adpressed hairs, later glabrous or glabrescent. Leaves 15–22 cm; petiole 4–12 cm; stipels not persistent; leaflets thinly papery or thicker textured, abaxially with dense silky hairs, adaxially with sparse adpressed long silvery hairs, rarely glabrescent with age, lateral veins 5 or 6, gently curved; terminal leaflet ovate, elliptic, or rhombic, 7–11.5 × 3–5 cm, relatively narrow, length 2–2.5 × width, base cuneate or rounded, apex caudate or abruptly broadly acuminate, 1–2 cm; lateral leaflets 7–10.5 cm, width ratio of abaxial to adaxial halves 1.5:1, base slightly cordate or truncate. Inflorescence axillary or from older stems, 3–12 cm, with up to 11 nodes spaced throughout length but more crowded near apex; bracts caducous, narrowly ovate, up to 3 mm; bracteoles caducous, elliptic, ovate, or slightly obovate, up to 6 mm; pedicels 4–5 mm, usually with abundant fine short adpressed silvery hairs. Calyx with dense light brown adpressed short hairs and sparse caducous reddish irritant bristles; tube 6–7 × 8–11 mm; lateral lobes 2–4 mm, lowest lobe 5–6 mm. Corolla reddish purple or deep crimson; standard 2–2.4 cm; wings 2.8–3.2 × ca. 1 cm; keel 3.5–4 cm. Legume linear-oblong, straight, ca. 13 × 1.8–3 cm, ca. 1.5 cm thick, ± woody or thickly leathery, indented between seeds, with dense reddish or pale long irritant bristles and short spreading hairs and with raised reticulate surface patterning; interior septum very thick, up to 2 mm, woody. Seeds ca. 7, oval in outline, flattened, not glossy, ca. 2 × 1.5 cm, ca. 1 cm thick; hilum brownish orange, length 1/2–3/4 of seed circumference.

- Forests, open thickets; 1000–3000 m. Yunnan.

This species is distinctive in its narrow leaflets without persistent stipels and usually densely silvery hairy abaxial surface, its small flowers, and its linear ± woody legume much smaller than the other *Mucuna* species with woody linear legumes. Other small linear legumes are distinguished by fleshy texture or surface lamellae.

**6. *Mucuna gigantea*** (Willdenow) Candolle, Prodr. 2: 405. 1825.

巨蠶豆 ju li dou

*Dolichos giganteus* Willdenow, Sp. Pl. 3: 1041. 1803; *Mucuna gigantea* subsp. *tashiroi* (Hayata) Hayata; *M. tashiroi* Hayata.

Large climbing woody vines. Stems glabrous or with sparse fine adpressed hairs. Leaves 12–27 cm; petiole 6–14 cm, glabrous or with fine adpressed hairs; stipels linear, 3–5 mm; leaflets thinly papery, glabrous or with sparse short adpressed hairs, lateral veins 4–6 pairs, gently curved; terminal leaflet usually elliptic-ovate, sometimes rhombic or ovate, 7–16 × 4–8.5 cm, base rounded, apex indistinctly shortly acuminate; lateral leaflets 7–11 × 4.5–8 cm, ratio of abaxial to adaxial halves ca. 2.2:1, base rounded and oblique or slightly cordate. Inflorescences axillary but usually arising from rather old stems, 8–25 cm, with up to 6 nodes all clustered in upper 1/4, lower part of inflorescence without flowers or scars; bracts lanceolate

to elliptic, 3–5 mm, caducous; bracteoles ovate-lanceolate, 16–18 × 5–7 mm, persistent to well-developed bud stage; ultimate peduncles and pedicels of varying lengths, 5–20 mm, progressively shorter near apex forming a corymb, with abundant short fine pale pubescence. Calyx with short fine pale pubescence and abundant caducous irritant bristles; tube 8–12 × 11–15 mm; lobes short and broad, lowest (1–)2–3 mm (only ca. 1/3 tube length), laterals 1–2 mm. Corolla white, tinged green, yellow, or pale pink; standard large relative to keel size, 2–3(–3.8) cm; wings 2.8–4.4 cm × 8–10 mm, slightly shorter or longer than keel; keel 3–4.2 cm. Legume oblong, 7–14 × 3–5.5 cm, ca. 5 mm thick, leathery, sparsely fine hairy and with irritant bristles, later glabrous, also ornamented with close fine raised reticulate venation giving pitted appearance, both margins thickened to prominent ribs and with pair of wings 0.5–1 cm wide. Seeds 1–3, dark brown or black, 2.3–3 × 2–2.5 cm, 8–10 mm thick; hilum black, length 2/3–3/4 of seed circumference.

Hillsides, at low elevations, often near the coast. Hainan, Taiwan [India, Japan, Malaysia, Vietnam; Australia].

*Mucuna gigantea* is easily distinguished from other species by the corymbose (pseudombellate) inflorescence with long ultimate peduncles and pedicels, which are all progressively markedly shorter toward the inflorescence apex; the rather persistent bracteoles; the small white flowers with very short calyx lobes; the relatively large standard; and the broadly oblong legume with reticulate surface-patterning and wide marginal wings. White-flowered variants of *M. hainanensis* with short, few-flowered inflorescences can be confused with *M. gigantea* but are distinguished by the knoblike ultimate peduncles, the lengths and relative proportions of various flower parts, with the keel and wings (but not the standard) longer, and the much longer calyx lobes, with the lowest one equaling (rather than ca. 1/3 as long as) the tube.

**7. *Mucuna interrupta*** Gagnepain, Notul. Syst. (Paris) 3: 26. 1914.

间序油麻藤 jian xu you ma teng

Twining vines, ± woody. Stems glabrous or with sparse adpressed or abundant spreading fine hairs. Leaves up to 25 cm; petiole 6–9 cm usually with spreading hairs; stipels 2–4 mm; leaflets thinly papery, inconspicuously finely hairy (rarely glabrous) on both sides, lateral veins 5–7 pairs, gently curved; terminal leaflet elliptic, 9–14 × 4–8 cm, base rounded or ± cordate, apex shortly acuminate; lateral leaflets 9–12 × 5–7 cm, width ratio of abaxial to adaxial halves 1.5–2:1, base of abaxial half truncate, base of adaxial half rounded or slightly cuneate. Inflorescence axillary, 8–24 cm, with up to 6 nodes all in upper part, without flowers or scars in lower part; bracts usually persistent, broadly ovate, 2.5–4 × (0.7–)2–2.5 cm, both sides with dense fine usually adpressed short hairs; bracteoles caducous, up to 3 × 0.5 mm; pedicels 8–10 mm, with dense adpressed fine pale hairs. Calyx densely hairy; tube ca. 1 × 2 cm; lobes broadly triangular, laterals 4–6 × 4–6 mm, lowest (8–)12–14 × ca. 6 mm. Corolla white; standard 3–3.5 × 1.8–2 cm, ca. 1/2 length of keel or slightly longer; wings 5.5–6 × 0.8–1(–1.5) cm; keel equaling wings. Legume broadly oblong with rounded apex and base, 13–14 × 6–7 cm, 1.5–2 cm thick, leathery, with abundant reddish hairs and irritant bristles, both margins with a pair of wide ± flat wings 12–15 mm wide, both surfaces with 10–20 obliquely transverse erect crowded parallel lamellae completely

concealing fruit surface, each divided into 2 wings along their margin with each wing flat or upcurved and up to 7 mm wide, lamellae all interrupted along midline of legume and not extending into marginal wings of fruit. Seeds (2 or)3, reddish brown, with black striations and spots, reniform or almost discoid, ca.  $3 \times 2.5$  cm, ca. 1.2 cm thick; hilum black, length slightly longer than 1/2 circumference of seed. Fl. Aug, fr. Oct.

Forest margins; 900–1100 m. Yunnan [Cambodia, Laos, Myanmar, Thailand, Vietnam].

*Mucuna interrupta* is distinctive in its large fruit with flat marginal wings and wide lamellae uniformly interrupted along the midline, not extending into the winged margins, and with flat or upcurved apical halves. It is vegetatively almost identical to *M. revoluta* and *M. hainanensis*, which differ in the form of their fruit lamellae and usually have purple or reddish flowers.

**8. *Mucuna revoluta*** Wilmot-Dear, Kew Bull. 47: 222. 1992.

卷翅莢油麻藤 juan chi jia you ma teng

Twining vines, ± woody. Stems glabrous or with sparse adpressed fine hairs. Leaves up to 20 cm; petiole up to 9 cm, often hairy; stipels 2–4 mm; leaflets thinly papery, hairy (rarely glabrous) on both sides, lateral veins 4 or 5 pairs, gently curved; terminal leaflet elliptic or ovate,  $8-10 \times 4-5.5$  cm, base narrowly rounded, apex abruptly acuminate; lateral leaflets up to 12 cm, width ratio of abaxial to adaxial halves 1.75–2:1, base of abaxial half truncate, base of adaxial half rounded to cuneate. Inflorescences (3–)8–16 cm, unbranched or once or twice branched near base, without flowers in lower 1/3 of axis, nodes 5–13; bracts caducous, widely varying in size and shape, elliptic or obovate to linear-oblong, (5–)10–17  $\times$  (2–)5–7, with sparse minute fine spreading hairs; bracteoles similar to bracts, longer than calyx; pedicels 5–10 mm, with dense minute (0.1–0.2 mm) fine spreading velvety light brown hairs. Calyx with dense minute hairs like pedicels and irritant red bristles; tube ca.  $8 \times 8-10$  mm; lobes conspicuous, laterals 4–6 mm, lowest 8–9 mm, all broadly triangular with abrupt fine acumen. Corolla deep purple or pinkish purple with paler keel (rarely all petals white); standard ca.  $3 \times 2$  cm, ca. 2/3 keel length; wings  $4.5-4.8 \times$  ca. 1 cm; keel equaling wings. Legume broadly oblong, sometimes asymmetric, with rounded apex and base,  $6-9 \times 4-4.5$  cm, up to 2.5 cm thick, leathery, with minute spreading hairs and abundant irritant bristles, both margins with a pair of strongly inrolled wings ca. 4 mm wide, both surfaces with 8–12 thickly leathery markedly obliquely transverse crowded parallel lamellae completely concealing fruit surface, each divided along their margin into 2 wings up to 5 mm broad and strongly revolute, lamellae uniformly interrupted along midline of legume and not extending into marginal wings of fruit. Seeds (1 or)2, shiny, red-brown with black mottling, very large,  $2.5-2.8 \times$  ca. 2 cm; hilum just over 1/2 circumference of seed.

Forests and disturbed vegetation, seasonal rain forests often by streams, dry evergreen forests, primary and slightly disturbed evergreen hardwood forests, swamp forests, degraded caducous forests and bamboo, scrub, roadsides; 300–800 m. W Yunnan [Cambodia, Laos, Thailand, Vietnam].

The original material of *Mucuna revoluta* was included within *M. interrupta*. *Mucuna revoluta* is distinctive in its legumes with strongly

inrolled marginal wings and rigid thick-textured lamellae, which are divided distally into 2 wings, interrupted along the midline of the legume, strongly revolute, and not extending into the legume wings, and in its minute spreading velvety pubescence on the flowering parts (in most other species hairs are at least 0.4 mm, often adpressed). *Mucuna interrupta* and *M. hainanensis* have almost identical leaves; *M. interrupta* differs by the longer usually adpressed indumentum on its flowering parts, by the flowers always white with longer wings and keel, and by the legume with thinly textured upcurved lamellae and flat or undulating marginal wings. *Mucuna hainanensis* is distinguished by the adpressed hairs on flowering parts and the fruit with simple lamellae mostly not interrupted along the midline.

**9. *Mucuna membranacea*** Hayata, Icon. Pl. Formosan. 3: 73. 1913.

兰屿血藤 lan yu xue teng

*Mucuna iriomotensis* Ohwi.

Climbing woody vines. Young stems glabrous. Leaves up to 22 cm; petiole 3–20 cm, with sparse short spreading soft pale hairs; stipels slender, 2–3 mm; leaflets membranous to papery with short fine spreading hairs on both sides, lateral veins 4–6, lower ones rather straight; terminal leaflet rhombic-elliptic or rhombic-ovate,  $8-13 \times 6-8$  cm, base cuneate but at extreme base obtuse-rounded, apex obtuse with abrupt acumen to 1 cm; lateral leaflets up to 12 cm, width ratio of abaxial to adaxial halves 2:1. Inflorescence 10–12 cm, pendulous with 5 or more nodes throughout most of length; pedicels 6–10 cm, with adpressed light brown short hairs; bracts broadly ovate, boat-shaped,  $12-14 \times 7-9$  mm, bracteoles narrowly ovate, all caducous before flowering. Calyx tube ca.  $8 \times 13$  mm, upper lip well marked, equaling lateral and lower lobes, all 10–12 mm. Corolla deep purple; standard 3–3.5 cm, ca. 2/3 keel length; wings ca.  $5 \times 2$  cm; keel ca. 5 cm. Legume asymmetric, elliptic-ovate to oblong in outline, (4–)6–9  $\times$  4–5 cm, 5–10 mm thick, leathery, surface with abundant very short spreading pale hairs and brown irritant bristles, apex rounded or acute, both margins with pair of sinuate wings 6–10 mm wide, both surfaces of legume with 9–12 obliquely transverse slightly undulating but well-spaced shallow lamellae of irregular height up to 5(–10) mm high and mostly interrupted along midline, some extending onto marginal wings of fruit. Seeds 1 or 2, brownish black, flattened-discoid, ca. 2 cm in diam.; hilum ca. 3/4 of seed circumference.

Forests near rivers or seacoast; sea level to near sea level. Taiwan [Japan].

*Mucuna membranacea* is distinctive in the rhombic-ovate leaflets with rather straight veins, the short purple flowers with wide wings equaling keel, and the short broad legume with narrow marginal wings and simple lamellae interrupted along the midline of the legume.

Records of *Mucuna nigricans* Steudel from China (Taiwan) and Japan (e.g., Fl. Taiwan 3: 343. 1977) were based on misidentifications of this species.

**10. *Mucuna macrobotrys*** Hance in Walpers, Ann. Bot. Syst. 2: 422. 1851.

大球油麻藤 da qiu you ma teng

Large climbing vines. Stems glabrous or with sparse red-

dish brown short hairs at nodes. Leaves 29–33 cm; petiole 6–13 cm, glabrous or with reddish brown short hairs; stipels slender 4–6 mm; leaflets thinly leathery or papery, glabrous or with reddish brown short hairs abaxially, lateral veins 4 or 5 pairs, uniformly strongly curved; terminal leaflet elliptic or elliptic-obovate, 11–15.5 × 3–8.5 cm, base rounded, apex with abrupt acumen ca. 1.5 cm; lateral leaflets 9–15 cm, width ratio of abaxial to adaxial halves ca. 1.7:1. Inflorescence ca. 15 cm, with 4 or 5 nodes spaced throughout length; bracts caducous; pedicels ca. 1 cm, with dark brown adpressed short hairs. Calyx with dark brown short adpressed hairs and red-brown caducous bristles; tube ca. 1 × 1.5 cm; lobes narrowly triangular, lowest ca. 10 mm and laterals ca. 7 mm, upper lip sometimes equaling lateral lobes. Corolla deep purple; standard 3.7–5 cm, with margin conspicuously pubescent in apical 1/3; wings 6–7 × 2–2.5 cm, ca. 2/3 of keel in length, apex with pubescent margin like standard; keel 7.5–9 cm. Legume asymmetric, oblong, 16–17 × ca. 4.5 cm, leathery, clothed with adpressed short hairs and sparse irritant bristles, with acute apex and persistent style, base rounded, both margins with a pair of wings 6–15 mm wide, both surfaces with 12–16 markedly obliquely transverse well-spaced parallel thinly textured lamellae up to ca. 6 mm high ± adpressed to surface and occasionally branching or interrupted, not extending onto marginal wings of fruit. Seeds 2 or 3. Fl. Dec, fr. Apr.

- Forests at low elevations. Guangdong, Guangxi, Yunnan.

*Mucuna macrobotrys* is distinctive in the large broad leaves with uniformly curved veins; the large purple flowers with petal margins pubescent around the apex, rather broad wing, and very long keel; and the oblong legume with acute apex, wide marginal wings, and narrowly oblique, occasionally interrupted, simple lamellae ± adpressed to the legume surface. Its apically pubescent-margined flowers are sometimes confused with those of *M. macrocarpa*, which differs by the bicolored corolla with usually shorter petals, the wings often relatively narrower, the standard often short relative to the keel, and the stipels rarely persistent even on very young leaves. A new species, *M. hirtipetala* (below), resembles large-leaved forms of *M. macrobotrys* in general appearance but differs by its spreading indumentum on the inflorescences, broader calyx with longer lowest tooth, and much shorter corolla without apically pubescent petals and with inner surface of the wing conspicuously long hairy.

### 11. *Mucuna hirtipetala* Wilmot-Dear & R. Sa, sp. nov.

毛瓣薰豆 mao ban li dou

Type: China. Yunnan: “Jenn-Yeh Hsien, Meng-Ping” [Mengla County, Mengpeng Township], Oct 1936, C. W. Wang 78923 (holotype, PE; isotype, A).

*Mucunae macrobotryi similis sed corolla minore ad apicem omnino glabromarginata, carina brevior 5–5.5 cm longa alas aequante (nec 7.5–9 cm nec quam alis longiore), alis in superficie adaxiali pilos conspicuos longos per dimidium basale abundanter dispersos ferentibus et calyce pedunculoque pilos patentes (nec adpressos) ferentibus differt.*

Climbing vines. Stems with sparse reddish brown short hairs. Leaves ca. 35 cm; petiole ca. 15 cm with sparse brown short spreading hairs; stipels robust, 4–6 mm; leaflets thinly leathery or papery, glabrous except for occasional hairs on veins abaxially, lateral veins 5 or 6 pairs, strongly curved; termi-

nal leaflet elliptic or elliptic-obovate, ca. 14 × 8.5 cm, base rounded, apex with abrupt acumen ca. 1 cm; lateral leaflets ca. 13 cm, width ratio of abaxial to adaxial halves ca. 1.5:1. Inflorescence ca. 10 cm, with 4 or 5 nodes spaced throughout length; bracts caducous, not seen; pedicels ca. 1 cm, with abundant golden spreading short hairs. Calyx with dark brown short spreading hairs and red-brown caducous fine long bristles; tube ca. 1 × 1.6–1.8 cm; lobes narrowly triangular, lowest ca. 12 mm and laterals ca. 7 mm, upper lip sometimes longer than laterals. Corolla deep purple (drying brownish); standard ca. 3.2 cm; wings 5–5.5 × ca. 2 cm, ca. equaling keel, inner surface with abundant long fine adpressed pale hairs in basal half. Ovules ca. 3. Mature fruit unknown.

- Dense woodlands near rivers; ca. 800 m. S Yunnan (Mengla).

This new species is *Mucuna* “sp. C” of Wilmot-Dear (Kew Bull. 39: 50. 1984). Known only from the type gathering, it is unusual in having conspicuous fine long hairs on the inner surface of the corolla wings (as in *M. lamellata*, which is otherwise very different in its smaller flowers and rhombic leaves). Its general appearance is that of *M. macrobotrys*, which differs in its mostly smaller leaves, its adpressed indumentum on the peduncles and calyx, and especially in its longer corolla with the keel longer than the wings and its standard and wings pubescent on their apical margins but not hairy on the inner surface.

### 12. *Mucuna hainanensis* Hayata, Icon. Pl. Formosan. 3: 72. 1913.

海南薰豆 hai nan li dou

*Mucuna nigricans* Steudel var. *hainanensis* (Hayata) Wilmot-Dear; *M. nigricans* var. *hongkongensis* Wilmot-Dear; *M. suberosa* Gagnepain.

Climbing vines, to 5 m. Young stems glabrous or with sparse fine adpressed hairs. Leaves widely varying in size, 7–25 cm; petiole 4.8–11.5 cm, glabrous or sparsely finely hairy; stipels 2–6 mm; leaflets papery or leathery, almost glabrous on both surfaces, lateral veins 4 or 5(–7) pairs, gently curved; terminal leaflet obovate-elliptic or elliptic, 4.5–10.5(–16) × 2.5–6(–9) cm, base rounded, apex caudate to abruptly shortly acuminate; lateral leaflets 5–8(–11) cm, ratio of abaxial to adaxial halves ca. 1.5:1. Inflorescence axillary, 6–40 cm, with 5–18 nodes, basal part without flowers but often with a few long acuminate bracts 2–3 cm; bracts at flowering nodes large, oblong or broadly ovate to elliptic with rounded often hooded apex, 1–2 cm, hairy; bracteoles linear-ovate or narrowly elliptic, to 13 × 4 mm; pedicels 8–10 mm, densely silky adpressed hairy. Calyx with dense silky short hairs and irritant bristles; tube 7–10 × 10–14 mm; lobes narrow, lowest 8–10 mm, laterals 5–6 mm. Corolla deep purple (rarely white); standard 2.5–3.5 cm; wings 4.5–5.5 × 1–1.3 cm; keel 4.8–5.7 cm. Legume asymmetrically oblong or ovate-oblong, 9–18 × 4.5–5.5 cm, ca. 1 cm thick, leathery, with red-brown irritant hairs, with narrowly rounded base and acute apex often with persistent style, both margins with pair of wings ca. 1 cm wide, both surfaces with 8–14 markedly oblique crowded winglike lamellae uniformly 4–5 mm high, mostly not interrupted nor branched, some extending onto marginal wings of fruit. Seeds 2–4, black, oblong or reniform, 1.7–2.5 × ca. 1.5 cm, 5–7 mm thick; hilum length 1/2–3/4 of seed circumference. Fl. Jan–Mar, fr. Mar–May.

Forests, thickets, valleys, mountain slopes, dry or swampy soil; sea level to low elevations, rarely to 1000 m. ?Guangdong, ?Guangxi, Hainan, Yunnan [Vietnam].

*Mucuna hainanensis* is distinguished by its fairly small usually purple flowers with a relatively long wing and its oblong legume with simple uninterrupted oblique lamellae of almost uniform height and sometimes running into the marginal wings. It is vegetatively almost identical to *M. interrupta* and *M. revoluta*, both of which have fruit lamellae T-shaped in cross section; *M. revoluta* also has distinctive minute spreading indumentum on the inflorescence. *Mucuna lamellata* has a similar but narrower fruit with less oblique lamellae, seeds only half the size, and rhombic-ovate leaves. *Mucuna championii* has a similar fruit and small flowers but a distinctive red indumentum. *Mucuna* "sp. D" of Wilmot-Dear (Kew Bull. 39: 57. 1984) is a white-flowered variant of *M. hainanensis*.

All of the material from the Flora area belongs to the typical subspecies. The other subspecies, *Mucuna hainanensis* subsp. *multi-lamellata* Wilmot-Dear, is found in the Philippines and the E and N Indian subcontinent and is distinguished mainly by its fruit with dense short spreading hairs and 20–25 scarcely oblique lamellae and its leaflets sometimes longer.

**13. *Mucuna championii*** Bentham, Hooker's J. Bot. Kew Gard. Misc. 4: 49. 1852 [*"championi"*].

港油麻藤 gang you ma teng

Tall climbing vines, to 10 m. Young stems with dense reddish crisped hairs, old stems almost glabrous. Leaves up to 15.5 cm; petiole ca. 6.5 cm, glabrous or sparsely hairy; stipels 1–2 mm; leaflets papery, adaxially clothed with sparse golden silky hairs, abaxially with dense reddish hairs on veins and golden silky hairs on surface, golden hairs becoming sparse on older leaves, lateral veins (4 or)5 or 6 pairs, slightly curved; terminal leaflet broadly ovate to rhombic-ovate, 5–9 × 3.5–5.5 cm, base broadly cuneate or rounded, apex shortly acuminate; lateral leaflets 6.5–7 × 3–5 cm, with width ratio of abaxial to adaxial halves 3:2, base rounded or slightly cordate. Inflorescences on old stems, ca. 8 cm, with up to 7 nodes; bracts and bracteoles very soon caducous; pedicels 3–4 mm, densely reddish hairy. Calyx densely softly hairy and with irritant bristles; tube 7–8 × ca. 10 mm; lateral lobes ca. 2 mm, lowest lobe broadly triangular, ca. 4 mm, upper lip as long as lateral lobes. Corolla purple; standard ca. 2.5 cm; wings ca. 4 cm × 6–8 mm; keel 4–4.2 cm. Legume asymmetric, narrowly oblong, 15–16.5 × ca. 4.5 cm, leathery, with acute apex and persistent style, when young with dense bristles gradually caducous after maturity; both margins with a pair of wings ca. 1 cm wide, both surfaces with 12–15 well-spaced obliquely transverse thinly textured winglike lamellae 3–4 mm high, mostly not interrupted nor branched, some extending onto marginal wings of fruit. Seeds reddish brown, oblong, ca. 2.5 × 2 cm, ca. 7 mm thick; hilum black, length ca. 1/2 circumference of seed. Fl. Aug.

• Among trees or shrubs in evergreen forests at low elevations. Hong Kong.

*Mucuna championii* is known only from the type collection and is possibly now extinct. All other records of this species are based on misidentifications of *M. hainanensis*. *Mucuna championii* is distinctive in its conspicuous soft red-brown indumentum and rather narrowly oblong fruit with oblique simple lamellae that extend to the outer edge of the marginal wings.

**14. *Mucuna lamellata*** Wilmot-Dear, Kew Bull. 39: 53. 1984.

褶皮蠶豆 zhe pi li dou

Climbing vines, to 5 m. Stems slightly woody, glabrous or sparsely adpressed or spreading hairy. Leaves 17–27 cm; petiole 7–11 cm with abundant hairs like on stem; stipels 2–3 mm, slender; leaflets thinly papery, adaxially glabrous or with very sparse long adpressed hairs, hairs abaxially sometimes less sparse, lateral veins 4–6 pairs, rather straight but curving near margin; terminal leaflet rhombic-ovate, 6–13 × 4–9.5 cm, base rounded or slightly cuneate, apex acuminate; lateral leaflets 8–14 cm, width ratio of abaxial to adaxial halves 2:1, base truncate. Inflorescence axillary, 7–27 cm, nodes 6–15, all crowded into upper 1/5–1/2 of inflorescence; lower part of inflorescence without bracts or scars; pedicels 7–8 mm, densely clothed with spreading reddish short fine hairs and light yellow adpressed hairs; bracts and bracteoles lanceolate, linear-lanceolate, or narrowly ovate, ca. 7 × 2 mm, hairy outside, late caducous often only shortly before flowering. Calyx densely clothed with dense pale short fine hairs inside and outside and sparse irritant reddish bristles outside; tube 5–6 × 8–10 mm; lateral lobes ca. 2 mm, lowest lobe 3–4 mm, all narrowly triangular, upper lip often indistinct. Corolla deep purple or reddish brown (often drying brown rather than black); standard broadly elliptic, 2–2.5 cm; wings oblong, 3.2–4 cm × 9–12 mm, often as long as keel, apical 2/3 of adaxial surface with abundant long fine golden hairs; keel (3.6–)4(–4.5) cm, apex sharply curved. Legume narrowly oblong, narrowing to base and apex and scarcely indented transversely between seeds, asymmetric in outline, slightly downcurved, 6.5–10 × 2–2.5(–3) cm, 5–8 mm thick, leathery, densely covered with reddish irritant bristles when young, later with pale spreading fine pubescence and sparser reddish bristles, both margins with pair of wings 2–4 mm wide but of irregular width giving slightly jagged outline, both surfaces with 12–16 well-spaced obliquely transverse narrow thinly textured winglike lamellae of irregular height to 3 mm, sometimes erratically interrupted, sometimes running into wings. Seeds 2–5, deep reddish brown or black, ca. 11 × 9 mm, markedly laterally flattened, ca. 7 mm thick, smooth; hilum black, length ca. 5/8 of circumference; aril absent. Fr. Apr–May.

• Riversides, thickets, roadsides, mountain valleys; 400–1500 m. Fujian, Guangdong, Guangxi, Hubei, Jiangsu, Jiangxi, Zhejiang.

*Mucuna lamellata* is distinguished by its rhombic-ovate leaves, its corolla wings with conspicuous long hairs on most of the adaxial surface, and its lamellate legume that is smaller and relatively much narrower than most lamellate-fruited species. Its fruit is similar only to *M. cyclocarpa*, which differs in the cordate leaflets, the usually larger almost spherical seeds, and the legume distinctly indented between seeds. *Mucuna hainanensis* sometimes has fairly short but always wider legumes with more markedly oblique lamellae, seeds twice the size, and ovate leaves. Flowers on dried specimens are often distinctively "dirty brown" in color.

**15. *Mucuna cyclocarpa*** F. P. Metcalf, Lingnan Sci. J. 19: 561. 1940.

闽油麻藤 min you ma teng

Climbing woody vines. Stems almost glabrous or with very sparse fine but rather stiff short hairs, more dense at nodes and on young stems. Leaves 26–31 cm; petiole up to 13 cm, with sparse fine stiff hairs; stipels slender, ca. 5 mm; leaflets thinly papery, adaxially almost glabrous or sparsely strigose, lateral veins 5–7 pairs, gently curved; terminal leaflet broadly ovate or triangular-cordate, 12–15 × ca. 11.5 cm, base cordate, apex acute; lateral leaflets ca. 15 × 11 cm, width ratio of abaxial to adaxial halves 1.7:1, base shallowly cordate or almost truncate. Inflorescences on old stems (flowers not known). Calyx with short dense spreading light brown stiff hairs outside. Legume narrowly oblong and slightly downcurved, narrowed to base and apex and distinctly indented transversely between seeds, ca. 9.5 × 2 cm, ca. 1 cm thick, leathery, densely pubescent like calyx on most of surface and clothed with reddish brown irritant bristles; both margins with a pair of wings up to 4 mm wide but of irregular width giving slightly jagged outline, both surfaces with 16–25 slightly obliquely transverse thinly textured winglike lamellae of irregular height up to ca. 3 mm high, sometimes interrupted or branched. Seeds ca. 5, black or brown, with irregular striations or spots, almost spherical, ca. 12 × 11 mm, ca. 9 mm thick; hilum black, length ca. 1/2 of seed circumference.

• Shrubs in rocky places; ca. 1200 m. Fujian, E Jiangxi (Wuyi Shan).

*Mucuna cyclocarpa* is distinctive in its large cordate leaflets and almost spherical seeds. Its small narrow legume with irregular surface lamellae resembles only that of *M. lamellata*, which differs in the markedly laterally flattened seeds, the legume scarcely indented between the seeds, and the leaflets cuneate at the base and usually smaller.

**16. *Mucuna pruriens* (Linnaeus) Candolle, Prodr. 2: 405. 1825.**

刺毛黧豆 ci mao li dou

Semiwoody twining vines. Stems and branchlets slender, with dense long fine hairs and often coarser longer hairs, later glabrous. Leaves up to 46 cm; petiole 8–26 cm, hairy like stem; stipels robust, tapering to tip, 4–5 mm; leaflets papery, adaxially sparsely or abundantly hairy when young, later glabrous, abaxially clothed with short white silky hairs, lateral veins 5–8 on each side, slender, straight or slightly curved, running into margin; terminal leaflet elliptic or ovate-rhombic, (3–)14–16 × (4.5–)8–10 cm, base broadly cuneate to rounded, apex rounded, acute, or shortly acuminate; lateral leaflets 7–19 cm, width ratio of abaxial to adaxial halves 2–3:1, abaxial half with base ± truncate or rarely cordate. Inflorescence axillary, long and pendulous, 15–35 cm, with (2–)5–20 nodes, all in upper 2/3 of inflorescence with no bracts or scars in lower part; pedicels 2–4(–6) mm, densely adpressed hairy and often bristly; bracts and bracteoles linear-lanceolate 6–9 mm, hairy, caducous before flowers open. Calyx with dense soft adpressed pale hairs and often irritant orange bristles; tube ca. 5 × 10 mm; lateral 2 lobes broadly triangular, 2–4 × 1.5–3(–3.5) mm, lowest narrowly triangular, 6–10 × 2–3 mm. Corolla deep purple; standard 1.6–2.5 cm, 1/2–2/3 of keel length; wings 2–4 × ca. 1.2 cm, shorter than or subequal to keel; keel 2.8–4.2(–4.5) cm. Legume linear-oblong and slightly swollen around seeds or misshapen with irreg-

ular swellings around seeds, to 9 × 1(–2) cm, ca. 5 mm thick, densely covered with soft pale hairs or orange to brown irritant caducous bristles, margin thickened, surface with or without longitudinal ridges. Seeds 3–6(–8), white to light yellow-brown, orange, brown, or black, sometimes mottled in various colors, elliptic, 0.9–1.78(–2) × 0.4–1.3 cm, (3–)4–10 mm thick; hilum 3–6 mm, ca. 1/8 of seed circumference, with aril forming a raised orange border. Fl. Sep–Jan, fr. Oct–Apr.

Forests, riversides, thickets, tall scrub, roadsides, also cultivated; below 1700 m. Guangdong, Guangxi, Guizhou, Hainan, Hubei, Sichuan, Taiwan, Yunnan [widely distributed in the tropics].

*Mucuna pruriens* is distinctive in its small flowers crowded along the upper part of the often very long inflorescence and is easily distinguished from all species, except *M. bracteata* and *M. incurvata*, by its ± straight lateral veins running into the leaflet margin and its small fleshy linear fruit.

One flowering specimen of uncertain identity has been seen from Ting Wu Shan, Guangdong (*Nan Z. D.* 526, MO), which differs from *Mucuna pruriens* mainly by the extremely long stipels ca. 15 mm.

- 1a. Fruit with orange or brown irritant bristles, to ca. 1 cm wide; seeds uniform in color; terminal leaflet with length 1.5–1.75 × width, lateral leaflets of similar size; calyx often with irritant bristles ..... 16a. var. *pruriens*
- 1b. Fruit with long pale silky hairs, often misshapen, irregularly swollen around seeds, to 2 mm wide in parts; seeds often mottled or streaked in different colors; terminal leaflet broad, length less than or to 1.5 × width, lateral leaflets often much larger than terminal; calyx without irritant bristles ..... 16b. var. *utilis*

**16a. *Mucuna pruriens* var. *pruriens***

刺毛黧豆(原变种) ci mao li dou (yuan bian zhong)

*Dolichos pruriens* Linnaeus, Herb. Amboin. 23. 1754; *Mucuna esquirolii* H. Léveillé; *M. prurita* Wight; *Stizolobium pruriens* (Linnaeus) Medikus.

Stems with fine and coarse hairs, later glabrous. Terminal leaflet with length:width ratio 1.5–1.75:1; lateral leaflets not markedly larger, to 19 cm. Inflorescence with dense hairs and often sparse bristles. Calyx with soft hairs and often irritant bristles. Legume linear-oblong, not or slightly swollen around seeds and slightly S-shaped, to ca. 1 cm wide, densely covered with orange or brown irritant caducous bristles. Seeds 3–6, usually light yellow-brown, sometimes brown to black. Fl. Sep–Jan, fr. Oct–Apr.

Forests, riversides, thickets, tall scrub, roadsides; to 1700 m. Guizhou, Hainan, Yunnan [widely distributed in the tropics].

*Mucuna pruriens* var. *pruriens* is distinctive in its small linear often S-shaped fleshy legume densely covered with irritant orange-brown bristles. It is often confused with *M. bracteata*, which differs in the acute leaflets with robust prominent veins less hairy abaxially than

the leaf surface, the inflorescences with bracts or scars of flowerless nodes in lower part, and the almost straight legume.

**16b. *Mucuna pruriens* var. *utilis*** (Wallich ex Wight) Baker ex Burck, Ann. Jard. Bot. Buitenzorg 11: 187. 1893.

蠶豆 li dou

*Mucuna utilis* Wallich ex Wight, Icon. Pl. Ind. Orient. 1: 280. 1840; *Carpogon niveum* Roxburgh; *Macranthus cochinchinensis* Loureiro; *Mucuna atrocarpa* F. P. Metcalf; *M. capitata* Wight & Arnott; *M. cochinchinensis* (Loureiro) A. Chevalier; *M. deeringiana* (Bort) Merrill; *M. martini* H. Léveillé & Vaniot; *M. nivea* (Roxburgh) Candolle; *Stizolobium deeringianum* Bort.

Stems with sparse long fine spreading hairs. Terminal leaflet with length:width ratio only ca. 1.5:1; lateral leaflets often markedly larger than terminal, to 20 cm. Inflorescence with sparse or dense soft adpressed hairs. Calyx with dense long pale hairs. Young legume green, linear but irregularly swollen around seeds, to 2 cm wide in parts, densely covered with silky hairs, with 1 or 2 prominent ribs. Seeds up to 8, white, light yellow-brown, or black, sometimes with streaks or spots; hilum yellowish white, ca. 7 mm. Fl. Oct, fr. Nov.

Cultivated. Guangdong, Guangxi, Guizhou, Hainan, Hubei, Sichuan, Taiwan [probably domesticated in India; cultivated in tropics and subtropics of Asia].

*Mucuna pruriens* var. *utilis* is a cultivated plant very similar to *M. pruriens* var. *pruriens* but distinctive in the misshapen silky-hairy legume entirely lacking irritant bristles and the lateral leaflets, which are often much larger than the terminal one.

This taxon is used for food, herbage, and green fertilizer.

**17. *Mucuna incurvata*** Wilmot-Dear & R. Sa, **sp. nov.**

喙瓣蠶豆 hui ban li dou

Type: China. Yunnan, "Che Li Dist., Ban-chiou Chian" [Jinghong County], Oct 1936, C. W. Wang 79571 (holotype, PE; isotype, A).

Paratypes: C. W. Wang 79233 (A, PE).

*Mucunae prurienti similis sed lobis lateralibus calycis duplo longioribus c. 6 mm (nec 2–4 mm tantum) longis atque multo latioribus 4–5 mm (nec 2–3 mm tantum) latis, calyce extus setulas multo tenuiores ferenti, carina ad apicem multo magis incurvata atque per 1 cm longitudinis indurata et foliis infra cauleque pilos longiores ferentibus differt.*

Twining vines. Young stems with dense spreading or adpressed long fine golden hairs. Leaves ca. 29 cm; petiole 13–15 cm with short adpressed fine pale hairs; stipels robust, tapering to tip, 2–4 mm; leaflets thinly papery or membranous, adaxially with abundant fine short pale adpressed hairs giving shiny appearance, abaxially with similar denser longer (ca. 1 mm) hairs but with veins dark and conspicuously less pubescent, lateral veins 5 or 6 pairs, slender, straight or slightly curved, running right into margin; terminal leaflet elliptic or rhombic-ovate to rhombic-obovate, ca. 11 × 7 cm, base broadly cuneate

to rounded, apex broadly acute to broadly rounded; lateral leaflets 9.5–11.5 cm, width ratio of abaxial to adaxial halves 2–2.5:1, abaxial half with base ± truncate. Inflorescence axillary, length and number of nodes unknown; pedicels 3–4 mm, densely adpressed hairy; bracts unknown. Calyx with dense soft adpressed pale hairs and fine golden bristles; tube ca. 6 × 10 mm; lateral 2 lobes broadly triangular, ca. 6 × 4–5 mm, lowest broadly triangular, 8–10 × 4–5 mm. Corolla deep purple; standard ca. 2.2 cm, ca. 1/2 of keel length; wings ca. 4 × 1.4 cm; keel 4–4.5 cm, apex markedly incurved clawlike and horny to ca. 1 cm. Ovary narrowly cylindrical, tapering to apex; ovules ca. 4. Mature fruit unknown.

