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# Three New Species of *Indigofera* (Leguminosae) from China

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**ABSTRACT.** Three new species of *Indigofera* L. (Leguminosae) are described from Sichuan and Yunnan provinces in China. *Indigofera shipingensis* X. F. Gao, known only from a single specimen collected in 1961 from Shiping County, Yunnan, has unifoliate leaves and is most similar to *I. caloneura* Kurz from southern Yunnan and Southeast Asia. *Indigofera megaphylla* X. F. Gao, described from Yuanjiang County and also endemic to neighboring Shiping County in southern Yunnan, resembles *I. dichroa* Craib and *I. balfouriana* Craib from western to northern Yunnan, Sichuan, and southern Xizang, although these two species have much smaller leaflets. *Indigofera pseudoheterantha* X. F. Gao & Schrire is described from Sichuan County and occurs from the Daocheng to Miyi counties in southwestern Sichuan to the Zhongdian region of northwestern Yunnan, and appears closely related to *I. heterantha* Wallich ex Brandis from northwestern Yunnan to southern Xizang, westward to the Himalayas.

**Key words:** China, *Indigofera*, IUCN Red List, Leguminosae.

*Indigofera* L. is the third largest genus in Leguminosae with ca. 750 species, and 81 species were documented in the Chinese-language *Flora of China* (Fang & Zheng, 1994). In preparing the treatment of *Indigofera* for the English-language *Flora of China* (Gao & Schrire, 2009), several new species have come to light. Two new species were previously described by Gao (2007), and three new species are described here.

## 1. *Indigofera shipingensis* X. F. Gao, sp. nov.

TYPE: China. Yunnan: Shiping Co., 21 Apr. 1961, s. coll. 106 (holotype, KUN). Figure 1.

Haec species ab *Indigofera caloneura* Kurz foliolis utrinque trichomatibus adpressis brunneis medifixis vestitis, vexillo dorsaliter trichomatibus patulis lenibus albo-pubescente atque staminum vagina 6–7 mm longa differt.

Shrub; stems with dense adpressed brown biramous hairs. Leaves 1-foliolate, petiole 10–15 mm, usually with dense adpressed brown hairs, and fewer spreading hairs; stipules subulate, ca. 4 mm; leaflets oblong to elliptic-ovate, young leaf blades 3–4 × 2–2.5 cm, both surfaces with adpressed brown medifixed biramous hairs, abaxially canescent, lateral veins in 12 to 15 pairs; petiolules 2–4 mm, with adpressed biramous hairs; stipels 1.5–2.5 mm. Racemes 3.5–6 cm, including a peduncle 4–7 mm, densely flowered; bracts subulate, 1–1.5 mm; pedicels ca. 2 mm. Calyx ca. 2 mm, the lobes ± equaling the tube, densely hairy with adpressed spreading white hairs; corolla ca. 7 mm, standard obovate, dorsal surface densely spreading softly white pubescent; wings narrowly oblong, 1.6–1.8 mm wide, ciliate at the margin, keels densely spreading hairy at the apex, spur to 1 mm; staminal sheath 6–7 mm, anthers glabrous; ovary densely hairy with white adpressed biramous hairs. Fruits not seen.

**Ecology and distribution.** Since the only known specimen of this species was collected along a roadside in Yunnan, China, there is no further information on the ecological requirements of this species.

**IUCN Red List category.** *Indigofera shipingensis* is only known from the type collection made 47 years ago. Lacking a precise locality, the first author did not find this species in a spring 2008 expedition to Shiping County. An IUCN Red List assessment of Critically Endangered (CR) highlights the need for more information on this taxon (IUCN, 2001).

**Etymology.** The specific epithet refers to the type locality of Shiping County in Yunnan, China.

**Discussion.** *Indigofera shipingensis* is similar to *I. caloneura*, but its leaflets are pubescent on both surfaces (vs. adaxial surface glabrous in *I. caloneura*), the standard is white pubescent dorsally (vs. strigose