• Mixed forests; 800–900 m. S Yunnan (Jinghong).

This new species is *Mucuna* "sp. A" of Wilmot-Dear (Kew Bull. 39: 64. 1984). Known only from the two gatherings cited, it is similar to *M. pruriens* but differs in having lateral calyx lobes twice as long, all calyx lobes much broader, corolla with a much more incurved and clawlike keel, longer hairs on the stem and leaves abaxially, and much finer bristles on the calyx.

**18. *Mucuna bracteata*** Candolle, Prodr. 2: 406. 1825.

黄毛蠶豆 huang mao li dou

Twining vines. Stems glabrous or with dense short pale adpressed hairs. Leaves 14–30(–40) cm; petiole 6–11 cm; stipels 2–5 mm, robust; leaflets thickly papery or almost leathery, adaxially sparsely or densely hairy with hairs denser on veins, abaxially densely hairy with hairs sparser on veins, rarely glabrous on both sides, lateral veins 5–7 pairs, prominent and conspicuous, straight and running into margin; terminal leaflet rhombic or sometimes rhombic-obovate or broadly ovate, 7–14 × 5.6–11(–13) cm, base broadly cuneate to rounded, apex acute or slightly acuminate; lateral leaflets 7–14 × 4–9 cm, width ratio of abaxial to adaxial halves 2–3:1, base on abaxial side truncate. Inflorescence axillary, 18–41 cm, with usually more than 12 flowering nodes always clustered in upper 2/3 of inflorescence; lower part of inflorescence axis with many bracts or their scars; bracts and bracteoles persistent at flowering and often fruiting time, hairy, bracts obovate to lanceolate or linear-lanceolate; pedicels 4–7 mm, densely short spreading hairy and often with longer fine bristles. Calyx densely clothed with soft hairs and yellow-brown irritant bristles; tube 4–7 × 7–10 mm; lateral 2 lobes 2–4 mm, lowest 5–6 mm. Corolla deep purple; standard 1.6–2.3 cm; wings 2.5–3.3 cm × 6–8 mm; keel 2.5–4.3 cm. Legume linear, not or slightly swollen around seeds, straight or slightly downcurved, 6–9 × 1.2–1.6 cm, fleshy, clothed with dark brown irritant hairs. Seeds 3–6, brown or black, usually with pinkish brown marks, ellipsoidal, ca. 9 × 6 mm, ca. 4 mm thick; hilum ca. 5 mm.

Forests, grasslands, roadsides, by rivers; 600–2000 m. Guangdong, Hainan, Yunnan [Laos, Myanmar, Thailand, Vietnam].

This species is extremely similar to *Mucuna pruriens* and is only distinguished by the thickly textured robust-veined ovate-rhombic leaflets with indumentum abaxially conspicuously sparser on the veins than on the leaf surface, the lower part of the inflorescence with many flowerless nodes with scars or persistent bracts, and the almost straight legume.

**89. SPATHOLOBUS** Hasskarl, Flora 25(2, Beibl.): 52. 1842.

密花豆属 mi hua dou shu

Chen Dezhaio (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

Woody climbing shrubs. Leaves pinnately 3-foliolate; stipules small, caducous; stipels persistent or deciduous. Panicles axillary or terminal. Flowers small and numerous, usually few clustered at nodes of rachis or branches; bracts and bracteoles small. Calyx campanulate or terete, usually with short teeth, 2-lipped; upper 2 teeth connate into entire or emarginate upper lip, lower lip with 3 teeth; teeth ovate, triangular, or lanceolate. Corolla exserted; petals all clawed; standard ovate or suborbicular, shorter than wings, base not appendaged, apex emarginate or lobed; wings oblong, obovate-oblong, or subspatulate, base sometimes auriculate, apex obtuse or rounded; keel shorter or longer than wings, nearly straight, base sometimes auriculate, apex obtuse. Stamens diadelphous; vexillary stamen free; anthers elliptic or suborbicular, equal in size or 5 larger and 5 smaller. Ovary shortly stipitate or sessile, 2-ovuled; style slightly incurved, glabrous or hairy; stigma small, terminal, capitate. Legumes sessile or stipitate, falcate or oblong, compressed, reticulate, densely puberulent or velutinous, thicker at top and 1-seeded, dehiscent only at seed bearing apex when mature, lower part indehiscent. Seed flat.

About 30 species: tropical Asia; ten species (seven endemic) in China.

- 1a. Anthers unequal in size, 5 larger and 5 smaller.
- 2a. Terminal and lateral leaflets equal in shape or nearly so, apex rounded or subtruncate, with short awn, lateral veins straight.
- 3a. Leaflets obovate, base broadly cuneate or obtuse; wings subspatulate, like keel auriculate on one side ..... 7. *S. varians*
- 3b. Leaflets narrowly obovate or oblanceolate, base narrowly cuneate; wings oblong, base biauriculate; keel with an obtuse auricle ..... 8. *S. biauritus*
- 2b. Terminal and lateral leaflets unequal in shape, apex rounded and mucronate, lateral veins slightly curved or arched.
- 4a. Rachis of panicles elongated, longer than branches; wings oblong, base obliquely truncate on both sides, with small rounded auricle on one side; keel base truncate and without auricle on lower side, upper side with small, rounded auricle at base; leaflets ca. 27 × 13.5 cm ..... 9. *S. gengmaensis*
- 4b. Rachis of panicles not elongated, shorter than branches; wings obovate-oblong, like keel with long obtuse auricle on one side at base; leaflets 11–15 × 5–7.5 cm ..... 10. *S. uniauritus*
- 1b. Anthers equal or nearly equal in size.
- 5a. Terminal and lateral leaflets equal in shape or nearly so, lateral ones symmetric or nearly so; corolla purplish red.
- 6a. Leaflets 5–9.5 × 2–4 cm, sparsely puberulent abaxially; petiolules strigose; wings obovate-oblong, base with an acute auricle on one side; keel shorter than wings, falcate-oblong, base truncate, without auricle ..... 1. *S. sinensis*
- 6b. Leaflets 7.5–13 × 3–6 cm, glabrous on both surfaces or ± puberulent abaxially; petiolules glabrous or slightly puberulent; wings and keel oblong, subequal in length, base with rounded auricles on both sides ..... 2. *S. harmandii*
- 5b. Terminal and lateral leaflets conspicuously unequal in shape, lateral ones asymmetric; corolla white, red, or purple before flowering, becoming white in full bloom.
- 7a. Calyx teeth rounded or slightly obtuse at apex, to 1 mm, 2–3 × shorter than calyx tube; leaflets often with tufts of hairs in axils of veins abaxially ..... 3. *S. suberectus*
- 7b. Calyx teeth acute or long acuminate at apex, 2–2.7 mm, as long as or slightly shorter than calyx tube; leaflets not with tufts of hairs abaxially.
- 8a. Calyx teeth lanceolate, as long as calyx tube; corolla white; standard 2-lobed at apex ..... 6. *S. pulcher*
- 8b. Calyx teeth triangular, slightly shorter than calyx tube; corolla red or purple before flowering, becoming pinkish white or white in full bloom; standard emarginate at apex.
- 9a. Lateral veins of leaflets usually not branched, tertiary veinlets often transverse; corolla red before flowering, becoming pinkish white or white in full bloom; standard ovate-triangular; keel shorter than standard and wings ..... 4. *S. parviflorus*
- 9b. Lateral veins of leaflets usually branched, tertiary veinlets forming a network; corolla purple before flowering, becoming white in full bloom; standard suborbicular; keel longer than standard and wings or as long as wings ..... 5. *S. discolor*

**1. *Spatholobus sinensis*** Chun & T. C. Chen, Acta Phytotax. Sin. 7: 31. 1958.

红血藤 hong xue teng

Woody climbers. Young branchlets purplish brown,

sparsely puberulent, glabrescent. Stipels subulate, 3–4 mm, persistent; petiolules densely strigose; leaflets equal in shape or nearly so, oblong-elliptic, terminal leaflet 5–9.5 × 2–4 cm, lateral smaller, leathery, sparsely puberulent abaxially, glabrous and shiny adaxially, midrib prominent, impressed adaxially,



raised and densely brownish strigose abaxially, lateral veins and veinlets slender, slightly raised on both surfaces, base rounded, apex abruptly contracted to a slightly blunt mucro. Panicles usually axillary, 5–10 cm, densely brownish strigose; bracts and bracteoles subulate, ca. 1 mm. Calyx ca. 4 mm, subequal to pedicel in length, densely strigose on both sides; teeth ovate, 1.5–2 mm, as long as tube, upper 2 teeth  $\pm$  connate. Corolla purplish red; standard orbicular, 5–5.5  $\times$  6–6.5 mm, apex 2-parted, claw ca. 2 mm; wings obovate-oblong, ca. 5 mm, base with short acute auricle on one side, claw ca. 2.5 mm; keel falcate, oblong, ca. 3.5 mm, apex rounded, base truncate, without auricle, claw ca. 2.5 mm. Anthers subglobose, equal in size. Ovary sessile, densely strigose along ventral suture, other parts pilose or subglabrous. Legumes obliquely oblong, 6–9 cm, 2–2.5 cm wide from middle downward, narrower in upper part, brownish villous, especially on beak and 2 sutures; stipe 1–3 mm or absent. Seeds blackish, dull, oblong, ca. 1.5  $\times$  0.8 cm. Fl. Jun–Jul, fr. Jan.

• Wet areas in dense forests, valleys at low elevation. S Guangdong, SW Guangxi, Hainan.

**2. *Spatholobus harmandii*** Gagnepain, Notul. Syst. (Paris) 2: 368. 1913.

光叶密花豆 *guang ye mi hua dou*

Woody climbers. Young branchlets puberulent, glabrescent. Stipels subulate, 2–3 mm; petiolules 3–5 mm, glabrous or sparsely hairy; leaflets equal in shape, oblong, elliptic, or broadly obovate, 7.5–13  $\times$  3–6 cm, leathery to thickly leathery, glabrous or  $\pm$  puberulent abaxially, glabrous and shiny adaxially, midrib raised abaxially, flat or slightly impressed adaxially, lateral veins slightly raised on both surfaces, veinlets obscure, base rounded, apex acuminate or rounded and with a short blunt mucro. Panicles axillary, solitary or 2 or 3 fascicled, sparsely brownish puberulent or glabrescent. Pedicels as long as or slightly shorter than calyx; bracteoles linear, caducous. Calyx ca. 4 mm; teeth bluntly triangular, 1.5–2 mm, sparsely puberulent outside, slightly hairy inside. Corolla purplish red; standard orbicular, 5–6 mm in diam., apex emarginate; wings and keel oblong, subequal in length, apex rounded, base with a rounded auricle on one side. Anthers equal in size. Ovary sessile, hairy. Legumes 8–9 cm, 2.2–2.5 cm wide in lower part, 1.6–1.8 cm wide in upper part, adpressed brownish puberulent, apex obtuse, without stipe. Seeds blackish, dull, oblong or narrowly elliptic, 1.9–2.9  $\times$  1–1.3 cm. Fl. Mar, fr. Jun–Jul.

Sparse forests, streamsides. Hainan (Baisha, Danxian) [Laos, Vietnam].

**3. *Spatholobus suberectus*** Dunn, J. Linn. Soc., Bot. 35: 489. 1903.

密花豆 *mi hua dou*

Woody climbers, shrubby when young. Leaves papery or subleathery; stipels subulate, 3–6 mm; petiolules 5–8 mm, puberulent or glabrous; leaflets subglabrous or slightly puberulent, with tufts of hairs in axils of veins abaxially, lateral veins 6–8 pairs, slightly curved; terminal leaflet symmetric, broadly elliptic or broadly obovate to suborbicular, 9–19  $\times$  5–14 cm, base broadly cuneate, apex abruptly contracted to shortly ob-

tusely caudate; lateral leaflets asymmetric, as broad as or slightly narrower than terminal one, base broadly cuneate or rounded. Panicles axillary or at apex of branchlets, to 50 cm; rachis and pedicels yellowish brown puberulent; bracts and bracteoles linear, persistent. Calyx 3.5–4 mm; teeth 2–3  $\times$  shorter than tube, lower 3 with apex rounded or slightly obtuse, less than 1 mm, upper 2 slightly longer,  $\pm$  connate, densely yellowish brown puberulent outside, silvery gray hairy inside. Corolla whitish; standard orbicular, 4–4.5  $\times$  5–5.5 mm, apex emarginate, base broadly cuneate, claw 2–2.5 mm; wings obliquely cuneate-oblong, 3.5–4 mm, as keel base with an acute auricle on one side, claw 3–3.5 mm; keel obovate, ca. 3 mm. Anthers globose, equal in size or nearly so. Ovary subsessile, strigose in lower part. Legumes subfalcate, 8–11 cm, densely brownish velutinous; stipe 4–9 mm. Seeds oblong, ca. 2  $\times$  1 cm; testa purplish brown, thinly crustaceous, shiny. Fl. Jun, fr. Nov–Dec.

• Open or dense forests or scrub, mountain slopes, valleys; 800–1700 m. Fujian, Guangdong, Guangxi, Yunnan.

The stems are used medicinally.

**4. *Spatholobus parviflorus*** (Roxburgh ex Candolle) Kuntze, Revis. Gen. Pl. 1: 205. 1891.

显脉密花豆 *xian mai mi hua dou*

*Butea parviflora* Roxburgh ex Candolle, Prodr. 2: 415. 1825; *Spatholobus roxburghii* Benth var. *denudatus* Baker.

Woody climbers. Branchlets subglabrous. Petiole 9–13 cm, puberulent; stipels subulate, ca. 1.5 mm; petiolules 5–6 mm, thick, puberulent; leaflets leathery, slightly puberulent abaxially, glabrous adaxially, lateral veins 7–9 pairs, usually not branched, tertiary veins transverse, quaternary veins slender, reticulate; terminal leaflet obovate or broadly elliptic, 14–17  $\times$  9.5–12 cm, rounded at both ends or slightly narrowed at base; lateral leaflets asymmetric, broadly ovate, 12–16  $\times$  6.5–10 cm, base rounded, apex obtuse. Inflorescence 30–40 cm; rachis puberulent. Calyx 3–4 mm, puberulent. Corolla white or pinkish white; standard broadly ovate, 5–6  $\times$  5.5–8 mm, apex emarginate, base truncate, claw 2–3 mm; wings 5–7.5 mm, auriculate, claw 3–4 mm; keel 4–5 mm. Ovary tomentose. Legumes falcate-oblong, 12–14 cm, thick, subwoody, apex rounded, densely brownish velutinous; stipe terete, 1.3–1.7 cm, densely velutinous. Seeds orbicular or reniform; testa brownish red. Fr. Feb–Mar.

Slopes, open forests or thickets. W Yunnan (Luxi) [Bangladesh, Cambodia, India, Laos, Myanmar, Sri Lanka, Thailand, Vietnam].

**5. *Spatholobus discolor*** C. F. Wei, Bull. Bot. Res., Harbin 5(2): 49. 1985.

变色密花豆 *bian se mi hua dou*

Climbing shrubs. Branchlets blackish brown, with numerous lenticels; branchlets, petiolules, panicles, and calyces hispidulous with yellowish brown hairs. Petiole 2.5–4.5 cm, subglabrous; stipels subulate, stiff, ca. 1.5 mm; petiolules 4–5 mm, glabrescent; leaflets subleathery, yellowish brown hispidulous abaxially, subglabrous adaxially, lateral veins 5 or 6 pairs, often branched, tertiary veins often reticulate; terminal leaflet obovate or obovate-elliptic, 6–12.5  $\times$  4.2–9.6 cm, symmetric, base ob-

tuse, apex rounded; lateral leaflets narrowly elliptic or oblong, 6.5–11 × 4–7.3 cm, asymmetric, rounded at both ends or base slightly obtuse. Panicles terminal, 13–27 cm, many flowered; bracts narrowly triangular, 1.5–2 mm; bracteoles triangular, ca. 1 mm. Calyx 4–5 mm; teeth 1.5–2 mm, upper 2 ± connate, lower 3 triangular, apex acute, middle 1 slightly longer. Corolla purplish before flowering, becoming whitish in full bloom, membranous; standard suborbicular, 7–7.5 mm in diam., apex emarginate, claw 1–1.5 mm; wings narrowly elliptic, 7.5–8 mm, margin of lower part emarginate on one side, other side with short obtuse auricle at base, claw ca. 1.5 mm; keel obovate-oblong, 7.5–8 mm, curved in upper part, ± connate at back, apex rounded, base with acute auricle on one side, claw 2–2.5 mm. Anthers elliptic, equal in size, ca. 0.7 mm. Ovary narrowly oblong, 5–7 mm, slightly compressed, shortly stipitate. Legumes not seen. Fl. Sep.

• Mountain slopes, secondary forests or thickets; ca. 1700 m. S Yunnan (Lüchun).

**6. *Spatholobus pulcher*** Dunn, J. Linn. Soc., Bot. 35: 489. 1903.

美丽密花豆 mei li mi hua dou

Climbing shrubs. Branchlets blackish brown, with sparse lenticels; branchlets, petioles, petiolules, and inflorescences hirsute with ferruginous hairs. Stipels subulate, ca. 2.5 mm; terminal leaflet obovate or broadly elliptic, 3–13 × 3–8.6 cm, lateral ones slightly smaller, ovate or oblong, subleathery, ferruginous hirsute abaxially, subglabrous adaxially, lateral veins 5–7 pairs, slightly curved, veinlets reticulate, base rounded, asymmetric, apex rounded or with short blunt mucro. Panicles with congested flowers; bracts and bracteoles persistent; bracteoles narrowly lanceolate, ca. 1.5 mm. Calyx 5–5.5 mm; teeth as long as tube or nearly so, 2–2.7 mm, upper ovate, apex slightly acute, lower 3 lanceolate, apex long acuminate, middle one longest. Corolla white; standard suborbicular, ca. 5.5 × 5 mm, apex emarginate, base cuneate, claw 3–3.5 mm; wings obovate-oblong, 4.5–5 mm, base with acute auricle ca. 1 mm on one side, other side without auricle or occasionally with slightly obtuse auricle, claw 3–3.5 mm; keel oblong, ca. 4 mm, slightly curved at back, base with a broad and acute auricle ca. 0.5 mm on one side, claw ca. 3.5 mm. Anthers subglobose, equal in size. Ovary sessile, ferruginous hirsute. Legumes falcate, 7.5–9.5 cm, base rounded and incurved, upper part attenuate to a slightly curved beak. Seed oblong, immature. Fl. Jan–Feb, fr. May–Jun.

• Open forests, mountain slopes, valleys, near roads, often climbing on trees; 700–1600 m. SW Yunnan.

**7. *Spatholobus varians*** Dunn, J. Linn. Soc., Bot. 35: 490. 1903.

云南密花豆 yun nan mi hua dou

Climbing shrubs. Branchlets strigose when young, glabrescent. Petiole 6–9 cm; stipels subulate, 5–7 mm; petiolules 4–5 mm; leaflets subequal, obovate, 7–13 × 4–6.5 cm, leathery, puberulent and strigose along veins abaxially, sparsely strigose adaxially, lateral veins 8 or 9 pairs, straight or arched toward margin, raised on both surfaces, veinlets reticulate, base broadly cuneate or obtuse, apex subtruncate, mucronate, strigose. Pani-

cles axillary or terminal, 15–20 cm; rachis and pedicels puberulent; bracts caducous; bracteoles linear, ca. 1 mm; pedicels 3.5–4.5 mm, slightly shorter than calyx. Calyx 5–5.5 mm, puberulent on both sides; upper 2 teeth ± connate, lower 3 ovate-lanceolate, 2.5–2.7 mm. Corolla purple; standard orbicular, ca. 7 mm in diam., apex emarginate, base cuneate, claw ca. 2 mm; wings subspatulate, 5–5.5 mm, apex 3–3.5 mm wide, base with obtuse auricle on one side, claw 4.5–5 mm; keel oblong or slightly broadened in upper part, 3.5–4 mm, curved and slightly connate at back, apex rounded, with obtuse auricle on one side, claw ca. 4.5 mm. Anthers globose, 5 larger and 5 smaller. Ovary narrowly oblong, ca. 4.5 mm, puberulent; style hairy. Legumes 6–9 cm, apex slightly narrowed and curved, with short acute beak, not stipitate. Fl. spring.

Forests, mountain slopes; ca. 1600 m. Yunnan (Simao) [Myanmar, Thailand].

**8. *Spatholobus biauritus*** C. F. Wei, Bull. Bot. Res., Harbin 5(2): 51. 1985.

双耳密花豆 shuang er mi hua dou

Climbing shrubs. Petiole 5.5–6 cm, villous; stipels subulate, as long as or slightly shorter than petiolules; petiolules ca. 4 mm, strigose; leaflets subequal, narrowly obovate or oblanceolate, 7–9.5 × 3–4 cm, papery, puberulent and strigose along veins abaxially, sparsely strigose adaxially, lateral veins 8–10 pairs, straight or arched toward margin, raised and with conspicuously reticulate veinlets on both surfaces, base narrowly cuneate, apex rounded or subtruncate, mucronate. Panicles terminal, to 30 cm; rachis elongated; branches short and dispersed; bracts ovate-triangular, ca. 2 mm, caducous, apex acuminate; bracteoles linear, ca. 1 mm. Flowers purplish red; pedicels slightly shorter than calyx. Calyx 5–5.5 mm, hairy on both sides; teeth shorter than tube, upper 2 ± connate, lower 3 ovate, apex obtuse or slightly acute. Standard orbicular, 6–7 mm in diam., apex emarginate, base cuneate, claw ca. 4 mm; wings oblong, ca. 5.5 mm, base with a rounded auricle on upper side, with an oblong auricle on lower side, claw ca. 4 mm; keel shorter than wings, ca. 4 mm, base with an obtuse long auricle, claw 3.5–4 mm. Anthers subglobose, 5 larger and 5 smaller. Ovary narrowly oblong, 3–4 mm, subsessile. Legumes not seen. Fl. Apr.

• Forests, mountain slopes; ca. 1400 m. Yunnan (Jingdong).

**9. *Spatholobus gengmaensis*** C. F. Wei, Bull. Bot. Res., Harbin 5(2): 53. 1985.

耿马密花豆 geng ma mi hua dou

Climbing shrubs. Petiole terete, ca. 6.5 cm, subglabrous; stipels subulate, as long as or slightly shorter than petiolules; petiolules thick, 5–6 mm; leaflets large, terminal one obovate-oblong, ca. 27 × 13.5 cm, symmetric, lateral ones ovate-elliptic, slightly smaller than terminal, asymmetric, subleathery, glabrous abaxially, glabrous adaxially, except pilose on midrib and lateral veins, lateral veins 6 or 7 pairs, slightly curved, raised on both surfaces, apex rounded. Panicles axillary, ca. 27 cm; rachis and pedicels densely light brown puberulent; bracts narrowly lanceolate, ca. 2.5 mm; bracteoles linear, ca. 1 mm. Calyx 5–5.5 mm, puberulent on both sides; teeth 1.5–2 mm,

upper 2 ± connate, apex subtruncate or emarginate, lower 3 ovate, apex obtuse or slightly acute. Corolla red; standard suborbicular, ca. 6 mm in diam., apex emarginate, base cuneate, claw ca. 3 mm; wings oblong, 5–5.5 mm, long ciliate at base, together with keel apex rounded, base obliquely truncate on 2 sides, with a small rounded auricle on one side, claw ca. 4 mm; keel oblong, 3.5–4 mm, claw ca. 4 mm. Anthers subglobose, 5 larger and 5 smaller. Ovary narrowly oblong, ca. 4 mm, puberulent, sessile. Legumes not seen. Fl. Mar.

• Open forests or secondary forests, mountaintops. Yunnan (Gengma).

**10. *Spatholobus uniauritus*** C. F. Wei, Bull. Bot. Res., Harbin 5(2): 54. 1985.

单耳密花豆 dan er mi hua dou

Climbing shrubs. Branchlets terete, pilose. Petiole 5–10 cm; stipels subulate, as long as or slightly shorter than petioles; petiolules 4–5 mm; terminal leaflet elliptic or obovate-elliptic, 11–15 × 5–7.5 cm, symmetric, lateral ones as large as

terminal, narrowly ovate, asymmetric, thickly papery, puberulent and strigose along midrib and lateral veins abaxially, glabrous adaxially, lateral veins 8 or 9 pairs, raised on both surfaces, reticulate veinlets slender, conspicuous, base cuneate or subrounded, apex rounded, mucronate. Panicles axillary; rachis not elongated, shorter than branches, 5–10 cm; branches crowded, spreading, to 15 cm, densely yellowish brown puberulent. Flowers purple, crowded together. Calyx ca. 5 mm, yellowish brown puberulent on both sides; teeth 1.5–1.7 mm, upper 2 ± connate, emarginate, lower 3 ovate, apex obtuse or slightly acute. Standard suborbicular, 6–7 mm in diam., apex emarginate, base cuneate, claw ca. 2 mm; wings obovate-oblong, 5.5–6 mm, base with a long obtuse auricle on one side, claw ca. 3 mm; keel shorter than wings, nearly equal in shape, ca. 3.5 mm, base with a long obtuse auricle, claw ca. 3.5 mm. Anthers 5 larger and 5 smaller. Ovary narrow, sessile, ca. 3.5 mm. Legumes not seen. Fl. Mar.

• Dense forests in mountain regions; ca. 900 m. S Yunnan (Xishuangbanna).

## 90. *BUTEA* Roxburgh ex Willdenow, Sp. Pl. 3: 857, 917. 1802, nom. cons.

紫矿属 zi kuang shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

*Megalotropis* Griffith; *Meizotropis* Voigt; *Plaso* Adanson.

Trees, climbing to erect shrubs, or perennial herbs. Leaves pinnately 3-foliolate; stipules small to medium-sized, caducous. Flowers large, orange-red or red, densely clustered in axillary or terminal racemes or panicles; bracts and bracteoles small, caducous. Calyx campanulate; teeth short, obtusely triangular, upper 2 connate into a broad entire or emarginate lip. Corolla medium-sized to large, exerted; petals subequal in size; standard ovate or lanceolate, apex acute, recurved, not appendaged; wings falcate, adherent to keel; keel longest, incurved, apex acute, back connate into a ridge. Stamens diadelphous; anthers uniform. Ovary sessile or shortly stipitate, 2-ovuled; style elongated, incurved, glabrous; stigma small, terminal. Legumes oblong, compressed, apex rounded, with 1 seed at top, empty and not dehiscent in lower part, often with stipe at base. Seed obovate; hilum small, estrophiolate.

Four or five species: Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; three species (one endemic) in China.

*Meizotropis*, with two species, was recognized by Sanjappa (Bull. Bot. Surv. India 29: 199–225. 1989), as well as by Schrire (in Lewis et al., Legumes World, 408. 2005). A broader view of *Butea* is taken here, but the matter is in need of further study.

1a. Shrubs or perennial herbs, erect or scandent; leaflets 15–45 × 12–35 cm ..... 3. *B. buteiformis*

1b. Trees or climbing shrubs; leaflets 6–17 × 4–15 cm.

2a. Leaflets glabrous adaxially, reticulate veins distinct; seed broadly reniform or reniform-orbicular,

ca. 2.7 cm, reddish brown; trees ..... 1. *B. monosperma*

2b. Leaflets densely velutinous with whitish yellow hairs on both surfaces, much denser abaxially, reticulate

veins indistinct, areoles obscure; seed reniform, 2–2.2 cm, blackish brown; climbing shrubs ..... 2. *B. braamiana*

**1. *Butea monosperma*** (Lamarck) Taubert in Engler & Prantl, Nat. Pflanzenfam. 3(3): 366. 1894.

紫矿 zi kuang

*Erythrina monosperma* Lamarck, Encycl. 2: 391. 1786;  
*Butea frondosa* Roxburgh ex Willdenow, nom. illeg. superfl.

Trees, 10–20 m tall. Trunk to 30 cm d.b.h. Bark grayish black. Petiole ca. 10 cm, robust; stipels subulate, ca. 1.5 mm; petiolules robust, ca. 8 mm; leaflets unequal, thickly leathery, rough on both surfaces, puberulent along veins abaxially, glabrous adaxially, lateral veins 6 or 7 pairs, like midrib raised

abaxially, reticulate veins distinct and with conspicuous areoles abaxially; terminal leaflet broadly obovate or suborbicular, 14–17 × 12–15 cm, base broadly cuneate, apex rounded or emarginate; lateral leaflets narrowly ovate or oblong, 11.5–16 × 8.5–10 cm, asymmetric, base rounded, apex obtuse or emarginate. Racemes or panicles axillary or at nodes of leafless branches; rachis, pedicels, and calyx outside densely brown or blackish brown velutinous. Calyx 1–1.2 cm, densely silvery gray on both surfaces or light brown pubescent inside. Corolla orange-red, becoming yellow later, ca. 3 × as long as calyx; standard narrowly ovate, recurved, 4–4.5 cm; wings narrowly falcate, ca. 4 cm, like keel with rounded auricles at base; keel broadly falcate,

5–5.5 cm, connate into an arcuate ridge, densely silvery gray velutinous. Anthers oblong. Ovary densely velutinous. Legumes 12–15 × 3.5–4 cm, adpressed silvery gray puberulent, apex rounded; stipe 12–15 mm. Seed reddish brown, broadly reniform or reniform-orbicular, compressed, ca. 2.7 × 3.3–3.6 cm. Fl. Mar–Apr.

Forests, wet places, near roads, also cultivated. SW Guangxi (Ningming), S and SW Yunnan (Gengma, Xishuangbanna) [Bhutan, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

This species is one of the main host plants of lac insects. The red resin from the bark is used medicinally as an astringent.

**2. *Butea braamiana*** Candolle, Prodr. 2: 415. 1825.

绒毛紫矿<sup>①</sup> rong mao zi kuang

Woody climbing shrubs. Old branches grayish brown, glabrous; young branchlets blackish brown, velutinous, with whitish yellow hairs. Petiole 10–13 cm; stipels subulate, ca. 3 mm, hairy; petiolules ca. 5 mm, like petiole densely velutinous with whitish yellow hairs; leaflets obovate-rhomboid, 6–8 × 4–6.5 cm, densely velutinous with whitish yellow hairs on both surfaces, especially on margin and abaxially, lateral veins 6–8 pairs, conspicuous on both surfaces, reticulate veins indistinct, areoles obscure abaxially, base rounded or broadly cuneate, apex emarginate or not; terminal leaflet (immature) ca. 6 cm from lateral ones. Racemes few flowered. Calyx light green. Legumes (immature) oblong, slightly curved, very compressed, 14–

17 × 3–4 cm, dorsal and ventral sutures densely velutinous with whitish yellow hairs; wing with reticulate veins, sparsely hairy; stipe ca. 1.5 cm, densely velutinous. Seed blackish brown, shiny, reniform, compressed, 2–2.2 × 3.3–3.5 cm. Fr. Jun–Jul.

• Yunnan (Xishuangbanna).

**3. *Butea buteiformis*** (Voigt) Grierson & D. G. Long, Notes Roy. Bot. Gard. Edinburgh 37: 346. 1979.

西藏紫矿<sup>①</sup> xi zang zi kuang

*Meizotropis buteiformis* Voigt, Hort. Suburb. Calcutt. 239. 1845 [*"buteaeformis"*]; *Butea minor* Buchanan-Hamilton ex Baker; *B. xizangensis* X. Y. Zhu & Y. F. Du; *Megalotropis buteiformis* (Voigt) Griffith.

Shrubs or perennial herbs, up to 5 m tall. Stems erect or scandent, angular, pubescent with brownish hairs. Petioles 10–20 cm; leaflets broadly ovate-elliptic, 15–45 × 12–35 cm, sericeous with brownish hairs abaxially, appressed pubescent adaxially, lateral veins 10–12 pairs, reticulate veins distinct abaxially, base rounded or truncate, apex acute. Racemes or panicles many flowered. Calyx 6–8 mm, pubescent with brownish hairs. Corolla orange-red; standard broadly elliptic, recurved, ca. 1.5 cm; wings narrowly ovate, falcate, ca. 1.3 cm; keel ovate, ca. 1.7 cm. Legumes (4.5–)6–10 × 2–3 cm, tomentose with brownish hairs.

Dry valley slopes, open grasslands; 1800–2000 m. Xizang [Bangladesh, Bhutan, India, Myanmar, Nepal].

**91. RHYNCHOSIA** Loureiro, Fl. Cochinch. 2: 425, 460. 1790, nom. cons.

鹿藿属 lu huo shu

Sa Ren (萨仁); Michael G. Gilbert

*Dolicholus* Medikus.

Usually vines, creeping or twining, rarely erect shrubs or subshrubs. Leaves pinnately 3-foliolate; stipules usually caducous; stipels persistent or absent; leaflets usually with sessile glands abaxially. Inflorescence axillary, racemose, sometimes branched or 1-flowered. Bracts usually deciduous, rarely persistent. Calyx campanulate, 5-lobed, upper 2 lobes ± connate, lowest 1 longer. Corolla longer than calyx or short; standard circular or obovate, base with inflexed auricles, with or without appendage; wings and keels subequal, inflexed. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary sessile or subsessile; ovules (1 or)2; style curved above middle, usually hairy at lower part; stigma terminal. Legume oblong, oblanceolate, obovoid-ellipsoid, obliquely orbicular, sickleform, or ellipsoid, dehiscent, compressed or inflated, (1 or)2-seeded, not septate, apex always beaked. Seeds (1 or)2, usually suborbicular or reniform; hilum round, funicle in middle, strophiole small or absent.

About 200 species: worldwide; 13 species (five endemic) in China.

- 1a. Legume densely green or yellowish green tomentose.  
 2a. Inflorescence densely 40–80-flowered; legume both tomentose and villous ..... 1. *R. acuminatissima*  
 2b. Inflorescence sparsely ca. 20-flowered; legume densely villous ..... 2. *R. lutea*  
 1b. Legume glabrous or pubescent.  
 3a. Legume oblanceolate or obovate-orbicular to ellipsoid, length:width ratio more than 2:1.  
 4a. Leaflet apex acuminate or shortly acuminate.  
 5a. Terminal leaflet broadly ovate or circular-rhomboid, apex acuminate; flowers lax ..... 12. *R. himalensis*  
 5b. Terminal leaflet rhomboid, apex shortly acuminate; flowers dense ..... 13. *R. kunmingensis*  
 4b. Leaflet apex rounded or obtuse.  
 6a. Stem slender, glabrous or sparsely pubescent; terminal leaflet 1.5–3 cm long and wide ..... 9. *R. minima*  
 6b. Stem robust, densely hairy; terminal leaflet 2–8 × 2.5–8 cm.  
 7a. Terminal leaflet reniform or oblate, base slightly cordate or almost truncate ..... 10. *R. yunnanensis*  
 7b. Terminal leaflet circular-rhomboid, base rounded ..... 11. *R. sericea*

- 3b. Legume obliquely orbicular, oblong, or obovate, length:width ratio less than 2:1.
- 8a. Legume obliquely orbicular, inflated; seed 1 ..... 3. *R. rufescens*
- 8b. Legume oblong or obovate, compressed; seeds usually 2.
- 9a. Terminal leaflet apex obtuse, rarely acute ..... 4. *R. volubilis*
- 9b. Terminal leaflet apex acuminate or caudate-acuminate.
- 10a. Inflorescence slender, 1–7 cm ..... 5. *R. acuminatifolia*
- 10b. Inflorescence robust, 5–27 cm.
- 11a. Stem tomentose and sticky with gland-tipped hairs ..... 6. *R. viscosa*
- 11b. Stem villous or pubescent, gland-tipped hairs absent.
- 12a. Terminal leaflet lanceolate to ovate-lanceolate, both sides sparsely pubescent, apex caudate-acuminate; raceme branched; legume glabrous or almost glabrous ..... 7. *R. chinensis*
- 12b. Terminal leaflet ovate, broadly elliptic, or rhomboid-ovate, both sides densely pubescent, apex acuminate or caudate-acuminate; raceme unbranched; legume pubescent ..... 8. *R. dielsii*

**1. *Rhynchosia acuminatissima*** Miquel, Fl. Ned. Ind. 1: 171. 1855.

密果鹿藿 mi guo lu huo

*Rhynchosia myriocarpa* Quisumbing & Merrill.

Herbs. Stems twining, densely yellow or yellow-green pubescent, spotted with black glands. Leaves pinnately 3-foliolate; stipules ovate to lanceolate, 4–6 mm; petiole 6–10(–14) cm; stipels small, pyramidal; petiolules 3–5 mm, densely pubescent; leaflets ovate to broadly ovate-rhomboid, 5.5–12 × 4.5–8.5 cm, almost membranous, base rounded, slightly cordate, or almost truncate, apex long acuminate and curved; lateral leaflets much smaller, base oblique, both surfaces pubescent, basal veins 3. Raceme 10–15 cm, hairy, densely 40–80-flowered; peduncle 1.5–3 cm. Flowers 1.1–1.3 cm, usually paired or clustered at upper part of inflorescence; pedicels slender, 4–5 mm, pubescent. Calyx ca. 5 mm; lobes acute, unequal, ca. 2 mm. Corolla light purple; standard abaxially pubescent, with obvious callosity inside; keels obtuse. Ovary villous. Legume oblong, 1.7–2 × 0.6–0.7 cm, slightly curved, slightly constricted between seeds, densely tomentose and villous. Seeds usually 2, deep blue or black, lustrous, ovate, 4–6 × 3.5–4 mm. Fl. Mar–Apr, fr. after May.

Forests, shrubs; ca. 600 m. Hainan, Yunnan [Indonesia, Malaysia, Papua New Guinea, Philippines, Vietnam; Australia, Pacific islands (Solomon Islands)].

**2. *Rhynchosia lutea*** Dunn, J. Linn. Soc., Bot. 35: 491. 1903.

黄花鹿藿 huang hua lu huo

Herbs. Stems twining, slender to slightly robust, pubescent. Leaves pinnately 3-foliolate; stipules small, triangular, ca. 6 mm, deciduous; petiole 4–12 cm, sparsely pubescent; stipels small, bristlelike; petiolules 3–5 mm, densely pubescent; terminal leaflet rhomboid-circular, oblate-circular, or rarely subtriangular, 5–9.5 × 4.5–10 cm, papery, pubescent, with sparse light yellow glands, basal veins 3, base almost truncate or slightly cordate, apex abruptly caudate-acuminate; lateral leaflets much smaller, obliquely ovate. Raceme axillary, to more than 20 cm, ca. 20-flowered, rachis densely villous. Flowers ca. 2 cm. Calyx campanulate, ca. 5 mm, pubescent; lobes triangular to lanceolate, unequal, lower one longest. Standard circular, with accessory substance; keels inflexed, shorter than standard and longer than wings. Ovary 2-ovuled. Legume oblong or obovate-

oblong, 2–3 × ca. 1 cm, compressed, green, apex with small curved mucro, densely villous, usually with constriction between seeds. Seeds 1 or 2, purplish black or dark brown, sub-orbicular, compressed, 5–7 mm wide; hilum short, circular. Fr. Sep–Oct.

• Rocky mountains; 1100–1300 m. Yunnan (Mengzi).

**3. *Rhynchosia rufescens*** (Willdenow) Candolle, Prodr. 2: 387. 1825.

淡红鹿藿 dan hong lu huo

*Glycine rufescens* Willdenow, Neue Schriften Ges. Naturf. Freunde Berlin 4: 222. 1803.

Shrubs, creeping, climbing or almost erect. Stems zigzag, pubescent. Leaves pinnately 3-foliolate; stipules small, linear-lanceolate, 2–4 mm, deciduous; petiole 2–4.5 cm, hairy; petiolules short, 1–2 mm; terminal leaflet ovate to ovate-elliptic, 2–5.5 × 1.2–2.5 cm, both surfaces pubescent, with dense sessile glands, basal veins 3, base rounded, apex obtuse or shortly mucronate; lateral leaflets slightly smaller, obliquely ovate. Raceme axillary, slender, 2–4 cm, 2–6-flowered, densely pubescent; bracts small, deciduous; peduncle usually 2–5 mm, hairy. Flower ca. 1 cm. Calyx green, ca. 1 cm, densely pubescent, deeply lobed to base; lobes oblong. Corolla purple to yellow, longer than calyx. Legume obliquely orbicular, inflated, equal or subequal to calyx, apex slightly curved, acute, pubescent, brown and dehiscent when mature. Seed 1, black, transversely elliptic, ca. 3.5 × 3 mm, with succulent strophiole. Fl. Apr–Oct, fr. Oct–Feb.  $2n = 22$ .

Valleys; 300–700 m. Guangxi, Yunnan [Cambodia, India, Indonesia, Malaysia, Sri Lanka].

**4. *Rhynchosia volubilis*** Loureiro, Fl. Cochinch. 2: 460. 1790.

鹿藿 lu huo

Herbs. Stems twining, ribbed, densely gray to light yellow villous. Leaves pinnately or sometimes almost digitately 3-foliolate; stipules small, lanceolate, 3–5 mm, pubescent; petiole 2–5.5 cm; petiolules 2–4 mm; leaflets papery; terminal leaflet rhomboid or obovate-rhomboid, 3–8 × 3–5.5 cm, both surfaces gray or light yellow villous, with yellow-brown sessile glands, basal veins 3, base rounded or broadly cuneate, apex obtuse or acute, usually mucronate; lateral leaflets smaller, usually oblique. Racemes 1–3 per axil, 1.5–4 cm; peduncle ca. 2 mm.

Flowers ca. 1 cm, slightly clustered. Calyx campanulate, ca. 5 mm; lobes lanceolate, exterior pubescent and with glands. Corolla yellow; standard subcircular, with wide and inflexed auricles; wings obovate-oblong, base with 1 long auricle at one side; keels beaked. Ovary hairy, with clustered glands. Legume reddish purple, oblong, 1–1.5 × ca. 0.8 cm, extremely compressed, slightly constricted between seeds, sparsely hairy to almost glabrous, apex with small beak. Seeds usually 2, black, lustrous, elliptic or subreniform. Fl. May–Aug, fr. Sep–Dec.  $2n = 22$ .

Mountains south of the Chang Jiang; 200–1000 m. Guangdong, Hainan, Taiwan [Japan, Korea, Vietnam].

This plant is used medicinally.

**5. *Rhynchosia acuminatifolia*** Makino, J. Jap. Bot. 2: 4. 1920.

渐尖叶鹿藿 jian jian ye lu huo

*Rhynchosia volubilis* Loureiro var. *acuminata* Maximowicz.

Herbs. Stems twining, slender, sparsely pubescent. Leaves pinnately 3-foliolate; stipules small, ovate, membranous, deciduous; petiole 2.5–7 cm, pubescent; stipels bristlelike; petiolules short; terminal leaflet ovate or broadly elliptic, 4–8 × 2–5.5 cm, almost membranous, both surfaces sparsely villous, abaxial surface with sessile glands, basal veins 3, lateral veins ca. 3 pairs, base rounded, apex acuminate or long acuminate; lateral leaflets obliquely ovate, smaller. Raceme axillary, slender, usually ± as long as petiole, pubescent; peduncles slender, 5–10 mm. Flowers clustered, ca. 1 cm. Calyx campanulate, 3–5 mm; lobes triangular, much shorter than tube, lower one longer, sparsely pubescent. Corolla yellow, longer than calyx, petals subequal; standard subcircular, base with inflexed auricles; keel apex with long beak. Ovary linear, 2-ovuled; style long and curved. Legume red, oblong, compressed, 1.2–1.5 × ca. 0.9 cm, apex with small beak. Seeds 1 or 2, usually black, reniform-orbicular, ca. 5 mm in diam. Fl. and fr. Jul–Oct.

Forests. Anhui, Guizhou, Jiangsu, Zhejiang [Japan].

**6. *Rhynchosia viscosa*** (Roth) Candolle, Prodr. 2: 387. 1825.

粘鹿藿 nian lu huo

*Glycine viscosa* Roth, Nov. Pl. Sp. 349. 1821.

Herbs. Stems twining, robust and slightly woody, densely gray viscous pubescent and with sticky glandular hairs. Leaves pinnately 3-foliolate; stipules small, usually lanceolate, 5–8 mm, pubescent, always persistent; petiole 4–9 cm, densely pubescent and with sticky glandular hairs; petiolules 1.6–2.5 cm; leaflets papery; terminal leaflet broadly elliptic or rhomboid-elliptic, 5–8 × 3.5–5 cm, both surfaces villous, abaxial surface with dense small yellow-brown sessile glands, basal veins 3, lateral veins 3–5 pairs, base rounded, apex usually acute, caudate-acuminate; lateral leaflets obliquely ovate to obliquely elliptic. Racemes solitary or a few clustered in axil, 7–22 cm; peduncle 2.8–3.9 cm, densely villous and glandular hairy. Calyx ca. 8 mm, exterior with glands; upper lobes triangular. Corolla ca. 2 × as long as calyx. Legume oblong, ca. 2 × 1 cm, pubescent, straight, apex with small beak, narrowed to both ends. Seeds 2, black, reniform, ca. 5 × 4 mm.  $2n = 22$ .

Roadsides. Yunnan [India, Indonesia, Malaysia, Nepal, Sri Lanka, Thailand; Africa (widespread), Madagascar].

The Chinese material belongs to *Rhynchosia viscosa* var. *viscosa*. Verdcourt (Kew Bull. 25: 82–86. 1971) recognized three further varieties, all almost entirely restricted to Africa.

**7. *Rhynchosia chinensis*** H. T. Chang ex Y. T. Wei & S. K. Lee, Guihaia 5: 171. 1985.

中华鹿藿 zhong hua lu huo

Herbs. Stems twining or climbing, densely pubescent or sometimes sparsely villous. Leaves pinnately 3-foliolate; stipules small, ovate, ca. 4 mm, sparsely pubescent, deciduous; petiole 4–10 cm, densely pubescent; stipels bristlelike; petiolules ca. 3 mm, densely pubescent; leaflets thinly leathery; terminal leaflet lanceolate to ovate-lanceolate, 9–15 × 3.5–8 cm, sparsely pubescent, abaxial surface with yellow-brown sessile glands, basal veins 3, lateral veins 3–5 pairs, base broadly cuneate or rounded, margin slightly sinuate, apex caudate-acuminate; lateral leaflet smaller, obliquely ovate. Raceme axillary, branched, up to 27 cm; bracts ovate, ca. 4 mm, deciduous; peduncle 1–3 cm, densely pubescent. Flowers small, ca. 1.1 cm, sparse; pedicels slender, 4–7 mm, pubescent. Calyx campanulate, ca. 5 mm, 5-lobed; lobes triangular, shorter than tube, sparsely hairy or almost glabrous. Corolla yellow, petals obviously stipitate, almost glabrous; standard ovate-orbicular or almost orbicular, ca. 1 cm, base with 2 slender auricles and accessory callosity; wings extremely narrow, apex acute, base with 2 auricles, one longer; keels slightly curved, with long beak. Ovary sparsely hairy; style linear, glabrous; stigma capitate. Legume reddish purple, oblong, ca. 1.5 × 1 cm, compressed, glabrous or almost glabrous, slightly constricted between seeds, with small beak. Seeds blackish purple, suborbicular, ca. 4 mm in diam. Fl. and fr. summer and autumn. Fr. Sep.

• Mountains; ca. 600 m. Guangdong, Guangxi, Guizhou, Jiangxi.

**8. *Rhynchosia dielsii*** Harms, Bot. Jahrb. Syst. 29: 418. 1900.

菱叶鹿藿 ling ye lu huo

Herbs. Stems twining, slender, usually densely yellowish brown villous or sometimes pubescent. Leaves pinnately 3-foliolate; stipules small, lanceolate, 3–7 mm; petiole 3.5–8 cm, pubescent; stipels bristlelike, ca. 2 mm; petiolules 1–2 mm, pubescent; terminal leaflet ovate, ovate-lanceolate, broadly elliptic, or rhomboid-ovate, 5–9 × 2.5–5 cm, densely pubescent, abaxial surface with sessile glands, basal veins 3, base rounded, apex acuminate or caudate-acuminate; lateral leaflets smaller, obliquely ovate. Raceme axillary, unbranched, 7–13 cm, pubescent; bracts lanceolate, 5–10 mm, deciduous; peduncle 4–6 mm. Flowers sparse, 8–10 mm. Calyx 5-lobed; lobes triangular, lower one longer, densely pubescent. Corolla yellow, petals all stipitate; standard obovate-circular, base with inflexed auricles at 2 sides; wings narrowly oblong, with 2 auricles, one longer and inflexed; keels auriculate, longer than or subequal to standard. Legume oblong or obovate, 1.2–2.2 × 0.8–1 cm, compressed, reddish purple when mature, pubescent, slightly constricted between seeds. Seeds 2, suborbicular, ca. 4 mm in diam. Fl. Jun–Jul, fr. Aug–Nov.

• Mountains, roadsides; 600–2100 m. Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Shaanxi, Sichuan.

This plant is used medicinally.

**9. *Rhynchosia minima*** (Linnaeus) Candolle, Prodr. 2: 385. 1825.

小鹿藿 xiao lu huo

*Dolichos minimus* Linnaeus, Sp. Pl. 2: 726. 1753; *Dolicholus flavus* Medikus, nom. illeg. superfl.

Herbs, annual. Stems twining, slender, sparsely pubescent. Leaves pinnately 3-foliolate; stipules small, lanceolate, usually 1–2 mm; petiole 1–4 cm, glabrous or sparsely pubescent; stipels extremely small; petiolules extremely short; leaflets ± membranous; terminal leaflet rhomboid-circular, 1.5–3 × 1.5–3 cm, sometimes wider than long, glabrous or sparsely villous, abaxially densely glandular, basal veins 3, apex obtuse or rounded, rarely shortly acute; lateral leaflets subequal to terminal leaflet or shorter, obliquely circular. Raceme 5–11 cm, axis slender, sparsely pubescent; bracts small, lanceolate, deciduous. Flowers 6–8 mm, slightly curved; pedicel extremely short. Calyx ca. 5 mm, sparsely pubescent; lobes lanceolate, slightly shorter than tube, lower one longer. Corolla yellow, longer than calyx, petals subequal; standard obovate-circular, base with 2 acute auricles; wings obovate-elliptic, auriculate; keels slightly curved, apex obtuse. Legume oblanceolate to ellipsoid, 1–2 × 0.4–0.5 cm, pubescent, 1- or 2-seeded. Fl. May–Oct, fr. Sep–Nov.  $2n = 22$ .

Forests; 900–2500 m. Sichuan, Taiwan, Yunnan [Afghanistan, Bhutan, India, Indonesia, Japan (Ryukyu Islands), Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; thought to be native in Africa and Asia, now pantropical].

This is a very variable species that has defied attempts to divide it into more homogeneous taxa.

**10. *Rhynchosia yunnanensis*** Franchet, Pl. Delavay. 185. 1890.

云南鹿藿 yun nan lu huo

Vines, herbaceous or sometimes almost woody, ca. 50 cm. Stems slightly robust, densely villous or tomentose, with dark brown sessile glands. Leaves pinnately 3-foliolate; stipules lanceolate, 4–8 mm, usually persistent; petiole 2.5–6 cm; stipels absent; petiolules 1–3 mm, hairy; leaflets papery; terminal leaflet reniform or oblate, 2–3.7 × 2.5–5.3 cm, densely gray villous, with dark brown glands, basal veins 3, lateral veins 2–4 pairs, reticulate veins visible, base shallowly cordate to almost truncate, margin slightly sinuate, slightly reflexed when dried, apex rounded or almost truncate, usually with small mucro; lateral leaflets smaller, slightly oblique. Raceme axillary, rarely solitary or branched, 2–5 cm; peduncle 1–3.5 cm, densely hairy; bracts lanceolate, 4–7 mm, persistent. Flowers yellow, 1.4–2 cm; pedicel 2–8 mm. Calyx 5-lobed; lobes lanceolate, longer than tube, lower one longest. Standard subcircular or obovate-circular, 1–1.5 cm, glabrous, base with 2 auricles; wings elliptic to obovate-elliptic, 7–13 mm, auriculate on one side; keel very wide, subobovate, 7–14 mm, without auricle. Ovary densely silky hairy, sessile; ovules 1 or 2; style linear, lower part silky hairy. Legume reddish brown, obovate-orbicular to ellipsoid, 2–2.5 × 0.7–0.8 cm, sparsely pubescent, apex beaked. Seeds dark

brown, reniform or orbicular, 4–5 × 5–6 mm. Fl. May–Aug, fr. Jun–Oct.

• River valleys; 1800–2300 m. Yunnan.

**11. *Rhynchosia sericea*** Spanoghe, Linnaea 15: 195. 1841.

绒叶鹿藿 rong ye lu huo

*Dolichos tomentosus* Roth, Nov. Pl. Sp. 345. 1821, not *Rhynchosia tomentosa* (Linnaeus) Hooker & Arnott (1835); *R. rothii* Benthham ex Aitchison.

Vines, woody. Stems densely pubescent and yellow glandular. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, 8–10 × 7–8 mm; petiole 4–6 cm; terminal petiolule 15–28 mm, densely hairy, lateral petiolules 3–4 mm; leaflets circular-rhomboid, 5–8 × 5–8 cm, both surfaces densely pubescent, basal veins 3, lateral veins 3 or 4 pairs, base rounded, apex rounded to nearly truncate, shortly mucronate. Raceme 11–16 cm, robust, many flowered, clustered. Calyx ca. 6 mm, densely hairy; lobes almost triangular, apex acute or acuminate, lobes shorter than or subequal to tube. Corolla reddish; standard obovate, 1.1–1.3 cm, densely hairy, auricles acute; wings obovate-oblong, shortest; keels falcate, subequal to standard, auriculate, apex obtuse. Ovary densely hairy, stipitate. Legume oblanceolate to ellipsoid, ca. 3 cm, compressed, pubescent, apex beaked. Seeds 2, reddish brown, reniform, ca. 3 × 4 mm. Fl. Apr–Nov, fr. Sep–Feb.  $2n = 22$ .

Grasslands. Fujian, Taiwan [Indonesia, Japan, Malaysia, Myanmar, Nepal, Pakistan, Thailand].

**12. *Rhynchosia himalensis*** Benthham ex Baker in J. D. Hooker, Fl. Brit. India 2: 225. 1876.

喜马拉雅鹿藿 xi ma la ya lu huo

Herbs. Stems twining, densely pubescent and with brownish glands. Leaves pinnately 3-foliolate; stipules narrowly ovate, 4–8 mm; petiole 2–6 cm; petiolules 1–2 cm; terminal leaflet broadly ovate or circular-rhomboid, 2.5–6 × 2.5–4.5 cm, densely pubescent mixed with glandular hairs, abaxial surface with light green glands, base rounded-cuneate, margin entire, apex acuminate; lateral leaflets oblique at base. Raceme axillary, sparsely flowered; bracts elliptic, 4–8 mm, apex acuminate; peduncle 4–7 mm. Calyx 5-lobed, hairy, exterior glandular; tube 3–4 mm; upper 2 lobes connate at base, narrowly triangular, 5–7 mm. Corolla yellow with obvious purple striations, 1.3–1.5 cm; standard broadly obovate, 1.5–1.8 × 1.1–1.3 cm, glabrous, base auriculate, with adaxial callosity at base, apex emarginate; wings glabrous, clawed, 12.5–13 mm, base auriculate, apex emarginate; keel crescent-shaped, inflexed, obviously longer than wings, 14.5–16 mm, apex obtuse, not auriculate. Ovary ca. 5 mm, densely minutely villous, stipe ca. 5 mm; style 13.5–15 mm. Legume 2.5–3 × ca. 0.9 cm, densely microvillous and glandular hairy.  $2n = 22$ .

Forest understories, river valleys, mountains, fields; 1200–3300 m. Sichuan, Xizang, Yunnan [India, Myanmar, Nepal, Pakistan].

- 1a. Flowers more than 5; lowest calyx lobe as long as corolla ..... 12a. var. *himalensis*
- 1b. Flowers 3–5; lowest calyx lobe shorter than corolla ..... 12b. var. *craibiana*

**12a. *Rhynchosia himalensis* var. *himalensis***

喜马拉雅鹿藿(原变种) xi ma la ya lu huo (yuan bian zhong)

Leaflets broadly ovate, 3–6 × 2.5–4.5 cm. Raceme 7–20 cm, more than 5-flowered. Lowest calyx lobe 10–15 mm, as long as corolla, linear-triangular.

Forest understories, river valleys; 1200–3300 m. Sichuan, Xizang [India, Myanmar, Nepal, Pakistan].

**12b. *Rhynchosia himalensis* var. *craibiana*** (Rehder) E. Peter, *Acta Horti Gothob.* 13: 448. 1940.

紫脉花鹿藿 zi mai hua lu huo

*Rhynchosia craibiana* Rehder in Sargent, *Pl. Wilson.* 2: 118. 1914.

Leaflets circular-ovate, 2.5–4.5 cm, length and width subequal. Raceme 6–9 cm, 3–5-flowered. Lowest calyx lobe 8–10 mm, shorter than corolla. Fl. Jul–Sep, fr. Aug–Oct.

• Forests, mountains, fields; 1300–3100 m. Sichuan, Xizang, Yunnan.

**13. *Rhynchosia kunmingensis*** Y. T. Wei & S. K. Lee, *Guihaia* 5: 171. 1985.

昆明鹿藿 kun ming lu huo

Vines. Stems twining, slender, pubescent and glandular hairy. Leaves pinnately 3-foliolate; stipules lanceolate, 5–7 mm, hairy; petiole slender, 2.5–4.5 cm, hairy; stipels absent; petioles ca. 2 mm, hairy; leaflets papery; terminal leaflet rhomboid, 2.5–3.5 × 1.7–2.3 cm, both surfaces pubescent and with slender glands, basal veins 3, lateral veins 2 or 3 pairs, base broadly cuneate, apex shortly acuminate; lateral leaflets subequal to terminal leaflet, ± oblique, base rounded. Raceme 7–14 cm, many flowered, densely pubescent. Legume oblanceolate to oblanceolate-ellipsoid, ca. 2.5 × 0.7 cm, sparsely pubescent, apex long beaked, valves slightly inflexed after dehiscence. Seeds 2, dark brown, reniform, ca. 3 × 5 mm. Fr. Nov.

• Yunnan (Kunming).

**92. ERIOSEMA** (Candolle) Desvaux, *Ann. Sci. Nat. (Paris)* 9: 421. 1826  
[“*Euriosma*”], nom. cons.

鸡头薯属 ji tou shu shu

Sa Ren (萨仁); Michael G. Gilbert

*Rhynchosia* sect. *Eriosema* Candolle, *Prodr.* 2: 388. 1825.

Herbs or subshrubs, erect or almost erect, usually with root tubers. Leaves 1-foliolate; stipules linear or linear-lanceolate; leaflets usually with sessile glands abaxially. Inflorescence axillary, 1- or 2-flowered to racemose. Calyx campanulate, 5-lobed. Corolla usually longer than calyx; standard obovate, abaxially silky hairy, base clawed, with auricles; wings and keels usually much shorter than standard. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary sessile; ovules 2; style filiform, glabrous; stigma small, capitate. Legume rhombic-elliptic or oblong, dehiscent, inflated, not septate. Seeds 1 or 2, oblique; hilum linear, funicle at one end.

About 130 species: worldwide; one species in China.

**1. *Eriosema chinense*** Vogel, *Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur.* 19(Suppl. 1): 31. 1843.

鸡头薯 ji tou shu

*Crotalaria tuberosa* Buchanan-Hamilton ex D. Don; *Eriosema himalaicum* H. Ohashi.

Herbs, perennial, erect, 12–50 cm tall. Root tuber fusiform to globose, succulent. Stems densely villous. Leaves 1-foliolate; stipules linear to linear-lanceolate, 4–8 mm, hairy, persistent; petiolule ± absent; blade lanceolate, 1.5–7 × 0.4–1.5 cm, abaxial surface shortly villous, adaxial surface and margins sparsely villous, base rounded or nearly cordate, apex obtuse or acute. Raceme axillary, extremely short, 1- or 2-flowered; bracts line-

ar. Calyx campanulate, 3–5 mm, 5-lobed, brown villous. Corolla pale yellow; standard obovate, base with 2 pendulous oblong auricles; wings obovate-oblong, auriculate on one side; keel shorter than wings, obovate-oblong. Ovary densely long hirsute; style inflexed, glabrous. Legume rhomboid-elliptic or oblong, 8–10 × 5–6 mm, black when mature, hirsute. Seeds 2, black, small, reniform; hilum linear, almost up to seed length; funicle at one end of hilum. Fl. May–Jul, fr. Jul–Oct.

Mountains; 300–2000 m. Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Taiwan, Xizang, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Australasia].

The roots of *Eriosema chinense* are edible and are used medicinally.

**93. DUNBARIA** Wight & Arnott, *Prodr. Fl. Ind. Orient.* 258. 1834.

野扁豆属 ye bian dou shu

Sa Ren (萨仁); Michael G. Gilbert

Herbs or woody vines, prostrate or twining. Leaves pinnately 3-foliolate; stipules caducous or absent; stipels usually absent; leaflets with obvious sessile glands abaxially. Inflorescence axillary, 1-flowered to racemose. Bracts caducous or absent; bracteoles



usually absent. Calyx campanulate; lobes lanceolate or triangular, lowest one longest. Corolla ± longer than calyx; standard almost circular, obovate or transversely elliptic, base with auricles; wings usually with auricles; keels shorter than wings, slightly curved. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary stipitate or sessile; ovules many; style filiform, introrse, glabrous; stigma small, terminal, capitate. Legume linear or linear-oblong, dehiscent. Seed hilum long or short; strophiole thin and small.

About 20 species: Asia, Oceania; eight species in China.

*Dunbaria* was revised by Maesen (Wageningen Agric. Univ. Pap. 98(1). 1998).

*Dunbaria merrillii* Elmer (usually treated as a synonym of *D. cumingiana* Benth), otherwise known from Indonesia and the Philippines, was recorded from Taiwan (Lan Yu) (Fl. Taiwan, ed. 2, 3: 275, t. 134. 1993). However, the illustration provided is more suggestive of a species of *Cajanus* as it shows a large legume, 10–12 cm, distinctly constricted between the seeds, and twisted after dehiscence.

- 1a. Terminal leaflet usually ca. 2 × as long as wide; ovary and legume sessile or subsessile.
  - 2a. Leaflets ovate, ovate-lanceolate, or lanceolate, 5–9.5 × 2.5–4 cm; flowers in extended racemelike inflorescence, purple ..... 1. *D. fusca*
  - 2b. Leaflets elliptic, ovate-elliptic, or oblong, 1.6–2.6 × 0.5–0.7 cm; flowers solitary, yellow ..... 2. *D. debilis*
- 1b. Terminal leaflet usually about as long as wide; ovary and legume sessile, subsessile, or stipitate.
  - 3a. Ovary sessile; legume stipe absent or extremely short.
    - 4a. Terminal leaflet more than 5 cm, abaxial surface and legume tomentose; inflorescence a long, robust, many-flowered raceme; flowers purple ..... 3. *D. incana*
    - 4b. Terminal leaflet 1.5–4 cm, abaxial surface and legume glabrous or sparsely pubescent; inflorescence a 1- to few-flowered fascicle or short raceme; flowers yellow.
      - 5a. Terminal leaflet orbicular-rhomboid; inflorescence a 1- or 2-flowered fascicle ..... 4. *D. rotundifolia*
      - 5b. Terminal leaflet rhomboid or almost triangular; inflorescence a short raceme, few flowered ..... 5. *D. villosa*
  - 3b. Ovary stipitate; legume stipe more than 6 mm.
    - 6a. Terminal leaflet obtriangular or obovate, both leaf surfaces and legume sparsely pubescent or glabrous; legume stipe 6–10 mm ..... 8. *D. truncata*
    - 6b. Terminal leaflet almost rhomboid or ovate-rhomboid; legume stipe 15–20 mm.
      - 7a. Terminal leaflet usually 1.8–4 cm long and wide, apex acute, both leaf surfaces and legume densely grayish pubescent; legume stipe 15–17 mm ..... 6. *D. podocarpa*
      - 7b. Terminal leaflet usually 5–6 cm long and wide, apex acuminate, both leaf surfaces and legume sparsely pubescent or glabrous; legume stipe ca. 20 mm ..... 7. *D. circinalis*

**1. *Dunbaria fusca*** (Wallich) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 45: 225. 1877.

黄毛野扁豆 huang mao ye bian dou

*Phaseolus fuscus* Wallich, Pl. Asiat. Rar. 1: 6. 1830; *Atylosia crinita* Dunn.

Herbs, annual. Stems twining, up to 3 mm thick, densely pubescent. Leaves pinnately 3-foliolate; stipules absent or deciduous; petiole 3–6.5 cm, densely pubescent; petiolules 1–2 cm; leaflets papery, subequal; terminal leaflet ovate, ovate-lanceolate, or lanceolate, 5–9.5 × 2.5–4 cm, abaxial surface densely pubescent and with reddish glands, adaxial surface glabrous or sparsely pubescent, basal veins 3, lateral veins 3 or 4 pairs, flat or slightly convex, base rounded or subcuneate, apex acute to acuminate; lateral leaflets similar but smaller. Raceme axillary, slightly robust, 4–15 cm, glabrous or sparsely pubescent, usually several or more flowered; bracts absent. Flower ca. 1.5 cm; pedicel 2–4 mm. Calyx campanulate, 4–7 mm, hirsute, glabrescent, and with brown glands, 4-lobed; lobes triangular or almost triangular, shorter than tube, lowest longer, linear-lanceolate. Corolla purple, ca. 1.3 cm; standard transversely elliptic, base auriculate on both sides; wings oblong, auriculate on one side; keels inflexed to almost right angle. Ovary sessile, densely golden hirsute. Legume black-brown, linear-oblong, 4–6 × 0.4–0.7 cm, hirsute; stipe absent. Seeds 5–7, brown, semiorbicular, ca. 4 × 4 mm. Fl. Jul–Sep, fr. Oct–Dec.

Slopes, open grasslands; 200–1200 m. Guangdong, Guangxi, Hainan, Yunnan [India, Laos, Malaysia, Myanmar, Thailand, Vietnam].

**2. *Dunbaria debilis*** Baker in J. D. Hooker, Fl. Brit. India 2: 218. 1876.

小叶野扁豆 xiao ye ye bian dou

*Dunbaria parvifolia* X. X. Chen; *D. singuliflora* F. Mueller.

Herbs. Stems twining, slender, pubescent. Leaves pinnately 3-foliolate; stipules lanceolate, 1.5–3 mm, pubescent; petiole slender, 0.5–2 cm, sparsely pubescent; stipules extremely small or inconspicuous; petiolules short, ca. 1 mm, pubescent; leaflets papery; terminal leaflet elliptic, ovate-elliptic, or oblong, 1.6–2.6 × 0.5–0.7 cm, both surfaces densely pubescent, abaxial surface with light brown sessile glands, basal veins 3, slender, base rounded, apex obtuse or almost round; lateral leaflets obliquely elliptic, 1–2.1 × 0.5–0.8 cm. Inflorescence 1-flowered; pedicel ca. 4 mm. Calyx campanulate, pubescent; lobes lanceolate, lowest longest, ca. 5 mm, longer than tube. Corolla yellow, 0.9–1.1 cm; standard suborbicular, base with lobed auricles on both sides, apex slightly emarginate; wings oblong, base with acute auricles; keels slightly shorter than wings, almost round. Ovary sessile, pubescent, with light brown glands; style slender; stigma small. Legume oblong, 3.5–4 × ca. 0.7 cm, slightly curved, compressed, pubescent, apex beaked; stipe absent. Fl. Jun–Aug, fr. Mar–Nov.

Mountain slopes, roadsides, grasslands. Guangxi [NE India; Australia].

**3. *Dunbaria incana*** (Zollinger & Moritz) Maesen, Wageningen Agric. Univ. Pap. 98(1): 61. 1998.

白背野扁豆 bai bei ye bian dou

*Phaseolus incanus* Zollinger & Moritz, Syst. Verz. 4. 1846; *Dunbaria harmandii* Gagnepain; *D. nivea* Miquel.

Herbs. Stems twining, densely villous. Leaves pinnately 3-foliolate; stipules small, deciduous; petiole 4–8(–11) cm, densely tomentose; terminal leaflet rhomboid, 5–7(–9.5) × 4.5–6.5 cm, abaxial surface tomentose, with obvious dark brown sessile glands, basal veins 5, lateral veins 2–4 pairs, visible from both sides, base broadly cuneate, rounded, or nearly truncate, margin slightly sinuate, apex acuminate to acute; lateral leaflets smaller, obliquely ovate, apex mucronate. Racemes axillary or lateral, robust, 5–15 cm, densely villous; bracts ovate-lanceolate, deciduous; pedicel 2–5 mm, densely tomentose. Calyx campanulate, 5–8 mm, tomentose, with red glands; lobes triangular, unequal, lowest longest, shorter than tube. Corolla purple; standard oblate, with 2 acute auricles at base; wings obovate-oblong, base with obtuse auricles; keels curved to semicircular. Ovary sessile, filiform, villous and red glandular. Legume linear-oblong, 4–6.5 × 0.7–0.9 cm, tomentose, apex with beak 2–3 mm; stipe absent. Seeds 6–8, almost circular, ca. 5 mm in diam. Fl. Feb–Apr, fr. May–Jun.

Open forests. Hainan [Indonesia (Java), Laos, Malaysia, Thailand, Vietnam].

**4. *Dunbaria rotundifolia*** (Loureiro) Merrill, Philipp. J. Sci. 15: 242. 1919.

圆叶野扁豆 yuan ye ye bian dou

*Indigofera rotundifolia* Loureiro, Fl. Cochinch. 2: 458. 1790; *Atylosia punctata* (Wight & Arnott) Dalzell; *Dolichos punctatus* Wight & Arnott; *Dunbaria punctata* (Wight & Arnott) Benth.

Herbs, perennial. Stems twining, slender, sparsely pubescent. Leaves pinnately 3-foliolate; stipules small, deciduous; petiole 0.8–2.5 cm, densely pubescent; petiolules 1–2 mm, densely pubescent; leaflets papery; terminal leaflet orbicular-rhomboid, 1.5–2.7(–4) cm, slightly wider than long, sparsely pubescent or almost glabrous, with dark brown glands, basal veins 3, base rounded, margin sinuate, apex obtuse; lateral leaflets smaller, oblique. Inflorescence 1- or 2-flowered; bracts narrowly ovate, 1–2 mm. Calyx campanulate, 2–5 mm, pubescent, with dense red to dark brown glands; lobes ovate-lanceolate, shorter than tube. Corolla yellow, 1–1.5 cm; standard obovate-orbicular, base with 2 auricles, apex slightly emarginate; wings obovate-oblong, slightly curved, mucronate; keels falcate, apex obtusely beaked. Ovary sessile. Legume linear-oblong, 3–5 × ca. 0.8 cm, slightly curved, compressed, pubescent or almost glabrous, apex with needlelike beak, stipe absent. Seeds 6–8, dark brown, suborbicular, ca. 3 mm in diam. Fl. Sep–Oct, fr. Oct–Nov.  $2n = 22$ .

Slopes, grasslands; ca. 600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangsu, Jiangxi, Sichuan, Taiwan [Bangladesh, Cam-

bodia, India, Indonesia, Laos, Myanmar, Nepal, Philippines, Thailand, Vietnam; Australia].

**5. *Dunbaria villosa*** (Thunberg) Makino, Bot. Mag. (Tokyo) 16: 35. 1902.

野扁豆 ye bian dou

*Glycine villosa* Thunberg in J. A. Murray, Syst. Veg., ed. 14, 659. 1784.

Herbs, perennial. Stems twining, slender, sparsely pubescent. Leaves pinnately 3-foliolate; stipules small, usually deciduous; petiole slender, 0.8–2.5 cm, pubescent; stipules extremely small; petiolules ca. 1 mm, densely pubescent; leaflets thinly papery; terminal leaflet larger, rhomboid or almost triangular, both surfaces sparsely pubescent, with reddish sessile glands, basal veins 3, lateral veins 1 or 2 pairs, base rounded, broadly cuneate, or almost truncate, apex acute or acuminate; lateral leaflets much smaller, oblique, 1.5–3.5 × 2–3.7 cm. Raceme or compound raceme axillary, 1.5–5 cm, densely pubescent, 2–7-flowered. Flower ca. 1.5 cm. Calyx campanulate, 5–9 mm, 4-lobed; lobes lanceolate or linear-lanceolate, unequal, usually lower one longest. Corolla yellow; standard almost orbicular or transversely elliptic, base auriculate on one side; keels similar to wings, but curved, shortly clawed, apex beaked. Ovary densely pubescent and with rubiginous glands. Legume linear-oblong, 3–5 × ca. 0.8 cm, compressed, pubescent or almost glabrous, apex beaked, stipe ± absent. Seeds 6 or 7, black, suborbicular, ca. 4 × 3 mm. Fl. Jul–Sep, fr. Aug–Oct.

Open places, roadsides; 1800–2100 m. Anhui, Guangxi, Guizhou, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang [Cambodia, India, Indonesia, Japan, Korea, Laos, Philippines, Thailand, Vietnam].

**6. *Dunbaria podocarpa*** Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43: 185. 1874.

长柄野扁豆 chang bing ye bian dou

Herbs, perennial, 1–4 m. Stems twining, densely pubescent. Leaves pinnately 3-foliolate; stipules small, deciduous; petiole 1.5–4 cm, densely pubescent; stipules usually absent; petiolules 1–2 mm, pubescent; terminal leaflet rhomboid, 1.8–4 × 1.8–4 cm, both surfaces densely pubescent, abaxial surface with red glands, basal veins 3, lateral veins 1–3 pairs, base obtuse, rounded, or subtruncate, apex acute; lateral leaflets smaller, obliquely ovate. Raceme axillary, 1- or 2(–4)-flowered; peduncle 0.5–1 cm, densely pubescent. Flowers 1.5–2 cm; pedicel 2–6 mm, pubescent. Calyx campanulate, pubescent, with golden yellow glands; lobes ovate-lanceolate. Corolla yellow; standard transversely elliptic, longer than wide, base with 2 auricles; wings narrowly elliptic, base with curved auricle at one side; keels very curved, without auricle, apex long beaked. Ovary filiform, pubescent, with orange glands, apex with long beak. Legume linear-oblong, 5–8 × 0.9–1.1 cm, densely pubescent, with orange glands, apex with long beak; stipe 1.5–1.7 cm. Seeds 7–11, black, suborbicular, compressed, ca. 4 mm. Fl. and fr. Jun–Nov.

Mountain slopes, roadsides, open fields; below 100–800 m. Fujian, Guangdong, Guangxi, Hainan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

**7. *Dunbaria circinalis*** (Benth) Baker in J. D. Hooker, Fl. Brit. India 2: 219. 1876.

卷圈野扁豆 *juan quan ye bian dou*

*Atylosia circinalis* Benth in Miquel, Pl. Jungh. 244. 1852.

Vines, woody. Stems slender, pubescent when young, then glabrous to almost glabrous. Leaves pinnately 3-foliolate; stipules small, narrowly triangular, ca. 2 mm, usually deciduous; petiole 2–4 cm, pubescent; petiolules 1–2 mm, pubescent; leaflets thinly papery; terminal leaflet larger, almost rhomboid or broadly ovate-rhomboid, 5–6 × 4–5.8 cm, abaxial surface sparsely pubescent and with dense yellowish brown sessile glands, adaxial surface almost glabrous, basal veins 3, base broadly rounded or subcuneate, apex acuminate; lateral leaflets obviously small, broadly obliquely ovate. Raceme axillary, 8–13 cm, pubescent, many flowered; pedicels 1–2 mm. Calyx ca. 8 mm, 5-lobed; lower lobe longest, subequal to tube. Corolla yellow, usually longer than calyx; standard transversely elliptic, 1–1.4 × 1.5–2 cm, base with 2 auricles; wings obovate-elliptic, base long clawed with auricle at one side; keels semiorbicular, long clawed. Legume linear-oblong, 5–7.5 × 0.8–1.2 cm, pubescent when young, later glabrous, apex with small beak, stipe ca. 2 cm. Seeds 6–10, dark brown, suborbicular, ca. 4 × 5 mm, with obvious strophiole. Fl. Sep–Oct, fr. Oct–Jan.

Grassy slopes. Yunnan [India, Indonesia, Laos, Myanmar, Thailand, Vietnam].

**8. *Dunbaria truncata*** (Miquel) Maesen, Wageningen Agric. Univ. Pap. 98(1): 89. 1998.

鸽子豆 *ge zi dou*

*Dolichos truncatus* Miquel, Fl. Ned. Ind. 1: 186. 1855;  
*Dunbaria henryi* Y. C. Wu.

Herbs. Stems twining, slender, sparsely pubescent. Leaves pinnately 3-foliolate; stipules small, linear-lanceolate, ca. 3 mm, deciduous; petiole 1.1–4 cm, sparsely pubescent; petiolules ca. 1 mm, pubescent; leaflets thinly papery; terminal leaflet broadly triangular or broadly ovate, 1.8–4.5 × 1.8–4.5 cm, both surfaces pubescent, sometimes with orange sessile glands, denser abaxially, basal veins 3, lateral veins 2 or 3 pairs, base almost truncate or sometimes broadly cuneate, apex acute or acuminate; lateral leaflets smaller, broadly ovate, usually oblique. Raceme axillary, 1.5–6 cm, sparsely pubescent, 2- to several flowered. Flower 1.5–1.7 cm; pedicel ca. 2 mm, pubescent; bracteoles small, linear-lanceolate. Calyx ca. 8 mm, densely pubescent, with red glands; lobes linear-lanceolate, unequal, shorter than or subequal to tube. Corolla yellow; standard almost orbicular, longer than wide, base with 2 auricles; wings obovate, inflexed, base with curved auricles; keels slightly inflexed, semicircular. Ovary stipitate, pubescent, with glands; ovules 7–10; style slender, upper glabrous, apex slightly inflated. Legume linear-oblong, 3–6 × 0.5–0.8 mm, compressed, sparsely pubescent, acute at both sides, apex beaked, stipe 0.6–1 cm. Seeds 5–8, reddish brown, almost orbicular, 3–4.5 mm in diam. Fl. Feb–Nov, fr. Jun–Dec.

Roadsides, open fields; 100–800 m. Guangxi, Hainan [Indonesia, Myanmar, Vietnam; Australasia].