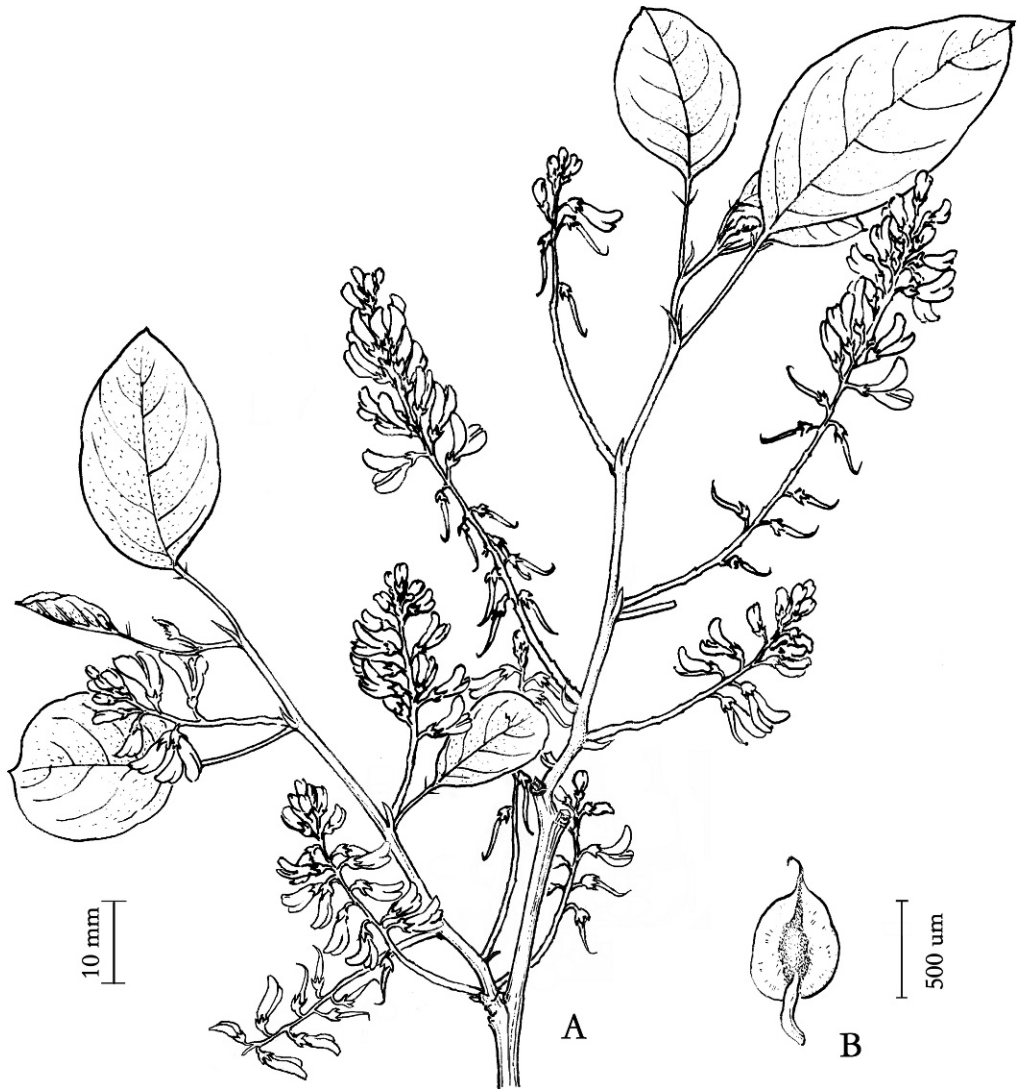


Figure 1. *Indigofera shipingensis* X. F. Gao. —A. Flowering branch. —B. Anther. Drawn by Jian Gu from the holotype s. coll. 106 (KUN).

with stiff brown biramous hairs), and the staminal sheath is 6–7 mm long (vs. 8–10 mm).

**2. *Indigofera megaphylla*** X. F. Gao, sp. nov.

TYPE: China. Yunnan: Yuanjiang Co., Wadi, 23°31'55"N, 102°16'44"E, 1575 m, 19 Apr. 2008, *Xin-Fen Gao & Bo Xu 10057* (holotype, CDBI; isotypes, CDBI, K, MO). Figure 2.

Haec species ab *Indigofera dichroa* Craib et *I. balfouriana* Craib foliis majoribus utrinque sicut ramis petiolis pedunculisque dense patulo-pubescentibus, foliolorum venatione manifesta supra impressa infra prominente, racemis 5–13 cm longis atque pedunculis 3–5 mm longis differt.

Shrub 1–2 m tall; stems with dense spreading equally biramous brownish hairs. Leaves 12–15 cm, (1)3- to 5(7)-foliolate; petiole 30–50 mm, petiole and rachis terete, both with sparse brownish hairs; stipules narrowly triangular, 5–6 mm; leaflets oblong or ovate to obovate-oblong, 5–8 × 4–6 cm, abaxially with long white biramous hairs, adaxially with short spreading brownish biramous hairs, base rounded to cuneate, apex obtuse or emarginate, primary to tertiary venation markedly impressed adaxially and prominent abaxially, lateral veins in 9 to 14 pairs; petiolules 3–4 mm; stipels 2–3 mm. Racemes 5–13 cm, including a peduncle of 3–5 mm, peduncle and rachis with very



Figure 2. *Indigofera megaphylla* X. F. Gao. —A. Flowering branch. —B. Fruit. Drawn by Jian Gu from the holotype Gao & Xu 10057 (CDBI) for A and G. D. Tao 38875 (HITBC) for B.