## 94. CAJANUS Adanson, Fam. Pl. 2: 326, 529. 1763 [“*Cajan* ”], nom. cons.

木豆属 *mu dou shu*

Sa Ren (萨仁); Michael G. Gilbert

Erect shrubs, subshrubs, or woody or herbaceous vines. Leaves pinnately or sometimes digitately 3-foliolate; stipules and stipels small or absent; leaflets usually with sessile glands abaxially. Inflorescence axillary or terminal, racemose. Bracts deciduous; bracteoles absent. Calyx campanulate, 5-lobed; lobes short, upper 2 connate or slightly lobed at apex. Standard almost circular, obovate or obovate-elliptic, base clawed, with inflexed auricles; wings narrowly to broadly elliptic, auriculate; keels obliquely circular, apex obtuse. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary almost sessile; ovules 2–6; styles long, linear, apex curved, upper part glabrous or slightly hairy; stigma terminal, small, capitate. Legume linear-oblong, dehiscent, compressed. Seeds 2–10, reniform to almost orbicular, colorful or blotched; strophiole obvious or absent.

About 30 species: tropical Asia, Madagascar, Oceania; seven species in China.

See Maesen, Wageningen Agric. Univ. Pap. 85(4): 1–225. 1985.

- 1a. Erect shrubs or subshrubs.
- 2a. Leaflets lanceolate to elliptic, 2.8–10 cm, apex acute or acuminate; mature seed without strophiole ..... 1. *C. cajan*
- 2b. Leaflets obovate, 2.5–3.8 cm, apex rounded or acute; mature seed with conspicuous strophiole ..... 2. *C. niveus*
- 1b. Climbing or twining vines.
- 3a. Legume 1.5–2.5 cm ..... 7. *C. scarabaeoides*
- 3b. Legume more than 3 cm.
- 4a. Flowers 2.5–3 cm; calyx with bulbous-based hairs ..... 6. *C. grandiflorus*
- 4b. Flowers 1.5–2.8 cm; calyx without bulbous-based hairs.
- 5a. Terminal leaflet ovate to ovate-elliptic; calyx densely yellow hirsute ..... 3. *C. goensis*
- 5b. Terminal leaflet rhomboid-ovate, rhomboid, or obovate-rhomboid; calyx pubescent or glandular hairy.
- 6a. Leaflets leathery, terminal leaflet broader than long; legume 4–6-seeded ..... 4. *C. volubilis*
- 6b. Leaflets papery or thickly papery, terminal leaflet longer than broad; legume 8–10-seeded ..... 5. *C. mollis*

**1. *Cajanus cajan*** (Linnaeus) Huth, *Helios* 11: 133. 1893.

木豆 mu dou

*Cytisus cajan* Linnaeus, *Sp. Pl.* 2: 739. 1753; *Cajanus bicolor* Candolle; *C. cajan* var. *bicolor* (Candolle) Purseglove; *C. cajan* var. *flavus* (Candolle) Purseglove; *C. flavus* Candolle; *C. indicus* Sprengel; *C. indicus* var. *bicolor* (Candolle) Kuntze; *C. indicus* var. *flavus* (Candolle) Kuntze; *C. indicus* var. *maculatus* Kuntze.

Shrubs, erect, 1–3 m tall. Branchlets gray pubescent. Leaves pinnately 3-foliolate; stipules small, ovate-lanceolate, 0.2–3 mm; petiole 1.5–5 cm, sparsely pubescent; stipels extremely small; petiolules 1–5 mm, hairy; leaflets lanceolate to elliptic, 2.8–10 × 0.5–3.5 cm, papery, abaxial surface densely pubescent and with inconspicuous yellow glands, adaxial surface pubescent, apex acute or acuminate, usually mucronate. Raceme 3–7 cm; peduncle 2–4 cm; few flowers terminal or almost terminal; bracts ovate-elliptic. Calyx campanulate, 5–7 mm; lobes triangular or lanceolate, pubescent. Corolla yellow, ca. 3 × calyx in length; standard suborbicular, with inflexed auricle; wings slightly obovate, with short auricle; keel apex obtuse, slightly inflexed. Ovary hairy; ovules several; style long, linear, glabrous; stigma capitate. Legume linear-oblong, ± inflated, 4–8.5 × 0.6–1.2 cm, dull pubescent, apex beaked, acuminate, long mucronate. Seeds 3–6, gray, sometimes with brown spots, subspherical, ca. 5 mm in diam., slightly compressed; strophiole absent. Fl. and fr. Jan–Nov.  $2n = 22$ .

Roadsides, hills; 100–900 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [probably originally from tropical Asia, now cultivated worldwide].

*Cajanus cajan* is used for food (“Pigeon Pea”), herbage, green fertilizer, and medicine. It is particularly valued in areas of low erratic rainfall.

**2. *Cajanus niveus*** (Wallich ex Benth) Maesen, *Wageningen Agric. Univ. Pap.* 85(4): 157. 1985.

白虫豆 bai chong dou

*Atylosia nivea* Wallich ex Benth in Miquel, *Pl. Jungh.* 243. 1852; *Cantharospermum niveum* (Wallich ex Benth) Raizada.

Subshrubs, erect, ca. 1 m tall. Stems pubescent. Leaves pinnately 3-foliolate; stipules small, deciduous; petiole 1.5–3 cm, densely tomentose; stipels absent; petiolules 2–5 mm, densely tomentose; leaflets leathery, with glandular spot below; terminal leaflet obovate, 2.5–3.8 cm, adaxial surface pubescent, basal veins 3, lateral veins 3–5 on each side, slightly obvious on both surfaces; lateral leaflets slightly smaller, obliquely elliptic, with black spot after drying adaxially, with fine downy hairs on abaxial surface. Raceme axillary, 3–6 cm, with a few flowers; peduncle 0.6–1.2 cm; bracts ovate. Calyx campanulate; lobes triangular, shorter than tube. Corolla yellow, 4–5 × as long as calyx; standard obovate, base auriculate; wings auriculate; keels with auricles, apex slightly inflexed. Ovary densely hairy. Legume obovate-elliptic, compressed, 3–4.5 cm, to 1.5 cm wide near top, densely pubescent, legume valve with obvious transverse constriction between seeds, apex with curved beak. Seeds 4–8, with light gray spot, ellipsoidal, ca. 5 × 4 mm, apex rounded; strophiole succulent at base. Fl. and fr. Aug–Oct.

Sunny slopes of rocky mountains; 400–1200 m. Yunnan [Myanmar].

**3. *Cajanus goensis*** Dalzell, *Hooker’s J. Bot. Kew Gard. Misc.* 2: 264. 1850.

硬毛虫豆 ying mao chong dou

*Atylosia barbata* (Benth) Baker; *A. calycina* (Miquel) Kurz; *A. goensis* (Dalzell) Dalzell; *A. siamensis* Craib; *Cantharospermum barbatum* (Benth) Koorders; *Dunbaria barbata* Benth; *D. calycina* Miquel; *D. stipulata* Thun; *D. thorelii* Gagnepain; *Endomallus pellitus* Gagnepain; *E. spirei* Gagnepain.

Vines, woody, twining, to several meters tall, yellow-brown villous except for corolla. Stems densely hairy when young, later glabrescent, to dark brown. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, 7–12 mm, persistent; petiole 3–7 cm; terminal leaflet ovate to ovate-elliptic, 5–10 × 3–5.5 cm, densely villous when young, later glabrescent, base rounded, apex acuminate with hard mucro. Peduncle a few centimeters; bracts ovate, densely villous. Flowers ca. 3 cm; pedicels slender, 11–15 mm. Calyx campanulate; lobes linear-lanceolate, lowest longest, ca. 2 × as long as tube. Corolla yellow; standard obovate-elliptic, ca. 2.8 cm, base with an inflexed auricle on each side, apex slightly emarginate; wings broadly elliptic, base with auricle on one side; keels sickleform, slightly shorter than wings, clawed, without auricle. Ovary linear, densely villous; style long, curved, glabrous; stigma capitate. Legume long elliptic, 4–6 × ca. 1 cm, straight, densely villous, apex beaked. Seeds 5–7, brown, subspherical, ca. 4 mm in diam., wider than long; strophiole acute and white, succulent. Fl. Jan–Feb, fr. Feb–Jul.

Roadsides, river valleys; 1000–1300 m. Yunnan [Bangladesh, India, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam].

**4. *Cajanus volubilis*** (Blanco) Blanco, *Fl. Filip.*, ed. 2, 417. 1845.

虫豆 chong dou

*Cytisus volubilis* Blanco, *Fl. Filip.* 599. 1837; *Atylosia crassa* Prain ex King; *A. volubilis* (Blanco) Gamble; *Cajanus crassus* (Prain ex King) Maesen; *Cantharospermum volubile* (Blanco) Merrill.

Vines, twining. Stems robust, brown villous when young. Leaves pinnately 3-foliolate; stipules small, ovate, 2–3 mm, deciduous; petiole 2–8 cm; stipels linear, ca. 2 mm; petiolules extremely short; leaflets leathery, both surfaces pubescent, abaxial surface with sessile glands; terminal leaflet rhomboid to rhomboid-ovate, 2–9.5 × 2.7–9 cm, base rounded or shallowly cordate, apex obtuse; basal veins 3; lateral leaflets slightly smaller, obliquely ovate, 3.5–6 × 3–5 cm. Raceme axillary, robust, 3.5–6 cm, densely gray villous, each node with 1 or 2 flowers; bracts large, ovate, to 1.7 cm, membranous, minutely villous, deciduous; pedicels 3–7 mm, hairy. Calyx campanulate, 5-lobed; lobes triangular, unequal, upper 2 nearly connate, sparsely shortly villous. Corolla yellow, ca. 1.5 cm; standard obovate-orbicular, base auriculate at both sides; wings oblong, slightly shorter than standard; keels subequal to wings, with auricles, apex curved. Ovary pubescent; style filiform, long and

curved, hairy adaxially. Legume oblong, inflated, 3–5 × 0.8–1 cm, hairy, transversely constricted between seeds. Seeds 4–6, black, usually subspherical, rarely hemispherical, 3–5 mm wide; strophiole thick and succulent. Fl. Dec–Mar, fr. Feb–Apr.

Forests. Guangxi, Hainan, Yunnan [India, Indonesia, Laos, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam].

**5. *Cajanus mollis*** (Benth) Maesen, Wageningen Agric. Univ. Pap. 85(4): 154. 1985.

长叶虫豆 chang ye chong dou

*Atylosia mollis* Benth in Miquel, Pl. Jungh. 243. 1852; *Cantharospermum molle* (Benth) Taubert.

Vines, woody, twining, densely villous. Stems longitudinally ribbed. Leaves pinnately 3-foliolate; stipules lanceolate, 2–3 mm, deciduous; petiole 1–2.5(–5) cm; petiolules extremely short; leaflets papery to thickly papery, both surfaces pubescent, denser abaxially and with rosinlike glands; terminal leaflet obovate-rhomboid, 4–7 × 2–4.5 cm, base rounded to obtusate, apex acuminate; basal veins 3; lateral leaflets slightly smaller, obliquely ovate, 4–7 × 2–4.5 cm. Raceme axillary, robust, 3.5–6 cm; bracts large, ovate, to 1.7 cm, membranous, exterior with several longitudinal striae and rosinlike glands, clothed with micro-villous hairs, deciduous; pedicels 3–7 mm, hairy. Calyx campanulate, 5-lobed; lobes lanceolate, unequal, upper 2 nearly connate, sparsely pubescent. Corolla yellow, ca. 1.5 cm, persistent; standard obovate-circular, with inflexed auricles on each side; wings oblong, slightly shorter than standard; keels subequal to wings, with auricles, apex curved. Ovary densely pubescent; style filiform, apex curved. Legume oblong, inflated, 4–7 × 0.8–1 cm, hairy, transversely constricted between seeds. Seeds 8–10, ellipsoidal to oblong, ca. 3 mm in diam.; strophiole thick and succulent. Fl. Sep–Nov, fr. Nov.

Forests. Yunnan [Bhutan, India, Nepal, Pakistan].

**6. *Cajanus grandiflorus*** (Benth ex Baker) Maesen, Wageningen Agric. Univ. Pap. 85(4): 125. 1985.

大花虫豆 da hua chong dou

*Atylosia grandiflora* Benth ex Baker in J. D. Hooker, Fl. Brit. India 2: 214. 1876; *Dunbaria pulchra* Baker; *Pueraria seguinii* H. Léveillé.

Vines, woody, twining. Stems cylindric, pubescent. Leaves pinnately 3-foliolate, deciduous; petiole 3–8 cm, villous; stipules small, linear; petiolules 2–3 mm, densely pubescent; leaflets papery, with glands at adaxial surface; terminal leaflet ovate-rhomboid or rhomboid, 6–10 × 4–7 cm, pubescent, especially dense on veins abaxially, basal veins 3(or 5), base rounded, broadly cuneate to slightly cordate, apex acute and mucronate; lateral leaflets obliquely ovate. Raceme axillary, robust, to 20 cm; bracts large, ovate-elliptic, ca. 2 × 1 cm, membranous, de-

ciduous. Flower 2.5–3 cm; pedicel ca. 8 mm. Calyx with bulbous-based hairs; lobes lanceolate. Corolla yellow, glabrous; standard obovate or nearly circular, with inflexed auricles on each side and with 2 inconspicuous callosities; wings oblong, shorter than standard; keels inflexed. Ovary linear, densely yellow-brown villous. Legume oblong, 3.5–5 × ca. 1 cm, densely villous, transversely constricted between seeds. Seeds 4–7, black to pitch-black, almost spherical, ca. 3 mm wide; strophiole thick and succulent. Fl. Aug–Nov, fr. Oct–Dec.

Forest margins, roadsides; 1000–2500 m. Yunnan, Zhejiang [Bhutan, India, Myanmar].

**7. *Cajanus scarabaeoides*** (Linnaeus) Thouars, Dict. Sci. Nat. 6: 617. 1817.

蔓草虫豆 man cao chong dou

*Dolichos scarabaeoides* Linnaeus, Sp. Pl. 2: 720. 1753; *Atylosia pauciflora* (Wight & Arnott) Druce; *A. scarabaeoides* (Linnaeus) Benth; *A. scarabaeoides* var. *argyrophyllus* Y. T. Wei & S. K. Lee; *Cajanus scarabaeoides* var. *argyrophyllus* (Y. T. Wei & S. K. Lee) Y. T. Wei & S. K. Lee; *Cantharospermum pauciflorum* Wight & Arnott; *C. scarabaeoides* (Linnaeus) Baillon; *Dolichos medicagineus* Roxburgh; *D. minutus* Wight & Arnott; *Rhynchosia biflora* Candolle; *R. scarabaeoides* (Linnaeus) Candolle; *Stizolobium scarabaeoides* (Linnaeus) Sprengel.

Vines, woody, twining or trailing, to 2 m. Stems slender, ± pubescent. Leaves pinnately 3-foliolate; stipules small, ovate, hairy, usually deciduous; petiole 1–2 cm; stipules absent; petiolules extremely short; leaflets papery or nearly leathery, with glandular spots, sparsely pubescent on both surfaces, denser abaxially, basal veins 3, obviously convex below; terminal leaflet elliptic or obovate-elliptic to obovate, 1.2–4 × 0.8–1.5(–3) cm, apex obtuse or rounded; lateral leaflets smaller, obliquely elliptic to obliquely obovate. Raceme axillary, usually less than 2 cm, 1–5-flowered; peduncle 2–5 mm, densely brown to dull brown villous. Calyx campanulate, 5-lobed, or 4-lobed with upper 2 incompletely connate; lobes linear-lanceolate. Corolla yellow, ca. 1 cm, usually deciduous; standard obovate, with emarginate auricle and claw at base; wings narrowly elliptic, slightly curved, base auriculate; keels curved at apex, densely very pale brown villous. Ovules several. Legume oblong, 1.5–2.5 × 0.4–0.6 cm, leathery, densely villous, transversely constricted between seeds. Seeds 2–7, dark brown, ellipsoidal, ca. 4 mm; strophiole convex. Fl. Sep–Nov, fr. Oct–Dec.

Fields, roadsides, grassy slopes, seashores; below 100–1500 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam; Africa, Oceania].

The roots of *Cajanus scarabaeoides* are used medicinally.

## 95. **FLEMINGIA** Roxburgh ex W. T. Aiton, Hort. Kew., ed. 2, 4: 349. 1812, nom. cons., not Roxburgh ex Rottler (1803).

千斤拔属 qian jin ba shu

Sa Ren (萨仁); Michael G. Gilbert

*Luorea* Necker ex J. Saint-Hilaire; *Maughania* J. Saint-Hilaire.

Shrubs or subshrubs, rarely herbs, erect or trailing. Leaves digitately 3-foliolate or simple; stipules persistent or caducous; stipels absent; leaflets usually with sessile glands abaxially. Inflorescence axillary or terminal, racemose or compound racemose, rarely paniculate or capitate. Bracts 2-columned; bracteoles absent. Calyx 5-lobed; lobes narrow and long, lower one longest; tube short. Corolla longer than calyx or included; standard oblong or elliptic, base clawed, with auricles; wings very narrow, auriculate. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary subsessile; ovules 2; style filiform, glabrous or slightly hairy; stigma small, capitate. Legume elliptic, dehiscent, inflated, not septate. Seeds 1 or 2, almost orbicular, without strophiole.

About 30 species: tropical Asia, Africa, Oceania; 15 species (two endemic) in China.

The generic synonym *Maughania* is very often written incorrectly as "*Moghania*."

- 1a. Leaves simple.
- 2a. Inflorescence a raceme or panicle; bracts small, ovate to ovate-lanceolate ..... 4. *F. paniculata*
- 2b. Inflorescence a thyrse of cymelets, each initially enclosed by large overlapping incurved bracts.
- 3a. Leaflets orbicular-cordate; standard with lobe as long as broad, contracted above auricles, and obovate or obcordate ..... 1. *F. chappar*
- 3b. Leaflets ovate, narrowly ovate, elliptic, or oblong; standard with lobes not contracted above auricles, transversely elliptic or broadly orbicular; wings much narrower than keel.
- 4a. Leaves 3–7 cm wide, base rounded or slightly cordate, petiole usually 5–15 mm ..... 3. *F. strobilifera*
- 4b. Leaves 1.5–2.5 cm wide, base cuneate, subsessile or petiole usually 1–5 mm ..... 2. *F. fluminalis*
- 1b. Leaves digitately 3-foliolate.
- 5a. Prostrate herbs; stipules persistent; inflorescence compact.
- 6a. Leaflets 4–7 cm, elliptic or ovate-lanceolate; stipules linear-lanceolate; inflorescence 2–2.5 cm ..... 13. *F. prostrata*
- 6b. Leaflets 1–5 cm, oblong or almost obovate; stipules ovate; inflorescence 2–10 cm ..... 14. *F. procumbens*
- 5b. Erect shrubs; stipules usually deciduous (persistent in *F. stricta*).
- 7a. Inflorescence a long-pedunculate capitulum; bracts 1.5–2 cm, persistent ..... 15. *F. involucrata*
- 7b. Inflorescence peduncle extremely short, racemes or panicles; bracts 0.4–1.2 cm, persistent or deciduous.
- 8a. Peduncle conspicuous, axis slender ..... 5. *F. lineata*
- 8b. Peduncle inconspicuous, axis robust.
- 9a. Leaflets usually more than 20 cm; stipules persistent; standard strongly contracted, narrowed above auricles ..... 6. *F. stricta*
- 9b. Leaflets less than 20 cm; stipules deciduous; standard not contracted.
- 10a. Leaflets usually 8–19 cm, lateral veins not grooved adaxially.
- 11a. Whole plant densely rusty tomentose; bracts elliptic to elliptic-lanceolate, apex obtuse ..... 7. *F. latifolia*
- 11b. Whole plant densely gray or grayish brown pubescent or silky villous; bracts ovate to triangular.
- 12a. Petiole with narrow wings; leaflets usually glabrous except for veins; inflorescence lax ..... 8. *F. macrophylla*
- 12b. Petiole without wings; leaflets densely pubescent, especially in lower part; inflorescence congested ..... 9. *F. mengpengensis*
- 10b. Leaflets usually 2–10 cm, lateral veins  $\pm$  grooved adaxially.
- 13a. Branchlets without obvious lenticels; leaflets abaxially glabrous or almost glabrous except for veins ..... 12. *F. kweichowensis*
- 13b. Branchlets with obvious lenticels; leaflets abaxially densely tomentose.
- 14a. Branchlets and abaxial surface of leaflets gray to grayish brown tomentose ..... 10. *F. wallichii*
- 14b. Branchlets and both sides of leaflets brown tomentose ..... 11. *F. grahamiana*

**1. *Flemingia chappar*** Buchanan-Hamilton ex Bentham in Miquel, Pl. Jungh. 244. 1852.

墨江千斤拔 mo jiang qian jin ba

*Maughania chappar* (Buchanan-Hamilton ex Bentham) Kuntze.

Shrubs, erect, ca. 1 m tall. Branchlets slender, densely brown villous. Leaves simple; stipules narrowly ovate, ca. 2 mm, deciduous; petiole ca. 1.5 cm, densely deciduous brown villous; leaf blade orbicular-cordate, 4–4.5 cm, papery or thinly

leathery, glabrous or sparsely pubescent except veins, abaxial surface with dense, orange, sessile glands, basal veins 3, lateral veins 3 pairs, base slightly cordate, apex rounded or obtuse. Inflorescence an axillary or terminal thyrse; inflorescence axis 3–7 cm, densely brown hairy; cymules each enclosed by concave bract; bracts 1.5–2  $\times$  1.8–3.8 cm, membranous, glabrous, with obvious reticulate veins, persistent, apex emarginate. Flowers 6–9 mm; pedicel 0.4–1.6 cm, densely hairy. Calyx 5-lobed, 4–5 mm, densely pubescent, with orange glands; lobes lanceolate, subequal to tube. Standard with lobe as long as broad, contracted above auricles, and obovate or obcordate; wings oblong;

keel slightly curved. Legume elliptic, 10–15 × 6–10 mm, densely brown villous. Fl. Dec–Mar, fr. Mar–May.

Forests. Yunnan [Cambodia, India, Laos, Myanmar, Nepal, Thailand].

**2. *Flemingia fluminalis*** C. B. Clarke ex Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 438. 1897.

河边千斤拔 he bian qian jin ba

*Flemingia strobilifera* (Linnaeus) W. T. Aiton var. *fluminalis* (C. B. Clarke ex Prain) Thuan; *Maughania fluminalis* (C. B. Clarke ex Prain) H. L. Li.

Shrublets, erect, ca. 0.5 m tall. Branchlets densely pubescent and tomentose. Leaves simple; stipules lanceolate, 1–2 cm, apex with long mucro, persistent or deciduous; petiole usually 1–5 mm, hairy; leaf blade narrowly oblong to lanceolate, 5–9 × 1.5–2.5 cm, pubescent on both surfaces, lateral veins 5–8 pairs, base cuneate, apex rounded-obtuse or acute. Inflorescence a terminal or axillary thyrse, sometimes branched; inflorescence axis 5–10 cm, slightly curved, densely pubescent; cymules small, each enclosed by concave bract; bracts 1–1.5 × 1.8–2.2 cm, papery, both surfaces pubescent, base slightly cordate, apex obviously emarginate. Calyx 2–3 mm, pubescent, with scattered small dark brown sessile glands; lobes ovate, equal to or shorter than tube. Corolla yellow, ca. 6 mm; standard transversely elliptic, auriculate, base shortly mucronate; wings obovate, subequal to standard, one with auricle, long mucronate; keel elliptic, slightly curved, shorter and wider than wings, ca. 4 mm, apex shortly mucronate. Legume oblong-elliptic, ca. 7 × 5 mm, densely pubescent. Fl. Jan–May, fr. Feb–Sep.

Plains, mountain slopes. Guangxi, Sichuan, Yunnan [Bangladesh, India, Laos, Myanmar, Vietnam].

*Flemingia fluminalis* is used medicinally. It is included within the following species, *F. strobilifera*, by some authors.

**3. *Flemingia strobilifera*** (Linnaeus) R. Brown in W. T. Aiton, Hort. Kew., ed. 2, 4: 349. 1812.

球穗千斤拔 qiu sui qian jin ba

*Hedysarum strobiliferum* Linnaeus, Sp. Pl. 2: 1053. 1753; *Flemingia bracteata* (Roxburgh) Wight; *F. fruticulosa* Wallich ex Benth; *F. strobilifera* var. *bracteata* (Roxburgh) Baker; *F. strobilifera* var. *fruticulosa* (Wallich ex Benth) Baker; *H. bracteatum* Roxburgh; *Maughania bracteata* (Roxburgh) H. L. Li; *M. fruticulosa* (Wallich ex Benth) Mukerjee; *M. strobilifera* (Linnaeus) J. Saint-Hilaire ex Kuntze; *Zornia strobilifera* (Linnaeus) Persoon.

Shrubs, erect or almost climbing, 0.3–3 m tall. Branchlets ribbed, densely gray to dull brown villous. Leaves simple; stipules linear-lanceolate, 0.8–1.8 cm, persistent or deciduous; petiole usually 0.5–1.5 cm, densely hairy; leaf blade ovate, narrowly ovate, ovate-elliptic, broadly elliptic, or oblong, 6–15 × 3–7 cm, thinly leathery, glabrous or almost glabrous except for veins, lateral veins 5–9 pairs, base rounded, slightly cordate, apex acuminate, obtuse, or acute. Inflorescence a thyrse, sometimes branched; inflorescence axis 5–11 cm, densely villous; cymules each enclosed by concave bract; bracts 1.2–3 × 2–4.4 cm, papery to almost leathery, both surfaces long hirsute,

margin ciliate, apex truncate or rounded, slightly emarginate and with slender mucro. Flowers small; pedicel 1.5–3 mm. Calyx pubescent; lobes ovate, slightly longer than tube. Corolla longer than calyx; standard broadly orbicular; wings narrower than keels. Legume elliptic, 6–10 × 4–5 mm, sparsely pubescent, inflated. Seeds 2, usually dark brown, suborbicular. Fl. Feb–Aug, fr. Apr–Nov.  $2n = 22$ .

Mountain slopes; 200–1600 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam].

*Flemingia strobilifera* is used medicinally.

**4. *Flemingia paniculata*** Wallich ex Benth in Miquel, Pl. Jungh. 245. 1852.

锥序千斤拔 zhui xu qian jin ba

*Maughania paniculata* (Wallich ex Benth) Kuntze; *M. phursia* Kuntze.

Shrubs, erect. Branchlets slightly zigzag, pubescent and villous. Leaves simple; stipules lanceolate, hairy, deciduous; petiole 1.5–2.3 cm, sparsely villous; leaf blade ovate-cordate or broadly elliptic-cordate, 7–12 × 5–7.5 cm, papery, adaxially glabrous, abaxially glabrous except on veins, with scattered black glands, basal veins 5, lateral veins 5 or 6 pairs, margin slightly sinuate, apex mucronate. Inflorescences axillary or terminal, racemose, sometimes branched, slender, 2.5–4 cm, pubescent and villous, sparsely flowered; bracts ovate to ovate-lanceolate; peduncle short or absent. Flowers 0.6–1 cm. Calyx ca. 5 mm, densely pubescent, with yellowish glands; lobes lanceolate, longer than tube, apex long acuminate, lower one longest. Corolla purple, longer than calyx; standard circular, clawed, auriculate; wings oblong, clawed, one with toothlike auricle; keel falcate, wider than wings, clawed. Legume elliptic, ca. 10 × 6 mm, pubescent, with yellowish glands. Seeds 2, suborbicular. Fl. Jan–Apr, fr. Feb–May.  $2n = ?18$ .

On limestone; 1000–1400 m. Yunnan [Bangladesh, Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

**5. *Flemingia lineata*** (Linnaeus) Roxburgh ex W. T. Aiton, Hort. Kew., ed. 2, 4: 350. 1812.

细叶千斤拔 xi ye qian jin ba

*Hedysarum lineatum* Linnaeus, Sp. Pl. 2: 1054. 1753; *Flemingia glutinosa* (Prain) Y. T. Wei & S. K. Lee; *F. lineata* var. *glutinosa* Prain; *F. lineata* var. *papuana* White; *F. macrophylla* (Willdenow) Merrill var. *nana* Sasaki; *Maughania lineata* (Linnaeus) Kuntze.

Shrublets, erect, many branched. Branchlets cylindrical, adpressed pubescent when young, becoming glabrous or subglabrous. Leaves digitately 3-foliolate; stipules lanceolate, 0.6–1 cm, apex long mucronate, usually persistent; petiole 0.7–3 cm, wingless, pubescent; leaflets thinly leathery; terminal leaflet obovate to obovate-oblong, 2–5.5 × 0.8–2 cm, both surfaces densely adpressed villous when young, gradually glabrescent, with sparse sessile glands, basal veins 3, lateral veins 3 or 4 pairs, base cuneate, apex obtuse with mucro; lateral leaflets smaller, obliquely elliptic, sessile or subsessile. Panicles axillary or terminal; inflorescence axis 2.5–6.5 cm, slender, villous

or clothed with glandular hairs; bracts linear, small, persistent. Flowers 5–7 mm. Calyx pubescent; lobes lanceolate, longer than tube. Corolla longer than calyx; standard almost orbicular, clawed, auriculate; wings oblong, clawed, one with auricle; keel almost semiorbicular, clawed, with inconspicuous auricle on one side, apex mucronate. Legume 8–12 × 5–8 mm, villous. Seeds 2, black, suborbicular, ca. 2 mm in diam. Fl. Dec–Feb, fr. Feb–May.

Mountain slopes, plains, roadsides. Guangxi, Taiwan, Yunnan [Cambodia, Indonesia, Laos, Malaysia, Myanmar, Sri Lanka, Thailand, Vietnam; Australia].

**6. *Flemingia stricta*** Roxburgh ex W. T. Aiton, Hort. Kew., ed. 2, 4: 349. 1812.

长叶千斤拔 chang ye qian jin ba

*Flemingia stricta* var. *pteropus* Baker; *Maughania stricta* (Roxburgh ex W. T. Aiton) Kuntze; *M. stricta* var. *pteropus* (Baker) Mukerjee.

Shrubs, tall. Stems robust; young branchlets trigonous prismatic, with sparse short adpressed hairs. Leaves digitately 3-foliolate; stipules lanceolate, to 7.5 cm, apex acuminate, usually persistent; petiole 8–16 cm, wings absent or extremely narrow, pubescent; petiolules 3–8 mm, densely pubescent; leaflets oblong or lanceolate to obliquely ovate-lanceolate, 21–32.5 × 6.5–10.5 cm, thinly leathery, glabrous except veins, with scattered black glands, lateral veins 15–19 pairs, base broadly cuneate to obliquely rounded, apex acuminate. Raceme terminal or axillary, columnar-cylindric, 10–16 cm, densely pubescent; bracts ovate-lanceolate, 9–13 mm, sparsely hairy, deciduous; peduncle 1–3 mm. Flowers 1–1.5 cm, clustered. Calyx 5-lobed; lobes lanceolate, equal or subequal to tube, lower one much longer. Corolla purple, standard with darker striae, petals subequal; standard wider, oblong to almost orbicular, strongly contracted and narrowed above auricles, clawed, auriculate, glabrous, apex slightly emarginate; wings obliquely ovate, long clawed, auricle acute; keel almost semiorbicular, long clawed, apex obtuse. Ovary ovoid, pubescent, sessile; style linear, glabrous. Legume elliptic, 10–15 × 5–7 mm, pubescent, apex slightly oblique, mucronate. Seeds 2, brown or black, oblong or orbicular, ca. 2 × 3 mm. Fl. Jan–Mar, fr. Feb–Mar. *2n* = 22.

Mountain slopes, roadsides; ca. 600 m. Yunnan [Cambodia, India, Indonesia, Laos, Philippines, Thailand, Vietnam].

**7. *Flemingia latifolia*** Benth in Miquel, Pl. Jungh. 246. 1852.

宽叶千斤拔 kuan ye qian jin ba

Shrubs, erect. Young branchlets trigonous-prismatic. Leaves digitately 3-foliolate; stipules lanceolate, 1–3 cm, apex acuminate, deciduous; petiole 3–10 cm, robust, narrowly winged or not, pubescent; petiolules 3–6 mm, densely reddish pubescent; leaflets papery to thickly papery, with dense dark brown glands; terminal leaflet elliptic or elliptic-lanceolate, rarely obovate, 8–14 × 4–6(–8.5) cm, pubescent, basal veins 3, base broadly cuneate or rounded, apex acuminate or acute; lateral leaflets oblique, broadly lanceolate, base rounded at one side, other narrowly cuneate. Raceme terminal or 1–3 per axil, 3–11 cm, densely rusty villous; bracts elliptic or elliptic-lanceolate, 0.7–1 cm, exterior densely rusty villous, apex usually ob-

tuse; peduncle ca. 2 mm. Flowers 1–1.2 cm, clustered. Calyx ca. 10 mm; lobes 4–7 mm, lower one longest. Corolla purple or pink, longer than calyx; standard obovate or obovate-elliptic, auricles obtuse; wings oblong to obovate-oblong, slightly curved, with long slender claw, auricle decurrent; keel semi-orbicular, wider than wings, clawed, with acute auricle. Ovary elliptic, with very pale brown hairs; style slender. Legume elliptic, 12–15 × 7–8 mm, rusty villous, inflated, apex with acute beak. Seeds 2, black, suborbicular, ca. 2 mm in diam. Fl. and fr. almost year-round.

Fields, mountain slopes, forests; 500–2100(–2700) m. Guangxi, Hainan, ?Sichuan, Yunnan [Cambodia, India, Laos, Myanmar, Vietnam].

1a. Petiole narrowly winged ..... 7a. var. *latifolia*

1b. Petiole wingless ..... 7b. var. *hainanensis*

**7a. *Flemingia latifolia* var. *latifolia***

宽叶千斤拔(原变种) kuan ye qian jin ba (yuan bian zhong)

*Flemingia congesta* Roxburgh ex W. T. Aiton var. *latifolia* (Benth) Baker; *Maughania latifolia* (Benth) Mukerjee.

Young branchlets densely rusty adpressed tomentose. Stipules 1–2 cm; petiole narrowly winged.

Fields, mountain slopes, forests; 500–2100(–2700) m. Guangxi, ?Sichuan, Yunnan [India, Laos, Myanmar].

**7b. *Flemingia latifolia* var. *hainanensis*** Y. T. Wei & S. K. Lee, Guihaia 5: 169. 1985.

海南千斤拔 hai nan qian jin ba

Whole plant densely dull brown long spreading villous. Stipules 1.5–3 cm; petiole wingless.

?Guangxi, Hainan, Yunnan [India, Myanmar, Vietnam].

This taxon was misidentified as *Maughania* (“*Moghania*”) *ferruginea* (Wallich ex Benth) H. L. Li in Fl. Hainan. (2: 311. 1965).

**8. *Flemingia macrophylla*** (Willdenow) Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 440. 1897.

大叶千斤拔 da ye qian jin ba

*Crotalaria macrophylla* Willdenow, Sp. Pl. 3: 982. 1802; *Flemingia congesta* Roxburgh ex W. T. Aiton; *F. ferruginea* Wallich ex Benth; *Maughania ferruginea* (Wallich ex Benth) H. L. Li; *M. macrophylla* (Willdenow) Kuntze.

Shrubs, erect, 0.8–2.5 m tall. Young branches densely adpressed silky villous. Leaves digitately 3-foliolate; stipules lanceolate, up to 2 cm, villous, with glandular striations, apex long acuminate, usually deciduous; petiole 3–6 cm, narrowly winged; petiolules 2–5 mm, densely hairy; leaflets papery to thinly papery; terminal leaflet broadly lanceolate to elliptic, 8–15 × 4–7 cm, glabrous except for veins, abaxial surface with small dark brown sessile glands, basal veins 3, base broadly cuneate, apex acuminate; lateral leaflets smaller, oblique, base rounded at one side, cuneate on other. Racemes usually clustered at axil, 3–8 cm, with many clustered flowers; peduncle usually extremely short. Calyx campanulate, 6–8 mm, shortly very pale brown villous; lobes linear-lanceolate, ca. 2 × as long as tube, lower one



longest. Corolla purple, slightly longer than calyx; standard oblong, shortly clawed, auriculate; wings narrowly elliptic, slenderly clawed, one with auricle; keel oblong, long clawed, apex slightly curved. Ovary elliptic, with very pale brown hairs. Legume elliptic, 10–16 × 7–9 mm, sparsely pubescent, apex with small acute beak. Seeds 1 or 2, glossy black, orbicular. Fl. Jun–Sep, fr. Oct–Dec.  $2n = 22$ .

Disturbed meadows, roadsides, forest margins; 200–1800 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Sichuan, Taiwan, Yunnan [Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam].

The glands on the fruit are separated after drying and are used as a purple or orange dye.

**9. *Flemingia mengpengensis*** Y. T. Wei & S. K. Lee, *Guihaia* 5: 167. 1985.

勐板千斤拔 meng ban qian jin ba

Shrubs, erect, ca. 1 m tall. Branchlets robust, densely adpressed villous. Leaves digitately 3-foliolate; stipules lanceolate, up to 2 cm, densely adpressed villous, apex long acuminate, deciduous; petiole 6–13 cm, wingless, adpressed villous; petiolules 5–7 mm, densely hirsute; leaflets papery; terminal leaflet broadly elliptic to lanceolate, 12–19 × 5–10 cm, both surfaces densely adpressed villous, abaxial surface with sparse black sessile glands, basal veins 3, lateral veins 7–13 pairs, base rounded to broadly cuneate, apex acuminate, with slender mucro; lateral leaflets smaller, obliquely lanceolate to obliquely elliptic. Raceme axillary, in clusters of 3–6, ca. 3 cm; peduncle absent. Flowers 1.7–2.1 cm, densely clustered; bracteoles ovate to ovate-elliptic, 4–5 mm; pedicel 2–4 mm. Calyx 15–17 mm, densely hirsute; tube ca. 3 mm; lobes linear-lanceolate, lower one longest. Corolla subequal to calyx; standard suborbicular, ca. 11 mm, clawed, auriculate; wings similar to standard, ca. 9 mm, clawed, one with auricle; keel subobovate, long clawed, apex obtuse. Ovary elliptic, sparsely pubescent; style linear, glabrous. Legume obliquely elliptic, 10–12 × ca. 7 mm, apex shortly beaked, curved. Seeds 1 or 2, black, orbicular. Fl. Jan.

• Mixed forests; 500–600 m. Yunnan.

**10. *Flemingia wallichii*** Wight & Arnott, *Prodr. Fl. Ind. Orient.* 242. 1834.

云南千斤拔 yun nan qian jin ba

*Flemingia yunnanensis* Franchet; *Maughania wallichii* (Wight & Arnott) Kuntze; *M. yunnanensis* (Franchet) H. L. Li.

Shrubs, erect, ca. 1 m tall. Branchlets obviously lenticellate, densely tomentose. Leaves digitately 3-foliolate; stipules deciduous; petiole 3–7 cm, wingless or narrowly winged, pubescent or tomentose; petiolules 2–4 mm, densely gray villous; leaflets almost leathery; terminal leaflet obovate or elliptic, 7–14 × 3–4 cm, basal veins 3, lateral veins 4–8 pairs, base cuneate, apex shortly acuminate or obtuse; lateral leaflets subequal to terminal leaflet, obliquely lanceolate to obliquely elliptic. Raceme solitary or sometimes branched from base; inflorescence axis densely tomentose; bracts elliptic, 4–5 × 1–2 mm, pubescent, persistent or deciduous. Flowers 7–8 mm, clustered; pedicel 1–2 mm. Calyx 5–6 mm, densely clothed with silky hairs;

lobes lanceolate, usually slightly longer than tube. Corolla white or yellowish, longer than calyx; standard suborbicular, ca. 6 mm, extremely short clawed, with slender auricle and callosity; wings oblong, ca. 4 mm, one with short acute auricle; keel slightly curved, wider than wings. Legume obliquely elliptic, ca. 10 × 6 mm, with dense very pale brown hairs and dark brown sessile glands, apex shortly beaked. Seeds usually 2, black, orbicular. Fl. and fr. Jan–Apr.