dense spreading brown hairs; bracts ovate, ca.  $2.5 \times 1.2$  mm, with adpressed hairs; pedicels 0.5–1 mm. Calyx 2.5–3 mm, the lobes narrowly triangular, ca. twice the length of the tube, densely spreading hairy; corolla purple, 7–8 mm, standard ovate-oblong, 4–4.5 mm wide, dorsal surface with densely spreading

soft white hairs; wings narrowly oblong, 1.6–1.8 mm wide, ciliate at the margin, keels densely spreading white pubescent distally and along lower margin, spur to 1 mm; staminal sheath 5.5–6 mm, anthers glabrous; ovary densely pubescent with white and brown hairs. Pod (3–)4–5 cm, with densely spreading gray or pale

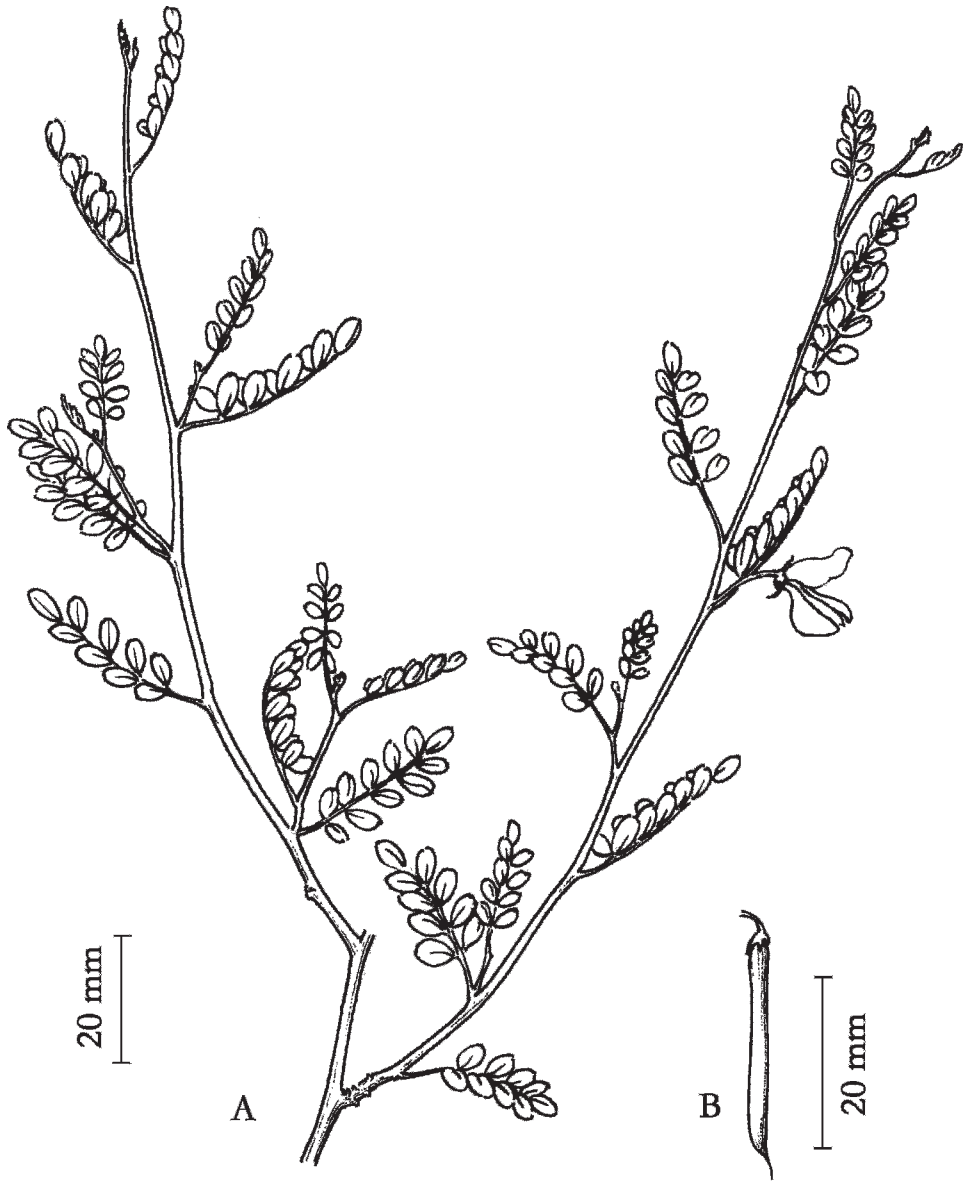


Figure 3. *Indigofera pseudoheterantha* X. F. Gao & Schrire. —A. Flowering branch. —B. Fruit. Drawn by Jian Gu from *J. Dong 28808* (CDBI) for A and the holotype *Veg. Exp. 29174* (CDBI) for B.

brown hairs, endocarp not blotched; seeds 9 to 12, dark brown.