Mountain slopes, roadsides, forests; 1600–1900 m. Yunnan [India, Laos, Myanmar, Vietnam].

**11. *Flemingia grahamiana*** Wight & Arnott, *Prodr. Fl. Ind. Orient.* 242. 1834.

绒毛千斤拔 rong mao qian jin ba

*Flemingia pycnantha* Benth; *F. rhodocarpa* Baker; *F. sericans* Kurz; *Maughania grahamiana* (Wight & Arnott) Kuntze; *M. rhodocarpa* (Baker) Hauman.

Shrubs, erect, usually many branched. Branchlets obviously lenticellate, densely tomentose. Leaves digitately 3-foliolate; stipules lanceolate or elliptic-lanceolate, ca. 1 cm, deciduous; petiole 1.5–6 cm; petiolules 1–3 mm; leaflets papery; terminal leaflet elliptic, elliptic-lanceolate, or rarely obovate, 2–6 × 1.5–2.5 cm, densely hairy, lateral veins flat or sometimes slightly concave, base cuneate, apex acuminate, acute, or sometimes obtuse with slender mucro; lateral leaflets smaller, obliquely lanceolate to obliquely elliptic, base obliquely rounded, apex obtuse or acuminate. Raceme axillary or terminal, simple or branched, 1–3.5 cm; inflorescence axis densely gray villous. Flowers 0.6–1 cm, clustered; pedicel 1–2 mm. Standard oblong, ca. 8 mm, base with claw and auricles; wings narrow, long and curved, slightly shorter than standard, slenderly clawed, auriculate; keel falcate, clawed, apex obtuse. Ovary elliptic, subsessile; style long, linear. Legume elliptic, ca. 10 × 6 mm, sparsely pubescent and with dense dark red glands, apex oblique, with small acute mucro, usually with persistent corolla. Seeds 1 or 2, black, suborbicular, ca. 2 mm in diam. Fl. Feb–Apr, fr. Feb–Oct.

Forests, mountain slopes; 900–1600 m. Yunnan [India, Laos, Myanmar, Vietnam; Africa, SW Asia (Yemen)].

The glands on the fruit are separated after drying and used as a purple or orange dye.

**12. *Flemingia kweichowensis*** Tang & F. T. Wang ex Y. T. Wei & S. K. Lee, *Guihaia* 5: 165. 1985.

贵州千斤拔 gui zhou qian jin ba

Shrubs, erect. Branchlets obviously ribbed, densely clothed with adpressed hairs. Leaves digitately 3-foliolate; stipules ovate-lanceolate, ca. 2 cm, adpressed hairy, apex long acuminate, deciduous; petiole 2.5–4.5 cm, narrowly winged, adpressed hairy; petiolules 1–2 mm, densely hairy; leaflets papery, subequal; terminal leaflet oblong to oblong-lanceolate, 6.5–10 × 1.8–3.5 cm, abaxial surface with black sessile glands, glabrous or almost glabrous except for veins, basal veins 2, lateral veins 7–9 pairs, base unequal at 2 sides, apex acuminate. Raceme axillary, 3–5.5 cm; bracts lanceolate, 6–8 mm, deciduous; peduncle ca. 1.5 mm. Flowers clustered. Calyx 5-lobed, densely

adpressed hairy; lobes linear-lanceolate, much longer than tube, densely covered with black glands, lower one longest, ca. 1 cm. Corolla yellowish green, petals subequal; standard oblong, ca. 8 mm, base acuminate, auricles toothlike; wings narrowly elliptic, long clawed, one with acute auricle; keel elliptic, slightly curved, wider than wings, long clawed, apex obtuse. Legume elliptic, purple, ca. 8 × 6 mm, pubescent, inflated, with dense black glands. Seeds 1 or 2, black, suborbicular, ca. 1.5 mm in diam. Fl. and fr. Sep–Oct.

• Roadsides, disturbed slopes. Guizhou, Yunnan.

**13. *Flemingia prostrata*** Roxburgh, Fl. Ind., ed. 1832, 3: 338. 1832.

千斤拔 qian jin ba

*Flemingia philippinensis* Merrill & Rolfe; *Maughania philippinensis* (Merrill & Rolfe) H. L. Li; *M. prostrata* (Roxburgh) Mukerjee.

Subshrubs, erect. Young branchlets trigonous-prismatic, densely pubescent. Leaves digitately 3-foliolate; stipules linear-lanceolate, 0.6–1 cm, hairy, deciduous; petiole 1.5–2.5 cm, densely pubescent; petiolules extremely short, densely pubescent; terminal leaflet oblong or ovate-lanceolate, 4–7 × 1.5–3 cm, thickly papery, sparsely pubescent, basal veins 3, base rounded, apex obtuse, sometimes with small mucro; lateral leaflets slightly smaller, oblique. Raceme axillary, usually 2–2.5 cm, densely pale villous; bracts narrowly ovate-lanceolate; peduncle short. Flowers clustered. Calyx lobes lanceolate, much longer than tube. Corolla purple, subequal to calyx; standard oblong, shortly clawed, inconspicuously auriculate; wings falcate, clawed, both auriculate; keel elliptic, slightly curved, clawed, with acute auricle on one side. Ovary hairy. Legume elliptic, 6–8 × 5–6 mm, pubescent, compressed. Seeds 2, black, suborbicular. Fl. Mar–Jun, fr. May–Oct.

Open fields, grasslands; below 100–300 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan [Bangladesh, India, Japan (Ryukyu Islands), Myanmar].

*Flemingia prostrata* is used medicinally.

**14. *Flemingia procumbens*** Roxburgh, Fl. Ind., ed. 1832, 3: 338. 1832.

矮千斤拔 ai qian jin ba

*Flemingia vestita* Baker; *Maughania procumbens* (Roxburgh) Mukerjee; *M. vestita* (Baker) Kuntze.

Herbs, perennial; roots tuberous. Stems prostrate, to 60 cm, densely pubescent. Leaves digitately 3-foliolate; stipules ovate, 4–8 mm, persistent; petiole 1–2 cm, wingless, pubescent;

petiolules short, densely hairy; leaflets papery; terminal leaflet oblong or nearly obovate, 1–5 × 0.5–2.5 cm, both surfaces sparsely pubescent or almost glabrous, abaxial surface with dense dark red glands, basal veins 3, lateral veins 3–5 pairs, apex and base rounded or almost so; lateral leaflets obliquely elliptic, slightly smaller. Raceme axillary or terminal, 2–10 cm, densely pubescent; bracts lanceolate, ca. 5 mm, striate. Flowers ca. 6 mm, clustered; pedicel ca. 1 mm. Calyx 5-lobed; lobes linear-lanceolate, lower one longest, longer than tube. Corolla slightly longer than calyx; standard elliptic, base with claw and auricles at 2 sides; wings narrowly oblong, base with claw and auricle at one side; keels falcate, clawed. Ovary elliptic, sparsely hairy; style linear, glabrous. Legume elliptic, ca. 5 × 4 mm, sparsely shortly villous and black glandular. Fl. Aug–Sep.

Mountain slopes. Sichuan, Yunnan [India, Laos, Nepal, Philippines, Vietnam].

*Flemingia procumbens* is cultivated as a minor root tuber crop in India.

**15. *Flemingia involucrata*** Benth in Miquel, Pl. Jungh. 246. 1852.

总苞千斤拔 zong bao qian jin ba

*Flemingia capitata* Zollinger; *Maughania involucrata* (Benth) Kuntze.

Shrubs, erect, 0.6–1.2 m tall. Branchlets slightly robust, almost cylindric, sometimes zigzag, usually densely densely villous. Leaves digitately 3-foliolate; stipules 0.5–1.5 cm, dry membranous, brown, deciduous; petiole 5–15 mm, wingless, densely villous; petiolules 1–2 mm, hairy; leaflets oblong to lanceolate, 4–8.5 × 1–3.5 cm, papery or almost leathery, glabrous or sometimes sparsely villous, abaxial surface with black glands, lateral veins 8–12 pairs, almost parallel, obviously convex abaxially, base cuneate or slightly oblique, apex shortly acuminate to acute. Inflorescence axillary or terminal, congested into head, 2–3 cm in diam., enclosed by involucre of bracts; bracts many, lanceolate or ovate-lanceolate, 1.5–2 × ca. 0.5 cm, leathery, whitish villous, apex acuminate. Pedicel extremely short. Calyx 12–15 mm, densely whitish villous; tube extremely short; lobes linear-lanceolate, apex long acuminate. Corolla purple to pale blue, included; standard obovate-elliptic, villous, shortly clawed, with auricles at 2 sides; wings small, obovate-oblong, clawed; keel slightly curved, long clawed. Ovary elliptic, hairy; style glabrous. Legume yellowish green, elliptic. Seed usually 1. Fl. Dec–May.

Slopes, disturbed grasslands; 500–1000 m. Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam; Australia].

## 96. *ERYTHRINA* Linnaeus, Sp. Pl. 2: 706. 1753.

刺桐属 ci tong shu

Sa Ren (萨仁); Michael G. Gilbert

Trees or shrubs [or perennial herbs], branches with prickles. Leaves pinnately 3-foliolate; stipules small; stipels fleshy and glandular; leaflets sometimes with stellate hairs. Inflorescence axillary or terminal, racemelike, noded, 2- or more flowered. Flowers conspicuous; bracts and bracteoles mostly deciduous. Calyx spathaceous, campanulate, or turbinate, truncate or 2-lobed. Corolla

often red or orange, usually longer than calyx; petals extremely unequal; standard large, rounded or oblong, often folded longitudinally, erect or spreading, subsessile or long clawed, without appendages; wings short, sometimes absent; keels much shorter than standard. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary stipitate; ovules 2 to many; style inflexed; stigma small, terminal. Legume stipitate, mostly linear-oblong, often curved, dehiscent along ventral suture, rarely indehiscent, mostly leathery or woody, often constricted between seeds, not septate. Seeds 1–14, white, gray, or brown, rarely red with dark spots, ovoid; hilum lateral, oblong, without strophiole.

More than 100 species: tropics and subtropics; four species in China.

*Erythrina corallodendron* Linnaeus and *E. crista-galli* Linnaeus, and to a lesser extent *E. caffra* Thunberg, *E. humeana* Sprengel, *E. lysistemon* Hutchinson, and *E. speciosa* Andrews, have been introduced into China as ornamentals.

1a. Calyx spathaceous, splitting on one side.

2a. Keels and wings subequal; stem prickles minute, usually black ..... 3. *E. variegata*

2b. Keels much longer than wings; stem prickles whitish ..... 4. *E. stricta*

1b. Calyx campanulate or turbinate, lobes truncate or 2-lobed.

3a. Keels subequal to wings; legume with seeds only toward apex ..... 2. *E. subumbrans*

3b. Keels longer than wings; legume with seeds uniformly distributed along length.

4a. Leaflets 8–20(–25) cm; terminal leaflet usually reniform ..... 1. *E. arborescens*

4b. Leaflets 5–15 cm; terminal leaflet not reniform.

5a. Leaflets rhomboid-ovate; seed red with black spots ..... *E. corallodendron*

5b. Leaflets ovate or lanceolate-elliptic; seed gray or bright brown ..... *E. crista-galli*

**1. *Erythrina arborescens*** Roxburgh, Pl. Coromandel 3: 14. 1811.

鹦哥花 ying ge hua

*Corallodendron arborescens* (Roxburgh) Kuntze.

Trees. Trunk and branches with prickles. Stipules small; petiole longer than leaflets, without or with a few prickles; terminal leaflet reniform, 8–20(–25) cm, both surfaces glabrous, base truncate or almost cordate, margin entire, apex acute; lateral leaflets obliquely broadly cordate. Raceme solitary in axil of terminal leaf, erect, longer than leaves. Flowers in clusters of 3, red, pendulous; bract 1, ovate. Calyx turbinate, truncate or unequally 2-lobed. Corolla red; standard subovate, boat-shaped, ca. 3.2 cm; wings obliquely ovate, shorter than keels; keels ca. 1/2 as long as stamens. Filament slightly shorter than standard, connate near base. Ovary long stipitate; style as long as stamens. Legume curved, 12–19 × 2–3 cm, with obvious beak and stipe. Seeds 5–10, white or brown, reniform, ca. 2 cm. Fl. Jul–Sep, fr. Aug–Feb.  $2n = 42$ .

Mountain valleys, grassy slopes; 400–2100 m. Guizhou, Hainan, Sichuan, Xizang, Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal, Thailand].

*Erythrina arborescens* is used for ornament, timber, and medicine.

"*Erythrina tienensis*" (F. T. Wang & Tang, Ill. Treatm. Princ. Pl. China, 654. 1995) belongs here but was not validly published because no Latin description or diagnosis was provided (*Vienna Code*, Art. 36.1).

**2. *Erythrina subumbrans*** (Hasskarl) Merrill, Philipp. J. Sci., C, 5: 113. 1910.

翅果刺桐 chi guo ci tong

*Hypaphorus subumbrans* Hasskarl, Hort. Bogor. Descr. 198. 1858; *Erythrina secundiflora* Hasskarl (1848), not Brotero (1824); *H. subumbrans* var. *aculeata* Hasskarl; *H. subumbrans* var. *inermis* Hasskarl.

Trees, 12–15 m tall. Trunk up to 60 cm d.b.h., with robust prickles. Leaves pinnately 3-foliolate; stipules ovate, deciduous;

petiole 10–12 cm, without prickles; petiolules ca. 7 mm; leaflets ovate-triangular, 10–15 cm × 7–10 mm, membranous, both surfaces glabrous, lateral veins 7 on each side, obviously convex abaxially, base rounded or broadly cuneate, margin entire, apex acuminate. Raceme 7–10 cm. Flowers ca. 4 cm. Calyx campanulate, 2-lobed, silky hairy. Standard scarlet, elliptic, 5–6 cm, apex obtuse, shortly clawed; wings obovate; keels subequal to wings. Ovary glabrous. Legume ca. 15 × 2.5 cm, with seeds restricted to apical part, indehiscent. Seeds 1–3, black. Fl. Aug–Oct, fr. to next Mar.

Forests; 300–600 m. Yunnan [East Timor, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Sri Lanka, Thailand, Vietnam; Indian Ocean islands (Mauritius)].

This plant is used for ornament, food, and green fertilizer.

**3. *Erythrina variegata*** Linnaeus, Herb. Amboin. 10. 1754.

刺桐 ci tong

*Corallodendron orientale* (Linnaeus) Kuntze; *Erythrina corallodendron* Linnaeus var. *orientalis* Linnaeus; *E. indica* Lamarck; *E. loureiroi* G. Don ["*loureiri*"]; *E. orientalis* (Linnaeus) Murray; *E. variegata* var. *orientalis* (Linnaeus) Merrill.

Trees, up to 20 m tall. Bark dark brown. Branches with obvious, black, straight and minute prickles; core pulpy. Leaves pinnately 3-foliolate, usually clustered at branch tip; stipules lanceolate, deciduous; petiole 10–15 cm, usually without prickles; leaflets broadly ovate or rhomboid-ovate, 15–30 × 15–30 cm, membranous, both surfaces glabrous, basal veins 3, lateral veins 5 pairs, base broadly cuneate or truncate, margin entire, apex acuminate to obtuse; base of leaflet with a pair of glands similar to stipules. Raceme terminal, 10–16 cm; peduncle robust, woody, 7–10 cm, pubescent; flowers paired. Calyx spathe-like, 2–3 cm, mouth oblique, split on one side. Corolla red, 6–7 cm; standard elliptic, 5–6 × ca. 2.5 cm, apex obtuse, shortly clawed; wings and keels subequal; keel petals separate. Ovary micro-villous; style glabrous. Legume black, reniform, ca. 1.5 × 1 cm. Seeds puniceous, oblong or oblong-ellipsoid. Fl. Feb–May, fr. Apr–Aug.  $2n = 42$ .

Fujian, Guangdong, Guangxi, Hainan, Taiwan [Bangladesh, Cambodia, India, Indonesia, Japan (Ryukyu Islands), Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Australia, Pacific islands; introduced to Africa and Central and South America].

*Erythrina variegata* is used as an ornamental and for timber and medicine.

**4. *Erythrina stricta*** Roxburgh, Fl. Ind., ed. 1832, 3: 251. 1832.

劲直刺桐 jin zhi ci tong

Trees, 7–12 m tall. Trunk straight. Branches with short whitish prickles. Leaves pinnately 3-foliolate; stipules deciduous; petiole 12–15 cm, rarely with prickles; terminal leaflet broadly triangular, almost rhomboid, or broadly reniform-oblate, 7–19 × 7–24.5 cm, both surfaces glabrous, lateral veins 5–8 pairs, base nearly cordate, truncate, or broadly cuneate, margin entire, apex acute or caudate with mucro 10–15 mm. Raceme ca. 15 cm, flowers in clusters of 3 or 4. Calyx spathe-like, undivided or apex slightly 2-lobed. Corolla red; standard elliptic-lanceolate or ovate-triangular, erect, 3–4.5 cm, subsessile; wings subobovate, 6–8 mm, shorter than calyx; keels much longer than wings. Ovary hairy, stipitate; style narrow, glabrous. Legume 7–12 × 0.7–1.5 cm, glabrous. Seeds 1–3 or more, light or dark brown, reniform. Fl. Mar–Jul, fr. Apr–Sep.  $2n = 42$ .

Forests by rivers, mountain slopes; ca. 1400 m. Guangxi, Xizang, Yunnan [Bhutan, Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

- 1a. Prickles usually dense; leaflet 7–15 cm long and wide ..... 4a. var. *stricta*

- 1b. Prickles usually sparse; leaflet 17–19 × 21–24.5 cm ..... 4b. var. *yunnanensis*

**4a. *Erythrina stricta* var. *stricta***

劲直刺桐(原变种) jin zhi ci tong (yuan bian zhong)

*Micropteryx stricta* (Roxburgh) Duchassaing & Walpers.

Trees, 7–12 m tall. Branches with many prickles. Terminal leaflet broadly triangular or almost rhomboid, 7–15 × 7–15 cm, both surfaces glabrous, lateral veins 5 or 6 pairs, base truncate or nearly cordate, margin entire, apex acute. Raceme with flowers in clusters of 3. Seeds light brown.  $2n = 42$ .

Sparse forests by rivers. Guangxi, Xizang, Yunnan [Cambodia, India, Laos, Myanmar, Nepal, Thailand, Vietnam].

**4b. *Erythrina stricta* var. *yunnanensis*** (T. S. Tsai & T. T. Yu ex S. K. Lee) R. Sa, Novon 16: 267. 2006.

云南刺桐 yun nan ci tong

*Erythrina yunnanensis* T. S. Tsai & T. T. Yu ex S. K. Lee, Guihaia 13: 101. 1993.

Trees, ca. 7 m tall. Branches with few prickles. Terminal leaflet broadly reniform-oblate, 17–19 × 21–24.5 cm, lateral veins 7 or 8 pairs and convex, base broadly cuneate, apex caudate, mucro 10–15 mm; petiolules 11–15 cm; lateral leaflets oblate, 17–18 × 7–21 cm, base almost truncate to broadly cuneate, apex with short mucro. Raceme with flowers in clusters of 3 or 4. Legume compressed, without obvious constriction between seeds. Seeds dark brown.

- Mountain slopes; ca. 1400 m. Yunnan.

**97. DYSOLOBIUM** (Bentham) Prain, J. Asiat. Soc. Bengal, Pt. 2., Nat. Hist. 66: 425. 1897.

镰瓣豆属 lian ban dou shu

Sa Ren (萨仁); Michael G. Gilbert

*Phaseolus* sect. *Dysolobium* Bentham in Miquel, Pl. Jungh. 239. 1852.

Herbs or woody vines, twining. Leaves pinnately 3-foliolate, stipulate. Inflorescence axillary, racemose; nodes swollen. Calyx campanulate, 4-lobed; lowest lobe lanceolate, longer than others, shorter than tube, upper 2 connate. Corolla usually purple with reddish or blue striations; standard usually large, circular, base clawed; wings almost equal to applanate part of keels, obovate or elliptic, upper auricle longer, lower short, stipe slender; keels sometimes obviously curved upward, beaked. Stamens diadelphous; vexillary stamen free. Ovary sessile, with silky hairs; stigma slender, curved upward, with perichaetial cirrus at base. Legume slender, dehiscent along sutures, woody, slightly compressed, tomentose, obliquely septate between seeds. Seeds pitch-black or black, oblong or orbicular, glabrous or shortly villous; hilum oblong; aril with 2 unequal valvules.

About four species: India and SE Asia; two species in China.

- 1a. Woody vines; terminal leaflet suborbicular to rhomboid-ovate; corolla ca. 3 cm ..... 1. *D. grande*  
1b. Herbaceous vines; terminal leaflet narrowly ovate or triangular-ovate; corolla less than 1.5 cm ..... 2. *D. pilosum*

**1. *Dysolobium grande*** (Wallich ex Bentham) Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66: 427. 1897.

镰瓣豆 lian ban dou

*Phaseolus grandis* Wallich ex Bentham in Miquel, Pl. Jungh. 239. 1852; *Canavalia grandis* (Wallich ex Bentham) Kurz; *Mucuna chienkweiensis* G. Z. Li [“*ckienkweiensis*”].

Vines, woody, twining, up to 5 m. Leaves pinnately 3-

foliolate; stipules lanceolate, ca. 6 mm, densely villous; petiole 9–12 cm; terminal petiolule ca. 7 mm, densely white villous; leaflets subequal, both surfaces sparsely minutely villous, lateral veins 4–6 pairs; terminal leaflet suborbicular to rhomboid-ovate, 12–19.5 × 9–16 cm, base rounded to obtuse, apex acute; lateral leaflets subequal at both sides, oblique, base nearly truncate, apex shortly acuminate. Raceme axillary, up to 40 cm, shortly villous, upper part with many flowers. Flowers solitary or 2 or 3 clustered; bracteoles subtriangular, ca. 4 mm

long and wide, deciduous. Calyx campanulate, exterior densely pubescent, 5-lobed; upper 2 lobes connate, middle lower lobe ca. 6 mm, laterals small; tube ca. 8 mm. Corolla purplish blue; standard broadly ovate, ca. 3 × 2.6 cm, apex emarginate, slightly reflexed, shortly clawed and with auricle at base; wings obovate, ca. 2 × 1.2 cm, apex obtuse, base acuminate, with auricles, ca. 2 mm; keels falcate, subovate, base wider, upper acuminate, near base with a triangular dentiform auricle, clawed. Stamens subequal, ca. 5 cm. Style ca. 2 cm; stigma hairy at base. Legume succulent, 12–16 × ca. 2 cm, densely shortly gray villous, apex shortly beaked, slightly jointed between seeds, dehiscent along 2 sutures. Seeds 2–10, dark brown, oblong, ca. 10 × 6 mm; hilum oblong, ca. 0.3 × 0.2 cm. Fl. Jul–Oct, fr. Aug–Nov.

Hill slopes, mountain valleys, damp land, forest margins, riversides; 300–500 m. Guizhou, Yunnan [India, Myanmar, Nepal, Thailand].

**2. *Dysolobium pilosum*** (Klein ex Willdenow) Maréchal, Bull. Jard. Bot. Natl. Belg. 47: 483. 1977.

毛镰瓣豆 mao lian ban dou

*Dolichos pilosus* Klein ex Willdenow, Sp. Pl. 3: 1043. 1800; *D. rhombifolius* (Hayata) Hosokawa; *Dolichovigna formosana* Hayata; *D. pilosa* (Klein ex Willdenow) Niyomdham;

*D. rhombifolia* Hayata; *Vigna pilosa* (Klein ex Willdenow) Baker.

Vines, herbaceous, twining. Leaves pinnately 3-foliolate; stipules deciduous; petiole 1.5–6 cm; terminal petiolule 5–12 mm, densely white villous; leaflets subequal, both surfaces villous, lateral veins 3 or 4 pairs; terminal leaflet narrowly ovate or triangular-ovate, 4–16 × 2–6 cm, base obtuse, apex acuminate; lateral leaflets subequal at both sides, oblique, base almost truncate, apex acuminate. Raceme axillary, 2–7 cm, upper part with many flowers. Calyx broadly campanulate, exterior densely pubescent, 5-lobed; upper 2 lobes connate, middle lower lobe ca. 4 mm, laterals small; tube ca. 4 mm. Standard broadly ovate, ca. 1.4 × 1.6 cm, apex emarginate, slightly reflexed, shortly clawed and with auricle at base; wings obovate, ca. 2 × 1.2 cm, apex obtuse, emarginate, base clawed, with auricles, ca. 1 mm; keels falcate, base wider, upper acute, near base with a triangular dentiform auricle, clawed. Stamens subequal, ca. 1.8 cm. Style ca. 1 cm. Legume 7–13 × 0.6–0.8 cm, leathery, densely brown villous, apex beaked, dehiscent along 2 sutures. Seeds 5–12, black, oblong, 5–6 × 3–4 mm; hilum oblong. Fl. Sep–Oct, fr. Oct–Nov.

Open forests; near sea level to 700 m. Taiwan [Bhutan, Cambodia, India, Laos, Philippines, Thailand, Vietnam].

## 98. PSOPHOCARPUS Necker ex Candolle, Prodr. 2: 403. 1825, nom. cons.

四棱豆属 si leng dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

*Botor* Adanson.

Herbs, climbing or prostrate, rarely erect, with tubers. Leaves pinnately 3-foliolate; stipules produced below point of insertion; leaflets stipellate. Flowers solitary or in axillary racemes with swollen nodes. Bracts small, very caducous; bracteoles larger, membranous, persistent for a time. Calyx 5-toothed, 2 upper teeth connate into entire or bifid lip. Corolla lilac or violet, exserted from calyx; standard suborbicular, appendaged with basal auricles; wings obliquely obovate; keel incurved at apex, obtuse. Vexillary stamen free at base, connate with tube in middle; anthers uniform, 5 basifixed alternating with 5 dorsifixed. Ovary shortly stipitate; ovules 3–21; style incurved; stigma globose, densely penicillate-villous. Legumes oblong, 4-winged lengthwise, septate between seeds. Seeds ovate or oblong-elliptic, with or without aril.

About 10 species: distributed in tropical regions of the Old World; one species (introduced) in China.

**1. *Psoplocarpus tetragonolobus*** (Linnaeus) Candolle, Prodr. 2: 403. 1825.

四棱豆 si leng dou

*Dolichos tetragonolobus* Linnaeus, Syst. Nat., ed. 10, 2: 1162. 1759; *Botor tetragonolobus* (Linnaeus) Kuntze.

Herbs, annual or perennial, climbing, with tubers. Stems 2–3 m or more, glabrous. Stipules dorsifixed, ovate to lanceolate, 0.8–1.2 cm; petiole sulcate; leaflets ovate-deltoid, 4–15 × 3.5–12 cm, base truncate or rounded, apex acute or acuminate. Racemes axillary, 1–10 cm, 2–12-flowered; peduncles 5–15 cm; bracteoles suborbicular, 2.5–4.5 mm in diam. Calyx cam-

panulate, ca. 1.5 cm. Standard green outside, pale blue inside, ca. 3.5 cm in diam., base appendaged, apex emarginate; wings pale blue, ca. 3 cm, with T-shaped auricle at middle of claw; keel white tinged with pale blue, slightly incurved with rounded auricle at base. Legumes yellow-green or green, sometimes with red spots, tetragonal, 10–25(–40) × 2–3.5 cm, wings 0.3–1 cm wide with serrate margins. Seeds 8–17, white, yellow, brown, black, or variegated, subglobose, 0.6–1 cm in diam., shining, margin arillate. Fr. Oct–Nov.

Cultivated. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [native perhaps to tropical Asia; cultivated throughout the tropics].

This species is used for food; parts are eaten as vegetables.

## 99. CALOPOGONIUM Desvaux, Ann. Sci. Nat. (Paris) 9: 423. 1826.

毛蔓豆属 mao man dou shu

Sun Hang (孙航); Mats Thulin

Herbs, twining or procumbent. Stems somewhat woody at base. Leaves pinnately 3-foliolate, stipulate; leaflets stipellate. Ra-

cemes axillary. Flowers small or moderately large, clustered at nodes of inflorescence rachis. Pedicels very short; bracts and bracteoles small, deciduous. Calyx campanulate or tubular; teeth 5, upper 2 ± connate. Corolla blue or purple; standard obovate, with 2 incurved auricles at base; wings narrow, auriculate, adnate to keel; keel shorter than wings, blunt and slightly curved. Stamen opposite to standard, free, others connate. Ovary sessile, many ovuled; style filiform; stigma capitate, small and terminal. Legumes linear or oblong, dehiscent, slightly compressed or biconvex, transversely corrugated between seeds. Seeds rounded, slightly compressed, without strophiole.

Five or six species: tropical and subtropical America and the Antilles; one species (introduced) in China.

**1. Calopogonium mucunoides** Desvaux, Ann. Sci. Nat. (Paris) 9: 423. 1826.

毛蔓豆 mao man dou

Herbs, twining or procumbent, densely hirsute with spreading fulvous hairs. Stipules triangular-lanceolate, 4–5 mm; petiole 4–12 cm; stipels subulate; terminal leaflet ovate-rhombic, lateral ones obliquely ovate, 4–10 × 2–5 cm, broadly cuneate to rounded at base, acute or blunt at apex. Inflorescences 1–10 cm; flowers 5 or 6, clustered at nodes of rachis; bracts and

bracteoles linear-lanceolate, ca. 5 mm. Calyx tube glabrescent; lobes longer than tube, linear-lanceolate, densely appressed hirsute, long acuminate at apex. Corolla purplish; wings obovate-oblong; keel straight, with short auricles. Ovary densely hirsute. Legumes linear-oblong, 2–4 cm × ca. 4 mm, straight or slightly curved, with appressed long brown bristles, 5- or 6-seeded. Seeds ca. 2.5 × 2 mm. Fl. Oct.

Cultivated. S Guangdong, S Guangxi, Hainan, Taiwan, Yunnan (Xishuangbanna) [native to tropical America].

**100. PACHYRHIZUS** Richard ex Candolle, Prodr. 2: 402. 1825, nom. cons.

豆薯属 dou shu shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

*Cacara* Thouars.

Vines, perennial, twining or erect, with fleshy tubers. Leaves pinnately 3-foliolate, stipulate; leaflets large, stipellate, ovate or rhomboid, entire or sinuately lobed. Racemes or panicles axillary, rachis often nodose. Bracts caducous; bracteoles small, subsistent or minute and caducous. Calyx 2-lipped, upper lip emarginate, lower 3-toothed. Corolla violet or white, exerted from calyx; standard broadly obovate, appendaged with 2 inflexed auricles; wings oblong or falcate, often adherent to middle of keel; keel sometimes beaked, subequal to wings. Stamens diadelphous; vexillary stamen free at base, connate with tube in middle; anthers uniform. Ovary many ovuled, hirsute, hairs extending up style, forming a false beard; style filiform, inflexed adaxially; stigma lateral to subterminal. Legumes linear-oblong, constricted between seeds. Seeds compressed, suborbicular or transversely oblong.

Five species: distributed in tropical America; one species (introduced) in China.

**1. Pachyrhizus erosus** (Linnaeus) Urban, Symb. Antill. 4: 311. 1905.

豆薯 dou shu

*Dolichos erosus* Linnaeus, Sp. Pl. 2: 726. 1753; *Pachyrhizus angulatus* Richard ex Candolle, nom. illeg. superfl.

Vines, robust, twining. Root tubers 10–20 cm in diam. Leaflets rhombic or ovate, 4–18 × 4–20 cm, upper margin often somewhat dentate or lobed, lateral ones very oblique, sparsely pubescent abaxially. Racemes axillary, 15–30 cm; flowers 3–5

at thickened nodes. Calyx campanulate, 9–11 mm, adpressed pilose. Corolla purplish or pink; standard suborbicular, 15–20 mm, with yellow-green spot and 2 thickenings near base; wings falcate, auriculate; keel subfalcate, 15–20 mm. Ovary yellowish hirsute; style curved. Legumes 7.5–13 × 1.2–1.5 cm, compressed, hirsute. Seeds 8–10, subsquare. Fl. Aug, fr. Nov.

Cultivated. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Sichuan, Taiwan, Yunnan [native to tropical America; widely cultivated in tropical regions].

This species is used as a vegetable.

**101. TEYLERIA** Backer, Bull. Jard. Bot. Buitenzorg, sér. 3, 16: 107. 1939.

琼豆属 qiong dou shu

Sun Hang (孙航); Mats Thulin

Herbs, perennial, twining. Stems 4-angled, angles with descending brown hairs. Leaves pinnately 3-foliolate; stipules ovate, tapering, longitudinally striate, persistent; stipels small, persistent. Flowers small, arranged in axillary racemes, with irregular branches at lower part of inflorescence; bract at base of pedicel persistent, lanceolate; bracteoles at base of calyx persistent. Calyx membranous, campanulate, 5-lobed; calyx teeth lanceolate, equal to calyx tube or slightly longer, upper pair often connate. Corolla slightly exerted; standard obovate, large, shortly clawed, not auriculate; wings narrowly oblong, with long claw, adnate to keel; keel blunt, with long beak at apex, with long claw at base, subequal to wings. Stamens monadelphous. Ovary sessile, 6–8-ovuled; style short, curved; stigma small, capitate. Legumes linear, flattened, slightly curved, shortly beaked at apex; valves transversely impressed between seeds. Seeds 4–8, strophiolate.

Three species: China, Indochina, Indonesia, Philippines; one species in China.

**1. *Teyleria koordersii*** (Backer ex Koorders-Schumacher) Backer, Bull. Jard. Bot. Buitenzorg, sér. 3, 16: 108. 1939.

琼豆 qiong dou

*Glycine koordersii* Backer ex Koorders-Schumacher, Syst. Verz. 1(Fam. 128): 59. 1911.

Herbs, twining. Stems striate. Petiole 4–6 cm, grooved, strigose, glabrescent; stipels subulate; petiolule 3–4 mm, hirsute; leaflets papery, green or yellowish green after drying, terminal leaflet ovate, 6–14 × 2.5–7 cm, lateral leaflets smaller, obliquely ovate, 6–9 cm, tapering or acute at apex, often rounded at base, both surfaces glabrous or sparsely appressed hirsute, lateral

veins 3 or 4 pairs. Racemes axillary; peduncle 5–18 cm, angulate, retrorsely strigose. Flowers 5–20, congested; bracts lanceolate, 3–4 mm, crested; pedicel 1–2 mm, glabrescent, sometimes inflated at tip; bracteoles subulate, 2.5–3.5 mm, strigose. Calyx longitudinally striate, 5–5.5 mm; teeth narrowly lanceolate, equal to calyx tube or slightly longer, glabrous. Corolla white, 6–7 mm; wings and keel slightly purple at tip, not auriculate. Legumes linear, 3–3.5 cm × 3–4 mm, segments thinly leathery, appressed hirsute. Seeds brown, nearly square, ca. 3 mm long and wide, with short strophiole, scarious and ligulate. Fl. Nov–Dec.

Shrublands, open forests. Hainan [Indonesia (Java)].

## 102. **DUMASIA** Candolle, Ann. Sci. Nat. (Paris) 4: 96. 1825.

山黑豆属 shan hei dou shu

Sa Ren (萨仁); Michael G. Gilbert

Herbs or climbing subshrubs, twining. Leaves pinnately 3-foliolate; stipules and stipels persistent. Inflorescence axillary, racemose; flowers medium-sized. Bracts and bracteoles small. Calyx tubular, mouth obliquely truncate, lobes inconspicuous or absent. Corolla yellow or light yellow, longer than calyx; petals all long clawed; standard usually obovate, rarely oblong or broadly elliptic, glabrous, with auricles; wings falcate-oblong, oblong, oblong-elliptic, or elliptic; keels usually slightly shorter than wings. Stamens diadelphous; vexillary stamen free; anthers uniform. Ovary shortly stipitate, linear; ovules 4 to many; style filiform, dilated and hollow near middle, apical part cylindrical, not barbate; stigma terminal, capitate. Legume linear, dehiscent, compressed, constricted between seeds, not septate, with persistent, membranous, cylindrical calyx at base. Seeds usually black or blue, subglobose; hilum short, central; aril not developed.

About ten species: S Africa, Asia; nine species (five endemic) in China.

- 1a. Leaflets almost cordate or reniform, base truncate to shallowly cordate; stem very slender ..... 1. *D. cordifolia*  
 1b. Leaflets ovate to almost orbicular, elliptic, oblong, or triangular, base broadly cuneate to nearly truncate; stem slender or robust.  
 2a. Stems glabrous.  
   3a. Leaflets abaxially gray adpressed hairy; raceme 5–13 cm ..... 8. *D. nitida*  
   3b. Leaflets abaxially glabrous; raceme 1–4 cm.  
     4a. Raceme 1–4 cm, densely flowered ..... 5. *D. truncata*  
     4b. Raceme 5–8 cm, loosely flowered ..... 9. *D. miaoliensis*  
 2b. Stems hairy.  
   5a. Stems and leaflets with dense long branched hairs; legume not constricted between seeds ..... 2. *D. hirsuta*  
   5b. Stems and leaflets with adpressed unbranched hairs; legume sometimes constricted between seeds.  
     6a. Bracts and bracteoles lanceolate, 4–7 mm; leaflets ovate, obovate, or suborbicular, sometimes broader than long ..... 3. *D. forrestii*  
     6b. Bracts and bracteoles setiform, 1–2 mm; leaflets distinctly longer than broad.  
       7a. Leaflets adaxially densely adpressed villous; raceme 4–11(–15) cm ..... 4. *D. villosa*  
       7b. Leaflets adaxially glabrous; raceme 1–4 cm.  
         8a. Petiolules 2–3 mm; leaflets 2.3–3.5 cm wide, abaxially glabrous ..... 5. *D. truncata*  
         8b. Petiolules ca. 1 mm; leaflets 1–2.3 cm wide, abaxially adpressed hairy.  
           9a. Calyx glabrous or sparsely pubescent ..... 6. *D. yunnanensis*  
           9b. Calyx densely adpressed pubescent ..... 7. *D. henryi*

**1. *Dumasia cordifolia*** Bentham ex Baker in J. D. Hooker, Fl. Brit. India 2: 183. 1876.

心叶山黑豆 xin ye shan hei dou

Herbs twining. Stems slender, 1–3 m, pubescent when young. Stipules small, lanceolate, 1–2 mm; petiole 0.2–2.6 cm; stipels small, setiform; petiolules slender, extremely short, absent on uppermost leaves, glabrous or pubescent; leaflets mem-

branous, almost cordate to reniform, 1–3 × 1.2–2.8 cm, abaxially glabrous or sparsely pubescent on midrib, reticulate veins slender, ± visible, base truncate or very shallowly cordate, apex subrounded or slightly concave, usually mucronate. Raceme axillary, slender, 2–7 cm, sparsely hairy or glabrous, 2- to many flowered; pedicels slender. Calyx ca. 5 mm, glabrous. Corolla light yellow, stipitate; standard obovate, auricles obtuse; wings and keels subequal. Ovary stipitate, glabrous; style enlarged,

compressed; stigma capitate. Legume oblanceolate to oblong, slightly curved, ca.  $3 \times 0.4\text{--}0.6$  cm, shortly stipitate. Seeds 3–5, brown-black, reniform, ca. 3 mm. Fl. Aug–Sep, fr. Oct–Dec.  $2n = 22$ .