**Ecology and distribution.** The new species occurs in Yunnan, China, growing in thickets and along roadsides between 1200 and 1600 m in elevation.

**IUCN Red List category.** *Indigofera megaphylla* is known only from a small area in two adjacent counties in southern Yunnan and grows commonly in thickets. The population size was estimated to number between 250 and 1000 mature individuals, and this species is

best assessed as Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001).

**Etymology.** The specific epithet is from the Greek “megas,” meaning “large,” and “phyllon,” meaning “leaf.”

**Discussion.** *Indigofera megaphylla* is similar to *I. dichroa* and *I. balfouriana*, but these latter species have much smaller leaflets (1–4 cm vs. 5–8 cm long in *I. megaphylla*) and the secondary and tertiary venation is not impressed adaxially as in *I. mega-*

*phylla*. Both species have longer peduncles (5–15 mm vs. 3–5 mm long in *I. megaphylla*) and shorter racemes (2–6 cm vs. 5–13 cm long).

*Paratypes*. CHINA. **Yunnan**: Yuanjiang Co., Wadi, 1400 m, 7 June 1984, *Guo-Da Tao 38875* (HITBC); 1200 m, 7 June 1984, *Guo-Da Tao 38883* (HITBC); Shiping Co., Niujie, 1380 m, 9 Dec. 1988, *Ya Tang 88-34* (KUN).

**3. *Indigofera pseudoheterantha*** X. F. Gao & Schrire, sp. nov. TYPE: China. Sichuan: Daocheng Co., Riwa, Kanggu Village, 2860 m, 11 Aug. 1982, *Vegetation Exp. 29174* (holotype, CDBI). Figure 3.

Haec species *Indigofera heterantha* Wallich ex Brandis affinis, sed ab ea stipulis triangularibus ca. 1 mm longis, foliis (5)7- ad 11(13)-foliolatis, stipellis absentibus, calyce ca. 2 mm longo atque staminum vagina 11–12 mm longa differt.

Shrub 0.2–3 m tall; stems ribbed, strigose with equally biramous adpressed minute white and scattered brown hairs. Leaves 1.5–3 cm, (5)7- to 11(13)-foliolate; petioles 4–7 mm, petiole and rachis with adpressed white hairs; stipules triangular, ca. 1 mm; leaflets elliptic to oblong, 4–9 × 2–4 mm, both surfaces with adpressed equally biramous white hairs but sometimes sparser adaxially, base cuneate or rounded, apex rounded to obtuse, lateral veins not visible; stipels absent. Racemes 1–4 cm, including a peduncle of ca. 10 mm, laxly 1- to 25-flowered; bracts 1–1.5 mm, subulate; pedicels 2–4 mm. Flowers 12–13 mm; calyx ca. 2 mm, lobes lanceolate to triangular, ± equaling or up to twice the length of the tube; corolla greenish and rose to purple; standard dorsal surface strigose with adpressed white hairs; wings ciliate at margin, keels with adpressed hairs at apex; staminal sheath 11–12 mm, anthers ovoid, mucronate, glabrous; style 4–5 mm. Young pods 2.5–3 cm, with minute adpressed hairs.

*Ecology and distribution*. This species is found in southwestern Sichuan and northwestern Yunnan, China, in sunny and dry brushland, grassland, open rocky areas, and near roadsides, from 1260 to 2900 m.

*IUCN Red List category*. During a 2007 field expedition, the first author observed the number of mature individuals to be fewer than 50 and noted that

the species is extremely vulnerable to habitat change. Also taking into consideration extent of occurrence and habitat preference, *Indigofera pseudoheterantha* can be assessed as Critically Endangered (CR) according to IUCN Red List criteria (IUCN, 2001).

*Etymology*. This species epithet refers to its resemblance to *Indigofera heterantha*.

*Discussion*. *Indigofera pseudoheterantha* differs from *I. heterantha* in having triangular stipules ca. 1 mm long (vs. stipules linear-attenuate and 2–6 mm in *I. heterantha*), stipels absent (vs. present), leaves (5)7- to 11(13)-foliolate (vs. 13- to 25-foliolate), calyx ca. 2 mm long (vs. 2.5–4 mm), and staminal sheath 11–12 mm long (vs. 8–10.5 mm).

*Paratypes*. CHINA. **Sichuan**: Xiangcheng Co., Yuejin Xiang, Heida village, near Shuoqu River, 24 July 1982, *Jian Dong 28808* (CDBI); Miyi Co., Wanqiu, 31 July 2007, *Xin-Fen Gao, Xiao-Mei Wei & Bo Xu 9748* (CDBI). **Yunnan**: Zhongdian (Chungtien) Plateau, July 1914, *G. Forrest 12602* (E, K).

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