Sunny mountain slopes; 1200–2800 m. Sichuan, Xizang, Yunnan [E India].

**2. *Dumasia hirsuta*** Craib in Sargent, Pl. Wilson. 2: 116. 1914.

硬毛山黑豆 ying mao shan hei dou

Herbs twining. Stems 1–3 m, densely long hirsute. Stipules lanceolate, 4–6 mm, striate; petiole 4–9 cm, hirsute; petiolules 2–3 mm, ± hairy; stipels small, setiform; leaflets papery or herbaceous, almost ovate to broadly ovate, 4–6(–9)  $\times$  2.7–7 cm, abaxially glabrous or hirsute, adaxially glabrous, lateral veins 4–6 pairs, base almost truncate, broadly cuneate, or almost rounded, margin slightly sinuate, apex obtuse, with slender mucro; lateral leaflets oblique. Raceme axillary, 5–7 cm, usually glabrous, terminally 2–4-flowered; bracts small, setiform. Flowers 1.4–1.8 cm; pedicel 1–2 mm. Calyx 5–7 mm, glabrous or sparsely adpressed hairy. Corolla yellow or light yellow; standard ca.  $11 \times 9$  mm, claw ca. 7 mm; wings ca. 7 mm; keels ca. 5.5 mm. Ovary linear; ovules 4–7. Legume linear, compressed, ca.  $6 \times 1$  cm, glabrous, base stipitate, with persistent calyx, apex with long beak. Seeds 4–7. Fl. and fr. Jun–Aug.

• Wet places, valleys; 700–1700 m. Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan.

**3. *Dumasia Forrestii*** Diels, Notes Roy. Bot. Gard. Edinburgh 5: 247. 1912.

小鸡藤 xiao ji teng

Herbs twining. Stems glabrous, obviously ribbed. Stipules linear-lanceolate, 4–7 mm; petiole 2–11 cm; leaflets almost papery, equal or subequal, ovate, broadly ovate, or almost orbicular, 2–5  $\times$  2–4.8 cm, glabrous or with sparse short adpressed hairs, lateral veins 4–6 pairs, slender, apex rounded or cuneate, usually slightly concave or with mucro. Raceme axillary, 3–12 cm, glabrous or sparsely hairy, densely flowered; peduncle 2–6 cm; bracts 2, similar to stipules. Flowers 1.5–1.8 cm; bracteoles 2, similar to stipules, persistent; pedicel 1–3 mm. Calyx 5–8 mm. Corolla light yellow; wings falcate-oblong; keels similar to wings, with claw, auricle absent. Ovary stipitate, base with sheathing floral disk; style long and curved, upper part enlarged, glabrous; stigma capitate. Legume linear-oblong, slightly curved, 3–4  $\times$  ca. 0.6 cm, glabrous, base acuminate, apex acuminate. Seeds usually 1 or 2. Fl. Aug–Sep, fr. after Oct.

• Mountain slopes; 1800–3200 m. Sichuan, Xizang, Yunnan.

*Dumasia Forrestii* is used medicinally.

**4. *Dumasia villosa*** Candolle, Ann. Sci. Nat. (Paris) 4: 97. 1825.

柔毛山黑豆 rou mao shan hei dou

*Apios martini* H. Léveillé; *Dumasia bicolor* Hayata; *D. glaucescens* Miquel; *D. leiocarpa* Benth; *D. pubescens* Candolle; *D. villosa* var. *arunachalensis* Predeep & M. P. Nayar; *D. villosa* subsp. *bicolor* (Hayata) Hayata; *D. villosa* var. *leiocarpa* (Benth) Baker; *Erythrina mairei* H. Léveillé.

Herbs twining. Stems villous. Stipules small, linear-lanceolate or setiform, 2–3 mm, densely villous; petiole 3–5(–9.5) cm, densely hairy; petiolules 2–3 mm, hairy; leaflets papery; terminal leaflet ovate to broadly ovate, 3.5–5(–9)  $\times$  2–3(–5) cm, both surfaces densely adpressed villous, lateral veins 4–6 pairs, base rounded, almost truncate or broadly cuneate, apex obtuse or slightly concave, with mucro; lateral leaflets slightly smaller and oblique. Raceme axillary, 4–11(–15) cm, flowers clustered or slightly sparse; peduncle obvious; bracts and bracteoles small, setiform. Flowers 1.5–1.8 cm; pedicel short, ca. 2 mm, pubescent. Calyx ca. 10 mm, glabrous or sparsely adpressed hairy. Corolla yellow; petals subequal, with obvious claws; standard obovate; wings and keels oblong-elliptic, with long claws, auricles absent. Style long, hairy, compressed near top; stigma capitate. Legume oblong, constricted between seeds, 2–3  $\times$  ca. 0.5 cm, densely yellow villous. Seeds 1–4, black or blue. Fl. Sep–Oct, fr. Nov–Dec.  $2n = 20$ .

Mountain valleys, riversides; 400–2500 m. Guangxi, Guizhou, Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Africa, Australasia, Madagascar].

The seeds of *Dumasia villosa* contain oil.

**5. *Dumasia truncata*** Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(2): 119. 1843.

山黑豆 shan hei dou

Herbs climbing and twining. Stems slender, 1–3 m, usually glabrous. Stipules small, linear-lanceolate, 2–4 mm, 3-veined; petiole slender, 3–7 cm, glabrous; petiolules 2–3 mm, glabrous; stipels setiform, ca. 1 mm; leaflets membranous, triangular or ovate-triangular, usually 3–6  $\times$  2.3–3.5 cm, both surfaces usually glabrous or sparsely hirsute abaxially, base truncate or rounded, apex ± rounded, sometimes slightly emarginate with mucro; lateral leaflets slightly smaller, base slightly oblique. Raceme axillary, slender, 1–4 cm, usually glabrous; peduncle short; bracts and bracteoles small. Flowers 1.2–2 cm; pedicel 1–3 mm. Calyx ca. 6 mm, glabrous. Corolla yellow or light yellow; standard elliptic to slightly obovate; wings and keels almost elliptic, slightly curved, slightly shorter than standard, with long claws, with a small auricle at base of one side. Ovary linear-oblanceolate, glabrous; ovules 3–5; style slender, glabrous. Legume oblanceolate to lanceolate-elliptic, ca.  $4 \times 0.9$  cm, slightly inflated, base acuminate, apex with beak. Seeds usually 2–5, blue, compressed, globose, 4–6 mm in diam. Fl. Aug–Sep, fr. Oct–Nov.

Mountain roadsides, wet places; 300–1000(–2300) m. Anhui, Fujian, Guangdong, Henan, Hubei, Jiangxi, Shaanxi, Zhejiang [Japan].

**6. *Dumasia yunnanensis*** Y. T. Wei & S. K. Lee, Guihaia 5: 159. 1985.

云南山黑豆 yun nan shan hei dou

Herbs perennial, twining. Stems slender, hirtellous. Petiole 1–8 cm, glabrous or sparsely pubescent; petiolules extremely short; stipels small, setiform; leaflets membranous or thinly papery, elliptic to elliptic-ovate, 2–4  $\times$  1.3–2.5 cm, abaxial surface with short adpressed hairs, adaxial surface almost glabrous, base broadly cuneate, rounded, or subtruncate, apex obtuse



or subrounded, slightly concave, with mucro. Raceme axillary, 1–3.5 cm, hirtellous, 3–6-flowered, rarely more; peduncle short; bracts and bracteoles extremely short, setiform; pedicel 1–2 mm. Calyx 5–8 mm, glabrous or sparsely pubescent. Corolla yellow; petals subequal; standard oblong; wings and keels elliptic, with long claws. Legume narrowly falcate, compressed, 3–5 × 0.3–0.6 cm, glabrous, apex with beak. Seeds 3 or 4. Fl. Aug–Oct.

- Mountains, roadsides, valleys; 1300–2500 m. Sichuan, Yunnan.

**7. *Dumasia henryi*** (Hemsley) R. Sa & M. G. Gilbert, **comb. nov.**

长圆叶山黑豆 chang yuan ye shan hei dou

Basionym: *Rhynchosia henryi* Hemsley, J. Linn. Soc., Bot. 23: 196. 1887; *Dumasia oblongifoliolata* F. T. Wang & Tang ex Y. T. Wei & S. K. Lee.

Herbs perennial, twining, all parts except leaves densely gray pubescent. Stipules coniform, ca. 2 mm; petiole 1.5–4 cm; stipels coniform, ca. 1 mm; petiolules ca. 1 mm; leaflets papery, oblong or oblong-ovate, 3–5 × 1–2.3 cm, abaxial surface densely gray adpressed hairy, adaxial surface glabrous, lateral veins 4–7 per side, base rounded, sometimes slightly oblique, apex rounded, slightly emarginate, with small mucro. Raceme axillary, 2–4 cm; peduncle densely gray pubescent. Flowers ca. 1.5 cm; bracts and bracteoles extremely short, ca. 1 mm, persistent; pedicel ca. 1 mm. Calyx 6–8 mm, densely adpressed pubescent. Corolla yellow; petals subequal; standard broadly oblong to obovate; wings oblong, with claw; keels elliptic, slightly curved. Fl. Oct.

- Hubei, Sichuan.

**8. *Dumasia nitida*** Chun ex Y. T. Wei & S. K. Lee, *Guihaia* 5: 161. 1985.

瑶山山黑豆 yao shan shan hei dou

*Dumasia nitida* var. *kurziana* Predeep & M. P. Nayar.

Herbs perennial, twining, all parts glabrous. Stems slender. Stipules small, linear, ca. 2 mm; petiole slender, 2–8 cm; stipels

small, linear; petiolules ca. 2 mm; leaflets membranous, ovate or oblong-ovate, 2.5–6 × 1.4–3 cm, midrib convex on both surfaces, lateral veins 5–9 per side, base truncate or broadly cuneate, apex obtuse or almost round, with small mucro. Raceme axillary, slender, 5–13 cm, few flowered; peduncle 1.5–6 cm; bracts and bracteoles short; pedicel 2–3 mm. Calyx ca. 8 mm. Corolla light yellow; standard oblong, 10–15 mm; wings and keels oblong, slightly curved, subequal to standard, with claw and auricle at one side of base. Ovary linear to linear-oblancoolate; ovules 1 or 2; style linear. Legume oblong to oblancoolate, 3–4 × ca. 1 cm, apex with beak. Seeds 1 or 2. Fl. and fr. Sep–Oct.

Thickets along mountain roadsides; 1200–1500 m. Guangxi, Yunnan [Myanmar].

**9. *Dumasia miaoliensis*** Y. C. Liu & F. Y. Lu, *Quart. J. Chin. Forest.* 10(3): 87. 1977.

苗栗野豇豆 miao li ye jiang dou

Herbs twining. Stems slender, glabrous. Leaves pinnately 3-foliolate; stipules 2–2.5 mm; stipels subulate ca. 1 mm; petiolules 1–2 mm, glabrous; leaflets membranous, ovate-lanceolate, glabrous on both surfaces, midrib prominent abaxially, slightly elevated adaxially, lateral veins 4 or 5 per side, veinlets distinctly reticulate, base truncate, margin entire, apex obtuse, emarginate, apiculate at summit; terminal leaflets with blades 3–5 × 1.5–2.5 cm. Raceme axillary, loosely flowered, 5–8 cm; bracteoles subulate, ca. 1 mm; pedicel 3–4 mm. Calyx membranous, tubular, 5–7 mm, glabrous, gibbous and with an oblique subtruncate mouth. Corolla whitish yellow, exerted 12–15 mm; petals subequal; standard auriculate at both sides; wings and keels all clawed ca. 1 mm. Ovary stipitate. Legume elliptic, compressed, falcate, ca. 3 cm including stalk, glabrous, dehiscent. Seeds usually 2, rarely 1–3, black.

- Open roadsides; 1000–1500 m. C Taiwan.

The hybrid *Dumasia miaoliensis* × *D. villosa* has been reported from Taiwan (Fl. Taiwan, ed. 2, 3: 272. 1993). It differs from normal *D. miaoliensis* by the less compressed legumes with shorter stalks.

**103. PUERARIA** Candolle, *Ann. Sci. Nat. (Paris)* 4: 97. 1825.

葛属 ge shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

*Neustanthus* Benth.

Twining herbs or shrubs. Roots sometimes tuberous. Stipules sometimes produced below point of insertion. Leaves pinnately 3-foliolate; leaflets large, stipellate, ovate or rhomboid, entire or sinuately lobed. Inflorescences axillary, racemose or paniculate with an elongated peduncle, or several racemes aggregated at tip of branchlets. Bracts usually small or narrow, very caducous; bracteoles small, subsistent or minute and caducous. Flowers blue or purplish, usually several flowers clustered at each node of rachis. Calyx campanulate, 2 upper teeth connate into entire or bifid lip. Corolla exceeding calyx; standard with 2 inflexed auricles; wings narrowly oblong or obovate-falcate, often adherent to middle of keel; keel sometimes beaked, subequal to wings. Vexillary stamen free at base, connate in middle with others, rarely quite free; anthers uniform. Ovary sessile, many ovuled; style filiform, inflexed above; stigma small, capitate. Legumes linear or cylindrical, continuous within or filled or septate between seeds. Seeds compressed, suborbicular or transversely oblong.

About 20 species: distributed in tropical and E Asia; ten species (three endemic) in China.

- 1a. Stipules basifixed.
- 2a. Legumes ca. 4 mm wide, with 15–20 seeds; standard suborbicular ..... 1. *P. phaseoloides*
- 2b. Legumes 6–12 mm wide, with 4–10 seeds; standard obovate.
- 3a. Shrubs, erect or climbing; standard 5–8 mm ..... 2. *P. stricta*
- 3b. Twining herbs; standard 12–14 mm.
- 4a. Leaflets ovate or obliquely ovate, densely hirsute on both surfaces; corolla white; standard ca. 14 mm; legumes 5–8 cm × 6–8 mm ..... 3. *P. peduncularis*
- 4b. Leaflets obovate, sparsely pubescent abaxially; corolla reddish; standard ca. 12 mm; legumes 7.5–12.5 cm × 6–12 mm ..... 4. *P. wallichii*
- 1b. Stipules dorsifixed.
- 5a. Stipules not 2-lobed at base.
- 6a. Lowest calyx lobe distinctly longer than lateral ones, acuminate; keel petals larger than wings ..... 5. *P. montana*
- 6b. Lowest calyx lobe slightly longer than lateral ones, acute; keel petals equal to wings.
- 7a. Leaflets to 14.5 × 12 cm, lateral ones entire; inflorescences to 17 cm, axis with retrorse hairs; keel petals not auriculate ..... 9. *P. bouffordii*
- 7b. Leaflets to 8 × 6.5 cm, all 3-lobed; inflorescences to 48 cm, branched, axis without retrorse hairs; keel petals auriculate at base ..... 10. *P. xyzhui*
- 5b. Stipules 2-lobed at base, sagittate.
- 8a. Bracts longer than flower buds, hirsute; standard to 1.5 cm ..... 6. *P. alopecuroides*
- 8b. Bracts shorter than flower buds, glabrous or thinly pubescent; standard over 1.8 cm.
- 9a. Leaflets suborbicular, usually entire or lateral leaflets irregularly 5–7-lobed; calyx 11–15 mm ..... 7. *P. calycina*
- 9b. Leaflets broadly ovate, 3-lobed or lateral leaflets 2-lobed; calyx 4–7 mm ..... 8. *P. edulis*

**1. *Pueraria phaseoloides*** (Roxburgh) Benth, J. Linn. Soc., Bot. 9: 125. 1865.

三裂叶野葛 san lie ye ye ge

*Dolichos phaseoloides* Roxburgh, Fl. Ind., ed. 1832, 3: 316. 1832; *Neustanthus phaseoloides* (Roxburgh) Benth.

Herbaceous vines. Stem slender, 2–4 m, brownish hirsute. Stipules basifixed, ovate-lanceolate, 3–5 mm; stipels linear, 2–3 mm; leaflets broadly ovate, rhomboid, or ovate-rhomboid, terminal one broader, 6–10 × 4.5–9 cm, lateral ones smaller, oblique, entire or 3-lobed, abaxially densely white hirsute, adaxially adpressed hirsute. Racemes solitary, 8–15 cm or more. Bracts and bracteoles linear-lanceolate, 3–4 mm, hirsute. Flowers with short pedicels, clustered at slightly distant nodes. Calyx ca. 6 mm, pilose; lower tooth as long as tube, apex hirsute, others deltoid, shorter than tube. Corolla bluish or lilac; standard suborbicular, 8–12 mm, base with 2 incurved auricles; wings obovate-oblong, slightly longer than keel, one side of base with rounded auricle, claw slender; keel falcate, apex with short beak, base truncate, clawed. Ovary linear, thinly hairy. Legumes subcylindric, 5–8 cm × ca. 4 mm, first adpressed hirsute, later subglabrous. Seeds 15–20, oblong-elliptic, subtruncate at both ends, ca. 4 mm. Fl. Aug–Sep, fr. Oct–Nov.

Thickets of mountainous and hilly areas. Guangdong, Guangxi, Taiwan, Yunnan, Zhejiang [Bhutan, Cambodia, India, Laos, Malaysia (Peninsular), Myanmar, Nepal, Thailand, Vietnam; widely cultivated elsewhere in the tropics].

This species is used as a cover plant, forage, and green manure.

**2. *Pueraria stricta*** Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 254. 1874.

小花野葛 xiao hua ye ge

*Galactia simaoensis* Y. Y. Qian; *Pueraria brachycarpa* Kurz; *P. colletii* Prain; *P. hirsuta* Kurz; *P. longicarpa* Thuan; *P. siamica* Craib.

Shrubs, erect or rarely climbing. Stem 1–2.5 m tall. Branches striate, gray pubescent when young, glabrous when old. Stipules triangular-ovate, ca. 7 mm, gray pubescent; terminal leaflet rhombic to ovate, 11–24 × 4–12 cm, lateral ones obliquely ovate, gray pubescent on both surfaces. Racemes usually unbranched. Bracts lanceolate, 2–3 mm, pubescent with ± hooked hairs; bracteoles ca. 1 mm. Flowers 4–6(–8) aggregated at nodes. Calyx tube 1.5–2.5 mm; teeth 0.5–1.5 mm, gray pubescent. Corolla white, pink, purple, blue, or yellow; standard obovate, 5–8 × 4.5–7 mm, apex emarginate, base clawed, auricles inflexed, without callosities; wings and keel nearly as long as standard, all clawed. Vexillary stamen joined to middle. Ovary silky pubescent along suture; ovules ca. 10. Legumes brownish, oblong, 3.5–6 × 0.5–0.7 cm, flattened, glabrous to thinly pubescent, with oblique stripes, suture thickened. Seeds 5–10, brown or black, ovate, ca. 4 × 3 mm, tuberculate. Fl. May–Jun, fr. Sep–Oct.

Forests, among grasses. Yunnan [Myanmar, Thailand].

**3. *Pueraria peduncularis*** (Graham ex Benth) Benth, J. Linn. Soc., Bot. 9: 124. 1865.

苦葛 ku ge

*Neustanthus peduncularis* Graham ex Benth in Miquel, Pl. Jungh. 232. 1852; *Derris bonatiana* Pampanini; *Pueraria peduncularis* var. *violacea* Franchet; *P. yunnanensis* Franchet.

Twining herbs, thinly or densely hirsute. Stipules basifixed, lanceolate, caducous; petiole 4–12 cm; stipels small, bristly; leaflets ovate or obliquely ovate, 5–12 × 3–8 cm, hirsute on both surfaces, rarely glabrous adaxially, base acute to truncate, margin entire, apex acuminate. Racemes slender, 20–40 cm. Bracts and bracteoles caducous. Flowers white, 3–5 clustered at nodes of rachis; pedicels slender, 2–6 mm. Calyx ca. 5 mm, villous; upper lobes very broad, lower ones slightly acute, shorter than tube. Standard obovate, ca. 1.4 cm, base attenuate, with narrow auricles, without callosities; wings slightly longer

than keel; keel apex incurved, widened, more pale in color. Vexillary stamen broader, first adherent to others but not connate. Legumes linear, 5–8 cm × 6–8 mm, straight, valves subpapery, subglabrous or thinly pubescent. Fl. Aug, fr. Oct.

Forests. Guangxi, Guizhou, Sichuan, Xizang, Yunnan [Bangladesh, Bhutan, India, Myanmar, Nepal, Pakistan].

*Pueraria yunnanensis* was treated as a separate species by Z. F. Le and X. Y. Zhu (Ann. Bot. Fenn. 46: 419–424. 2009).

**4. *Pueraria wallichii*** Candolle, Ann. Sci. Nat. (Paris) 4: 97. 1825.

须弥葛 *xu mi ge*

Shrubs, sometimes climbing. Branches slender, thinly pubescent or glabrescent. Stipules basifixed, lanceolate, caducous; stipels small, bristly; terminal leaflet obovate, 10–13 cm, abaxially with few adpressed hairs, adaxially green, glabrescent, base deltoid, margin entire, apex caudate-acuminate. Racemes up to 15 cm, often fascicled or paniculate; peduncle long, slender. Pedicels slender, clustered at nodes of rachis. Calyx ca. 4 mm, subglabrous; teeth obscure or very broad, lower ones broader. Corolla white to reddish; standard obovate, ca. 1.2 cm, base narrowed into a short claw, without auricles; wings slightly shorter than curved keel; keel equal to standard. Vexillary stamen only free at base, other part joined with filament tube. Legumes straight, 7.5–12.5 cm × 6–12 mm, glabrous. Fl. Sep–Oct.

Hill slopes in forests or thickets. Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Thailand].

**5. *Pueraria montana*** (Loureiro) Merrill, Trans. Amer. Philos. Soc., ser. 2, 24(2): 10, 210. 1935.

葛 *ge*

Robust climbers, with tuberous roots. Stems to 8 m, woody at base, hirsute with yellowish hairs in all parts. Stipules dorsifixed, ovate-oblong, striate; stipels linear-lanceolate, equal to petiolules or longer; leaflets 3-lobed, rarely entire, terminal one broadly ovate, 7–15(–19) × 5–12(–18) cm, apex acuminate, lateral ones obliquely ovate, smaller, with yellowish adpressed hairs adaxially, more densely hairy abaxially. Racemes 15–30 cm. Flowers 2 or 3 aggregated at nodes. Bracts linear-lanceolate to linear, shorter or longer than bracteoles, caducous; bracteoles ovate, less than 2 mm. Calyx 7–20 mm, villous with yellow-brown hairs; lobes lanceolate, acuminate, slightly longer than tube. Corolla purple; standard obovate, 8–18 mm, auriculate and with yellow callosities at base, shortly clawed; wings falcate, narrower than keel, base with linear auricles; keel falcate-oblong, with very small and acute auricles. Vexillary stamen free in upper part. Ovary linear, hairy. Legumes long elliptic, 4–14 cm × 6–13 mm, flattened, brown hirsute. Fl. Jul–Oct, fr. Oct–Dec.

Mountain forests, thickets, open places. Everywhere in China except Qinghai, Xinjiang, and Xizang [SE Asia to Australia].

This plant is commonly known as kudzu vine.

1a. Bracts shorter than bracteoles; calyx 7–8 mm; standard ca. 8 mm in diam.; legumes 4–9 cm × 6–8 mm ..... 5a. var. *montana*

1b. Bracts longer than bracteoles; calyx 8–20 mm; standard 10–18 mm; legumes 5–14 cm × 8–13 mm.

2a. Calyx 8–10 mm; standard obovate, 10–12 mm; wings subequal to keel; legumes 5–9 cm × 8–11 mm ..... 5b. var. *lobata*

2b. Calyx to 20 mm; standard suborbicular, 16–18 mm; wings slightly shorter than keel; legumes 10–14 cm × 10–13 mm ..... 5c. var. *thomsonii*

### 5a. *Pueraria montana* var. *montana*

葛(原变种) *ge (yuan bian zhong)*

*Dolichos montanus* Loureiro, Fl. Cochinch. 2: 440. 1790; *Glycine javanica* Linnaeus (1753), not *Pueraria javanica* (Benth) Benth (1865); *P. lobata* (Willdenow) Ohwi var. *montana* (Loureiro) Maesen; *P. thunbergiana* (Siebert & Zuccarini) Benth var. *formosana* Hosokawa; *P. tonkinensis* Gagnepain.

Bracts shorter than bracteoles. Calyx 7–8 mm. Standard ca. 8 mm in diam. Legumes 4–9 cm × 6–8 mm. Fl. Jul–Sep, fr. Oct–Dec.

Open places, thickets, forests. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Japan, Laos, Myanmar, Philippines, Thailand, Vietnam].

**5b. *Pueraria montana* var. *lobata*** (Willdenow) Maesen & S. M. Almeida ex Sanjappa & Predeep in Sanjappa, Legumes India, 288. 1992.

葛麻姆 *ge ma mu*

*Dolichos lobatus* Willdenow, Sp. Pl. 3: 1047. 1802; *D. hirsutus* Thunberg; *Neustanthus chinensis* Benth; *Pachyrhizus thunbergianus* Siebold & Zuccarini; *Pueraria argyi* H. Léveillé & Vaniot; *P. bodinieri* H. Léveillé & Vaniot; *P. caerulea* H. Léveillé & Vaniot; *P. koten* H. Léveillé & Vaniot; *P. lobata* (Willdenow) Ohwi; *P. lobata* var. *chinensis* (Benth) Ohwi; *P. montana* var. *chinensis* (Benth) Maesen & S. M. Almeida ex Sanjappa & Predeep; *P. thunbergiana* (Siebold & Zuccarini) Benth.

Calyx 8–10 mm. Standard obovate, 10–12 mm; wings subequal to keel. Legumes 5–9 cm × 8–11 mm.

Mountain forests or cultivated. Everywhere in China except Qinghai, Xinjiang, and Xizang [SE Asia to Australia; also introduced in Africa, America, and Europe].

This taxon is used medicinally and as edible tubers, a cover crop, and fodder.

**5c. *Pueraria montana* var. *thomsonii*** (Benth) M. R. Almeida, Fl. Maharashtra 2: 122. 1998.

粉葛 *fen ge*

*Pueraria thomsonii* Benth, J. Linn. Soc., Bot. 9: 122. 1865 [“*thomsonii*”]; *P. lobata* subsp. *thomsonii* (Benth) H. Ohashi & Tateishi; *P. lobata* var. *thomsonii* (Benth) Maesen.

Calyx to 20 mm. Standard suborbicular, 16–18 mm; wings slightly shorter than keel. Legumes 10–14 cm × 10–13 mm. Fl. Sep, fr. Nov.

Thickets, open forests, or cultivated. Guangdong, Guangxi, Hainan, Jiangxi, Sichuan, Taiwan, Xizang, Yunnan [Bhutan, India, Laos, Myanmar, Philippines, Thailand, Vietnam].

This taxon is used as a vegetable and for extracting starch.

**6. *Pueraria alopecuroides*** Craib, Bull. Misc. Inform. Kew 1910: 276. 1910.

密花葛 mi hua ge

Woody climbers. Branches hispid with ferruginous hairs. Stipules dorsifixed, sagittate, ca. 2.2 cm × 8 mm, striate; petiole 10–20 cm, sparsely hispid with ferruginous hairs; stipels linear-lanceolate, slightly longer than petiolules, striate; terminal leaflet broadly ovate, 10–15 × 6.5–12 cm, sparsely pubescent on both surfaces, lateral veins 6–8 pairs, conspicuous on both surfaces, base rounded, margin crenate, apex caudate-acuminate, mucronate or acute when young; lateral leaflets smaller, oblique. Inflorescences paniculate, very dense before flowering, ca. 22 cm, branches ca. 10 cm. Bracts lanceolate or linear-lanceolate, ca. 1.3 cm, longer than flower bud, ferruginous hispid; bracteoles ca. 5.5 mm. Pedicels ca. 5 mm. Calyx puberulent and ferruginous pilose; tube ca. 3 mm; lobes lanceolate, 4–6 mm, upper 2 connate. Standard white, suborbicular, ca. 1 cm in diam., emarginate, with yellow spot at base, with incurved auricles and callosities, claw ca. 2.5 mm; wings oblong, longer than keel, with long appendage; keel purple, ca. 1 cm, obtuse. Vexillary stamen free at base. Ovary sessile, ca. 7 mm, sparsely villous.

Mixed forests, among grasses. S Yunnan [Myanmar, Thailand].

**7. *Pueraria calycina*** Franchet, Pl. Delavay. 181. 1890.

黄毛萼葛 huang mao e ge

*Pueraria forrestii* W. E. Evans.

Woody climbers. Stem base bulbous; branches villous with brownish hairs, glabrescent when old. Stipules dorsifixed, sagittate, striate, pubescent, upper part ovate, 1–2 cm, base 2-lobed, lobes 5–10 mm; petiole 5–12 cm; stipels lanceolate, 5–10 mm; leaflets suborbicular, 7–16 × 6–14 cm, terminal one broader, lateral ones oblique, margin irregularly 5–7-lobed, apex mucronate, brownish villous on both surfaces. Racemes 10–25 cm, villous. Bracts ovate-lanceolate to lanceolate, 5–10 mm, sparsely villous; bracteoles ovate-lanceolate, 2–3 mm. Flowers 2 at each node. Calyx ferruginous hispid; tube 3–5 mm; lobes 4, lanceolate, 11–15 mm, upper one bifid. Corolla purplish red; standard obovate, ca. 1.6 × 1.3–1.5 cm, apex emarginate, shortly clawed, auricles reflexed; wings oblong, 1.5–1.7 cm, base auriculate; keel as long as wings, oblique, clawed. Vexillary stamen free, joined with others at middle. Ovary stipitate, silky pubescent. Legumes oblong, 7–8 × 8–12 cm, flattened, yellow-brown hirsute. Seeds red or brown, reniform, 7–9 × 5–6 mm, compressed. Fl. Jul–Aug.

• Mountain thickets; 2000–2600 m. Yunnan.

**8. *Pueraria edulis*** Pampanini, Nuovo Giorn. Bot. Ital., n.s., 17: 28. 1910.

食用葛 shi yong ge

*Pueraria bicalcarata* Gagnepain; *P. edulis* var. *likiangensis* P. C. Li.

Twining herbs, with tuberous roots. Stems sparsely hirsute with brown hairs. Stipules dorsifixed, sagittate, upper lobes 5–11 mm, basal 2 lobes 3–8 mm, striate and ciliate; petiole 3.5–16 cm; stipels lanceolate, 5–7 mm; terminal leaflet ovate, 9–15 × 6–10 cm, 3-lobed to entire, lateral ones obliquely broadly ovate, smaller, ± 2-lobed, base cuneate or rounded, apex shortly acuminate, pubescent on both surfaces. Racemes up to 30 cm, simple or once branched. Bracts ovate, 4–6 mm, glabrous or ciliate; bracteoles 2–3 mm, glabrous or sparsely hirsute. Flowers 3 at each node of rachis; pedicels slender, up to 7 mm, glabrous. Calyx hairy on both surfaces or glabrous outside; tube 3–5 mm; lobes 4, lanceolate, 4–7 mm, subequal, upper one broader. Corolla purple or pink; standard suborbicular, 14–17 mm, apex emarginate, base auriculate and with callosities, claw ca. 3.5 mm; wings obovate, ca. 16 mm, clawed and auriculate; keel oblique. Ovary shortly hirsute, subsessile. Legumes linear-oblong, 5.5–6.5(–9) × ca. 1 cm, very sparsely hirsute with yellowish hairs, suture thickened, densely hairy. Seeds 9–12, reddish-brown, ovate, flattened, ca. 4 × 2.5 mm. Fl. Sep, fr. Oct.

Forests; 1000–3200 m. Sichuan, Yunnan [Bhutan, India].

**9. *Pueraria bouffordii*** H. Ohashi, J. Jap. Bot. 80: 9. 2005.

贵州葛 gui zhou ge

Twining herbs. Stems densely adpressed sericeous. Stipules unknown; petiole 9–10 cm; stipels linear, ca. 4 mm; terminal leaflet broadly ovate, up to 14.5 × 12 cm, shallowly 3-lobed, lateral ones oblique, slightly smaller, entire, base rounded, apex acute, sericeous abaxially, sparsely adpressed sericeous adaxially. Inflorescences branched, up to 17 cm, densely sericeous with reflexed hairs. Bracts narrowly ovate, ca. 1.5 mm; bracteoles 1–1.5 mm. Pedicels 3–4 mm. Calyx densely adpressed sericeous; tube ca. 2.5 mm; upper 2 lobes connate, ca. 3 mm, lateral lobes ca. 2 mm, lowest lobe 2.5–3 mm. Corolla white with tips of wings and keel purple; standard broadly elliptic, 11–12 × 10–11 mm, apex emarginate, base slightly auriculate and with callosities, claw ca. 1 mm; wings oblong, ca. 12.5 mm, clawed and slightly auriculate; keel ca. 12 mm, clawed, not auriculate. Vexillary stamen free at base. Ovary sessile, adpressed sericeous. Legumes unknown.

• Riverbanks; 700–1000 m. Guizhou.

**10. *Pueraria xyzhui*** H. Ohashi & Iokawa, J. Jap. Bot. 81: 27. 2006.

云南葛 yun nan ge

Twining herbs. Stems densely adpressed sericeous with reflexed hairs. Stipules dorsifixed, 3–4 mm wide; petiole 7–8 cm; stipels narrowly ovate-triangular, 4–5 mm; terminal leaflet broadly ovate, to 8 × 6.5 cm, 3-lobed, lateral ones oblique, almost as large as terminal one, 3-lobed, base rounded, apex acute, sericeous abaxially, adpressed sericeous with short hairs on veins adaxially. Inflorescences branched, up to 48 cm, densely adpressed sericeous. Bracts deciduous; bracteoles ca. 3 mm. Pedicels 3–4 mm. Calyx densely adpressed sericeous; tube ca. 2 mm; upper 2 lobes connate, ca. 4.5 mm, lateral lobes ca. 4

mm, lowest lobe ca. 4.5 mm. Standard suborbicular, ca. 11 × 13 mm, apex ± emarginate, base slightly cordate, with callosities, claw ca. 2 mm; wings elliptic, ca. 12.5 mm, clawed and slightly auriculate; keel ca. 12 mm, clawed, auriculate. Vexillary stamen

free at base. Ovary sessile, adpressed sericeous. Legumes unknown.

- Mountain regions; ca. 1500 m. Yunnan.

#### 104. **NOGRA** Merrill, Trans. Amer. Philos. Soc., ser. 2, 24(2): 201. 1935.

土黄芪属 tu huang qi shu

Chen Dezhaio (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

Prostrate or climbing herbs. Leaves 1-foliolate; stipules very caducous; stipels persistent. Racemes axillary or in a few-branched terminal panicle. Flowers solitary, paired or clustered at nodes of rachis of inflorescence; bracts deciduous or persistent; bracteoles persistent. Calyx tube campanulate, 5-toothed; upper 2 teeth connate from middle downward. Corolla exerted; petals subequal in length, clawed; standard obovate, elliptic, or suborbicular, with 2 minute, inflexed basal auricles; wings falcate or obovate-oblong, slightly adherent to keel at base; keel falcate or narrowly oblong, incurved, without auricle or nearly so. Stamens diadelphous, vexillary stamen free; anthers uniform, dorsifixed. Ovary sessile or subsessile; ovules numerous; style incurved, glabrous; stigma small, capitate. Legumes narrowly oblong or linear, compressed, septate between seeds. Seeds orbicular or oblong, with a thick strophiole at small hilum.

About four species: China, India, Thailand; one species (endemic) in China.

##### 1. **Nogra guangxiensis** C. F. Wei, Guihaia 5: 351. 1985.

广西土黄芪 guang xi tu huang qi

Climbing herbs, sparsely hirsute. Leaves 1-foliolate; petiole 1.5–3.5 cm; stipels subulate, as long as petiolules; petiolules 3–4 mm; leaflets papery, narrowly oblong or narrowly lanceolate, 12–19 × 2.3–3 cm, rough on both surfaces, base rounded or slightly cordate, margin slightly revolute, apex acuminate or obtuse; midrib elevated abaxially, prominent adaxially, lateral veins 9–15 pairs, raised on both surfaces, at an angle of 50–60°, veinlets reticulate, slightly prominent on both surfaces. Racemes axillary, 5–15 cm, sometimes forming panicles with 1 or 2 branches. Flowers pedicellate, solitary or paired; bracts small, caducous; bracteoles ovate-lanceolate. Calyx ca. 7 mm; teeth

narrowly lanceolate, upper 2 as long as tube, lower 3 slightly longer. Corolla light yellow; standard broadly elliptic, ca. 10.5 × 8 mm, apex emarginate, with 2 inflexed, short basal auricles, claw ca. 2 mm; wings obovate-oblong, ca. 9 × 4 mm, apex obtuse or rounded, with long, acute basal auricle, claw ca. 3 mm; keel falcate, ca. 8 × 2.5 mm, arcuate and ± connate on back, apex slightly acute, base without auricle, claw ca. 4 mm. Anthers broadly oblong, ca. 0.5 mm. Ovary narrowly oblong, slightly compressed, hirsute. Legumes narrowly oblong or linear, compressed, 4.5–5 × 0.5–0.6 cm, base rounded, apex with a 2–3 mm beak, valves sparsely hirsute. Seeds 6–8, blackish brown, shiny, orbicular, ca. 3 mm in diam. Fl. Aug.

- Mountain slopes, thick grass, near roads. E and NW Guangxi (Mengshan, Tian'e), SE Yunnan.

#### 105. **SINODOLICHOS** Verdcourt, Kew Bull. 24: 398. 1970.

华扁豆属 hua bian dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Perennial twining herbs. Leaves pinnately 3-foliolate; stipules deltoid, basifixed, late deciduous; stipels linear, persistent. Racemes axillary; peduncles short, or flowers clustered. Bracts ovate, apex caudate; bracteoles late deciduous. Calyx campanulate, hirsute with white or yellow hairs, 2-lipped, upper lip bifid, lower lip 3-lobed. Corolla glabrous, petals clawed; standard orbicular or oblong, base with short auricles, without appendages; wings and keel obovate-oblong, with narrow auricles; keel obtuse. Stamens diadelphous; filaments unequal; anthers uniform. Ovary linear, subsessile, ca. 10-ovuled; disk present; style linear; stigma funnel-shaped. Legumes linear-oblong, flattened, not septate, densely bristly-pilose with yellowish hairs. Seeds 3–10, oblong, without aril; hilum central.

Two species: China, Malaysia (Sarawak), Myanmar, Thailand; one species in China.

##### 1. **Sinodolichos lagopus** (Dunn) Verdcourt, Kew Bull. 24: 398. 1970.

华扁豆 hua bian dou

*Dolichos lagopus* Dunn, J. Linn. Soc., Bot. 35: 490. 1903.

Stems and petiole densely pubescent with yellow hairs. Stipules ca. 3 mm; petiole 4–10 cm; leaflets papery, ovate or rhombic, 4–10 × 2.5–7 cm, hirsute on both surfaces, veins

elevated adaxially, base obtuse, apex acuminate. Racemes axillary, shorter than petiole. Calyx ca. 1 cm, hirsute with gray or yellow hairs; lobes linear-lanceolate, ca. 6 mm. Corolla purple; standard suborbicular, ca. 1.3 cm (including claw); wings and keel as long as standard. Filament tube ca. 1 cm. Legumes 5.5–6.5 × ca. 0.6 cm, densely pilose with yellowish bristly hairs. Seeds 3–10, black, ca. 4 × 3 mm.

- Forests, thickets; 100–1700 m. Guangxi, Hainan, Yunnan [Malaysia (Sarawak), Thailand].

**106. AMPHICARPAEA** Elliot ex Nuttall, Gen. N. Amer. Pl. 2: 113. 1818  
[“*Amphicarpa*”], nom. cons.

两型豆属 liang xing dou shu

Sa Ren (萨仁); Michael G. Gilbert

Herbs, twining. Leaves pinnately 3-foliolate. Inflorescence axillary, racemose, sometimes with apetalous cleistogamous flowers at base or 1–3 in axils of lower leaves, nodes not swollen but sometimes more than 1-flowered. Bracts persistent or deciduous. Calyx tubular, 4- or 5-lobed. Corolla longer than calyx; petals subequal; standard obovate or obovate-elliptic, glabrous, base clawed, with inconspicuous auricles; keels slightly curved. Stamens diadelphous; vexillary stamen free; cleistogamous flowers with only 3–5 anthers. Ovary sessile or subsessile, with sheathing disk at base; ovules many; style glabrous; stigma small, terminal. Legumes of 2 types: normal and underground; normal legumes linear-oblong, dehiscent, compressed, unjointed, few seeded; underground legumes usually orbicular or ellipsoidal, indehiscent, 1-seeded. Seeds subglobose or ovoid; hilum short, lateral; aril not developed.

About five species: tropical Africa, E Asia, North America; three species (two endemic) in China.

- 1a. Perennial herbs; stipules 6–8 mm; leaflets papery or thickly papery ..... 2. *A. ferruginea*  
1b. Annual herbs; stipules 3–5 mm; leaflets membranous or nearly so.  
2a. Bracts ovate or elliptic to broadly elliptic; terminal leaflet rhomboid-ovate or oblate-ovate, apex obtuse, sometimes with mucro ..... 1. *A. edgeworthii*  
2b. Bracts linear; terminal leaflet ovate to broadly ovate, apex acute ..... 3. *A. linearis*

**1. *Amphicarpaea edgeworthii*** Benth in Miquel, Pl. Jungh. 231. 1852.

两型豆 liang xing dou

*Amphicarpaea bracteata* (Linnaeus) Fernald subsp. *edgeworthii* (Benth) H. Ohashi; *A. edgeworthii* f. *aidzuensis* Matsuda; *A. edgeworthii* var. *japonica* Oliver; *A. japonica* (Oliver) H. Ohashi; *A. trisperma* (Miquel) Baker; *Falcata comosa* (Linnaeus) Kuntze var. *japonica* (Oliver) Makino; *F. edgeworthii* (Benth) Kuntze; *F. japonica* (Oliver) Komarov; *Shusteria trisperma* Miquel.

Herbs, annual, 0.3–1.3 m tall. Stems slender. Stipules lanceolate or ovate-lanceolate, 3–4 mm, densely pubescent; petiole 2–5.5 cm; stipels extremely small, usually deciduous, narrowly triangular; petiolules usually 2–3 mm; leaflets papery or almost membranous; terminal leaflet rhomboid-ovate or oblate-ovate, 2.5–5.5 × 2–5 cm, both surfaces sparsely yellowish brown villous, base rounded, broadly cuneate or nearly truncate, apex obtuse or sometimes with mucro; lateral leaflets usually obliquely ovate or ovate-rhombic, dimorphic. Upper inflorescences axillary, shortly racemose; bracts almost membranous, ovate to elliptic, 3–5 mm. Cleistogamous flowers often present. Normal flowers: pedicel 1–2 mm. Calyx tubular, 5–7 mm, 5-lobed; lobes unequal, sparsely pubescent, apex acuminate. Corolla purplish or white; petals subequal; standard obovate, 1–1.7 cm; wings oblong, with long stipes and acute auricles at base; keels similar to wings. Ovary hairy. Cleistogamous flowers underground, sessile; style curved. Legumes dimorphic: those of normal flowers oblong or obovate-oblong, 2–3.5 × ca. 0.6 cm, compressed, 2–5-seeded; legumes of cleistogamous flowers elliptic or suborbicular, 1–4-seeded. Seeds reniform-orbicular, 2–4 × 2–3 mm; hilum short. Fl. and fr. Aug–Nov.  $2n = 40$ .

Mountain slopes, roadsides, fields, grasslands; 300–3000 m. Anhui, Fujian, Gansu, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xizang, Yunnan, Zhejiang [India, Japan, Korea, Russia, Vietnam].

**2. *Amphicarpaea ferruginea*** Benth in Miquel, Pl. Jungh. 231. 1852.

锈毛两型豆 xiu mao liang xing dou

*Amphicarpaea edgeworthii* Benth var. *rufescens* Franchet; *A. ferruginea* f. *pauciflora* Pampanini; *A. rufescens* (Franchet) Y. T. Wei & S. K. Lee.

Herbs, perennial. Stems almost robust. Stipules oblong to broadly ovate, 6–8 mm, hairy; petiole 4–12 cm; stipels obvious, linear; petiolules 2–5 mm, densely yellowish brown villous; leaflets papery or thickly papery; terminal leaflet usually ovate or ovate-elliptic to broadly elliptic, 3.5–8.5 × 2–4 cm, both surfaces densely yellowish brown villous, basal veins 3, lateral veins 4–6 on each side, slender, base rounded or broadly cuneate, apex with mucro; lateral leaflets obliquely ovate. Cleistogamous flowers not recorded. Racemes 3–7 cm, pubescent; flowers 2–5 clustered; bracts elliptic, deciduously pubescent. Flower 1.5–2 cm; pedicels 2–4 mm, minutely villous. Calyx tubular, 6–8 mm, 5-lobed; lobes unequal, apex with mucro or shortly acuminate, pubescent. Corolla red or purple; petals subequal; standard obovate-elliptic, ca. 1.2 cm, with short stipe; wings elliptic, base with long stipes and acute auricles, apex obtuse; keels similar to wings. Ovary linear, stipitate, with sheathlike disk at base, 2- or 3-ovuled; style glabrous; stigma capitate. Legume elliptic, 2–3 × 0.6–0.9 cm, slightly inflated, clothed with yellowish brown pubescence, base acuminate, apex beaked. Seeds (1 or) 2 or 3, blackish gray, reniform, ca. 5 × 3 mm. Fl. and fr. Aug–Oct.

• Roadsides, open fields; 2300–3000 m. Sichuan, Yunnan.

**3. *Amphicarpaea linearis*** Chun & T. C. Chen, Acta Phytotax. Sin. 7: 23. 1958.

腺毛两型豆 xian mao liang xing dou

Herbs, annual. Stems slender, densely hirsute, glabrescent. Stipules linear to linear-lanceolate, 4–5 mm; petiole 4.5–8 cm; stipels small, subulate; petiolules 2–3 mm, hirsute; leaflets membranous or nearly membranous; terminal leaflet ovate to

broadly ovate, 4.5–6 × 3–3.5 cm, both surfaces sparsely adpressed deciduous hirsute, basal veins 3, lateral veins 4 or 5 on each side, slender, base rounded or nearly truncate, rarely broadly cuneate, apex with acute mucro; lateral leaflets obliquely ovate, much smaller. Cleistogamous flowers not recorded. Racemes axillary, 3–7.5 cm; peduncle 1.5–3 cm; bracts linear, 4–5 mm, hairy. Pedicels short, ca. 1 mm. Bracteoles ca.

1.5 mm. Calyx tubular-campanulate, almost glabrous, 5–6 mm, 5-lobed; lobes unequal, lowest one longest. Corolla blue; standard ca. 1 cm; wings and keels with long slender stipes. Anthers small, almost orbicular. Ovary linear, 9-ovuled. Fruit not seen. Fl. Jan.

- Roadsides, open fields. Hainan, Yunnan.

### 107. TERAMNUS P. Browne, Civ. Nat. Hist. Jamaica, 290. 1756.

软荚豆属 ruan jia dou shu

Sun Hang (孙航); Mats Thulin

Perennial twining herbs. Leaves pinnately 3-foliolate; stipules and stipels deciduous. Flowers small, in axillary clusters or racemes; bracts small, linear, persistent; bracteoles linear, longitudinally striate. Calyx membranous, campanulate, 4- or 5-lobed. Corolla slightly exerted; standard obovate, narrow at base, clawed, without auricles; wings narrow, adnate to blunt, straight, and shorter keel. Stamens monadelphous, only 5 longer developed, 5 shorter sterile or lacking. Ovary sessile, many ovuled; style short, curved, glabrous; stigma capitate. Legumes linear, flattened, persistent style base forming upcurved beak at apex, sometimes transversely impressed between seeds. Seeds numerous.

About eight species: tropics of both hemispheres; one species in China.

1. *Teramnus labialis* (Linnaeus f.) Sprengel, Syst. Veg. 3: 235. 1826.

软荚豆 ruan jia dou

*Glycine labialis* Linnaeus f., Suppl. Pl. 325. 1782.

Stems slender, to 4 m, angular, densely appressed yellow tomentose. Stipules lanceolate; petiole 1.5–4 cm; stipels linear, ca. 3 mm; leaflets membranous, terminal leaflet oblong or long ovate, 2.5–6 × 1–2.2 cm, abaxially densely hairy, adaxially glossy and appressed scattered yellow pubescent, lateral veins 5 or 6 pairs, base rounded, apex acute. Racemes axillary, 2.5–4 cm, with 6–10 flowers, appressed hairy; peduncle ca. 2 cm;

bracts lanceolate; pedicels ca. 5 mm; bracteoles at base of calyx, similar to bracts. Calyx 3–4 mm, appressed pubescent, 5-lobed; teeth ovate-lanceolate and shorter than calyx tube. Corolla white, changing to pink or purple; standard ca. 4 mm; wings oblong, truncate at base; keel rhombic. Ovary hairy. Legumes linear, ca. 4 cm × 3.5–4 mm, nodding, pubescent, hooked at apex. Seeds 5–9, oblong-ellipsoid, ca. 4 × 2 mm. Fl. Jun–Jul, fr. Sep–Oct.

Sparse bushlands, wastelands; low to middle elevations. Hainan, S Taiwan [Cambodia, India, Indonesia, Laos, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical America, West Indies].

### 108. GLYCINE Willdenow, Sp. Pl. 3: 854, 1053. 1802, nom. cons., not Linnaeus (1753).

大豆属 da dou shu

Sa Ren (萨仁); Michael G. Gilbert

*Leptocyanus* Benthams; *Leptolobium* Benthams (Jun 1837), not Vogel (Apr–May 1837); *Soja* Moench.

Annual or perennial herbs, twining, climbing, creeping or erect. Roots herbaceous or almost woody, usually with nodules. Leaves pinnately 3(–7)-foliolate; stipules small, free, usually deciduous. Inflorescence axillary, racemose; flowers solitary or clustered at nodes. Bracts small, at peduncle base; bracteoles paired, at calyx base. Calyx membranous, campanulate, hairy, deeply 2-lipped; upper 2 lobes connate, lower 3 lanceolate to setiform. Corolla usually purple, light purple, or white, slightly longer than calyx, glabrous; petals long clawed; standard large, subcircular or obovate, with inconspicuous auricles; wings narrow, slightly connate with keels; keels shorter than wings, obtuse, apex untwisted. Stamens diadelphous; vexillary stamen partly joined to others; anthers uniform. Ovary subsessile; ovules many; style ± filiform, slightly inflexed, glabrous or shortly pubescent; stigma terminal, capitate. Legume stipitate, linear or oblong, straight or curved, dehiscent, valves coiling after dehiscent, compressed or slightly inflated, septate between seeds. Seeds 1–5, ovoid-oblong, almost oblate-tetragonal, oblate, or orbicular.

About nine species: tropics, subtropics, and temperate region of E Hemisphere; six species (two endemic, one introduced) in China.

1a. Raceme longer than leaves, 4–8 cm.

2a. Leaflets elliptic to ovate, tomentose; stems twining or climbing ..... 5. *G. tomentella*

2b. Leaflets lanceolate to linear, sparsely strigose; stems procumbent ..... 4. *G. tabacina*

1b. Raceme shorter than leaves, usually 1–3 cm.

3a. Perennial herbs; root almost woody ..... 6. *G. dolichocarpa*

3b. Annual herbs; root leathery.

4a. Stem erect; cultivated ..... 1. *G. max*

4b. Stem twining or creeping; wild.

5a. Stem slender, twining; legume 17–23 × 4–5 mm; seed 2.5–4 × 1.8–2.5 mm ..... 2. *G. soja*

5b. Stem robust, twining or creeping; legume 30–60 × 5–7 mm; seed 5–6 × 4–4.5 mm ..... 3. *G. gracilis*

**1. *Glycine max*** (Linnaeus) Merrill, Interpr. Herb. Amboin. 274. 1917.

大豆 da dou

*Phaseolus max* Linnaeus, Sp. Pl. 2: 725. 1753; *Dolichos soja* Linnaeus; *Glycine angustifolia* Miquel; *G. hispida* (Moench) Maximowicz; *Soja angustifolia* Miquel; *S. hispida* Moench; *S. japonica* Savi; *S. max* (Linnaeus) Piper; *S. viridis* Savi.

Herbs annual, 0.3–0.9 m tall. Stems robust, erect, sometimes ± twining at apex, ± ribbed, densely brown hirsute. Leaves usually pinnately 3-foliolate; stipules broadly ovate, 3–7 mm, acuminate, densely yellow villous; petiole 2–20 cm, sparsely pubescent or hirsute when young; stipels lanceolate, 1–2 mm; petiolules 1.5–4 mm, hirsute; leaflets papery, broadly ovate, almost circular, or elliptic-lanceolate, terminal one larger, 5–12 × 2.5–8 cm, base broadly cuneate or rounded, apex acuminate or ± rounded, mucronate; lateral leaflets smaller, obliquely ovate. Raceme short or long; peduncle 1–3.5 cm; bracts lanceolate, 2–3 mm, strigose. Flowers few to many, those on lower part of stem sometimes solitary or 1 pair between 2 axils; bracteoles lanceolate, 2–3 mm, hirsute. Calyx 4–6 mm, densely long hirsute and strigose, usually 2-lipped; lobes 5, lanceolate, upper 2 connate to above middle, lower 3 separate, all densely white villous. Corolla purple, light purple, or white, 4.5–8(–10) mm; standard obovate-suborbicular, base clawed, apex slightly emarginate and usually reflexed; wings crenate, base narrow, with claws and auricles; keels obliquely obovate, with short claws. Ovary with undeveloped glands at base, hairy. Legume succulent, oblong, slightly curved, pendulous, 40–75 × 8–15 mm, densely silky hairy. Seeds 2–5, elliptic, suborbicular, or ovate to oblong, ca. 10 × 5–8 mm, many colored; testa smooth; hilum obvious, elliptic. Fl. Jun–Jul, fr. Jul–Sep.  $2n = 40$ .

Cultivated throughout China [now cultivated throughout temperate and tropical regions].

It has been estimated that *Glycine max*, soybean, provides ca. 35% of human protein (X. Bao et al., FAO/IBPGR Plant Genetic Resources Newsletter 94/95: 1–3. 1993). It is also an important source of oil and used extensively industrially.

There seems very little doubt that *Glycine max*, not known as a wild plant, has been selected from the following species, *G. soja*. It has been confused nomenclaturally with that species.

**2. *Glycine soja*** Siebold & Zuccarini, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 4(2): 119. 1843.

野大豆 ye da dou

*Glycine formosana* Hosokawa; *G. gracilis* Skvortsov var. *nigra* Skvortsov; *G. max* (Linnaeus) Merrill subsp. *formosana* (Hosokawa) Tateishi & H. Ohashi; *G. max* subsp. *soja* (Siebold & Zuccarini) H. Ohashi; *G. soja* var. *albiflora* P. Y. Fu & Y. A. Chen; *G. soja* f. *angustifolia* P. Y. Fu & Y. A. Chen; *G. soja* subsp. *formosana* (Hosokawa) W. Liu & X. Y. Zhu; *G. soja* f. *lanceolata* (Skvortsov) P. Y. Fu & Y. A. Chen; *G. soja* var.

*lanceolata* Skvortsov; *G. soja* f. *linearifolia* L. Z. Wang; *G. soja* f. *maximowiczii* (Enken) L. Z. Wang; *G. soja* var. *maximowiczii* Enken; *G. soja* f. *nigra* (Skvortsov) X. Y. Zhu & W. Liu; *G. soja* f. *ovata* (Skvortsov) L. Z. Wang; *G. soja* var. *ovata* Skvortsov; *G. ussuriensis* Regel & Maack; *G. ussuriensis* var. *angustata* Komarov; *G. ussuriensis* var. *brevifolia* Komarov & Alissova-Klobukova; *Rhynchosia argyi* H. Léveillé.

Herbs annual, 1–4 m. Stems slender, twining, hirsute. Leaves pinnately 3-foliolate, to 14 cm; stipules ovate-lanceolate, 1–2 mm, acute, densely yellow villous; petiole 1.5–3.5 cm, densely pubescent; stipels linear, ca. 1 mm; terminal leaflet ovate-circular to ovate-lanceolate, 3.5–6 × 1.5–2.5 cm, both surfaces silky strigose, base subrounded, margin entire, apex acute to obtusely rounded; lateral leaflets obliquely ovate-lanceolate. Raceme usually short, rarely up to 13 cm; peduncle 0.3–0.8 cm, densely hirsute; bracts lanceolate; flowers densely arranged on upper part of inflorescences. Flowers ca. 5 mm. Calyx campanulate, densely long hairy; lobes 5, triangular-lanceolate, apex acute. Corolla reddish purple or white; standard suborbicular, base with short claw, apex slightly emarginate; wings obliquely obovate, with obvious auricles; keels shorter than standard and wings, densely hairy. Style short and inclined to one side. Legume oblong, slightly curved and compressed, constricted between seeds, 17–23 × 4–5 mm, densely hirsute, dehiscent when dry. Seeds 2 or 3, brown to black, elliptic, slightly compressed, 2.5–4 × 1.8–2.5 mm. Fl. Jul–Aug, fr. Aug–Oct.  $2n = 40$ .

Fields, valleys, beaches, marshes, seashores, islands, ?cultivated; near sea level to 2700 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Heilongjiang, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Afghanistan, Japan, Korea, Russia].

Plants from Henan with cleistogamous flowers 2.5–3(–3.5) mm with only (2 or)3 or 4(or 5) fertile stamens have recently been described as *Glycine soja* var. *cleistogama* C. S. Zhu & S. X. Zhu (J. Wuhan Bot. Res. 26: 361. 2008).

*Glycine soja* is protected in China because of its importance as the wild progenitor of *G. max* and thus its potential for further plant breeding. It is used as a food and fodder plant.

**3. *Glycine gracilis*** Skvortsov, Publ. Manckur. Res. Soc., Nat. Hist. Sec. Ser. A, 22: 8. 1927.

宽叶蔓豆 kuan ye man dou

*Glycine soja* Siebold & Zuccarini var. *gracilis* (Skvortsov) L. Z. Wang.

Herbs annual. Stems robust, twining or creeping, densely hirsute. Leaves pinnately 3-foliolate; stipules lanceolate to linear, villous; petiole 3–13 cm, pale yellow villous; rachis ca. 5 cm; stipels lanceolate, 1.5–2 mm; petiolules ca. 10 mm, pubescent; leaflets ovate-lanceolate to elliptic-lanceolate, 5–8(–9) × 2–4(–5) cm, abaxial surface more densely hairy, adaxial surface more sparsely hairy, lateral veins 5 pairs, obvious, base rounded, margin entire, apex acuminate, shortly acute to obtuse. Raceme usually short, with small lanceolate bracts, hairy;



peduncle ca. 1.5 mm. Flowers ca. 7 mm; bracteoles lanceolate, densely villous. Calyx campanulate, membranous, densely hairy. Corolla purple, light purple, or white; standard suborbicular, base with short claw, apex slightly emarginate; wings obovate, apex slightly acute, base acuminate, with auricles and short claws; keels small, with long claws. Ovary hairy. Legume yellow to brown, succulent, 30–60 × 5–7 mm. Seeds many colored, usually not shiny, elliptic, suborbicular, or almost oblong, 5–6 × 4–4.5 mm. Fl. Jul–Aug, fr. Sep–Oct.  $2n = 40^*$ .

- Field sides, by villages, roadsides. Heilongjiang, Jilin, Liaoning.

*Glycine gracilis* is sometimes treated as a synonym of *G. max*.

**4. *Glycine tabacina* (Labille) Benth.**, Fl. Austral. 2: 244. 1864.

烟豆 yan dou

*Kennedyia tabacina* Labille, Sert. Austro-Caledon. 70. 1824; *Glycine koidzumii* Ohwi; *G. membranacea* Ohwi; *G. pescadrensis* Hayata; *G. tabacina* var. *uncinata* Benth.; *Leptocyanus elongatus* (Benth.) Benth.; *Leptolobium elongatum* Benth.; *L. tabacinum* (Labille) Benth.

Herbs perennial. Stems slender, procumbent, usually curved, many branched at base, nodes obvious, sparsely pubescent. Leaves pinnately 3-foliolate; stipules lanceolate, ca. 2 mm, villous; petiole 2–3 cm, sparsely strigose; stipels linear, ca. 1 mm, hairy; leaflets at lower part of stem obovate or ovate to oblong, 0.7–1.2 × 0.4–0.8 cm, both surfaces adpressed white villous, denser abaxially, lateral veins 5–7 pairs, curved, reticulate veins visible, base rounded, apex obtusely rounded, truncate or slightly emarginate, mucronate; leaflets at upper part of stem ovate-lanceolate, narrowly elliptic-oblong, or linear, 1.2–3.2 cm × 5–8 mm. Raceme slender and spreading, 1–5.5 cm; peduncle 3–7.5 cm; bracts linear, villous; flowers sparse, usually 1 per bract or 2 or 3 clustered at lower part of rachis. Flowers 7–9 mm; pedicel ca. 2 mm; bracteoles slender. Calyx membranous, campanulate, densely strigose; lobes 5, triangular, longer than tube, upper 2 connate to middle. Corolla purple or light purple; standard orbicular, ca. 15 mm in diam., with claw; wings and keels smaller, with auricles and claws. Ovary with short stipe, many ovuled. Legume oblong, straight, not constricted between seeds, 20–25 × ca. 2 mm, adpressed white villous, stipe short, apex with beak ca. 2 mm. Seeds 2–5, dark brown, cylindrical, truncate at 2 ends, ca. 2.5 × 2 mm; testa not shiny, with granular small nodules. Fl. Mar–Jul, fr. May–Oct.  $2n = 40, 80$ .

- Fujian, Guangdong, Taiwan [Japan; Australia, Oceania].

The Chinese record of *Glycine clandestina* J. C. Wendland (FRPS 41: 239. 1995) is based on a misidentification, probably of *G. tabacina*. True *G. clandestina* is endemic to Australia.

**5. *Glycine tomentella* Hayata**, Icon. Pl. Formosan. 9: 29. 1920.

短绒野大豆 duan rong ye da dou

*Glycine tomentosa* Benth. (1864), not Linnaeus (1753); *Leptocyanus tomentosus* (Benth.) Benth.; *Leptolobium tomentosum* Benth.

Herbs annual. Stems robust, twining or climbing, base many branched, yellowish brown villous. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, 2.5–3 mm, yellow-brown tomentose; petiole ca. 1.5 cm; stipels lanceolate; leaflets papery, elliptic or ovate, 1.5–2.5 × 1–1.5 cm, abaxial surface sparsely hairy, adaxial surface densely yellow-brown tomentose, lateral veins 5 pairs, base rounded, apex obtuse-rounded, mucronate. Raceme 3–7 cm, yellowish brown villous; peduncle ca. 4 cm; bracts lanceolate; flowers solitary or 2–7(–9) clustered at top. Flowers ca. 10 mm; pedicel ca. 1 mm; bracteoles linear. Calyx campanulate, membranous, ca. 4 mm, densely pubescent; lobes 5, narrowly triangular, longer than or subequal to tube. Corolla reddish, puniceous, or purple; standard large; wings and keels smaller, clawed. Ovary with short stipe. Legume narrowly oblong, compressed, straight, dehiscent, 18–22 × 4–5 mm, yellow-brown villous; neck short. Seeds 1–4, dark brown, oblate-tetragonal, ca. 2 × 2 mm; testa with minipores and granular nodules. Fl. Jul–Aug, fr. Sep–Oct.  $2n = 38, 40, 78, 80$ .

By the sea, islands, dry slopes. Fujian, Guangdong, Taiwan [New Guinea, Philippines; Australia, Oceania].

**6. *Glycine dolichocarpa* Tateishi & H. Ohashi**, Sci. Rep. Tohoku Imp. Univ., Ser. 4, Biol. 40: 23. 1991.

扁豆荚大豆 bian dou jia da dou

Herbs. Stems terete, twining or prostrate, with dense deflexed long tawny hairs. Leaves pinnately 3-foliolate; stipules narrowly triangular, 3–4 mm, striate, densely tawny hairy; petiole 2–4.5 mm; stipels linear-subulate; petiolules 2–4 mm; leaflets papery, both surfaces with rather appressed hairs; terminal leaflet lanceolate to ovate, 3–6 cm; lateral leaflets slightly oblique, lanceolate to narrowly ovate. Raceme usually 2 or more times as long as petiole. Flowers 6–7 mm; pedicels ca. 1 mm; bracteoles subulate to lanceolate, 1.5–2 mm, densely pilose. Calyx campanulate; lobes longer than tubes. Corolla pink; standard orbicular, 8–8.5 × 7.5–8 mm, apex emarginate; wings narrowly obovate, 7–8 × 2.5–3 mm, ± constricted at middle; keels distinctly shorter than wings, elliptic, 5.5–6 × ca. 2 mm. Ovary sessile, linear, pubescent. Legume linear, compressed, straight, usually 20–30 mm, with long spreading hairs, brown when mature. Seeds 5–9.

- Coasts, wastelands, roadsides. Taiwan.

**109. PHYLACIUM** Bennett in Bennett & R. Brown, Pl. Jav. Rar. 159. 1840.

苞护豆属 bao hu dou shu

Huang Puhua (黄普华 Huang Pu-hwa); Hiroyoshi Ohashi

Herbs, twining. Leaves pinnately 3-foliolate; stipules narrow. Inflorescence axillary, racemelike, sometimes 1- or 2-branched; flowers solitary or fascicled at nodes. Bracts membranous, enlarging after anthesis, leaflike, boat-shaped. Calyx membranous, 5-lobed, upper 2 lobes connate. Corolla white; petals clawed; standard nearly orbicular, with paired calluses above auricles; wings ob-

long, auriculate; keel incurved, shortly auriculate. Vexillary stamen free; anthers uniform. Ovary nearly sessile, with annular disk around base; ovule 1; style slightly thickened above. Legume broadly elliptic, indehiscent, compressed, reticulate veined. Seed 1, reniform or orbicular.

Three species: China, India, Laos, Malaysia, Myanmar, Philippines, Thailand; one species in China.

*Phylacium* was originally placed within the Desmodieae, largely because of the indehiscent fruit; but the twining habit is anomalous within the tribe, and the genus is now regarded as a member of the Phaseoleae.

**1. *Phylacium majus*** Collett & Hemsley, J. Linn. Soc., Bot. 28: 44. 1890.

苞护豆 bao hu dou

Young stem winged, long appressed hairy. Petiole 7–10 cm; leaflet blade oblong, (5–)8–13 × (2–)4–5(–6.5) cm, abaxially densely grayish yellow pubescent, adaxially glabrous, base rounded to slightly cordate, sometimes emarginate, apex obtuse. Inflorescence 10–15 cm, retrorsely strigose, ca. 14 flowers per bract; bracts boat-shaped, enlarging after anthesis, 2.5–3.8 cm,

veined, abaxially glabrous, adaxially strigose. Flowers 1.2–1.4 cm; pedicel short, 2–3 mm, retrorsely strigose. Calyx strigose, 5-lobed; lower 3 lobes ovate, upper 2 lobes connate, triangular. Corolla white, ca. 1 cm; standard nearly orbicular; wings oblong; keel nearly erect, apex obtuse. Ovary shortly stipitate, with an annular disk around base. Legume ovoid, ca. 8 × 5 mm, retrorsely strigose, apex acute. Seed brown, reniform, ca. 5 × 5 mm. Fl. and fr. Sep–Nov.

Sunny slopes, mixed forests, thickets; 200–900 m. SW Guangxi, S Yunnan [Laos, Myanmar, Thailand].

## 110. **LABLAB** Adanson, Fam. Pl. 2: 325. 1763.

扁豆属 bian dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Herbs perennial, twining or suberect. Leaves pinnately 3-foliolate; stipules basifixed, reflexed, persistent; stipels lanceolate. Racemes axillary, nodes of rachis swollen. Calyx campanulate, 2-lipped, upper lip entire or emarginate, lower 3-lobed. Corolla purple or white; standard orbicular, reflexed, auriculate at base, with 2 callosities on inner surface; wings broadly ovate; keel incurved at right angle. Stamens diadelphous; anthers uniform. Style abruptly upturned, laterally compressed, bearded in upper part; stigma terminal. Legumes obliquely oblong-falcate, compressed, with minute warts along both sutures, shallowly septate between seeds within. Seeds slightly compressed, with white aril.

One species: native to Africa, cultivated throughout the tropics including China.

**1. *Lablab purpureus*** (Linnaeus) Sweet, Hort. Brit. 481. 1826.

扁豆 bian dou

*Dolichos purpureus* Linnaeus, Sp. Pl., ed. 2, 2: 1021. 1763; *D. albus* Loureiro; *D. lablab* Linnaeus.

Herbs, twining. Stems to 6 m, usually purplish. Stipules lanceolate; leaflets deltoid-ovate, 6–10 × 6–10 cm, lateral ones oblique, base subtruncate, apex acute or acuminate. Racemes axillary, erect, 15–25 cm. Flowers 2–5 clustered at each node. Calyx ca. 6 mm, upper 2 teeth wholly connate, lower 3 sub-

equal. Corolla white or purple; standard orbicular, ca. 12 mm; wings with blade ca. 10 mm; keel base attenuate. Ovary linear; style longer than ovary. Legumes oblong-falcate, 5–7 × 1.4–1.8 cm, compressed, straight or slightly curved, beaked. Seeds 3–5, white, purple, or purple-black, oblong; hilum linear. Fl. Apr–Dec.

Widely cultivated in China [native to Africa; cultivated throughout the tropics].

This species is edible and is used medicinally.

## 111. **DOLICHOS** Linnaeus, Sp. Pl. 2: 725. 1753, nom. cons.

镰扁豆属 lian bian dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

Herbs or shrubs, erect, climbing or prostrate, sometimes with carrotlike woody rhizomes. Leaves pinnately 3-foliolate, subdigitate, or 1-foliolate; stipules basifixed; stipels present. Racemes axillary or terminal, sometimes subumbellate, or flowers solitary, axillary. Calyx 5-toothed, 2-lipped, upper lip entire or bifid, lower lip 3-toothed. Corolla white or purple; petals clawed; standard suborbicular, often with inflexed auricles and appendages at base; wings obovate or oblong, ± adherent to keel; keel incurved, often beaked but not twisted. Vexillary stamen free, remainder connate into an open sheath; anthers uniform. Ovary 3–12-ovuled; disk present; style swollen and ± twisted toward base or narrowed from base to tip, glabrous or shortly pubescent all over, or with a ring of hairs around terminal capitate stigma. Legumes straight or arcuate, flattened, not septate. Seeds ± flattened, arillate or strophiolate; hilum short, usually central.

About 60 species: distributed in Africa and Asia; four species in China.

- 1a. Leaves glabrous or almost so on both surfaces ..... 1. *D. trilobus*  
 1b. Leaves hairy on both surfaces or abaxially.  
 2a. Standard up to 1.2 cm ..... 2. *D. tenuicaulis*  
 2b. Standard 1.5 cm or more.  
 3a. Leaflets ovate-rhombic, 6–7 × 4–6 cm, apex acuminate and apiculate; corolla white with purple striae ..... 3. *D. thorelii*  
 3b. Leaflets broadly rhombic-ovate or ovate, 10–11 × 9–9.5 cm, apex acute or slightly obtuse; corolla purple ..... 4. *D. junghuhnianus*

**1. *Dolichos trilobus*** Linnaeus, Sp. Pl. 2: 726. 1753.

镰扁豆 lian bian dou

*Dolichos falcatus* Klein ex Willdenow; *D. kosyumentis* Hosokawa; *D. trilobus* var. *kosyumentis* (Hosokawa) H. Ohashi & Tateishi.

Twining herbs. Stems slender, glabrous or subglabrous. Leaves pinnately 3-foliolate; stipules ovate, ca. 3 mm, veins conspicuous; petiole 2–3 cm; stipels linear; leaflets rhombic or ovate-rhombic, 2–6 × 2–4.5 cm, glabrous or almost so on both surfaces, base broad and obtuse, apex acute or acuminate. Racemes axillary, slender, 1–4-flowered; peduncles equal to or longer than petiole. Bracts and bracteoles with conspicuous veins. Calyx broadly campanulate, ca. 3 mm, glabrous; teeth triangular. Corolla white, 10–20 mm; standard orbicular, base with 2 triangular appendages, without auricles; wings obovate, slightly longer than standard; keel base truncate, clawed. Ovary sessile. Legumes linear-oblong, ca. 6 × 0.8 cm, slightly curved, compressed. Seeds 6 or 7. Fl. Oct–Mar.

Thickets. Hainan, Taiwan [tropical Africa and Asia].

**2. *Dolichos tenuicaulis*** (Baker) Craib, Contr. Fl. Siam, Dicot. 66. 1912.

丽江镰扁豆 li jiang lian bian dou

*Phaseolus tenuicaulis* Baker in J. D. Hooker, Fl. Brit. India 2: 201. 1876; *Dolichos appendiculatus* Handel-Mazzetti.

Twining herbs. Stems slender, over 1 m, sparsely pubescent with yellowish hairs. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, ca. 6 mm, ciliate, 7-veined; stipels lanceolate, ca. 2 mm, densely hirsute; leaflets broadly rhombic-ovate, 2.5–4.8 × 2.5–4.5 cm, lateral ones more narrow, oblique, white strigose on both surfaces, especially on veins abaxially, 3-veined, base broadly cuneate, apex acute. Racemes axillary; peduncles equal in length to petiole; rachis ± densely hirsute with short curved hairs. Pedicels 2.5–4 mm; bracts and bracteoles lanceolate, 1.5–2 mm. Calyx tube obliquely cup-shaped, 1–1.5 mm, puberulent or subglabrous; teeth broadly triangular, upper 2 connate for ca. 2/3 of length. Corolla violet, ca. 1.2 cm; standard suborbicular, slightly emarginate, base attenuate into a claw, with appendages and auricles; wings oblong-obovate, as long as standard, clawed and with auricles; keel ca. 8 mm, slightly curved, margin rough. Ovary stipitate, sparsely hairy; style glabrous; stigma brush-shaped. Legumes linear-oblong, 6–8 × ca. 0.8 cm, slightly curved, compressed. Seeds 6–8. Fl. Aug.

In grass; 2000–2300 m. Yunnan [Bhutan, India, Laos, Myanmar, Nepal, Thailand].

**3. *Dolichos thorelii*** Gagnepain, Notul. Syst. (Paris) 3: 191. 1915.

海南镰扁豆 hai nan lian bian dou

Twining herbs. Stems angular, pubescent. Leaves pinnately 3-foliolate; stipules ovate-lanceolate, striate; stipels linear, 3–5 mm; leaflets ovate-rhombic, 6–7 × 4–6 cm, appressed pubescent on both surfaces, 3-veined from base, base rounded or broadly cuneate, apex acuminate and apiculate. Racemes axillary, 7–14 cm, densely pubescent, with flowers in upper 2–3 cm; peduncles 5–11 cm. Bracts ovate, striate, caducous; bracteoles ovate, ca. 5 mm. Calyx ca. 5 mm; teeth very short, upper 2 nearly wholly connate. Corolla white with purple striae, 16–18 mm; standard below middle with 2 appendages; wings obovate-oblong, with round auricles at top of claw; keel falcate, apex obtuse. Ovary linear, slightly pubescent; style glabrous; stigma brush-shaped. Legumes linear, ca. 6 × 0.7 cm, compressed, pubescent. Seeds 7. Fl. Dec.

Thickets, open forests. Hainan [Laos, Vietnam].

**4. *Dolichos junghuhnianus*** Benth in Miquel, Pl. Jungh. 240. 1852.

滇南镰扁豆 dian nan lian bian dou

*Dolichos henryi* Harms.

Twining herbs. Stems densely pilose or subglabrous. Leaves pinnately 3-foliolate; stipules broadly lanceolate; stipels linear-lanceolate; leaflets broadly rhombic-ovate or ovate, 10–11 × 9–9.5 cm, sparsely pilose, base rounded or obtuse to broadly cuneate, apex acute or slightly obtuse or with very short acumen. Racemes pubescent, with flowers paired at swollen nodes of axis; peduncles 4–7 cm. Bracteoles 7–8 mm. Calyx 7–8 mm; teeth short, upper 2 nearly wholly connate. Corolla purple, glabrous; standard suborbicular, ca. 15 mm, below middle with 2 callosities, base with inflexed auricles, claw curved; wings obliquely oblong, 16–17 mm; keel dorsally curved, apex obtuse. Ovary linear, shortly stipitate, very shortly tomentose; style glabrous, thickened; stigma brush-shaped. Legumes tomentose when young, glabrescent when mature.

S Yunnan [Indonesia, Thailand].

**112. MACROTYLOMA** (Wight & Arnott) Verdcourt, Kew Bull. 24: 322. 1970, nom. cons.

硬皮豆属 ying pi dou shu

Chen Dezha (陈德昭 Chen Te-chao), Zhang Dianxiang (张奠湘); Mats Thulin

*Dolichos* sect. *Macrotyloma* Wight & Arnott, Prodr. Fl. Ind. Orient. 248. 1834.

Climbing, prostrate or erect herbs. Leaves pinnately 3-foliolate or sometimes 1-foliolate; stipules basifixed; stipels present. Flowers usually in axillary clusters or pseudoracemes. Calyx campanulate, 4- or 5-lobed; upper 2 lobes  $\pm$  connate. Corolla yellow to light yellowish green, rarely becoming reddish, exserted, glabrous; standard orbicular or elliptic, usually with auricles and 2 long, linear, flat appendages; wings narrow; keel not twisted. Stamens diadelphous; anthers uniform. Ovary 3–13-ovuled; style slender, not thickened upward, bearded around stigma; stigma terminal, capitate. Legumes straight or recurved, linear or linear-oblong, compressed, not septate. Seeds compressed; hilum short, central.

About 25 species: Africa, Asia; one species in China.

**1. *Macrotyloma uniflorum*** (Lamarck) Verdcourt, Kew Bull. 24: 322. 1970.

硬皮豆 ying pi dou

*Dolichos uniflorus* Lamarck, Encycl. 2: 299. 1786.

Perennial or annual, climbing herbs, to 60 cm tall. Stems clothed with whitish hairs. Stipules lanceolate, 4–8 mm; petiole 0.8–6.8 cm; leaflets 3, thin, ovate-rhomboid, obovate, or elliptic, oblique, 1–8  $\times$  0.7–7.8 cm, glabrous or puberulent or rarely velutinous on both surfaces, base rounded, apex rounded or slightly acute. Flowers (1 or)2 or 3(–5) clustered in axils of

leaves; peduncle and rachis of inflorescence 0–1.5 cm; bracts linear, ca. 2 mm. Calyx tube ca. 2 mm; lobes triangular-lanceolate, 3–8 mm. Standard yellow or light yellowish green, with a purple spot in middle, obovate-oblong, 6–12  $\times$  4–7 mm; wings and keel light yellowish green. Legumes linear-oblong, 3–5.5  $\times$  0.4–0.8 cm, puberulent or subglabrous. Seeds light or deep reddish brown, oblong or orbicular-reniform, 3–4.2  $\times$  2.8–3.5 mm.

Scrub, dry places. S Taiwan (Pingdong) [Bhutan, India, Indonesia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka; Africa, Australia].

This species is widely cultivated in the tropics as green manure and forage.

### 113. VIGNA Savi, Nuovo Giorn. Lett. 8: 113. 1824, nom. cons.

豇豆属 jiang dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

*Candellium* Medikus.

Twining or erect herbs, rarely subshrubs. Leaves pinnately 3-foliolate; stipules peltate or basally spurred, 2-lobed, cordate, or truncate. Racemes axillary or terminal, nodes of rachis often thickened and glandular. Bracts and bracteoles deciduous. Calyx 5-toothed, 2-lipped. Corolla yellow, blue, or purple; standard suborbicular, base appendaged; wings shorter than standard; keel subequal to wings, incurved, not beaked or produced into an incurved or spirally twisted beak. Stamens diadelphous; anthers uniform. Ovary sessile; style filiform, upper part thickened, bearded or hirsute lengthwise inside; stigma oblique. Legumes linear or linear-oblong, terete or flat. Seeds reniform or subquadrate; hilum short or elongate, with or without aril.

About 100 species: distributed in tropical regions; 14 species (one introduced) in China.

According to molecular evidence (Thulin et al., Syst. Bot. 29: 903–920. 2004), *Vigna adenantha* belongs to a group of neotropical species of *Vigna* that is not closely related to the Old World species otherwise present in China. Pending a new classification of the New World species, *V. adenantha* is here retained in *Vigna*.

*Phaseolus anguinus* Bunge (Enum. Pl. Chin. Bor. 20. 1833), described from near Beijing, is probably a species of *Vigna*. No type material has been seen, but the name may well be a synonym of *V. radiata*.

- 1a. Stipules truncate at base and not prolonged below point of insertion ..... 3. *V. adenantha*  
 1b. Stipules 2-lobed, cordate, or spurred at base, or peltate.  
 2a. Stipules 2-lobed or cordate at base.  
 3a. Keel prolonged into a conspicuous beak incurved through 180° ..... 4. *V. vexillata*  
 3b. Keel without conspicuous incurved beak.  
 4a. Corolla 0.5–1 cm; legumes 1–2 cm ..... 1. *V. hosei*  
 4b. Corolla 1.2–3 cm; legumes 3.5–8 cm.  
 5a. Leaflets rounded or obtuse at apex; legumes glabrous when ripe ..... 2. *V. marina*  
 5b. Leaflets acute or acuminate at apex; legumes pubescent ..... 5. *V. luteola*  
 2b. Stipules spurred at base, or peltate.  
 6a. Stipules spurred at base; keel without a pocket ..... 12. *V. unguiculata*  
 6b. Stipules peltate; keel with a distinct pocket on left-hand side.  
 7a. Corolla less than 10 mm; leaflets 3–5-lobed.  
 8a. Lobes of leaflets linear-lanceolate; stems 60–130 cm ..... 6. *V. aconitifolia*  
 8b. Lobes of leaflets  $\pm$  broadly spatulate; stems 30–60 cm ..... 7. *V. trilobata*  
 7b. Corolla 10 mm or more; leaflets mostly entire.  
 9a. Legumes hispid with brownish hairs; corolla usually tinged with pink ..... 8. *V. radiata*  
 9b. Legumes glabrous or almost so; corolla all yellow.

- 10a. Stipules 4–6 mm.  
 11a. Stipules lanceolate; racemes 3- or 4-flowered ..... 9. *V. minima*  
 11b. Stipules ovate; racemes 5–8-flowered ..... 10. *V. riukiensis*  
 10b. Stipules 8 mm or more.  
 12a. Stipules 10–15 mm; plants twining ..... 11. *V. umbellata*  
 12b. Stipules 8–10 mm; plants often erect.  
 13a. Leaves sparsely pilose; seeds 5–6 × 4–5 mm ..... 13. *V. angularis*  
 13b. Leaves hispid; seeds ca. 3 × 2 mm ..... 14. *V. reflexopilosa*

**1. *Vigna hosei*** (Craib) Backer in Backer & Slooten, Geill. Handb. Jav. Theonkr. 153. 1924.

和氏豇豆 he shi jiang dou

*Dolichos hosei* Craib, Bull. Misc. Inform. Kew 1914: 76. 1914; *Vigna oligosperma* Backer; *V. parkeri* Baker subsp. *acutifoliola* Verdcourt.

Perennial herbs, twining or creeping, often forming a thick ground cover. Stipules 2-lobed at base; petiole 2–5 cm; leaflets ovate-elliptic or obliquely ovate, 3–7.5 × 2–5 cm, thinly hairy on both surfaces, base rounded, apex obtuse to acute. Racemes axillary; peduncles 1.5–7 cm; pedicels 1.7–2.2 mm, appressed pubescent. Calyx tube 1.7–2.2 mm; upper teeth connate into a triangular lip of ca. 1.2 mm. Corolla yellow; standard 6–12 mm in diam.; keel not or slightly longer than wings, not beaked. Ovary densely adpressed villous. Legumes black, oblong, 1–2 cm × 4–4.5 mm, hairy, 1–4-seeded.

In grass at roadsides, wastelands; below 500 m. Taiwan [Indonesia, Japan (Ryukyu Islands), Malaysia, New Guinea, Sri Lanka; E Africa, Australia, North and South America].

**2. *Vigna marina*** (Burman) Merrill, Interpr. Herb. Amboin. 285. 1917.

滨豇豆 bin jiang dou

*Phaseolus marinus* Burman, Index Alt. Herb. Amboin. 18. 1769.

Perennial herbs, prostrate or climbing. Stems up to several meters, glabrescent when old. Stipules 2-lobed at base, ovate, 3–5 mm; leaflets ovate-orbicular or obovate, 3.5–9.5 × 2.5–7.5 cm, very shortly setose to subglabrous on both surfaces, base broadly cuneate or narrowly rounded, apex rounded, obtuse, or emarginate. Racemes axillary, 2–4 cm; peduncles 3–13 cm. Calyx 2.5–3 mm; teeth deltoid, 1–1.5 mm, upper 2 connate. Corolla yellow; standard broadly obovate, 1.2–1.3 × ca. 1.4 cm; wings and keel ca. 1 cm. Legumes linear-oblong, 3.5–6 × 0.8–0.9 cm, pubescent when young, later glabrous, slightly constricted between seeds. Seeds 2–6, yellow-brown or red-brown, oblong, 5–7 × 4.5–5 mm; hilum oblong. Fr. Oct.

On sandy beaches. Hainan, Taiwan [widely distributed in tropical regions].

This species is edible and is used medicinally.

**3. *Vigna adenantha*** (G. Meyer) Maréchal, Mascherpa & Stainier, Taxon 27: 202. 1978.

腺药豇豆 xian yao jiang dou

*Phaseolus adenanthus* G. Meyer, Prim. Fl. Esseq. 239. 1818.

Perennial herbs, twining. Stipules truncate at base and not produced below point of insertion, lanceolate, 3–5 mm; petiole 3.5–5(–9) cm; terminal leaflet rhomboid-ovate, 7–8 × 5–6.5 cm, nearly glabrous, base obtuse, apex acute; lateral leaflets somewhat oblique. Racemes axillary, 9–17 cm including peduncle; pedicels 2–3 mm. Bracteoles ovate, ca. 4 mm, caducous. Calyx lobes acuminate. Corolla purple, 1.8–3 cm; standard orbicular; wings oblong, inconspicuously auriculate; keel spirally incurved for ca. 3 turns. Ovary glabrous. Legumes linear, 9–14 × 0.8–1.4 cm, glabrous, 11–15-seeded. Seeds dark brown, reniform, ca. 7 × 5 mm.

At roadsides. Taiwan [pantropical].

**4. *Vigna vexillata*** (Linnaeus) A. Richard, Hist. Fis. Cuba, Bot. 10: 191. 1845.

野豇豆 ye jiang dou

*Phaseolus vexillatus* Linnaeus, Sp. Pl. 2: 724. 1753; *Vigna vexillata* var. *pluriflora* Franchet; *V. vexillata* var. *yunnanensis* Franchet.

Perennial herbs, twining. Root woody, fusiform. Stems with spreading brown bristly hairs, glabrescent. Stipules ovate to ovate-lanceolate, 3–5 mm, cordate or auriculate at base, ciliate; petiole 1–11 cm; leaflets membranous, variable in shape, ovate to lanceolate, 4–9(–15) × 2–5(–8) cm, brown or gray pubescent on both surfaces, base rounded to cuneate, margin entire, sometimes slightly 3-lobed, apex acute or acuminate. Racemes axillary, 2–6-flowered, subumbellate; peduncles 5–20 cm. Bracteoles subulate, ca. 3 mm, caducous. Calyx with brown or white bristly hairs, rarely glabrescent; tube 5–7 mm; lobes linear or linear-lanceolate, 2–5 mm, upper 2 connate at base. Standard pink, purple, or partly yellow, sometimes with yellow or purple spots inside at base, 2–3.5 × 2–4 cm, emarginate; keel whitish or purplish, falcate, with beak incurved through 180°. Legumes erect, linear-terete, 4–14 cm × 2.5–4 mm, bristly. Seeds 10–18, yellowish, black, or brown to scarlet with black spots, oblong or oblong-reniform, 2–4.5 mm. Fl. Jul–Sep.

Thickets, open forests. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Sichuan, Yunnan, Zhejiang [widely distributed in tropical and subtropical regions].

This species is used medicinally.

*Vigna vexillata* var. *tsusimensis* Matsumura (Bot. Mag. (Tokyo) 16: 93. 1902) differs only by having larger seeds, ca. 5 × 4 mm. It has been recorded from Taiwan (see T. C. Huang & H. Ohashi, Fl. Taiwan, ed. 2, 3: 393. 1993).

**5. *Vigna luteola*** (Jacquin) Benth in Martius, Fl. Bras. 15(1): 194. 1859.

长叶豇豆 chang ye jiang dou

*Dolichos luteolus* Jacquin, Hort. Bot. Vindob. 1: 39. 1770; *Vigna acuminata* Hayata; *V. glabra* Savi, nom. illeg. superfl.; *V. repens* (Linnaeus) Kuntze (1891), not Baker (1876); *V. repens* var. *glabra* Kuntze.

Trailing or twining herbs, 1.2–2.4 m. Stems with upper parts hairy or glabrescent. Stipules lanceolate, 3–4 × ca. 2 mm, 2-lobed at base; petiole 2–8 cm; leaflets ovate, ovate-elliptic, or ovate-lanceolate, rarely linear-lanceolate, 2.5–11 × 0.4–5 cm, sparsely pubescent on both surfaces or glabrous, base rounded or cuneate, margin entire, apex acute or acuminate. Racemes axillary; peduncles 5–40 cm; rachis 1.5–5 cm, 12–20-flowered; pedicels 4–9 mm, hirsute. Bracteoles ovate-lanceolate, 1.5–2 mm. Calyx pubescent or glabrescent; tube 3–4 mm; lobes deltoid, 2–4 mm, upper 2 wholly connate, apex acute or rarely 2-lobed. Standard yellow or greenish, sometimes tinged with red dorsally, oblate, 1.3–2.5 × 1.2–2.6 cm, glabrous, apex emarginate; wings obovate; keel shortly beaked. Legumes linear, 4–8 cm × 5–6.5 mm, pubescent, slightly constricted between seeds. Seeds dark brown or gray brown and with black spots, oblong or ovate-rhombic, 3–6 × 2–3.5 mm; hilum oblong.

In open ground near seashores; below 100 m. Taiwan [widely distributed in tropical regions].

**6. *Vigna aconitifolia*** (Jacquin) Maréchal, Bull. Jard. Bot. Natl. Belg. 39: 160. 1969.

乌头叶豇豆 wu tou ye jiang dou

*Phaseolus aconitifolius* Jacquin, Observ. Bot. 3: 2. 1768.

Annual herbs, trailing. Stems slender, 60–130 cm, angular, sparsely pubescent. Stipules peltate, lanceolate, ca. 1.2 cm; petiole 5–10 cm; leaflets deeply 3–5-lobed, 5–8 cm, lobes linear-lanceolate, ± hairy, margin entire. Racemes axillary, headlike; peduncles 5–10 cm; bracts lanceolate, ciliate; pedicels short. Flowers clustered 2–5 together. Calyx 2–3 mm; lobes 5, subequal. Corolla yellow, 5–6(–9) mm; standard cordate; wings obovate, auriculate; keel apex contorted. Legumes brown, cylindrical, 2.5–5 cm × 4–5 mm, hispidulous, with obtuse beak, 4–9-seeded. Seeds yellow, brown, or variegated with black dots, elliptic, 4–5 mm; hilum white, linear.

In grass; ca. 1000 m. Yunnan [India, Myanmar, Pakistan, Sri Lanka; cultivated elsewhere].

**7. *Vigna trilobata*** (Linnaeus) Verdcourt, Taxon 17: 172. 1968.

三裂叶豇豆 san lie ye jiang dou

*Dolichos trilobatus* Linnaeus, Mant. Pl. 1: 101. 1767; *Phaseolus trilobatus* (Linnaeus) Schreber.

Perennial or annual trailing herbs. Stems 30–60 cm, glabrous or glabrescent. Stipules peltate, ovate, 0.6–1.9 cm; petiole 5–10 cm; leaflets rhombic or ovate, 2.5–5 cm, in annual cultivated forms often shallowly 3-lobed, in perennial wild forms often deeply 3-lobed, medium lobe broadly spatulate, apex obtuse, glabrous or inconspicuously pubescent. Racemes axillary, headlike; peduncles longer than leaves; pedicels very short. Calyx campanulate; teeth deltoid, ca. 2 mm. Corolla yellow, ca. 6 mm; standard cordate; wings obovate, auriculate; keel apex contorted. Legumes cylindrical, 3–4 cm × 3–4 mm, glabrescent, 6–12-seeded. Seeds deep brown, cylindrical, very small, truncate at both ends.

Grasslands; ca. 1000 m. Taiwan, Yunnan [Afghanistan, Bangladesh, Bhutan, India, Indonesia, Kashmir, Myanmar, Nepal, Pakistan, Sri Lanka, Vietnam].

**8. *Vigna radiata*** (Linnaeus) R. Wilczek, Fl. Congo Belge 6: 386. 1954.

绿豆 lü dou

Annual herbs, erect, twining, or creeping, 20–60 cm tall. Stems hispid with brown spreading hairs. Stipules peltate, ovate, 0.8–1.2 cm, ciliate; petiole 5–21 cm; leaflets ovate, 5–16 × 3–12 cm, lateral ones ± oblique, ± sparsely pilose on both surfaces, sometimes 3-veined from base, base broadly cuneate or rounded, apex acuminate or acute. Racemes axillary, 4- to several flowered (up to 25). Bracteoles linear-lanceolate or oblong, striate. Calyx tube 3–4 mm, glabrous; lobes narrowly deltoid, 1.5–4 mm, upper 2 connate into a 2-fid lip. Standard yellow-green outside, sometimes pink inside, suboblate, ca. 1.2 × 1.6 cm, apex emarginate; wings yellow, ovate; keel falcate and incurved through 180°, green tinged with pink. Legumes linear-terete, 4–9 × ca. 0.6 cm, shortly hispid with pale brown hairs. Seeds 8–14, greenish or yellow-brown, shortly cylindrical, 2.5–4 × 2.5–3 mm; hilum white. Fl. May–Jun, fr. Jun–Sep.

Open wastelands, roadsides, thicket margins, also cultivated; ca. 500 m. Taiwan; cultivated throughout China [Cambodia, India, Indonesia, Laos, Sri Lanka, Thailand, Vietnam; Africa; widely cultivated in tropical and subtropical regions].

The seeds are edible and are used medicinally.

Two varieties occur in China. In addition, *Vigna radiata* var. *glabra* (Roxburgh) Verdcourt (Kew Bull. 24: 559. 1970; *Phaseolus glaber* Roxburgh, Fl. Ind., ed. 1832, 3: 291. 1832) was said to occur in China in Fl. Cambodge, Laos & Vietnam (17: 198. 1979). This variety has almost glabrous stems, leaves, and legumes, but no specimens from China have been seen.

- 1a. Stems erect; leaflets entire, acuminate at apex ..... 8a. var. *radiata*  
 1b. Stems twining or creeping; leaflets 2- or 3-lobed, acute at apex ..... 8b. var. *sublobata*

**8a. *Vigna radiata* var. *radiata***

绿豆(原变种) lü dou (yuan bian zhong)

*Phaseolus radiatus* Linnaeus, Sp. Pl. 2: 725. 1753; *Azukia radiata* (Linnaeus) Ohwi; *Candelium nigrum* Medikus; *P. aureus* Roxburgh; *Rudua aurea* (Roxburgh) Maekawa.

Stems erect. Leaflets entire, acuminate at apex.

Cultivated throughout China [widely cultivated in tropical and subtropical regions].

**8b. *Vigna radiata* var. *sublobata*** (Roxburgh) Verdcourt, Kew Bull. 24: 559. 1970.

三裂叶绿豆 san lie ye lü dou

*Phaseolus sublobatus* Roxburgh, Fl. Ind., ed. 1832, 3: 288. 1832; *P. trinervius* Wight & Arnott; *Vigna stipulata* Hayata.

Stems twining or creeping. Leaflets 2- or 3-lobed, acute at apex.

Open wastelands, roadsides, thicket margins; ca. 500 m. Taiwan [Cambodia, India, Indonesia, Laos, Sri Lanka, Thailand, Vietnam; Africa].

**9. *Vigna minima*** (Roxburgh) Ohwi & H. Ohashi, J. Jap. Bot. 44: 30. 1969.

贼小豆 *zei xiao dou*

*Phaseolus minimus* Roxburgh, Fl. Ind., ed. 1832, 3: 290. 1832; *Azukia minima* (Roxburgh) Ohwi; *P. gracilicaulis* Ohwi; *P. heterophyllus* Hayata (1920), not Willdenow (1809); *P. minimus* f. *heterophyllus* Hosokawa; *P. minimus* f. *linearis* Hosokawa; *P. minimus* f. *rotundifolius* (Hayata) Hosokawa; *P. rotundifolius* Hayata; *Vigna dimorphophylla* T. L. Wu; *V. gracilicaulis* (Ohwi) Ohwi & H. Ohashi; *V. lutea* A. Gray var. *minor* Matsumura; *V. minima* f. *heterophylla* (Hosokawa) Ohwi & H. Ohashi; *V. minima* f. *linearis* (Hosokawa) T. C. Huang & H. Ohashi; *V. minima* var. *minor* (Matsumura) Tateishi.

Annual herbs, twining. Stems slender, subglabrous. Stipules peltate, lanceolate, ca. 4 mm, sparsely hirsute; leaflets variable in size and shape, oblong-ovate, suborbicular, linear, linear-lanceolate, or ovate, 2–7 × 0.5–3 cm, subglabrous or sparsely strigose on both surfaces, base rounded or broadly cuneate, apex acute to obtuse. Racemes axillary, slender, 3- or 4-flowered. Bracteoles linear or linear-lanceolate. Calyx campanulate, ca. 3 mm; teeth 5, unequal. Corolla yellow; standard suborbicular, ca. 10 × 8 mm, deflexed; keel with long and acute auricle. Legumes terete, 3.5–6.5 × ca. 0.4 cm, glabrous. Seeds 4–8, dark gray to brownish, oblong, ca. 4 × 3 mm; hilum linear. Fl. and fr. Aug–Oct.

Grasslands, thickets. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Hunan, Jiangsu, Jiangxi, Liaoning, Shandong, Shanxi, Taiwan, Yunnan, Zhejiang [India, Japan, Philippines].

**10. *Vigna riukiensis*** (Ohwi) Ohwi & H. Ohashi, J. Jap. Bot. 44: 31. 1969.

琉球豇豆 *liu qiu jiang dou*

*Phaseolus riukiensis* Ohwi, J. Jap. Bot. 13: 437. 1937; *Azukia riukiensis* (Ohwi) Ohwi.

Twining herbs, strigose. Stipules peltate, ovate, 4–6 mm, strigose, 5–7-veined; terminal leaflet obovate or elliptic, 2–4 × 1.2–2 cm, sparsely strigose, base cuneate or obtuse, margin entire, apex slightly acute and mucronate; lateral leaflets obliquely ovate, subequal. Racemes axillary, 5–8-flowered; peduncles 3–10 cm. Calyx obconic, ca. 2.5 mm. Corolla yellow; standard orbicular, ca. 1.2 cm wide, apex emarginate, with rectangular callosity at middle, auricles reflexed, incurved; wings obovate, ca. 1 cm, with reflexed appendage at base; keel incurved. Ovary linear, sparsely strigose. Legumes brown with white striations, subcompressed, 3.5–4.5 × ca. 0.4 cm, glabrous. Seeds dull red, elliptic, ca. 3 mm; hilum white.

Taiwan [Japan (Ryukyu Islands)].

The authors have not seen any material of this species from China, and it was not mentioned in Fl. Taiwan (ed. 2, 3. 1993). However, *Vigna riukiensis* has been recorded from Taiwan (e.g., in Tomooka et al., Genet. Res. Crop Evol. 49: 521–530. 2002). The closely related *V. nakashimae* (Ohwi) Ohwi & H. Ohashi (J. Jap. Bot. 44: 30. 1969; *Phaseolus nakashimae* Ohwi, J. Jap. Bot. 13: 436. 1937), described from Japan, with smaller and more pale yellow flowers, has also been recorded but from mainland China.

**11. *Vigna umbellata*** (Thunberg) Ohwi & H. Ohashi, J. Jap. Bot. 44: 31. 1969.

赤小豆 *chi xiao dou*

*Dolichos umbellatus* Thunberg, Trans. Linn. Soc. London 2: 339. 1794; *Azukia umbellata* (Thunberg) Ohwi; *Phaseolus calcaratus* Roxburgh; *P. chrysanthus* Savi; *P. pubescens* Blume; *Vigna calcarata* (Roxburgh) Kurz.

Annual twining herbs. Stems slender, 1 m or more, pilose with yellow hairs when young, later glabrescent. Stipules peltate, lanceolate or ovate-lanceolate, 10–15 mm; leaflets ovate or lanceolate, 10–13 × 5–7.5 cm, sparsely pubescent on veins of both surfaces, base broadly cuneate or obtuse, entire or slightly lobed, 3-veined from base, apex acute. Racemes axillary, 2- or 3-flowered; bracts lanceolate; pedicels short. Calyx campanulate, 3–4 mm; teeth deltoid. Corolla yellow; standard oblong, ca. 1.5 cm, apex emarginate; wings obovate. Legumes linear-terete, 6–10 × ca. 0.5 cm, glabrous. Seeds 6–10, dull red, brown, black, or speckled, oblong, 4–9 × 3–3.5 mm. Fl. May–Aug.

Wild or cultivated. Guangdong, Guangxi, Hainan, Taiwan, Yunnan [Japan, Korea, Philippines; SE Asia; widely cultivated in tropical regions].

**12. *Vigna unguiculata*** (Linnaeus) Walpers, Repert. Bot. Syst. 1: 779. 1842.

豇豆 *jiang dou*

Annual or perennial herbs, erect, trailing, or twining. Stems 1–3 m, subglabrous. Stipules lanceolate, ca. 1 cm, with a narrow spur below point of attachment; leaflets ovate-rhomboid, 5–15 × 4–6 cm, lateral ones oblique, puberulent or glabrous on both surfaces, base acute to rounded, apex acute. Racemes axillary, with 2–6 flowers clustered at top of rachis. Calyx campanulate, 6–10 mm; teeth lanceolate. Standard yellowish white or violet, suborbicular, 1.2–3.3 × 1–3.2 cm, apex emarginate; wings blue to purple, subdeltoid; keel usually white or pale, not twisted. Legumes terete, 7.5–30(–90) × 0.6–1 cm. Seeds several, dark red or black, mottled with black or brown, oblong or reniform, 6–12 mm.

Widely cultivated in China [native to Africa and Asia; widely cultivated in tropical and subtropical regions].

- 1a. Herbs twining, 2–4 m; legumes 30–80(–90) cm, pendulous, slightly fleshy and inflated when young; seeds 8–12 mm ..... 12b. subsp. *sesquipedalis*
- 1b. Herbs erect or trailing, 15–80 cm; legumes 7.5–30 cm, more solid and not inflated when young; seeds 6–9 mm.
  - 2a. Legumes 20–30 cm, pendulous ..... 12a. subsp. *unguiculata*
  - 2b. Legumes 7.5–13 cm, erect or spreading ..... 12c. subsp. *cylindrica*

**12a. *Vigna unguiculata* subsp. *unguiculata***

豇豆(原亚种) *jiang dou* (yuan ya zhong)

*Dolichos unguiculatus* Linnaeus, Sp. Pl. 2: 725. 1753; *D. sinensis* Linnaeus; *Vigna sinensis* (Linnaeus) Hasskarl.

Legumes 20–30 cm, pendulous. Fl. Jun–Jul, fr. Aug.

Widely cultivated in China [native to Africa; widely cultivated in tropical and subtropical regions].

The legumes and seeds are edible.

**12b. *Vigna unguiculata* subsp. *sesquipedalis*** (Linnaeus) Verd-court in P. H. Davis, Fl. Turkey 3: 266. 1970.

长豇豆 chang jiang dou

*Dolichos sesquipedalis* Linnaeus, Sp. Pl., ed. 2, 2: 1019. 1763; *Vigna sinensis* subsp. *sesquipedalis* (Linnaeus) Van Eseltine; *V. sinensis* var. *sesquipedalis* (Linnaeus) Körnicke ex Ascherson & Schweinfurth.

Twining herbs, 2–4 m. Legumes 30–80(–90) cm, pendulous, slightly fleshy and inflated when young. Seeds 8–12 mm. Fl. and fr. Jun–Aug.

Widely cultivated in China [native to tropical Asia; widely cultivated in tropical regions of Asia, Africa, and America].

*Dolichos sesquipedalis* was originally described from material of American origin, but this was presumably cultivated material originally introduced from tropical Asia as all related taxa are from the Old World.

This taxon is used as a vegetable.

**12c. *Vigna unguiculata* subsp. *cylindrica*** (Linnaeus) Verd-court, Kew Bull. 24: 544. 1970.

眉豆 mei dou

*Phaseolus cylindricus* Linnaeus, Herb. Amboin. 23. 1754; *Dolichos catjang* N. L. Burman; *Vigna catjang* (N. L. Burman) Walpers; *V. cylindrica* (Linnaeus) Skeels; *V. sinensis* var. *catjang* (N. L. Burman) Chiovenda; *V. sinensis* subsp. *cylindrica* (Linnaeus) Van Eseltine; *V. unguiculata* var. *cylindrica* (Linnaeus) H. Ohashi.

Legumes 7.5–13 cm, erect or spreading. Fl. Apr–May, fr. Sep.

Widely cultivated in China [Cambodia, Japan, Korea, Laos, Vietnam; Africa, America (cultivated)].

This taxon is used as a vegetable.

**13. *Vigna angularis*** (Willdenow) Ohwi & H. Ohashi, J. Jap. Bot. 44: 29. 1969.

赤豆 chi dou

*Dolichos angularis* Willdenow, Sp. Pl. 3: 1051. 1800; *Azukia angularis* (Willdenow) Ohwi; *Phaseolus angularis* (Willdenow) W. Wight; *P. nipponensis* Ohwi; *Vigna angularis* var. *nipponensis* (Ohwi) Ohwi & H. Ohashi.

Annual herbs, erect or twining, 30–90 cm tall. Stems angular, sparsely pilose. Stipules peltate, lanceolate, ca. 8 mm, point of attachment elongated; leaflets ovate or rhomboid-ovate, 5–10 × 5–8 cm, sparsely pilose on both surfaces, apex broadly triangular or subrounded, lateral leaflets oblique, entire or shallowly 3-lobed. Racemes axillary, 5- or 6-flowered, pedunculate. Calyx campanulate, 3–4 mm. Corolla yellow, ca. 15 mm; standard oblate or subreniform, apex emarginate; wings broader than keel, shortly clawed and auriculate; keel apex incurved for nearly a half circle, base clawed. Ovary linear; style curved. Legumes terete, 5–8 × 0.5–0.6 cm, glabrous or almost so. Seeds dull red or with various other colors, oblong, 5–6 × 4–5 mm, truncate or subrounded at both ends; hilum not impressed. Fl. Jun–Jul, fr. Sep–Oct.

Widely cultivated and also wild in China [native to Asia; introduced in America, Africa, and elsewhere].

This species is edible and is used medicinally.

**14. *Vigna reflexopilosa*** Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 82. 1911 [*“reflexo-pilosa”*].

卷毛豇豆 juan mao jiang dou

*Azukia reflexopilosa* (Hayata) Ohwi; *Phaseolus reflexopilosus* (Hayata) Ohwi.

Annual herbs, erect. Stems terete, striate, hispid with reflexed yellow hairs. Stipules peltate, oblong, ca. 1 × 0.3 cm, apex acute, villous; stipels lanceolate, 2–4 mm; terminal leaflet rhomboid-ovate, ca. 8.5 × 5 cm, hispid on both surfaces, 3-veined from base, base rounded, margin entire or sinuate, apex acute; lateral leaflets slightly larger than terminal, obliquely ovate. Racemes axillary, ca. 3 cm; peduncles ca. 13 cm, pilose with reflexed hairs. Bracts similar to stipules; pedicels ca. 1 cm; bracteoles lanceolate, ca. 4.5 mm. Calyx broadly campanulate, ca. 3 mm, 2-lipped, margin denticulate-ciliate, upper lip broadest, emarginate, lower lip 3-lobed. Corolla yellow; standard suborbicular, emarginate; wings obovate, base auriculate; keel subfalcate. Legumes linear, 5–7.5 cm, glabrous or almost so. Seeds dark gray, ca. 3 × 2 mm.

Wastelands, grasslands; below 1500 m. Hainan, Taiwan [Japan; SE Asia, Australia].

## 114. **MACROPTILIUM** (Bentham) Urban, Symb. Antill. 9: 457. 1928.

大翼豆属 da yi dou shu

Wu Delin (吴德邻 Wu Te-lin); Mats Thulin

*Phaseolus* sect. *Macroptilium* Bentham, Comm. Legum. Gen. 76. 1837.

Erect or climbing herbs. Stipules not produced below point of insertion, strongly striate; stipels similar but smaller; leaves pinnately 3-foliolate. Racemes long, flowers paired or several at nodes of rachis. Bracts sometimes persistent. Calyx tube narrowly campanulate or cylindrical; lobes 5, equal or unequal. Corolla white, purplish, violet, or black; standard reflexed, obovate or orbicular, with 2 small reflexed auricles at base; wings large, much longer than standard, very broad, obovate or suborbicular, erect, 2-auricled below base of limb, long clawed, claw partly adnate to staminal tube; keel twisted, long clawed. Stamens diadelphous; vexillary stamens free, remainder connate; anthers uniform. Ovary sessile, few to many ovuled; style twice ca. 90° incurved, thickened in upper part. Legumes linear, subterete or compressed, straight or falcate. Seeds numerous or few; hilum short.



About 20 species: tropical America; introduced and cultivated elsewhere; two species (both introduced) in China.

- 1a. Plants perennial, prostrate; stipules ovate, 4–5 mm; leaflets ovate to rhombic, abaxially silvery tomentose, adaxially pubescent ..... 1. *M. atropurpureum*  
 1b. Plants annual or biennial, erect, sometimes prostrate or climbing; stipules lanceolate, 5–10 mm; leaflets narrowly elliptic to ovate-lanceolate, abaxially densely pubescent or sparsely pilose, adaxially glabrous ..... 2. *M. lathyroides*

**1. *Macroptilium atropurpureum*** (Mociño & Sessé ex Candolle) Urban, Symb. Antill. 9: 457. 1928.

紫花大翼豆 *zi hua da yi dou*

*Phaseolus atropurpureus* Mociño & Sessé ex Candolle, Prodr. 2: 395. 1825.

Perennial prostrate herbs, sometimes rooting at nodes. Stems pubescent or tomentose. Stipules ovate, 4–5 mm, pilose; petiole 0.5–5 cm; leaflets ovate to rhombic, 1.5–7 × 1.3–5 cm, sometimes lobed, lateral ones oblique, lobed on outer side, abaxially silvery tomentose, adaxially pubescent, base rounded, apex obtuse or acute. Inflorescences with peduncle 10–25 cm and rachis 1–8 cm. Calyx campanulate, ca. 6 mm, white pilose. Corolla deeply blackish purple; standard 1.5–2 cm, with long claw. Legumes linear, 5–9 cm × ca. 4 mm, apex rostrate, 12–15-seeded. Seeds marbled with brown and black striae, oblong-elliptic, ca. 4 mm.

Cultivated. Guangdong, Taiwan (also naturalized) [native to tropical America; widely cultivated and naturalized in the tropics].

This species is used for forage.

**2. *Macroptilium lathyroides*** (Linnaeus) Urban, Symb. Antill. 9: 457. 1928.

大翼豆 *da yi dou*

*Phaseolus lathyroides* Linnaeus, Sp. Pl., ed. 2, 2: 1018. 1763.

Annual or biennial herbs, erect, 0.6–1.5 m tall, sometimes prostrate or twining. Stems densely pubescent. Stipules lanceolate, 5–10 mm; petiole 0.5–5 cm; leaflets narrowly elliptic to ovate-lanceolate, 3–8 × 1–3.5 cm, abaxially densely pubescent or sparsely pilose, adaxially glabrous, sometimes slightly lobed, base cuneate, apex acute. Inflorescences with peduncles 15–40 cm, flowers paired in upper part of rachis. Calyx tubular-campanulate; teeth shortly triangular. Corolla purple-red; standard suborbicular, ca. 1.5 cm, with pale claw. Legumes linear, 5.5–10 cm × 2–3 mm, densely pubescent, 18–30-seeded. Seeds brown or with brown and black markings, obliquely oblong, ca. 3 mm.

Cultivated. Fujian, Guangdong, Taiwan (also naturalized) [native to tropical America; widely cultivated and naturalized in the tropics].

This species is used as a cover crop.

## 115. PHASEOLUS Linnaeus, Sp. Pl. 2: 723. 1753.

菜豆属 *cai dou shu*

Wu Delin (吴德邻 *Wu Te-lin*); Mats Thulin

Twining or erect herbs, often with hooked hairs. Stipules basifixed, persistent, not produced below point of insertion. Leaves pinnately 3-foliolate; stipules present. Racemes axillary, flowers at swollen nodes. Bracts and bracteoles persistent or deciduous. Calyx 2-lipped, upper pair of teeth connate, lower lip 3-toothed. Corolla yellow, white, red, or purple; petals clawed; standard suborbicular, reflexed, sometimes with appendages at base; wings obovate or oblong, adherent to keel; keel linear, beak long, spirally coiled through 1–5 turns. Stamens diadelphous. Style spirally coiled through at least 360°; stigma oblique. Legumes linear or oblong, subterete or compressed. Seeds 2 to many, oblong or reniform; hilum shortly linear, estrophiolate.

About 50 species: native to tropical America; three species (all introduced) in China.

- 1a. Bracteoles inconspicuous, shorter than calyx tube ..... 3. *P. lunatus*  
 1b. Bracteoles conspicuous, longer than calyx tube.  
 2a. Inflorescences shorter than leaves; legumes linear-oblong, slightly curved, not broadened toward top ..... 1. *P. vulgaris*  
 2b. Inflorescences longer than leaves; legumes falcate-oblong, broadened toward top ..... 2. *P. coccineus*

**1. *Phaseolus vulgaris*** Linnaeus, Sp. Pl. 2: 723. 1753.

菜豆 *cai dou*

Annual herbs, twining or suberect. Stems pubescent or glabrescent when old. Stipules lanceolate, ca. 4 mm; leaflets broadly ovate or obovate-rhombic, lateral ones oblique, 4–16 × 2.5–11 cm, pubescent, base rounded or broadly cuneate, margin entire, apex acuminate. Racemes shorter than leaves, usually several flowered at top of rachis. Bracteoles ovate, usually as long as calyx or slightly longer, persistent. Calyx cup-shaped, 3–4 mm, upper lip emarginate. Corolla white, yellow, violet, or

red; standard 9–12 mm wide; wings obovate; keel ca. 1 cm, apex spirally twisted. Ovary pubescent. Legumes linear-oblong, 10–15 × 1–1.5 cm, slightly curved and turgid, glabrous, beaked. Seeds 4–10, white, brown, blue, or variegated, oblong or ensiform, 0.9–2 × 0.3–1.2 cm. Fl. Apr–Jul.

Cultivated. Throughout China [native to tropical America; widely cultivated everywhere].

This species is used as a vegetable.

*Phaseolus vulgaris* var. *humilis* Alefeld is a variety frequently cultivated in Guangdong.

**2. Phaseolus coccineus** Linnaeus, Sp. Pl. 2: 724. 1753.

荷包豆 he bao dou

*Phaseolus multiflorus* Willdenow.

Perennial herbs, twining, usually annual crop in temperate zone. Stems pubescent or glabrous. Stipules small, inconspicuous; leaflets ovate or obovate-rhombic, 7.5–12.5 × 7.5–12.5 cm or more, pubescent or glabrous on both surfaces, apex acuminate or slightly obtuse. Racemes longer than leaves, several flowered at top of rachis. Bracteoles oblong-lanceolate, ca. as long as calyx or slightly longer. Calyx broadly campanulate, glabrous or sparsely pilose; teeth shorter than tube, upper lip triangular. Corolla generally scarlet, occasionally white or variegated (red and white), 1.5–2 cm. Legumes falcate-oblong, (5–)16(–30) × ca. 1.5 cm. Seeds deep purple with red spots, black, or red, rarely white, broadly oblong, 1.8–2.5 × 1.2–1.4 cm. Fl. Apr–Jul.

Cultivated. Guizhou, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi, Sichuan, Yunnan [native to tropical America; widely cultivated elsewhere].

This species is used for food and as an ornamental.

**3. Phaseolus lunatus** Linnaeus, Sp. Pl. 2: 724. 1753.

棉豆 mian dou

Annual or perennial herbs, twining. Stems pubescent or glabrous. Stipules triangular, 2–3.5 mm; leaflets ovate, 5–12 × 3–9 cm, lateral ones often oblique, sparsely pubescent along veins or glabrous on both surfaces, base rounded or broadly cuneate, apex acuminate or acute. Racemes axillary, 8–20 cm. Bracteoles elliptic, shorter than calyx tube, with 3 elevated veins when dry. Calyx campanulate, 2–3 mm, pubescent. Corolla white, yellowish, or reddish; standard 7–10 × 5–8.5 mm, apex emarginate; wings obovate; keel apex twisted for 1–2 turns. Ovary pubescent. Legumes falcate-oblong, 5–10 × 1.5–2.5 cm, compressed, apex beaked, 2–4-seeded. Seeds white, purple, or other color, subrhombic or reniform, 12–13 × 8.5–9.5 mm. Fl. spring to summer.

Cultivated. Fujian, Guangdong, Guangxi, Hainan, Hebei, Hunan, Jiangxi, Shandong, Yunnan [native to tropical America; widely cultivated elsewhere].

The seeds of this species are used for food.